Eduweb

Revista de Tecnología de Información y Comunicación en Educación

Online ISSN: 2665-0223
Print ISSN: 1856-7576

Volumen 18, No. 2.
Abril - Junio 2024

Universidad de Carabobo
Facultad de Ciencias de la Educación

UNIVERSIDAD DE CARABOBO

Rectora
Jessy Divo de Romero

Vicerrector Académico
Ulises Rojas

Vicerrector Administrativo
José Ángel Ferreira

Secretario
Pablo Aure

Facultad de Ciencias de la Educación

Decana
Ginoid Sánchez de Franco

Director Escuela de Educación
María Auxiliadora González

Dirección de Docencia y Desarrollo Curricular
María Cristina Arcila

Dirección de Investigación y Producción Intelectual
José Álvarez

Dirección de Asuntos Profesorales
Zoraida Villegas

Dirección de Estudios para Graduados
Flor Morales

Dirección de Administración
José Gregario López

Directora-Editora de la Revista Eduweb
Elsy Medina

Consejo de Desarrollo Científico y Humanístico

Vicerrector Académico Presidente
Ulises Rojas

Director Ejecutivo
Aaron Muñoz

Depósito legal: pp200702CA2520
ISSN: 1856-7576

Código Revencyt: RVE022
Registrada en el Catálogo Latindex con el número de folio 19424

Dirección de la Revista: Apartado de Correo 3812, Oficina de correos Trigal Sur, Valencia, Edo. Carabobo. Venezuela.
Correo electrónico: revistaeduweb@gmail.com

La revista Eduweb es una publicación trimestral editada por la Universidad de Carabobo. Es una publicación de ámbito nacional e internacional indizada en el índice de Revistas Venezolanas de Ciencia y Tecnología REVENCYT, en el Catálogo LATINDEX, Actualidad Iberoamericana, Dialnet, Red Iberoamericana de Innovación y Conocimiento Científico REDIB, y en Emerging Sources Citation Index.

Los contenidos de los trabajos publicados en la revista son de entera responsabilidad de los autores.

Versión electrónica de la Revista:
http://revistaeduweb.org

Esta edición se produce bajo el auspicio del Consejo de Desarrollo Científico y Humanístico y la Dirección de Postgrado de la Facultad de Ciencias de la Educación de la Universidad de Carabobo.

DE LOS FINES Y PROPÓSITOS DE EDUWEB, REVISTA DE TECNOLOGÍA DE INFORMACIÓN Y COMUNICACIÓN EN EDUCACIÓN

Eduweb, la revista de Tecnología de Información y Comunicación en Educación, es una publicación de carácter nacional e internacional de divulgación del conocimiento, del uso, aplicación y experiencias de las Tecnologías de la Información y Comunicación (TIC) en ambientes educativos. Con la revista se pretende divulgar las innovaciones que en materia de TIC están siendo implementadas y ensayadas en los diferentes niveles y modalidades del sistema educativo venezolano e iberoamericano. De igual manera contribuir a proyectar las experiencias de estudiantes de pre y postgrado, docentes, investigadores y especialistas en TIC en educación en la Universidad de Carabobo y en otras universidades de Venezuela y de otros países de Iberoamérica. Es una revista arbitrada e indexada adscrita al programa de la especialización en Tecnología de la Computación en Educación, de la Facultad de Ciencias de la Educación de la Universidad de Carabobo, registrada bajo el ISSN 1856-7576. Editada en formato impreso y digital.

Visión

Ser un espacio académico-científico de difusión y divulgación de las distintas tendencias del pensamiento universal ubicadas en el área de TIC en ambientes educativos, con altos niveles de calidad académica.

Misión

Promover y facilitar la difusión y divulgación de los productos de las investigaciones y experiencias de los docentes e investigadores de la Universidad de Carabobo y otras universidades del país y del mundo en el área de TIC en ambientes educativos; motivar la participación en redes comunes de información y publicación nacional e internacional; coordinar esfuerzos y velar por la calidad de las publicaciones a fin de procurar elevar el nivel académico del personal docente y de investigación mediante el desarrollo de trabajos de investigación como función esencial en su crecimiento académico.

Objetivos

Servir como órgano de divulgación de las TIC y su influencia en ambientes educativos. Estimular la producción intelectual no solo en los docentes e investigadores de la Universidad de Carabobo, sino también en otros centros de educación e investigación nacional e internacional.

Propiciar el intercambio cultural, académico, científico y tecnológico con otros centros de educación superior en Venezuela y el mundo.

Contenido

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.0
Cómo citar:
Medina, E. (2024). Editorial. Revista Eduweb, 18(2), 7-8. https://doi.org/10.46502/issn.1856-7576/2024.18.02.0

EDITORIAL

El editorial está conformado por dos bloques, el primero aborda la importancia de seguir instrucciones relacionadas a la estructura del artículo científico, es decir, cuáles son los apartados relevantes que integran el documento para publicar los resultados de una investigación en el área de tecnología y educación. Las Normas para autores que pueden encontrar en nuestro portal son fácilmente identificables en el cintillo azul en su columna cuatro, ya que contiene los requisitos de publicación, así como el formato plantilla descargable para cada autor. En este sentido, exhortamos a los autores a seguir la ruta estructurada para cumplir con la enumeración propia de los artículos científicos y que son de vital importancia para reflejar sistemáticamente cómo y de qué manera se realizó la investigación que lleva a comunicar los resultados obtenidos. La macroestructura organizativa del artículo inicia con la introducción, marco teórico, metodología, resultados y discusión, conclusiones y referencias bibliográficas. Básicamente, observamos que se trata de seis apartados y sin duda representan el conjunto de escritos que se divulgan ante una comunidad científica con el propósito de aportar conclusiones genuinas y fidedignas en el área de tecnología y educación. Entre otras especificaciones, queremos compartir el llamado a mantener la formalidad en las características solicitadas por la Revista y que como en todo trabajo investigativo hemos de distinguir como una de nuestras preocupaciones principales. El segundo bloque expone de forma sucinta los títulos integradores del Volumen 18 Nro. 2, al que el comité le da especial importancia porque ofrece la posibilidad de descubrir la temática ilustrativa que ocupa cada trabajo. Inicia la exposición temática con el trabajo titulado: "Incidencia tecnológica en la transformación digital del área educativa de los colegios públicos de Facatativá" en el que se podrán apreciar los hallazgos relacionados con la transformación digital en la educación inicial. Seguido de esta innovadora investigación "Fortaleciendo la integridad académica en la cadena de suministro: Evaluación de un programa antiplagio en la formación universitaria". En la misma línea investigativa presentamos "El papel de las plataformas interactivas en la mejora de la automotivación durante los estudios de postgrado a distancia", trabajo que dio especial importancia al desarrollo de las competencias comunicativas y personales del profesor empleando la plataforma MOODLE. Otra investigación se centró en "El papel de las tecnologías inteligentes en el mantenimiento de la motivación de los estudiantes durante el aprendizaje a distancia". Por su parte, la discusión a partir de la relación de tres enfoques diferentes de arte es expuesta en este artículo: "Análisis de los enfoques modernos de la educación artística interdisciplinaria: combinando el arte con otros campos del conocimiento". Como parte histórica contemporánea el lector podrá recorrer las líneas que integran este título "Innovaciones educativas en tiempos de guerra: investigación y evaluación de resultados". Una vez más la tecnología es objeto de estudio a partir de lo investigado en "La influencia de las tecnologías digitales en la mejora de las competencias comunicativas de los estudiantes en el proceso de estudio de lenguas extranjeras (en centros de enseñanza superior no lingüística)". Un análisis sobre la adaptación de la enseñanza artística superior a los requisitos de la era digital moderna es divulgado a través de este interesante artículo "Revolucionando la educación artística: tecnologías y plataformas virtuales para la era digital". Así también, este estudio demostró la importancia de la educación extraescolar basada en tecnologías: "Aplicación de tecnologías innovadoras en la educación extraescolar: oportunidades y perspectivas". Un análisis del uso de la tecnología de la realidad virtual en la educación puede ser consultado en el trabajo "Perspectivas del uso de la realidad virtual para aumentar la accesibilidad en la educación a distancia". Otro interesante tema puede ser consultado en el "Análisis de corpus para el desarrollo de competencias lingüísticas en futuros profesionales" Se suma a la exposición temática el

objetivo es estudiar el potencial y la eficiencia de la gamificación en el proceso educativo en el contexto de la educación a distancia, para esto realizar lectura detenida en: "Gamificación del proceso educativo en educación a distancia". El tema sobre ampliación de programas educativos para futuros maestros expone una estructura investigativa en el artículo "Preparación de futuros profesores de preescolar para la interacción con los niños en un entorno natural". A través del trabajo titulado "El uso de tecnologías multimedia en el desarrollo de la competencia metodológica de los futuros docentes" fue abordado el desarrollo de la competencia metodológica a la que se le atribuye un impacto significativo en los componentes cognitivo y motivacional. Así también, forman parte de este volumen las "Peculiaridades de la enseñanza de disciplinas sobre temas ambientales y legales durante la ley marcial en Ucrania". Cierra esta variedad temática con un trabajo que aborda la importancia lingüística en otras lenguas y puede consultarlo en "El debate sobre la naturaleza de los sustantivos verbales en las lenguas eslavas: ¿nominales o verbales?".

Expresamos nuestro más profundo agradecimiento a los investigadores y lectores que participan en nuestras diversas ediciones. Ratificamos nuestro compromiso con la publicación de temas relacionados con la tecnología y la educación, reconociendo el privilegio que representa fomentar la investigación y el intercambio de conocimientos. Al promover el desarrollo de prácticas educativas innovadoras y efectivas, no solo fortalecemos las capacidades de los educadores y estudiantes, sino que también les proporcionamos las herramientas necesarias para enfrentar los desafíos del siglo XXI. La continua difusión de estas ideas a través de nuestras publicaciones asegura que permanezcamos a la vanguardia de la transformación educativa, preparando a las futuras generaciones para un mundo en constante evolución tecnológica.

Elsy Medina
Universidad de Carabobo, Venezuela.

Check for updates

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.1

Cómo citar:
Valenzuela Sabogal, G.M., Barahona Rodríguez, C.Y., Medina Vizcaino, L.V., & Angulo García, J.A. (2024). Incidencia tecnológica en la transformación digital del área educativa de los colegios públicos de Facatativá. *Revista Eduweb*, 18(2), 9-25. https://doi.org/10.46502/issn.1856-7576/2024.18.02.1

Incidencia tecnológica en la transformación digital del área educativa de los colegios públicos de Facatativá

Technological impact on the digital transformation of educational area of the public schools of Facatativa

Gina Maribel Valenzuela Sabogal
https://orcid.org/0000-0002-2833-1579
WoS Researcher ID: KFQ-8562-2024
Universidad de Cundinamarca, Docente investigadora, Facatativá, Colombia.
Cesar Yesid Barahona Rodríguez
https://orcid.org/0000-0001-7673-7381
WoS Researcher ID: KFQ-8473-2024
Universidad de Cundinamarca, Docente investigador, Facatativá, Colombia.
Lizeth Vanessa Medina Vizcaino
https://orcid.org/0009-0009-5787-7966
WoS Researcher ID: KFQ-8512-2024
Universidad de Cundinamarca, Estudiante semillerista, Facatativá, Colombia.
Julia Andrea Angulo García
https://orcid.org/0009-0006-6239-1328
WoS Researcher ID: KIE-7259-2024
Universidad de Cundinamarca, Estudiante semillerista, Facatativá, Colombia.

Recibido: 17/11/23
Aceptado: 30/03/24

Resumen

La persistente incógnita sobre el rol de las Tecnologías de la Información y Comunicación (TIC) en la educación elemental forma el epicentro de este estudio, que busca determinar cómo la incorporación de herramientas digitales afecta el rendimiento académico de los alumnos de primer grado en colegios públicos. Empleando una metodología de investigación mixta, el proyecto captura tanto datos cuantitativos a través de encuestas a docentes como cualitativos mediante la observación directa en aulas de matemáticas, estableciendo un paralelismo entre entornos educativos con y sin el apoyo de TIC. La recolección y análisis de datos, se gestionó desde el desarrollo de una herramienta informática para su almacenamiento; culminando en un análisis detallado que refleja la influencia de las TIC en la educación temprana. Este artículo presenta un resumen del trabajo de campo, la analítica de datos y comparte hallazgos que podrían sentar las bases para una transformación digital metodológica en la educación inicial, con el objetivo de potenciar el aprendizaje en las primeras etapas de la escolaridad.

Palabras clave: Análisis de datos, educación temprana, herramientas digitales, rendimiento académico, tecnologías de la información.

Abstract

The persistent question about the role of Information and Communication Technologies (ICTs) in elementary education forms the epicenter of this study, which seeks to determine how the incorporation of digital tools affects the academic performance of first graders in public schools. Using a mixed research methodology, the project captures both quantitative data through teacher and qualitative surveys through direct observation in math classrooms, establishing a parallel between educational environments with and without ICT support. Data collection and analysis was managed from the development of a computer tool for storage; culminating in a detailed analysis that reflects the influence of ICTs in early education. This article presents a summary of fieldwork, data analysis and shares findings that could lay the foundations for a methodological digital transformation in early education, with the aim of enhancing learning in the early stages of schooling.

Keywords: Academic performance, data analysis, digital tools, early education, information technologies.

Introducción

En la actualidad el ambiente escolar se ve influenciado por el acceso a las TIC; se ha ido dejando atrás las enseñanzas tradicionales y poco innovadoras. De acuerdo con el informe realizado por la UNICEF, las TIC incrementan los riesgos habituales de la niñez, como la intimidación, y fomentan nuevas formas de abuso y explotación infantil, como el material con contenido de abuso sexual infantil (UNICEF, 2017). Sin embargo, desde otra perspectiva, resulta evidente que las TIC también pueden ofrecer ventajas significativas como herramientas de apoyo en las aulas, la integración de las TIC en el sistema educativo es un hecho inminente, mirar hacia otro lugar es negar la evidencia (Pisá Bó & Novejarque Civera, 2017).

Ante el contraste evidenciado desde una perspectiva académica, donde se suele asumir que la tecnología es una herramienta de valor en el aula, surge una problemática: las instituciones educativas carecen de un entendimiento completo sobre las ventajas de las TIC en las clases. Esta carencia de conocimiento se manifiesta en la incertidumbre y la desconfianza que experimentan los padres de familia, quienes cuestionan si la tecnología puede suplantar el papel fundamental que desempeña la familia en el proceso educativo de sus hijos. Tanto en las escuelas como en los hogares, la falta de información es evidente. Este debate genera controversias sobre la conveniencia de integrar o no las TIC en la educación inicial. En este contexto, surge la necesidad de llevar a cabo una investigación centrada en la incidencia de la tecnología en la educación infantil de los colegios públicos del municipio de Facatativá. Por ende, se propone realizar un estudio que analice de qué manera el uso de las TIC afecta el rendimiento académico de los niños de primer grado. ¿De qué manera las TIC inciden en el rendimiento académico de los niños de primer grado?

Una vez formulada la pregunta de investigación, surge el presente trabajo que busca explorar si la utilización de tecnologías despierta interés y motivación en estudiantes de colegios públicos, y si, como resultado, contribuye a mejorar el rendimiento académico de los niños, fomentando un aprendizaje más dinámico que potencie sus habilidades.

Reconociendo la declaración del Ministerio de Educación que establece la educación como un derecho fundamental e inaplazable (Ministerio de Education, 2013), este explora la interacción entre la tecnología y el desarrollo infantil, y cómo afecta los procesos educativos. La pertinencia de adaptar modelos pedagógicos contemporáneos que incorporen las TIC en el sistema educativo es un eje central de esta investigación. Inicialmente, el artículo ofrece un análisis profundo del estado del arte, incluyendo investigaciones a nivel internacional, nacional y local, fundamentales para la construcción del proyecto. Además, se detalla la metodología implementada en la investigación, enfatizando su eficiencia y efectividad

para abordar la pregunta central del proyecto: la incidencia de las TIC en el rendimiento académico de estudiantes de primer grado. Desde una perspectiva de ingeniería educativa, el trabajo de campo se lleva a cabo en cinco colegios públicos de Facatativá, donde se ejecutaron dos sesiones de dos horas cada una: una de naturaleza tradicional y otra apoyada en tecnología. A través de un proceso técnico meticuloso, que incluye el uso de herramientas como Visual Studio Code y JavaScript para el diseño de software destinado a la recopilación de datos, se establecieron las bases para una interpretación estadística rigurosa. La meta es derivar gráficos analíticos que ilustren el impacto de las TIC en las aulas, proporcionando así información crucial para el debate sobre su rol en el rendimiento escolar.

Referentes teóricos o revisión de literatura

En el área de la psicología educacional el rendimiento académico es uno de los constructos más estudiados, debido al valor que puede entenderse de este mismo; se pretende como razonamiento lógico que cuanto mayores son los valores obtenidos en este campo es también mejor el desempeño (Imig, 2020). Para empezar a estudiar acerca del rendimiento académico en niños, es necesario primero, definir el concepto de este, para lo cual y en contraste con Basto (2017) se define el rendimiento académico como un indicador que permite evaluar la eficiencia y calidad de los procesos educativos de los estudiantes, variables que dependen de los esfuerzos de las instituciones educativas, y específicamente de los docentes.

Para enriquecer la presente investigación y obtener una perspectiva sobre estudios previos, se examinaron proyectos centrados en la tecnología. A continuación, se presentan tres investigaciones que contribuyeron significativamente a la construcción de esta exploración.

A nivel internacional, en Perú, estudiantes de la facultad de educación y humanidades, realizaron un proyecto titulado "Uso de TIC y rendimiento académico durante la educación no presencial en niños de 5 años de la I.E.P. "CIENTEC" donde se afirma que:

Las TIC demandan que los profesores estén capacitados para brindar una educación de calidad. Si se toma como enfoque primordial al estudiante, se sabe que está inmerso en un constante desarrollo tecnológico y que está muy presente en su vida diaria, entonces la función de la escuela es adaptarse, facilitando buenos aportes hacia la exigencia de la educación, instruyendo individuos que tengan capacidad crítica y una indudable independencia (Cruzado Jares & Paredes Miñano, 2022).

Tomando en cuenta este estudio, el cual posee un fuerte componente matemático, se concluye que el uso de las TIC en el rendimiento académico de los niños resulta muy beneficioso, sirviendo como respaldo en el aprendizaje de las habilidades básicas del alumno y destacando así sus competencias a nivel cognitivo; cabe resaltar que en este estudio las tecnologías de la información desempeñan un rol interesante. Al centrarse en las clases no presenciales su principal objetivo de estudio será la tecnología:

Existe una relación directa entre el uso de las TIC y rendimiento académico durante la educación no presencial en niños de 5 años de la I.E.P. "CIENTEC" (r= .638: p<.01) dado que, en la variable de las TIC se obtuvo un 64,3 % en el nivel bueno, 32,1% para regular y 3,6% en deficiente. Respecto al rendimiento académico, se obtuvo una predominancia de nivel logro destacado, representado por el 60.7%; así como del 21.4% que evidencia nivel logro esperado; 17.9% que ostenta nivel en proceso y 0.0% que evidencia nivel en inicio. Por ende, a mayor uso de las TIC en los estudiantes, mayor será el rendimiento académico durante la educación no presencial (Cruzado Jares & Paredes Miñano, 2022).

En Colombia, los autores del proyecto "Efecto del uso de las TIC en el rendimiento académico de las matemáticas con población diversa" llevado a cabo en la universidad Surcolombiana de Neiva, realizaron una investigación cuantitativa utilizando una metodología específica para la recolección de datos. Esta metodología consistió en administrar una prueba antes de utilizar los Objetos Virtuales de Aprendizaje

(OVA), el objetivo era contrastar los datos y evaluar la eficacia de los OVA en el aprendizaje de los niños de quinto grado de primaria en cuanto a sus habilidades matemáticas. La prueba se basó en los exámenes ICFES, los cuales son elaborados por expertos y se consideran totalmente confiables (Medina et al., 2020).

La incorporación del OVA facilitó el proceso de enseñanza y aprendizaje para el estudiante, quien asumió un rol activo y se convirtió en el principal responsable de su propio aprendizaje; por otro lado, para el docente le facilitó un ambiente constructivista, con tareas significativas, donde los conocimientos previos de los alumnos fueron el punto de partida, para mejorar el desarrollo de las habilidades matemáticas (Medina et al., 2020).

En términos locales, la Universidad de Cundinamarca desde la facultad de ingeniería, programa ingeniería de sistemas y computación, estudiantes semilleristas realizaron un software educativo para fortalecer las competencias en niños con dislexia de 5 a 7 años, ¿por qué se aborda este proyecto? Porque no es de ocultar que niños con discapacidad o capacidades diferentes tienen un proceso académico diferente, incluso más lento.

…se logró identificar aspectos importantes de la dislexia y sus respectivos tratamientos por medio de la revisión bibliográfica, encuestas y entrevistas con profesionales en esta área… Con base a esto se definieron los módulos de aprendizaje de learn app, con los que se buscó fortalecer las competencias como lo son conciencia fonológica, memoria, orientación espacial, lateralidad y discriminación auditiva verbal (Portela et al., 2021).

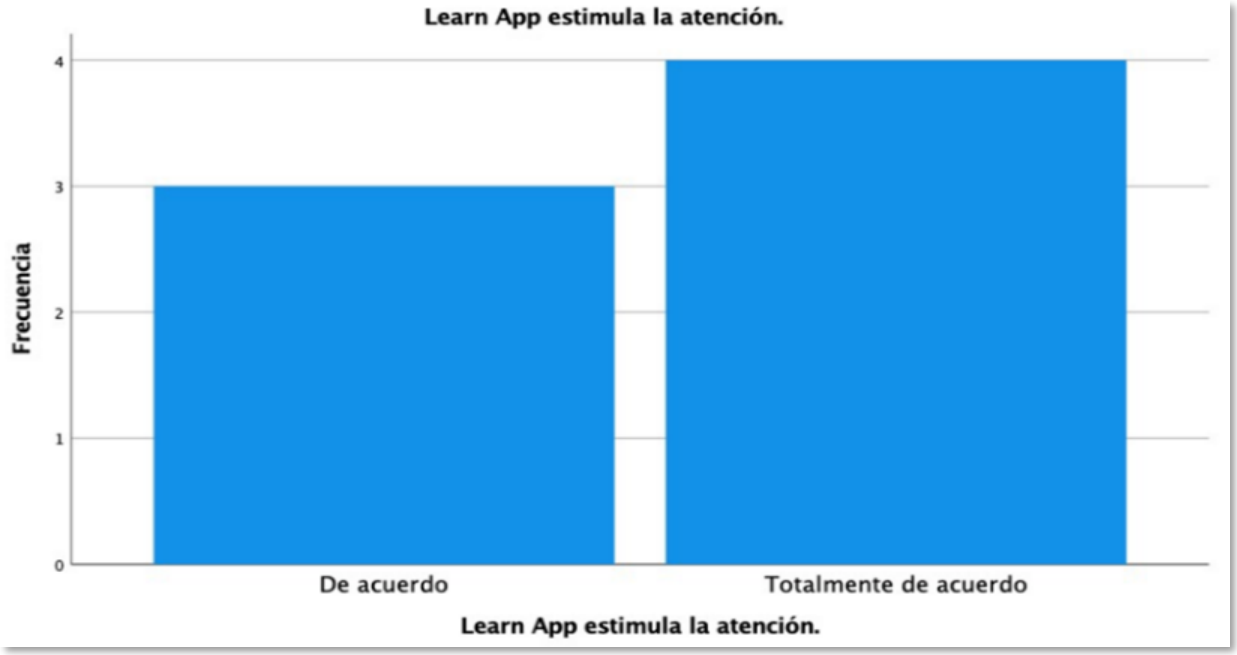

Figura 1. Gráfico de barras sobre la estimulación de la atención.
Nota. Tomado de desarrollo de un software educativo para el fortalecimiento de competencias en niños con dislexia entre los 5 y 7 años. (p.116), por (Portela et al., 2021).

En la figura 1 se puede evidenciar la percepción de los expertos con respecto a validar que el software Learn app estimula la atención de los niños; a partir de lo anterior, se obtiene que el 42,9% de los expertos (3) están de acuerdo y el 57,1% (4) están totalmente de acuerdo con este ítem (Portela et al., 2021).

A continuación, se presenta la tabla 1 en donde se resumen los hallazgos, se presentan las principales conclusiones encontradas en cada una de las investigaciones.

Tabla 1.
Tabla comparativa de los proyectos con mayor aporte de la investigación

Proyecto	Lugar donde se llevó a cabo	Año	Principales conclusiones
Uso de TIC y rendimiento académico durante la educación no presencial en niños de 5 años de la I.E.P. "CIENTEC	Perú	2022	La escuela debe adaptarse a los cambios tecnológicos venideros, instruyendo así a individuos con buena capacidad de crítica y análisis. Se ha observado un resultado positivo en el rendimiento académico con el uso de las TIC; cuanto mayor sea este uso, mejor será el rendimiento académico (Cruzado & Paredes, 2022).
Efecto del uso de las TIC en el rendimiento académico de las matemáticas con población diversa	Colombia-Neiva	2019	La incorporación del OVA ayudo a que en el proceso de enseñanza y aprendizaje el estudiante, asumiera un rol activo, convirtiéndose en el único responsable de su propio aprendizaje. Por otro lado, al docente le facilitó un ambiente constructivista, con tareas significativas, donde los conocimientos previos de los educandos fueron el punto de partida, para mejorar el desarrollo de las habilidades matemáticas (Medina et al., 2020).
Learn App: software educativo para fortalecer las competencias en niños con dislexia de 5 a 7 años	Colombia-Fusagasugá	2021	Learn app estimula la atención de los niños, comprobando con esto que las TIC sirven de apoyo para el área educativo y que su incorporación en el campo en inminente. (Portela, Ochoa,2021).
The role of ICT in early childhood education: Scale development and research on ICT use and influencing factors	Bélgica	2015	El empleo efectivo de las TIC no solo potencia la adquisición de conocimientos, sino que también contribuye al desarrollo de actitudes positivas hacia el aprendizaje (Kerckaert, Vanderlinde, & Van Braak, 2015).
ICT use in early childhood education: storytelling	Grecia	2022	La narración digital se observa como promotora del aprendizaje y la creatividad, también se muestra como apoyo y eficiencia a la sociedad digital (Toki & Pange, 2014).
Digital competence of early childhood education teachers: attitude, knowledge and use of ICT	España	2020	La disposición positiva de los estudiantes se manifestó de forma favorable; se observó un uso moderado de las TIC y un nivel limitado de conocimientos, lo que resultó en una baja competencia digital (Casillas Martín et al., 2020).
Implicaciones, uso y resultados de las TIC en educación primaria: estudio cualitativo de un caso.	España	2015	Las actividades realizadas se abordaron didácticamente mediante el empleo de las TIC. Durante su desarrollo, se observó que estas actividades no presentaron dificultades significativas, lo que sugiere la ausencia de una relación negativa en su adopción y uso. Por el contrario, se identificaron aspectos positivos en el proceso de enseñanza-aprendizaje y en los resultados pedagógicos obtenidos (Sánchez et al., 2015).
Digital disruption in early childhood education from teachers' point of view: A qualitative research	Palestina	2023	Las Tecnologías de la Información y Comunicación (TIC) permiten a los futuros docentes (ECTs) representar los estilos pedagógicos en la aplicación en el aula de manera efectiva (Ahmad, 2023).

Fuente: Autores

Tras examinar detenidamente los estudios presentados en la Tabla 1, se pueden extraer valiosas lecciones sobre el papel de las Tecnologías de la Información y Comunicación (TIC) en el ámbito educativo. Estos

proyectos, realizados en diversos contextos geográficos y temporales, coinciden en señalar el potencial transformador de las herramientas digitales en el proceso de enseñanza-aprendizaje. Desde la mejora del rendimiento académico hasta el fomento de la creatividad y el pensamiento crítico, las TIC emergen como aliadas estratégicas para los educadores. Sin embargo, estos estudios también ponen de relieve la necesidad de una implementación cuidadosa y contextualizada, que tenga en cuenta factores como la capacitación docente, la infraestructura tecnológica y las particularidades socioculturales de cada entorno educativo. Solo así se podrá aprovechar al máximo el potencial de las TIC para enriquecer la experiencia educativa de los estudiantes y prepararlos para los desafíos del siglo XXI.

Metodología

Desde la óptica de la metodología de investigación y teniendo en cuenta los datos necesitados para llevar a cabo el proyecto, el paradigma que mejor se ajusta a él, es la metodología mixta que combina datos cuantitativos con cualitativos. Por otro lado, para definir la muestra del proyecto se tiene en cuenta lo nombrado por Hernández Sampieri en su libro que tiene como título metodología de la investigación, en este expone dos tipos de muestras: la muestras probabilísticas y las no probabilistas, siendo está ultima la que elige para el proyecto; el muestreo no probabilístico es aquel que no depende de la probabilidad sino de la característica de la investigación o el propósito del investigador, este muestreo es recomendado para investigaciones cualitativas y que usan el método de observación para llegar a sus conclusiones (Hernández et al., 2014). Por lo anterior y sabiendo que Facatativá cuenta con un total de 26 colegios entre los cuales 11 son públicos, se estima que en cada uno de ellos se ofrecen 4 salones de grado primero, dejando así un total aproximado de 44 grados, y estableciendo entonces que la muestra para la presente investigación es 20 grados primeros. En la primera fase de nuestra metodología de investigación, se procedió a la recopilación de datos cuantitativos a través de las clases propuestas. La variable principal bajo análisis fue la calificación obtenida por los estudiantes en cada una de las actividades. Además, se llevó a cabo una evaluación exhaustiva del estado de las salas de sistemas en las instituciones participantes, con el fin de garantizar las condiciones adecuadas para la realización de dichas actividades, luego de esto y mediante graficas se llegaron a las conclusiones correspondientes de la investigación.

Trabajo de campo GUIA

Se desarrolla un aplicativo web para la recolección de datos cuantitativos mediante una encuesta con preguntas cerradas. Esta encuesta evalúa la perspectiva del docente sobre el uso de las TIC en el aula, abordando tres aspectos: la utilización de las tecnologías de la información por parte de los docentes, su criterio sobre el apoyo que brindan en clase y la actitud de los estudiantes hacia estas clases con TIC.

Para la recolección de los datos cualitativos, se sugieren dos tipos de clases a los docentes, una con TIC y otra sin TIC. A continuación, se presenta la planificación de la clase con TIC en la tabla 2, la cual incluye el uso de Objetos Virtuales de Aprendizaje (OVA) y se consideran los Derechos Básicos de Aprendizaje (DBA) para la preparación de la clase.

Tabla 2.
Estructura de clases con TIC para aplicar en el aula

Clase de matemáticas con TIC	
Tema: Sumas y/o adiciones aritméticas	
Objetivo: Utilizar diferentes estrategias para contar, realizar operaciones (suma y resta) y resolver problemas aditivos.	
Tiempo estimado: 2 horas	
Elemento de clase	**Recurso**
Exploración	Actividad lúdica, trabajo grupal y exposición oral

Estructuración	Paint (Windows) Canva Youtube (videos alusivos a la temática)
Practica	https://arbolabc.com/juegos-de-sumas https://aulaitbook.com/ Kahoot!
Transferencia	Canva
Valoración	Canva

Fuente: Autores

En la clase sin TIC, se sugiere al docente emplear una metodología tradicional, utilizando herramientas físicas disponibles en el aula y proporcionando guías de apoyo para que los estudiantes las completen. Se evitará el uso de servicios tecnológicos durante la clase para garantizar la imparcialidad en la recolección de datos por parte de los investigadores. De esta manera, se evaluará la actitud de los niños hacia las clases y los resultados que puedan obtener en ellas.

Resultados y discusión

En el estudio de campo del presente proyecto, se llevaron a cabo dos fases. En la primera fase clase sin TIC, correspondiente a la recolección de datos utilizando la metodología mixta, los estudiantes participaron en una clase tradicional sin el uso de Tecnologías de la Información y Comunicación (TIC). Durante esta fase, el docente impartió la lección utilizando métodos convencionales, como el tablero, ábacos, y otros elementos didácticos, así como las guías proporcionadas por los investigadores con la temática a desarrollar, en este caso la resta. Esta metodología se aplicó en los cinco colegios seleccionados para el estudio. Los resultados de esta fase se presentaron como promedios.

Por ejemplo, en el Colegio A, participaron 30 estudiantes. La docente desarrollo la clase con su temática y propuso algunos ejercicios en el tablero; posteriormente, se implementó la guía proporcionada por los investigadores. La evaluación se realizó entre 0 y 5, y los resultados salen de dividir la máxima nota entre el número de puntos (5,0/14=0,357).

Los estudiantes frente a la nota se presentan en la siguiente tabla:

Tabla 3.
Colegio A: Estudiantes frente a la nota que obtuvieron en la actividad del docente

Estudiante	Nota
#1	4,642
#2	5
#3	5
#4	5
#5	5
#6	5
#7	5
#8	5
#9	5
#10	5
#11	5
#12	5
#13	5
#14	5

#15	5
#16	
#17	5
#18	5
#19	5
#20	5
#21	5
#22	5
#23	5
#24	5
#25	5
#26	5
#27	5
#28	5
#29	5
#30	5

Fuente: Autores

Como se muestra en la tabla 3, las notas obtenidas están por encima de 4 y usando la fórmula estándar de promedio se obtuvo un resultado de: 4,964

En la siguiente figura se revela que hay 2 estudiantes por debajo del promedio del salón lo cual equivale al 6,667% de la muestra.

A continuación, se presenta la figura del promedio de clases sin TIC.

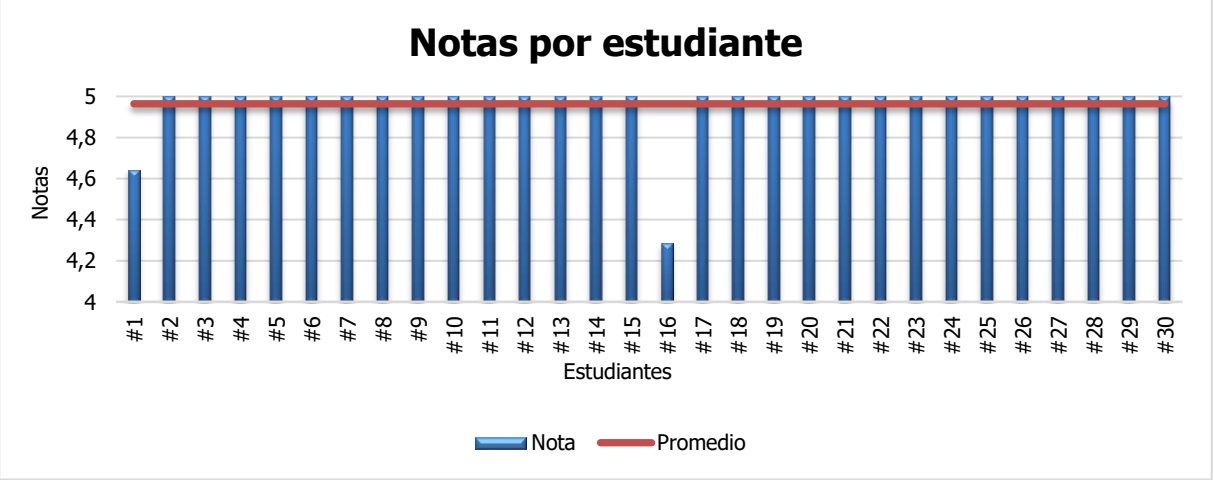

Figura 2. Promedio de notas de la clase sin TIC.
Fuente: Autores

En la segunda fase de trabajo de campo, se implementó una clase utilizando tecnología de la información. Se emplearon herramientas como la plataforma kahoot y parte de la infraestructura del colegio como el uso de televisores, computadores, video beam, entre otros. Los resultados de esta fase fueron los siguientes:

Tabla 4.
Colegio A con TIC: notas obtenidas

Estudiante	Nota
#1	3,548
#2	3,548
#3	3,566
#4	3,566
#5	3,752
#6	3,752
#7	4,410
#8	4,410
#9	4,055
#10	4,055
#11	4,068
#12	4,068
#13	4,575
#14	4,575
#15	4,091
#16	4,091
#17	4,076
#18	4,076
#19	3,667
#20	3,667
#21	4,572
#22	4,572
#23	4,614
#24	4,614
#25	4,082
#26	4,082
#27	3,258
#28	1
#29	1
#30	1

Fuente: Autores

Teniendo en cuenta la tabla anterior, se realizó el promedio de las notas obtenidas por los estudiantes, obteniendo 4,052.

La siguiente gráfica de barras ilustra las notas obtenidas por los estudiantes.

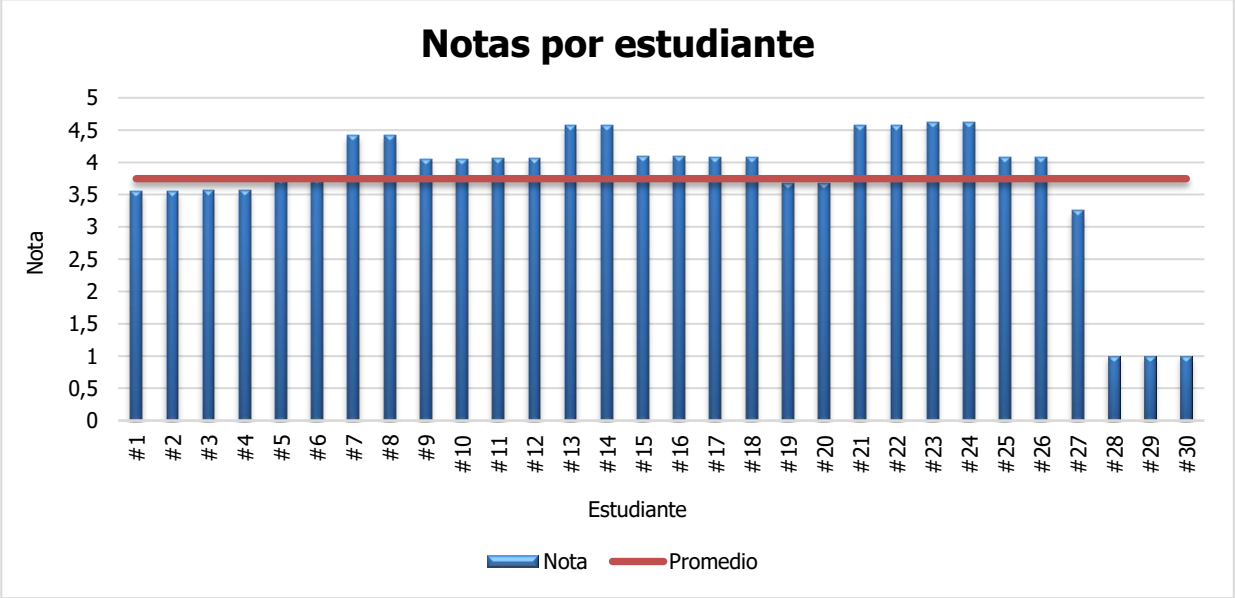

Figura 3. Promedio de notas de las clases con TIC.
Fuente: Autores

A partir de la figura 3 se destaca que 12 estudiantes se encuentran por debajo del promedio, el cual se calculó anteriormente, representando al 40% de la población de la muestra.

Después de llevar a cabo este trabajo de campo en todos los colegios, se procedió a comparar las clases impartidas y sus respectivos los resultados obtenidos; el objetivo de esta comparación era calcular un promedio de las notas de la práctica respecto a los 5 colegios. Dicho promedio se obtuvo de las clases aplicadas, lo cual arrojó el siguiente resultado:

Tabla 5.
Promedio de las notas en clases con y sin TIC

Colegio	Promedio sin TIC por colegio	Promedio con TIC por colegio
Colegio A	4,96	3,74
Colegio B	3,40	3,53
Colegio C	3,83	3,45
Colegio D	4,04	3,13
Colegio E	4,22	3,23

Fuente: Autores

Según se muestra en la tabla 5, los promedios de los colegios revelan diferencias significativas entre las clases con las herramientas tecnológicas aplicadas (TIC) y las que no las tienen. Se destaca que el colegio B alcanzó los mejores resultados en las pruebas con TIC, mientras que el colegio D obtuvo el puntaje más bajo en la evaluación realizada. Estas disparidades son claramente evidentes, subrayando la influencia considerable de la tecnología en el rendimiento escolar. Los promedios en las dos actividades son:

$$Promedio\ clases\ sin\ TIC's\ = 4{,}093$$

$$Promedio\ clases\ con\ TIC's\ = 3{,}420$$

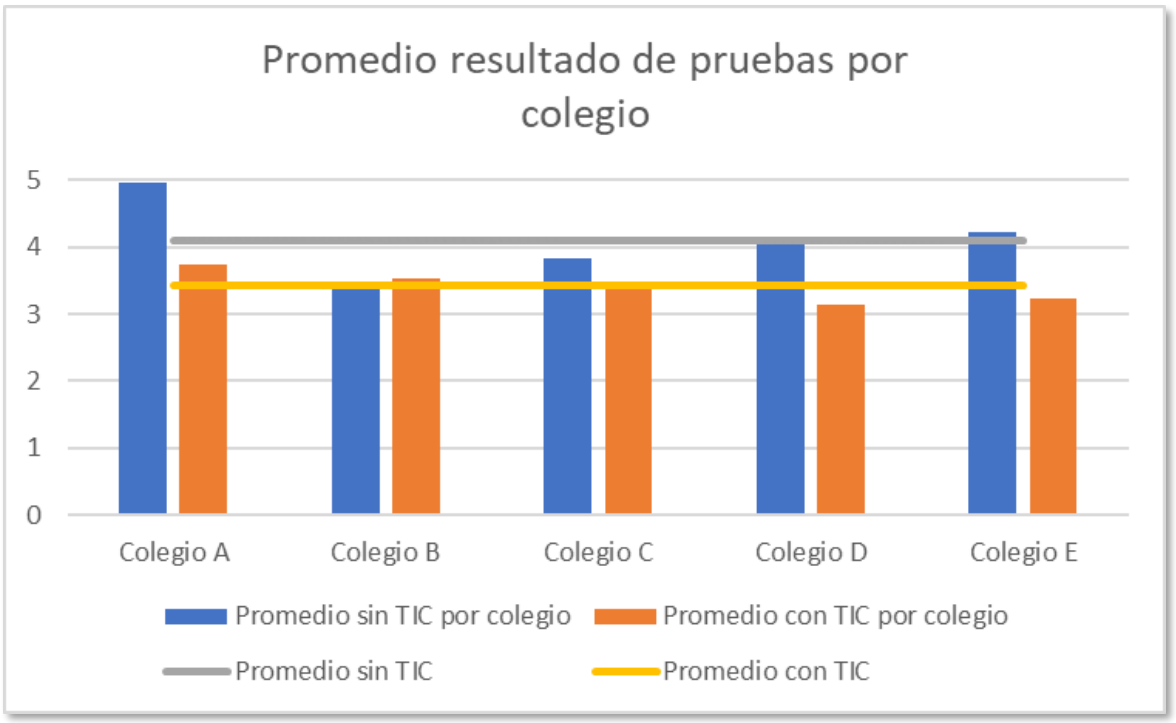

Figura 4. Gráfico del promedio de notas de las clases sin TIC y con TIC.
Fuente: Autores

En la figura 4 se pueden observar los promedios de los colegios, se contempla que 3 de los 5 colegios alcanzaron el promedio de notas de las clases con TIC, sin embargo, en las clases sin TIC también se evidencian 3 colegios que llegaron al promedio.

A través de la figura 5 se puede visualizar el comportamiento de las notas en las clases aplicadas. Este tipo de grafico sirve para resaltar el promedio de los valores atípicos que se pueden presentar.

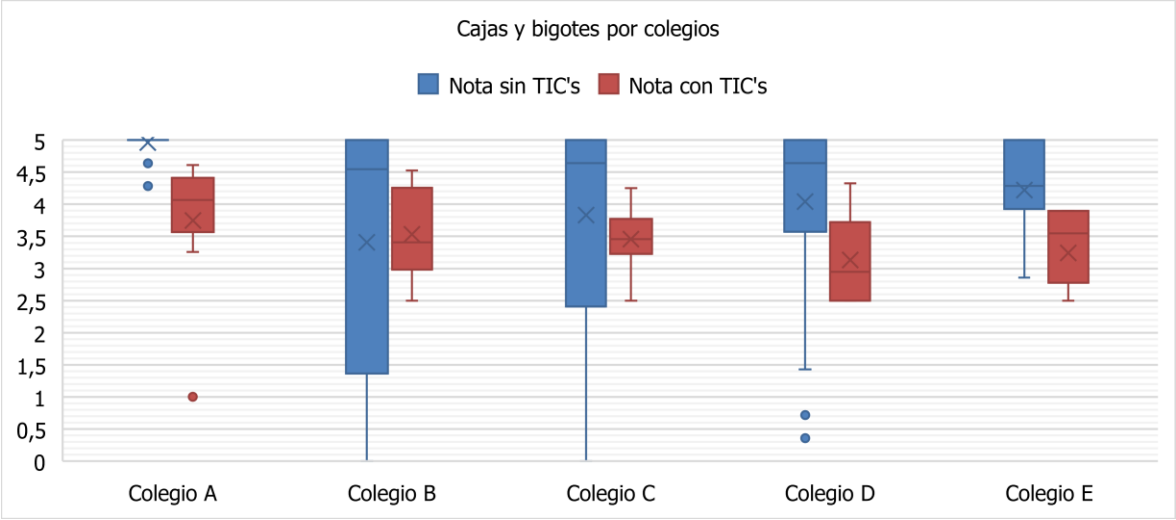

Figura 5. Gráfico aplicado de cajas y bigotes para las notas de las clases con y sin TIC.
Fuente: Autores

Al analizar los datos presentados en la figura 5, para la clase sin tecnología (TIC), representada con el color azul, en el caso del colegio A, se observa, las variaciones entre la mediana, los valores extremos y los cuartiles son apenas perceptibles, este se encuentra en el rango de 4,285 a 5. Aunque hay dos puntos atípicos (4,285 y 4,642) ubicadas fuera del rango central, a pesar de ello, son suficientes para aprobar.

En contraste, en las clases con tecnología (TIC), representadas con el color morado en la figura 5, se muestran diferencias más marcadas: las calificaciones varían entre 3,258 y 4,614, con una media de 4068, con cuartiles entre 3,566 y 4,41. Se identifica un valor atípico de 1,0. Aunque la figura 5 clarifica la información para las clases con TIC, esto no implica un resultado más favorable.

A continuación, se presenta un gráfico de cajas y bigotes sobre los resultados generales de las clases con y sin TIC.

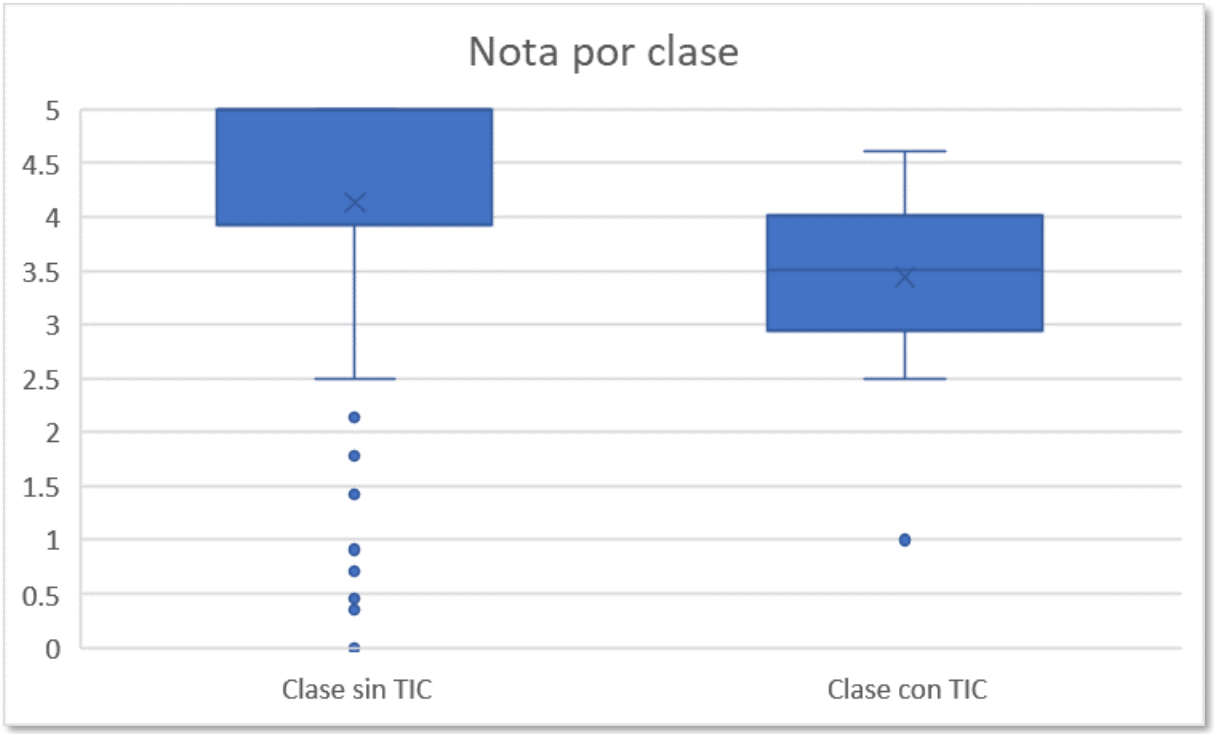

Figura 6. Cajas y bigotes para las notas de las clases con y sin TIC.
Fuente: Autores

En la figura 6 se muestran los resultados de los estudiantes en general; cabe resaltar que en total se contó con 122 estudiantes. Se observa que para la clase sin TIC se encontró que la nota mínima obtenida es 2,5 y la máxima es 5,0, con 8 datos atípicos, mientras que las clases con TIC se obtiene una nota mínima de 2,5 y una máxima de 4,642 con 1 dato atípico. En relación con lo anterior, se puede observar claramente en un gráfico de líneas el desempeño de los estudiantes en las actividades realizadas.

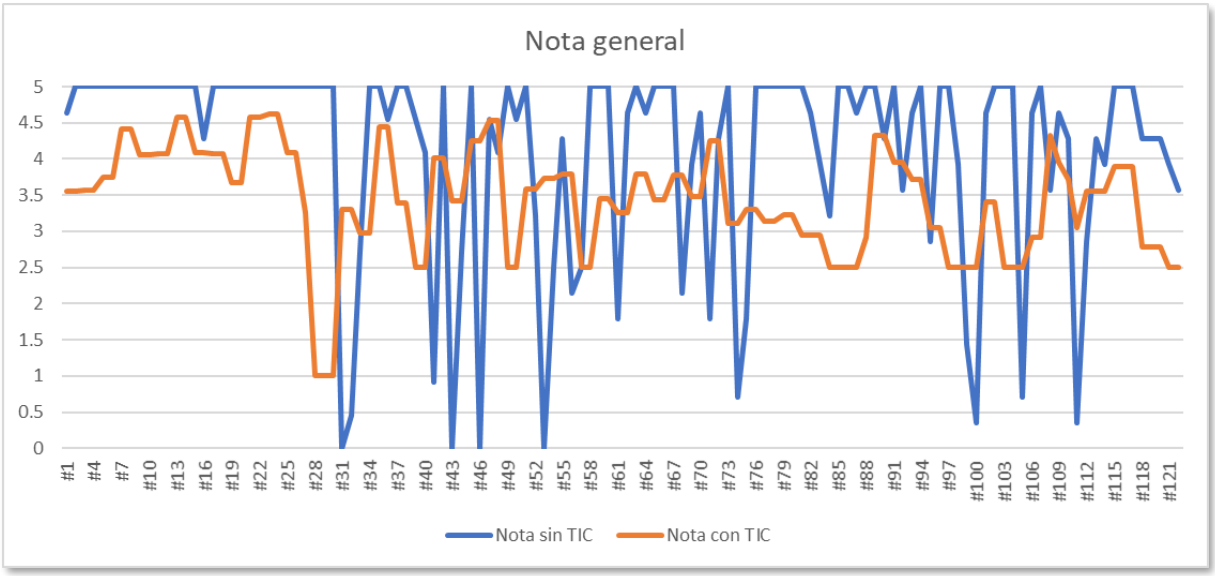

Figura 7. Notas de las clases con y sin TIC.
Fuente: Autores

En relación con lo anterior, se puede observar en la figura 7 el desempeño de los estudiantes en las dos fases del trabajo de campo. Aunque los resultados son más favorables en las clases sin TIC, se presentan picos extremos en los datos. Esto podría indicar que las clases con TIC fueron mejor recibidas en términos de comprensión de las actividades, se puede inferir que, a pesar de que las clases con tecnología exhiben un rendimiento generalmente superior, se manifiestan extremos notables que podrían influir en la variabilidad de los resultados a largo plazo. Para cuantificar de manera matemática la naturaleza de los gráficos de línea, se procede al cálculo de la varianza y la desviación estándar para ambas clases.

Tabla 6.
Varianza y desviación estándar entre clases

	Media	**Varianza**	**Desviación estándar**
Clase sin TIC	4.13	1.997	1.41
Clase con TIC	**3.43**	**0.54**	**0.73**

Fuente: Autores.

Es importante destacar que la varianza y la desviación estándar ofrecen una medida de la dispersión de los datos; un aumento en la varianza indica una mayor separación entre los puntos de datos, lo que refleja una mayor variabilidad en los datos. Al examinar los resultados presentados en la Tabla 6, se evidencia una mayor uniformidad en el rendimiento de los estudiantes en las clases que incorporan Tecnologías de la Información y la Comunicación (TIC), lo que representa una ventaja significativa en el entorno educativo.

Por otro lado, a pesar de que los resultados sugieren un mejor desempeño en las clases sin TIC, es importante destacar que los estudiantes no dominan completamente las tecnologías. Según la encuesta realizada a los docentes de las diferentes instituciones educativas, se resaltan los siguientes resultados, el 60% considera que el dominio de los estudiantes con las TIC es excelente, mientras que el 40% opina que es bueno. Sin embargo, los resultados muestran lo contrario: los estudiantes no dominan las tecnologías en su totalidad, lo que complica la implementación de clases con TIC debido a su interacción limitada con la tecnología durante su jornada académica.

A pesar de los resultados, es factible fortalecer el uso tecnológico, ya que el 100% de los encuestados están de acuerdo en que las TIC apoyan el aprendizaje de los estudiantes. Además, en dicha encuesta, los docentes concuerdan en que los estudiantes demostraron una buena comprensión del tema y una disposición y actitud favorable hacia el aprendizaje.

Se observa que la utilización de herramientas tecnológicas por parte de los estudiantes exhibe una ambigüedad considerable, siendo principalmente empleadas por el docente, este último, a su vez, hace uso predominantemente de herramientas de contenido audiovisual. Específicamente, el 20% utiliza únicamente programas de ofimática, el 40% utiliza YouTube y herramientas de visualización de contenido audiovisual, mientras que el restante 40% utiliza herramientas interactivas libres. Este enfoque resulta en una utilización limitada de la tecnología en la que se involucre más al estudiante, desaprovechando las amplias posibilidades que ofrece Internet para enriquecer la interactividad en el aula.

Se empleó una rúbrica para evaluar la funcionalidad de las instituciones en el área de sistemas para su uso con los estudiantes. A continuación, se presentan los resultados en la tabla 7, donde se evalúan con 4 criterios (malo, regular, aceptable y bueno).

Tabla 7.
Resultados de datos cualitativos de las instituciones.

Colegio	Sala de sistemas	Estado de equipos	Internet
Colegio A	Bueno	Bueno	Bueno
Colegio B	Aceptable	Bueno	Malo
Colegio C	Regular	Regular	Regular
Colegio D	Malo	Malo	Malo
Colegio F	Regular	Regular	Regular

Fuente: Autores

Ahora bien, se debe tener en cuenta que el avance tecnológico actual ha impactado diversas esferas de la sociedad, y la educación no es una excepción. La pandemia obligó a numerosas instituciones educativas a modificar sus enfoques pedagógicos y a depender de las Tecnologías de la Información (TIC) para la impartición de clases. No obstante, con el fin de esta, los estudiantes regresaron a la modalidad de enseñanza presencial, lo que ha reavivado el debate en torno al papel de las TIC y su impacto en el rendimiento académico, especialmente a la luz de los resultados postpandemia.

Teniendo en cuenta la revisión sistemática de Valverde, se encontró que las áreas curriculares que centran más su atención en el uso de las TIC y el rendimiento académico son las matemáticas y las ciencias. Así mismo los autores concluyen que la exploración académica de cómo las Tecnologías de la Información y Comunicación (TIC) influyen en el desempeño estudiantil parece estar influenciada por las particularidades de los sistemas educativos en los cuales se llevan a cabo dichas investigaciones (Valverde, 2022).

Desde la óptica de Valverde, es relevante destacar que el concepto de rendimiento asociado al empleo de las Tecnologías de la Información y Comunicación (TIC) se distingue en la medida en que los beneficios derivados de su utilización se manifiestan principalmente en la adquisición de nuevas competencias, las cuales no se evalúan de forma directa, tales como la competencia digital o el aprendizaje autorregulado. Este trabajo investigativo, procede a proponer la redefinición de las metodologías de_investigación educativa que tradicionalmente han sido empleadas en el ámbito de la tecnología educativa, abogando por la incorporación de estudios longitudinales y mixtos con el fin de proporcionar una visión más integral y profunda de los efectos de las TIC en el ámbito académico (Valverde, 2022).

Por otra parte, es importante manifestar la coherencia con el estudio realizado por Rodríguez y otros, en donde se afirma que la transición metodológica en la enseñanza de las matemáticas, desde el enfoque convencional hacia el innovador empleo de las Tecnologías de la Información y Comunicación (TIC), está en marcha. No obstante, este cambio se está produciendo de manera gradual y no ha alcanzado todas las aulas de manera uniforme con el objetivo de fomentar la competencia matemática en todos los estudiantes. No obstante, se ha observado un incremento en el aprendizaje significativo y una mejora en el desempeño en procesos matemáticos fundamentales y en la comprensión de conceptos abstractos (Rodríguez et al., 2023).

Desde el mismo estudio, se comprobó que las Tecnologías de la Información y Comunicación (TIC) pueden potenciar la comprensión de operaciones concretas, tales como la multiplicación o la división. Además, contribuyen al desarrollo de aprendizajes significativos, posibilitan la visualización de conceptos abstractos y facilitan la asimilación del contenido, (Rodríguez et al., 2023). Aunque coincidimos con estas afirmaciones, cabe resaltar que el estudio en mención tuvo la limitación que sus métodos descritos, los alumnos estudiados, los materiales y propuestas metodológicas fueron muy variados y complejos, lo que les dificultó sintetizar la información. En la investigación presente la metodología se unificó para todos los colegios y los estudiantes guardaban relación en edad y tipo de institución.

En conclusión, el impacto positivo de las Tecnologías de la Información y Comunicación (TIC) en la enseñanza de las matemáticas es innegable. Se ha evidenciado su capacidad para mejorar la comprensión de operaciones específicas como la multiplicación o la división, así como para fomentar aprendizajes significativos. Además, su uso facilita la visualización de conceptos abstractos, contribuye a la asimilación del contenido, resalta la relevancia de los procedimientos y ofrece herramientas para superar dificultades en el proceso de aprendizaje. Estos hallazgos respaldan la importancia de la integración de las TIC en el ámbito educativo para potenciar el desarrollo de competencias matemáticas en los estudiantes.

Un aporte importante en esta discusión y desde el ámbito nacional, la investigación de Recalde, realizada en el municipio de Florencia, en el departamento de Caquetá (Colombia), identificó que la metodología de investigación usada se dividió en cuatro etapas distintas, cada una enfocada en los colegios seleccionados tanto en zonas urbanas como rurales. Estas etapas incluyeron el diagnóstico de la institución, la aplicación de encuestas a los docentes, el trabajo de campo y la identificación de la integración de las TIC en los procesos de formación de los niños de transición.

A diferencia del estudio realizado en Caquetá, la presente investigación se enfocó en la aplicación práctica de estas herramientas en un contexto específico de aprendizaje, sin embargo, no se realizó la caracterización de la infraestructura educativa, solo se observó el aula de sistemas, ni el análisis de los Proyectos Educativos Institucionales (PEI) en las escuelas visitadas, sin embargo, en la investigación del municipio de Florencia – Caquetá, se afirma lo siguiente:

Las TIC están siendo incorporadas a los procesos de formación integral de la infancia, se hicieron las respectivas visitas a las diferentes instituciones focalizadas, para acceder a los Proyectos Educativos Institucionales (PEI) y a los planes de estudio del preescolar, grado Transición, y así poder realizar su respectivo análisis a partir del objetivo propuesto. Por consiguiente, en esta fase de la investigación se hizo trabajo de campo y revisión documental (Recalde España et al., 2015, p.328).

Es relevante destacar que, contrastando ambos proyectos de investigación, en la recolección de datos se aplicaron encuestas dirigidas a los docentes, y se constituyeron como la fuente primaria de información. En el caso del municipio de Facatativá, estas encuestas se basaron en quince preguntas, con el objetivo principal de medir si los docentes estaban aplicando activamente el uso de las TIC en la enseñanza diaria de los niños. Mientras tanto, en el municipio de Florencia y de acuerdo con los autores (Recalde España et al., 2015):

El objetivo consistente en identificar el conocimiento que tienen los docentes y los padres de familia acerca de las TIC y el uso didáctico en los procesos de formación integral de la infancia se diseñó y aplicó una encuesta que constó de trece preguntas estructuradas a partir de tres categorías de análisis: Concepciones, Estrategias y Entorno Familiar (p.328).

De esta discusión se deduce que el impacto positivo de las Tecnologías de la Información y Comunicación (TIC) en la enseñanza de las matemáticas es innegable. Se ha evidenciado su capacidad para mejorar la comprensión de operaciones específicas como la multiplicación o la división, así como para fomentar aprendizajes significativos. Además, su uso facilita la visualización de conceptos abstractos, contribuye a la asimilación del contenido, resalta la relevancia de los procedimientos y ofrece herramientas para superar dificultades en el proceso de aprendizaje. Estos hallazgos respaldan la importancia de la integración de las TIC en el ámbito educativo para potenciar el desarrollo de competencias matemáticas en los estudiantes.

Conclusiones

- Se demostró que el impacto de las tecnologías de la información y la comunicación sobre el rendimiento académico de los estudiantes de primer grado es diferencial y dependiente del contexto específico de su implementación. Este hallazgo subraya la necesidad de considerar factores locales, como la infraestructura tecnológica y el nivel de formación docente, al integrar las TIC en los sistemas educativos. Por lo tanto, la adaptación debe ser contextual con el objetivo de aprovechar al máximo los beneficios educativos de la tecnología.
- El estudio señala varios problemas en la incorporación efectiva de las TIC en el aula, incluyendo limitaciones en la infraestructura y en la capacitación del profesorado. Estas barreras pueden atenuar los potenciales beneficios pedagógicos de las herramientas digitales. Se recomienda que las intervenciones tecnológicas sean acompañadas de políticas robustas que aseguren el desarrollo profesional continuo de los educadores y la actualización de la infraestructura escolar.
- La investigación revela una percepción dualista de las TIC en la educación. Mientras que algunos educadores ven en la tecnología una herramienta para enriquecer el aprendizaje y estimular la participación estudiantil, otros expresan preocupaciones sobre su influencia en los métodos tradicionales de enseñanza y las interacciones sociales entre los estudiantes.
- Este contraste enfatiza la importancia de equilibrar la innovación tecnológica con las metodologías pedagógicas consolidadas. Se sugiere que las políticas educativas orientadas a la inclusión de las TIC deberían priorizar no solo la dotación de recursos tecnológicos, sino también el apoyo constante a los docentes, evaluaciones regulares de impacto y ajustes basados en la retroalimentación de todas las partes interesadas.
- Tal enfoque garantizaría que las inversiones en TIC se alineen efectivamente con los objetivos educativos y respondan a las necesidades reales de los alumnos y docentes. Finalmente, el estudio enfatiza la necesidad apremiante de continuar investigando los efectos a largo plazo de las TIC en la educación. Las futuras investigaciones deberían explorar en profundidad cómo las tecnologías digitales pueden ser integradas de manera efectiva en los currículos escolares y prácticas pedagógicas, considerando tanto los beneficios como los posibles riesgos o desventajas.

Referencias Bibliográficas

Ahmad, N. A. (2023). Digital disruption in early childhood education From Teachers' point of view: Qualitative research. *Advances in Mobile Learning Educational Research, 3*(1), 671-681. https://doi.org/10.25082/amler.2023.01.016

Basto, R. (2017). La función docente y el rendimiento académico: una aportación al estado del conocimiento. In *Ponencia presentada en el XIV Congreso Nacional de Investigación Educativa. San Luis Potosí*.

Casillas Martín, S., Cabezas Gonzalez, M., & Garcia Penalvo, F. J. (2020). Digital competence of early childhood education teachers: attitude, knowledge and use of ICT. *European journal of teacher education*, *43*(2), 210-223. https://doi.org/10.1080/02619768.2019.1681393

Cruzado Jares, E. M., & Paredes Miñano, R. G. (2022). *Uso de TIC y rendimiento académico durante la educación no presencial en niños de 5 años de la iep "CIENTEC*. (tesis de grado), Universidad Privada Antenor Orrego, Perú.

Hernández Sampieri, R., Fernández Collado, C., & Baptista Lucio, P. (2014). *Metodología de la investigación.* México D.F.: McGraw-Hill. Vol. 6, pp 102-256. https://acortar.link/F2fist

Imig, P. G. (2020). Rendimiento académico: Un recorrido conceptual que aproxima a una definición unificada para el ámbito superior / Academic performance: a conceptual journey that approximates a unified definition for the higher level. *Revista de Educación,* (20), 89-104. https://fh.mdp.edu.ar/revistas/index.php/r_educ/article/view/4165

Kerckaert, S., Vanderlinde, R., & Van Braak, J. (2015). The role of ICT in Early Childhood Education: scale development and research on ICT use and influencing factors. *European Early Childhood Education Research Journal, 23*(2), 183-199. https://doi.org/10.1080/1350293x.2015.1016804

Knysh, I., Budanova, O., Vakulenko, S., Syrotina, O., & Popychenko, S. (2023). Innovative educational technologies as a way of higher education enhancement. *Amazonia Investiga*, *12*(68), 21-32. https://doi.org/10.34069/AI/2023.68.08.2

Medina, A., Laiseca, A. C., Lasso, M. A. L., & Judith, D. (2020). *Efecto del uso de las TIC en el rendimiento académico de las matemáticas con población diversa*. Universidad Surcolombiana. https://repositoriousco.co/handle/123456789/1919

Ministerio de Education. (2013). *¿Qué es la educación inicial?* https://acortar.link/8vmtio

Pisá Bó, M., & Novejarque Civera, J. (2017). *Las TICs en el aula y su efecto final en el resultado de aprendizaje – (The ICTs in the classroom and its final effect on learning outcomes)*. Universidad ZAGUAN, 689-694. https://doi.org/10.26754/CINAIC.2017.000001_148

Portela, Y. P., & López Ochoa, J. C. (2021). *Desarrollo De Un Software Educativo Para El Fortalecimiento De Competencias En Niños Con Dislexia Entre Los 5 Y 7 Años. 6.* (Trabajo de grado). Universidad de Cundinamarca.

Recalde España, E., Serna Agudelo, B., & Stella Polo, S. (2015). Importancia del uso de las TIC en los procesos de formación integral de la infancia. *Revista Interamericana De Investigación Educación Y Pedagogía RIIEP*, *8*(2). https://doi.org/10.15332/s1657-107X.2015.0002.06

Rodríguez-Jiménez, C., de la Cruz-Campos, J.-C., Campos-Soto, M.-N., & Ramos-Navas-Parejo, M. (2023). Teaching and Learning Mathematics in Primary Education: The Role of ICT-A Systematic Review of the Literature. *Mathematics, 11*(2), 272. https://www.mdpi.com/2227-7390/11/2/272

Sánchez, L. N., Vélez, S. C., Fernández, J. A. Á., & Martínez, M. D. M. (2015). Implicaciones, uso y resultados de las TIC en educación primaria. Estudio cualitativo de un caso. *Edutec, Revista Electrónica de tecnológica educativa*, (53). https://doi.org/10.21556/edutec.2015.53.581

Toki, E. I., & Pange, J. (2014). ICT USE IN EARLY CHILDHOOD EDUCATION: STORYTELLING. *Tiltai, 66*(1), 183-192. https://doi.org/10.15181/tbb.v66i1.786

UNICEF. (2017). *Niños en un mundo digital. UNICEF–el estado mundial de la infancia*. 1-40 https://www.unicef.org/media/48611/file

Valverde-Berrocoso, J., Acevedo, J., & Cerezo Pizarro, M. (2022). Educational Technology and Student Performance: A Systematic Review. *Frontiers in Education, 7*. https://doi.org/10.3389/feduc.2022.916502

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.2
Cómo citar:
González Torres, A., Ríos Romero, V., & Pereira Hernández, M.L. (2024). Fortaleciendo la integridad académica en la cadena de suministro: Evaluación de un programa antiplagio en la formación universitaria. *Revista Eduweb*, 18(2), 26-49. https://doi.org/10.46502/issn.1856-7576/2024.18.02.2

Fortaleciendo la integridad académica en la cadena de suministro: Evaluación de un programa antiplagio en la formación universitaria

Strengthening academic integrity in the supply chain: Evaluating an anti-plagiarism program in university training

Arturo González Torres
https://orcid.org/0000-0002-3337-7600
Tecnológico Nacional de México/ Instituto Tecnológico de Milpa Alta, Profesor - Investigador, Ciudad de México, México.
Vianey Ríos Romero
https://orcid.org/0000-0002-5328-5586
Tecnológico Nacional de México/ Instituto Tecnológico de Milpa Alta, Profesora - Investigadora, Ciudad de México, México.
María Luisa Pereira Hernández
https://orcid.org/0000-0002-4748-5397
Universidad Pedagógica del Estado de Sinaloa, Profesora - Investigadora, Sinaloa, México.

Recibido: 01/04/24
Aceptado: 01/06/24

Resumen

En la presente investigación "Implementación del software antiplagio en el tópico de formación universitaria, caso de estudio: cadena de suministro; tuvo como objetivo, conocer el impacto del plagio en la materia de Cadena de Suministro de la carrera de Ingeniería en Gestión Empresarial. Así mismo, los estudiantes se enfrentan a circunstancias diversas por prácticas del plagio, así el proceso de enseñanza se ha visto vulnerado. Se destaca entonces las prácticas de los universitarios, originadas por malos hábitos que influyen en su formación. Por otra parte, conocer a detalle, la situación mencionada implicó dos instrumentos; el primero fue "diagnóstico del plagio en la educación superior" con un alfa de Cronbach de .81%, por su parte en el instrumento dos: "El plagio en el tópico de formación" se obtuvo .83% es decir, existe una confiabilidad en ambos instrumentos. Uno de los factores del acto de plagiar es en relación a la sobre carga de trabajo con 27.8%, así mismo, la falta de tiempo en las tareas demandadas con 30.6%; el estrés con 27.8%, mientras que el instrumento dos, "El plagio en el tópico de formación los estudiantes" subrayan que el 28.9% si han copiado fragmentos de otros trabajos sin citar, mientras que el 21.1% dicen haber hecho trabajos sin colocar autores; otro de los tópicos fue, si han realizado algún escrito sin citar con 54.1 %. Finalmente se implementó el software Turnitin para evaluar trabajos investigativos del estudiantado, donde se obtuvo 62 % de originalidad, el cual se busca reforzar sus habilidades investigativas.

Palabras clave: Educación, enseñanza, aprendizaje, plagio.

Abstract

In the present research "Implementation of anti-plagiarism software in the topic of university training, case study: supply chain"; The objective was to know the impact of plagiarism in the subject Supply Chain of the Business Management Engineering degree. Likewise, students face various circumstances due to plagiarism practices, thus the teaching process has been violated. The practices of university students are then highlighted, caused by bad habits that influence their training. On the other hand, knowing in detail, the aforementioned situation involved two instruments; The first was "diagnosis of plagiarism in higher education" with a Cronbach's alpha of .81%, while in instrument two: "Plagiarism in the training topic" .83% was obtained, that is, there is reliability on both instruments. One of the factors of the act of plagiarism is in relation to the overload of work with 27.8%, likewise, the lack of time in the requested tasks with 30.6%; stress with 27.8%, while instrument two, "Plagiarism in the topic of student training" highlights that 28.9% have copied fragments of other works without citing, while 21.1% say they have done works without mentioning authors. Another topic was, if they have written something without citing it with 54.1%. Finally, the Turnitin software was implemented to evaluate the students' research work, where 62% of originality was obtained, which seeks to reinforce their research skills.

Keywords: Education, teaching, learning, plagiarism.

Introducción

El propósito de esta investigación fue explorar la percepción del programa antiplagio entre estudiantes universitarios, específicamente en la materia de Cadena de Suministros. El plagio es una práctica inaceptable que compromete la calidad del trabajo académico y la integridad del proceso educativo. El rol del docente es crucial en la formación de los estudiantes, quienes deben ser guiados hacia prácticas éticas de investigación y escritura. La población de estudio consistió en 39 estudiantes de Ingeniería en Gestión Empresarial del Instituto Tecnológico de Milpa Alta, lo que proporciona un contexto específico para el análisis de esta problemática.

En la era actual, las instituciones educativas ya no son las únicas fuentes de conocimiento, gracias a la proliferación de nuevas tecnologías que facilitan el acceso a una amplia gama de recursos. Estas tecnologías también han transformado las metodologías de enseñanza y aprendizaje, y han introducido nuevos roles en el entorno educativo. Desde una edad temprana, los estudiantes se adaptan a estas tecnologías, lo que les permite interactuar y compartir en un contexto social, cultural y profesional. Además, las tecnologías emergentes han creado nuevos espacios de comunicación y han hecho posible la educación a distancia.

Para comprender mejor la percepción de los estudiantes sobre el plagio, se aplicaron dos encuestas de diagnóstico tituladas "El plagio en la educación superior y el plagio en el proceso de enseñanza-aprendizaje" (Porto, 2022, p. 68), con el fin de investigar los hábitos y prácticas de investigación de los estudiantes de educación superior.

El plagio es un acto que consiste en copiar o parafrasear el trabajo o las ideas de otros sin reconocer su autoría (Ragi, (s/f)) . Se manifiesta de varias maneras, incluyendo la copia textual sin citar, el parafraseo sin mencionar la fuente original, y la connivencia, donde hay colaboración indebida en tareas que deberían ser individuales. Las consecuencias del plagio son severas y pueden incluir sanciones académicas, cese de estudios, expulsión de la institución, daño a la reputación y un impacto negativo en la carrera profesional. Además, el plagio afecta negativamente el desempeño académico y el desarrollo de habilidades críticas y de análisis.

La población de estudio fue seleccionada por su relevancia en el contexto de la investigación académica. Los 39 estudiantes de la materia de Cadena de Suministros del Instituto Tecnológico de Milpa Alta representan un grupo significativo para analizar la percepción del plagio, ya que la materia requiere de habilidades de investigación y escritura. Las características demográficas y académicas de estos estudiantes proporcionan una base para entender cómo el plagio puede afectar a individuos en un entorno universitario específico.

En el presente artículo, se expone el propósito de la investigación que aborda el problema del plagio en la educación superior, contextualizando su relevancia en el ámbito académico. Se describe la problemática del plagio, detallando sus diversas formas, las consecuencias que acarrea y su impacto negativo en la educación. Para ello, se define la población de estudio, especificando el proceso de selección y las características de los participantes. La metodología empleada se explica en detalle, abarcando los métodos utilizados para la recopilación y análisis de los datos. Los resultados de la investigación se presentan a continuación, destacando los hallazgos obtenidos. Posteriormente, se discuten estos resultados, interpretándolos y evaluando su relevancia en el contexto educativo. Finalmente, se concluye con un resumen de los principales descubrimientos y se ofrecen recomendaciones para futuras investigaciones y prácticas educativas, con el fin de mitigar el problema del plagio y promover una cultura de integridad académica.

La conveniencia de esta investigación radica en su capacidad para identificar y entender los hábitos y actitudes de los estudiantes hacia el plagio. Esto es esencial para diseñar intervenciones educativas y políticas institucionales que puedan prevenir el plagio y fomentar una cultura de integridad académica. Los resultados pueden servir para mejorar los programas educativos y garantizar que los estudiantes desarrollen las habilidades necesarias para llevar a cabo investigaciones académicas originales y de calidad.

Los principales beneficiarios de esta investigación serán los estudiantes, los docentes y las instituciones educativas. Los estudiantes se beneficiarán al recibir una formación más sólida en ética académica, lo que mejorará su desempeño académico y futuro profesional. Los docentes podrán utilizar los hallazgos para desarrollar mejores estrategias de enseñanza que aborden directamente las causas y las percepciones del plagio. Las instituciones educativas, por su parte, podrán implementar políticas y programas antiplagio más efectivos basados en evidencia concreta, lo que aumentará la calidad y la credibilidad de sus programas académicos.

Referentes teóricos o revisión de literatura

Los avances tecnológicos y su integración en la pedagogía han generado importantes contribuciones en la capacitación, actualización y formación tanto de estudiantes como de docentes. En particular, el ámbito de la formación desempeña un rol fundamental debido a las ventajas que ofrecen las tecnologías emergentes, las cuales promueven actividades innovadoras y participativas. La diversidad de programas, plataformas y redes sociales emergentes ha suscitado nuevas formas de instrucción, facilitando no solo la gestión y búsqueda de información, sino también el avance en las acciones pedagógicas tanto del profesorado como del estudiantado. Este entorno tecnológico constituye un valor agregado, permitiendo operar en un ambiente de indagación continua, donde los individuos desarrollan competencias para examinar, tomar decisiones y educarse en nuevos temas dentro de una sociedad cada vez más sistematizada.

Además, el auge de las nuevas tecnologías de la información y la comunicación (TIC) ha creado condiciones de vida novedosas, dando lugar a la aparición de sociedades del conocimiento. Este fenómeno es especialmente evidente en grupos con acceso prácticamente ilimitado e inmediato a la información, lo que contribuye significativamente a la promoción de la innovación, el progreso y el bienestar social. Según García Sánchez et al. (2017), cada persona dispone de una amplia gama de alternativas para su

capacitación y educación, lo que fomenta en los individuos la capacidad de tomar control de su propio proceso formativo hasta alcanzar un nivel de autodidactismo.

Este cambio paradigmático en la formación y la educación, impulsado por las TIC, no solo mejora la eficiencia y la efectividad de los procesos educativos, sino que también transforma profundamente las metodologías de enseñanza y aprendizaje. La interacción continua y dinámica con herramientas digitales permite un aprendizaje más personalizado y adaptable, alineado con las necesidades y preferencias individuales de los estudiantes. Por otro lado, para los docentes, el dominio de estas tecnologías se traduce en la posibilidad de innovar en sus prácticas pedagógicas, diversificar sus estrategias didácticas y mejorar la evaluación del rendimiento estudiantil.

En este contexto, es crucial considerar la importancia de una formación integral y continua en competencias digitales tanto para estudiantes como para docentes. La alfabetización digital se convierte en un requisito esencial para participar activamente en una sociedad del conocimiento, capaz de enfrentar los desafíos de un entorno globalizado y altamente tecnificado. De este modo, la educación no solo debe centrarse en la transmisión de conocimientos, sino también en el desarrollo de habilidades críticas y competencias transversales que preparen a los individuos para el aprendizaje a lo largo de la vida.

El internet en la educación Superior

La rápida introducción de tecnologías en el ámbito de la gestión del conocimiento ha generado un impacto significativo, obligando a la educación a adaptarse y a los docentes a actualizarse continuamente para mantenerse a la vanguardia. Hugo Cardenas et al. (2020) subrayan la responsabilidad de los docentes en guiar a los estudiantes para discernir la fiabilidad de los recursos disponibles, destacando la necesidad de estrategias específicas para este fin. González (2021) resalta la importancia de la personalización del internet y su accesibilidad para satisfacer las necesidades individuales de aprendizaje, aunque omite la evaluación crítica de estos recursos. Martín Vega (2016) identifica la falta de una cultura sólida de evaluación de la información como un obstáculo en la educación, sin ofrecer soluciones concretas. Torres Cañizález, & Cobo Beltrán (2017) abogan por una gestión estratégica del entorno educativo, pero no detallan cómo implementarla efectivamente. La revisión de la literatura muestra que, aunque la tecnología ha mejorado el acceso a recursos y herramientas, también ha planteado desafíos en términos de fiabilidad y evaluación crítica de la información. La personalización del aprendizaje a través de internet ofrece oportunidades, pero requiere un enfoque estratégico para asegurar la fiabilidad de los recursos utilizados y la actualización de los docentes en competencias digitales. Este estudio aborda vacíos en la literatura proponiendo estrategias concretas para enseñar a los estudiantes a evaluar la fiabilidad de los recursos en línea, fomentar una cultura de evaluación crítica en la educación superior y desarrollar modelos de gestión estratégica del entorno educativo. Así, se busca mejorar la calidad de la educación y la formación de competencias digitales críticas en un entorno cada vez más digitalizado.

La rápida introducción de tecnologías en el ámbito de la gestión del conocimiento ha tenido repercusiones significativas, imponiendo a la educación la necesidad imperativa de adaptarse y a los docentes la obligación de actualizarse continuamente para mantenerse a la vanguardia. Hugo Cardenas et al. (2020) enfatizan que los docentes tienen la responsabilidad crucial de guiar al estudiantado en el discernimiento de la fiabilidad de los recursos disponibles en la vasta oferta de información que proporciona la tecnología moderna, subrayando la necesidad de estrategias pedagógicas específicas para cumplir con esta responsabilidad. En un contexto paralelo, González (2021) pone de relieve la importancia de la personalización del internet y su accesibilidad para satisfacer las necesidades individuales de aprendizaje de los estudiantes, proporcionando una amplia gama de recursos y herramientas que facilitan tanto las actividades educativas como las personales. Sin embargo, González no aborda de manera suficiente la evaluación crítica de estos recursos, una omisión que Martín Vega (2016) identifica como un obstáculo fundamental en la educación, debido a la carencia de una cultura sólida de evaluación crítica de la

información. Martín Vega destaca esta deficiencia sin ofrecer soluciones concretas para su remediación. Además, Torres Cañizález, & Cobo Beltrán (2017) abogan por una gestión estratégica del entorno educativo como medio para mejorar el proceso de enseñanza-aprendizaje, aunque no especifican cómo implementar estas estrategias de manera efectiva en las instituciones educativas.

La revisión exhaustiva de la literatura pone de manifiesto que, aunque la integración de tecnologías ha mejorado el acceso a recursos y herramientas educativas, también ha generado desafíos significativos en términos de la fiabilidad de la información y la falta de una cultura sólida de evaluación crítica. La personalización del aprendizaje a través de internet presenta oportunidades considerables, pero también requiere un enfoque estratégico que asegure que los recursos utilizados sean fiables y que los docentes estén continuamente actualizados en competencias digitales. Este estudio se propone llenar los vacíos identificados en la literatura mediante la propuesta de estrategias concretas para enseñar a los estudiantes a evaluar la fiabilidad de los recursos en línea, fomentar una cultura de evaluación crítica de la información en el ámbito de la educación superior y desarrollar modelos de gestión estratégica del entorno educativo que puedan ser implementados de manera práctica y efectiva. En última instancia, el objetivo es mejorar la calidad de la educación y la formación de competencias digitales críticas en un entorno cada vez más digitalizado, preparando así a los estudiantes para enfrentar los desafíos de un mundo en constante evolución tecnológica.

Innovación docente y empleo de las TIC en la Educación Superior.

La rápida integración de las Tecnologías de la Información y la Comunicación (TIC) en el ámbito educativo no solo busca satisfacer las demandas emergentes de los procesos de enseñanza y aprendizaje, sino que también pretende catalizar una transformación profunda en la sociedad, alineándose con las necesidades impuestas por la globalización. Este fenómeno ha obligado al sector académico a ajustar sus estructuras y prácticas para competir en un entorno cada vez más exigente y dinámico. La capacidad de adaptación y actualización de los docentes se ha convertido en un factor crucial para asegurar una educación de calidad en este contexto.

En cuanto a las investigaciones revisadas, Aguiar et al. (2019) proporcionan un análisis detallado sobre cómo la labor docente enfrenta retos tecnológicos y de innovación, acentuados por las exigencias de una generación joven estrechamente vinculada con la tecnología. Destacan la necesidad imperativa de que los docentes realicen cambios constantes en su práctica educativa para mantenerse pertinentes y efectivos en un entorno tecnológico en rápida evolución. La actualización continua se presenta no solo como una opción, sino como una obligación profesional para los docentes que buscan cumplir con las expectativas contemporáneas.

Sin embargo, el estudio de Aguiar et al. (2019) no profundiza en las estrategias específicas o prácticas que los docentes pueden emplear para integrar estos cambios de manera efectiva en su enseñanza. Tampoco aborda los posibles obstáculos y resistencias que los docentes podrían enfrentar durante el proceso de actualización continua, lo que limita la aplicabilidad práctica de sus hallazgos.

En cuanto a García (2011) hace hincapié en la importancia de las competencias adquiridas durante la educación previa, tales como el análisis crítico, la resolución de problemas, las habilidades de comunicación y el pensamiento creativo. Estas competencias son fundamentales para que los estudiantes enfrenten con éxito los desafíos académicos y profesionales que se presentan en la educación superior. García subraya que estas habilidades no solo son esenciales para el desempeño académico, sino también para la integración efectiva de los graduados en un mercado laboral globalizado y altamente competitivo.

De igual manera, García (2011) no detalla los mecanismos o enfoques pedagógicos específicos que las instituciones educativas pueden utilizar para desarrollar y fortalecer estas competencias en los estudiantes. La falta de un enfoque práctico y estructurado en su estudio limita la capacidad de las instituciones para implementar sus recomendaciones de manera efectiva y medible.

La revisión de la literatura revela que la integración de las TIC en la educación ha mejorado significativamente el acceso a una amplia gama de recursos y herramientas educativas. Sin embargo, esta integración también ha planteado desafíos considerables en términos de la fiabilidad de la información y la falta de una cultura sólida de evaluación crítica. Aunque la personalización del aprendizaje a través de internet presenta oportunidades valiosas, se requiere un enfoque estratégico para asegurar que los recursos utilizados sean confiables y que los docentes posean competencias digitales actualizadas.

La revisión de la literatura identifica varios vacíos que requieren atención urgente, como el tema de estrategias prácticas para la integración de las TIC: La falta de directrices claras y aplicables que los docentes puedan seguir para integrar eficazmente las TIC en su práctica educativa; la superación de obstáculos tecnológicos, en cuanto a métodos y enfoques que aborden los desafíos y resistencias que los docentes enfrentan durante su proceso de actualización tecnológica y por último el tema de desarrollo de competencias críticas, donde es necesario desarrollar enfoques pedagógicos específicos y estructurados para desarrollar y reforzar competencias como el análisis crítico, la resolución de problemas, las habilidades de comunicación y el pensamiento creativo en los estudiantes.

Modelos holísticos de integración de las TIC: Diseños y modelos que integren las necesidades tecnológicas, sociales, culturales y ambientales de manera coherente y efectiva.

El contexto general de la globalización y la evolución tecnológica rápida crea un entorno educativo que debe adaptarse de manera continua y proactiva. La problemática específica de este estudio radica en cómo las instituciones educativas pueden integrar efectivamente las TIC y desarrollar competencias críticas en los estudiantes para prepararlos adecuadamente para los desafíos del siglo XXI. La capacidad de las instituciones para adaptarse a estas demandas tecnológicas y globales es esencial para su éxito y relevancia futura.

La necesidad de este estudio se justifica por la rápida evolución tecnológica y las demandas de la globalización que requieren que las instituciones educativas adapten sus prácticas de manera efectiva. Al identificar y abordar los vacíos en la literatura existente, este estudio pretende proporcionar estrategias prácticas para la integración de las TIC y el desarrollo de competencias críticas en los estudiantes. Además, al proponer modelos que consideren de manera integral los aspectos tecnológicos, sociales, culturales y ambientales, el estudio aspira a contribuir significativamente a la mejora de la educación y la preparación de los estudiantes para enfrentar los desafíos del futuro.

La integración de las TIC en el ámbito educativo es crucial para satisfacer las demandas contemporáneas y mejorar la preparación de los estudiantes para un entorno globalizado y tecnológicamente avanzado. Las investigaciones revisadas destacan la necesidad imperativa de que los docentes se actualicen continuamente y de que las instituciones educativas desarrollen competencias críticas en los estudiantes. Este estudio aborda los vacíos identificados en la literatura y propone estrategias y modelos efectivos para mejorar la calidad de la educación y la formación de competencias digitales críticas en un entorno cada vez más digitalizado. En última instancia, la implementación de estas estrategias y modelos contribuirá a preparar mejor a los estudiantes para enfrentar y superar los desafíos académicos y profesionales del siglo XXI.

Aplicación de las TIC en educación superior como estrategia innovadora para el desarrollo de competencias digitales

La integración de las Tecnologías de la Información y la Comunicación (TIC) en el ámbito educativo se ha convertido en un imperativo para satisfacer las demandas contemporáneas de los procesos de enseñanza y aprendizaje. Este fenómeno, impulsado por la globalización, ha llevado a una transformación significativa en el sector académico, que ahora debe ajustarse para competir en un entorno cada vez más exigente y dinámico. La capacidad de adaptación y actualización de los docentes es crucial para asegurar una educación de calidad y pertinente en este nuevo contexto.

Aguiar et al. (2019) ofrecen un análisis exhaustivo sobre los desafíos tecnológicos y de innovación que enfrentan los docentes, exacerbados por las demandas de una generación joven profundamente conectada con la tecnología. Subrayan la necesidad imperiosa de que los docentes realicen cambios constantes en sus prácticas educativas para mantenerse pertinentes y efectivos en un entorno en rápida evolución. La actualización continua se presenta como una obligación profesional, no solo como una opción.

El estudio de Aguiar et al. (2019) no proporciona guías detalladas sobre las estrategias específicas que los docentes pueden emplear para integrar estos cambios en su práctica educativa de manera efectiva. Además, no aborda los posibles obstáculos y resistencias que los docentes podrían enfrentar durante el proceso de actualización continua, limitando así la aplicabilidad práctica de sus hallazgos.

EN cuanto a García (2011) destaca la importancia de las competencias adquiridas durante la educación previa, como el análisis crítico, la resolución de problemas, las habilidades de comunicación y el pensamiento creativo. Estas competencias son fundamentales para que los estudiantes enfrenten con éxito los desafíos académicos y profesionales en la educación superior. García subraya que estas habilidades no solo son esenciales para el desempeño académico, sino también para la integración efectiva de los graduados en un mercado laboral globalizado y altamente competitivo.

Sin embargo, García (2011) en su estudio no detalla los mecanismos o enfoques pedagógicos específicos que las instituciones educativas pueden utilizar para desarrollar y fortalecer estas competencias en los estudiantes. La falta de un enfoque práctico y estructurado limita la capacidad de las instituciones para implementar sus recomendaciones de manera efectiva y medible.

Por su parte Augusto et al. (2014) ponen de relieve que la educación ha avanzado significativamente, reflejándose en la mayor visibilidad de competencias sofisticadas entre los profesionales. Señalan la importancia de capitalizar las habilidades investigativas en respuesta a la creciente demanda por competencias más avanzadas.

El estudio de Augusto et al. (2014) carece de una guía detallada sobre cómo las instituciones educativas pueden capitalizar estas habilidades investigativas de manera práctica y efectiva. Además, no analiza los desafíos específicos que los profesionales enfrentan al desarrollar y aplicar estas competencias.

EN caunto a Padilla-Beltrán et al. (2014) resaltan la necesidad de colaboración dentro de la comunidad educativa, enfatizando el manejo adecuado de las TIC en la formación de los escolares. Promueven la creación de equipos interdisciplinarios que fomenten el uso adecuado de los recursos tecnológicos en la educación.

El estudio de Padilla-Beltrán et al. (2014) no aborda los obstáculos específicos que pueden surgir al implementar equipos interdisciplinarios. Tampoco ofrece estrategias concretas para fomentar hábitos adecuados en el uso de recursos tecnológicos entre los escolares.

La revisión de la literatura muestra que, aunque la integración de las TIC en la educación ha mejorado significativamente el acceso a una amplia gama de recursos y herramientas, también ha planteado desafíos considerables en términos de la fiabilidad de la información y la falta de una cultura sólida de evaluación crítica. Aunque la personalización del aprendizaje a través de internet presenta oportunidades valiosas, se requiere un enfoque estratégico para asegurar que los recursos utilizados sean confiables y que los docentes posean competencias digitales actualizadas.

En cuanto a los vacíos en la Literatura, se peude decir que existe una falta de directrices detalladas sobre cómo las instituciones educativas pueden aprovechar y desarrollar habilidades investigativas entre sus estudiantes; se necesita un desarrollo de estrategias concretas para la formación y funcionamiento efectivo de equipos interdisciplinarios en el ámbito educativo; de igual manera existe una insuficiencia en el análisis de los obstáculos que los profesionales pueden enfrentar al desarrollar y aplicar competencias avanzadas en su campo y sobre todo hay una falta de enfoques pedagógicos específicos y estructurados para fomentar una cultura de evaluación crítica de la información en la educación superior.

El contexto general de la globalización y la rápida evolución tecnológica crea un entorno educativo que debe adaptarse de manera continua y proactiva. La problemática específica de este estudio radica en cómo las instituciones educativas pueden implementar efectivamente la colaboración interdisciplinaria y el uso adecuado de las TIC para mejorar la formación de los estudiantes. La necesidad de estrategias prácticas y modelos aplicables es fundamental para asegurar que los recursos tecnológicos sean utilizados de manera óptima y que los estudiantes desarrollen competencias relevantes para el siglo XXI.

La integración de las TIC en el ámbito educativo es crucial para satisfacer las demandas contemporáneas y mejorar la preparación de los estudiantes para un entorno globalizado y tecnológicamente avanzado. Las investigaciones revisadas destacan la importancia de la colaboración y el manejo adecuado de los recursos tecnológicos, pero carecen de guías prácticas y estrategias específicas para su implementación. Este estudio busca abordar estos vacíos y proporcionar soluciones prácticas para mejorar la educación y preparar a los estudiantes para los desafíos del siglo XXI. En última instancia, la implementación de estas estrategias y modelos contribuirá a una educación de calidad y al desarrollo de competencias críticas en un entorno cada vez más digitalizado.

Conocimiento de los estudiantes universitarios sobre herramientas anti plagio y medidas preventivas

Las tecnologías, concebidas originalmente como herramientas para el progreso y la resolución de problemas sociales, enfrentan una dualidad inherente: su potencial positivo se ve contrarrestado por la posibilidad de ser utilizadas de manera contraproducente. En el contexto educativo contemporáneo, los estudiantes se enfrentan a una abundancia de recursos digitales al llevar a cabo sus actividades académicas. Sin embargo, la vastedad de la información disponible en internet puede dar lugar al acceso a fuentes de dudosa calidad y fiabilidad. En muchos casos, los estudiantes buscan simplemente cumplir con los requisitos de las tareas asignadas, sin reflexionar sobre la importancia de la calidad de sus trabajos.

La raíz del problema yace en la accesibilidad ilimitada a internet, donde la sobreabundancia de información puede conducir a la desinformación. En este sentido, los docentes desempeñan un papel crucial al orientar a los estudiantes hacia la producción de trabajos académicos libres de plagio y de alta calidad. Además, la evaluación de los estudiantes depende en gran medida de la calidad de los entregables y del uso adecuado de las tecnologías, lo que repercute directamente en su desempeño académico (Zambrano-De La Rosa et al., 2020).

Es esencial que los estudiantes adquieran habilidades autocríticas y sean capaces de generar trabajos de excelencia. Por lo tanto, resulta imperativo desarrollar su capacidad para llevar a cabo investigaciones, redactar de manera efectiva, analizar de forma crítica y, sobre todo, comunicar sus ideas sin incurrir en plagio, ya que la prevención de esta práctica puede fomentar el desarrollo de competencias investigativas. En este contexto, Cebriánb et al. (2020) proponen el uso de herramientas antiplagio como una estrategia efectiva para abordar esta problemática, al mismo tiempo que se promueven valores éticos y de integridad en el ámbito académico.

Por otro lado, Sanvicén Torné, & Molina Luque (2015) destacan el papel fundamental de la investigación en la optimización del uso de herramientas tecnológicas, especialmente en el contexto de la práctica docente. En un entorno donde la mayoría de la información se busca en internet, la fiabilidad de los recursos digitales se convierte en un factor determinante. Sin embargo, muchos de estos recursos carecen de la necesaria confiabilidad, lo que plantea un desafío significativo para la comunidad educativa.

La literatura revisada hasta el momento, subraya la complejidad de la relación entre las tecnologías digitales y la calidad educativa. A pesar de las oportunidades que ofrecen estas herramientas, también plantean desafíos importantes en términos de acceso a información confiable y prevención del plagio. Es necesario profundizar en la investigación para desarrollar estrategias efectivas que aborden estas problemáticas y promuevan un entorno educativo ético y de alta calidad. En última instancia, la implementación de estas estrategias contribuirá no solo a mejorar el proceso educativo, sino también a formar estudiantes más críticos, éticos y competentes en el ámbito académico y profesional.

Metodología

Método

En el desarrollo de este estudio se utilizó el enfoque cuantitativo, mismo que implica recopilar y examinar información numérica con el fin de abordar interrogantes en investigaciones científicas; este método se emplea para sintetizar datos, calcular promedios, identificar tendencias, realizar predicciones y validar relaciones causales, además de aplicar resultados a grupos más extensos; de igual manera proporciona la capacidad de medir el impacto de manera cuantitativa, evaluar la robustez de las relaciones, establecer prioridades y valorar la validez de la evidencia de eficacia (Rana et al., 2021).

En cuanto al método se determinó la utilización del estudio de caso. Toda investigación de estudio de caso parte de la motivación de obtener una comprensión profunda de uno varios "casos" ubicados en contextos del mundo real, siendo el objetivo, lograr una apreciación minuciosa de estos casos para generar nuevos conocimientos sobre el comportamiento del mundo real y su significado (Yin, 2011). En el caso particular de este estudio se pretendía conocer el impacto del plagio en la materia de Cadena de Suministro de la carrera de Ingeniería en Gestión Empresarial.

La singularidad del estudio de caso se define como una investigación empírica sobre un fenómeno contemporáneo dentro de su contexto real, especialmente cuando las fronteras entre el fenómeno y el contexto no están claras, es entonces necesario realizar una evaluación detallada del contexto y otras condiciones complejas relacionadas con el caso es esencial para comprenderlo adecuadamente (Yin, 2011). Es, bajo esta premisa que el plagio se ve como fenómeno social en el actuar del estudiantado, durante la elaboración de sus trabajos de investigación.

Participantes

Participaron en estudio un conjunto de 39 estudiantes matriculados de la materia “Cadena de Suministro”,

de la carrera de Ingeniería en Gestión Empresarial. Se destaca que una minoría de los encuestados se encuentra en el grupo de edades entre 26 y 30 años, mientras que la mayoría son jóvenes adultos en el rango de 21 a 24 años. Respecto a la distribución de género, hay una predominancia de mujeres en la muestra, en contraste con una proporción menor de hombres.

La selección de la población de estudio se fundamentó en criterios específicos relacionados con la naturaleza del tema de investigación y la disponibilidad de participantes. En este caso, se optó por estudiantes matriculados en la materia "Cadena de Suministro" de la carrera de Ingeniería en Gestión Empresarial. Esta elección se basa en la relevancia directa de la materia en relación con el tema de estudio, que presumiblemente aborda aspectos relacionados con la gestión de la cadena de suministro en contextos empresariales.

En cuanto a las características demográficas de la población seleccionada, se observa una distribución específica en cuanto a la edad y el género. La mayoría de los participantes son jóvenes adultos, en su mayoría comprendidos entre las edades de 21 a 24 años. Este rango de edad es coherente con el perfil típico de los estudiantes universitarios en etapas avanzadas de sus carreras. Sin embargo, también se destaca la presencia de una minoría de participantes en el grupo de edades entre 26 y 30 años, lo que puede aportar una perspectiva adicional en función de su experiencia y trayectoria académica y profesional.

En términos de género, se observa una predominancia de mujeres en la muestra, mientras que la proporción de hombres es menor. Esta disparidad puede reflejar una tendencia demográfica dentro de la carrera de Ingeniería en Gestión Empresarial o en la propia materia de "Cadena de Suministro", y podría influir en los resultados y análisis del estudio, considerando posibles diferencias en las experiencias, perspectivas y enfoques de género en relación con el tema de investigación.

Instrumento

Los instrumentos utilizados se adaptaron en función a la necesidad de la materia de cadena de suministro, debido a las horas teórico-prácticas de la materia., donde el instrumento 1 tiene un alfa Cronbach de .803%, mientras el instrumento 2, tiene un alfa de Cronbach de .809%. Significando en ambos instrumentos su confiabilidad para su aplicación (Porto, 2022).

En el instrumento 1 "Plagio en la educación superior", se consideraron las siguientes respuestas:

Poco tiempo para efectuar las labores pedidas, problemas para acceder a las fuentes documentales, falta de motivación, efecto de estrés, las tareas no poseen ponderación en la evaluación final de la asignatura, lo cual hace que sea fácil el acceso al material vía internet.

En cuanto al instrumento 2 "El plagio en el proceso de enseñanza-aprendizaje" las respuestas fueron:

Entrega de algún trabajo elaborado por otros/ as cursos anteriores, copiar fragmentos de textos de páginas web, etc., incorporación al trabajo que tenían escrito, entregas como propio algún trabajo completo descargado de una página digital, pero, sin realizar algún cambio, adquisición de alguna tarea por medio de una página digital, emplear textos de la información del equipo docente para confeccionar alguna tarea, sin dar crédito.

Evidentemente ambos instrumentos permiten saber algunas acciones que los escolares tienden a vivir en su actividad de formación y cómo estas afectan su desarrollo académico.

Los dos instrumentos de encuesta se aplicaron dentro del ámbito de la materia de cadena de suministro.

Tabla 1.
Procedimiento de investigación.

Realizar una revisión de literatura.	**Se realizaron investigaciones alusivas a los siguientes temas:** ● **Tecnologías de la Información y Comunicación (TIC)** ● **Las tecnologías en el proceso de enseñanza-aprendizaje.** ● **El plagio.**
Analizar las causas que originan el plagio.	Se implementaron dos instrumentos: ● Diagnóstico: el plagio en la educación superior. ● El plagio en el proceso de enseñanza-aprendizaje.
Implementar programa anti-plagio en estudiantes universitarios.	Actualmente la academia del Instituto Tecnológico de Milpa Alta cuenta la licencia del software para detección de plagio (Turnitin).
Evaluar el impacto del plagio.	Se realizaron investigaciones multidisciplinarias, de tres artículos solo un artículo está por encima del 80% de legitimidad de información.

Fuente. Elaboración propia.

Como se puede observar, Se destacan dos instrumentos específicos utilizados para sondear este fenómeno, a saber, el "Plagio en la educación superior" y "El plagio en el proceso de enseñanza-aprendizaje". Ambos instrumentos, meticulosamente diseñados, ofrecen una visión detallada de las diversas facetas del plagio, desde la falta de tiempo y acceso a fuentes documentales hasta la desmotivación y el estrés, elementos que se consideran inextricablemente ligados al fenómeno en cuestión.

La fiabilidad de estos instrumentos se refuerza mediante la mención de sus coeficientes alfa de Cronbach, alcanzando valores notables de .803% y .809% respectivamente, lo que subraya su idoneidad para ser empleados en investigaciones de esta índole. Este hecho, a su vez, implica una coherencia en la medición de las variables pertinentes, lo que asegura la consistencia y validez de los datos obtenidos.

El procedimiento de investigación delineado abarca una fase inicial de revisión bibliográfica, que aborda temas cruciales como las tecnologías de la información y comunicación, su integración en el proceso educativo y el fenómeno del plagio en sí mismo. Posteriormente, se implementaron los instrumentos de medición mencionados para analizar en profundidad las causas y manifestaciones del plagio en el contexto educativo, culminando en la adopción de un programa anti-plagio dirigido a estudiantes universitarios.

Limitaciones

El estudio aborda una serie de temas fundamentales en el ámbito educativo contemporáneo, centrándose en la percepción del plagio entre estudiantes universitarios, específicamente en el contexto de la materia de Cadena de Suministro. Sin embargo, es importante reconocer algunas limitaciones que podrían haber afectado la amplitud y la profundidad de la investigación.

En primer lugar, la muestra utilizada en el estudio se limitó a 39 estudiantes de Ingeniería en Gestión Empresarial del Instituto Tecnológico de Milpa Alta. Aunque esta población ofrece un contexto específico para el análisis del problema del plagio, la generalización de los resultados a otras instituciones educativas o programas académicos podría ser limitada. Sería beneficioso para futuras investigaciones considerar muestras más amplias y diversas, que abarquen una variedad de disciplinas y contextos educativos.

Además, el estudio se basó principalmente en la aplicación de encuestas de diagnóstico para recopilar datos sobre la percepción del plagio entre los estudiantes. Si bien las encuestas proporcionan información valiosa, su naturaleza autoinformada puede estar sujeta a sesgos de respuesta y no captar completamente la complejidad del problema. Sería útil complementar este enfoque con métodos cualitativos, como entrevistas en profundidad o grupos focales, para obtener una comprensión más holística de las actitudes y experiencias de los estudiantes en relación con el plagio.

Otra limitación importante es que el estudio no exploró en profundidad las estrategias específicas que podrían utilizarse para abordar el problema del plagio en el contexto educativo. Si bien se mencionan brevemente herramientas antiplagio como una posible solución, no se proporciona una evaluación detallada de su efectividad ni se exploran otras intervenciones potenciales, como programas de educación en integridad académica o cambios en las políticas institucionales. Futuras investigaciones podrían centrarse en identificar y evaluar estas estrategias en el contexto específico de la materia de Cadena de Suministro y otras disciplinas relacionadas.

Resultados y discusión

Como un primer parámetro se considera esencial analizar los rangos de edad en el estudiantado universitario. Se observa que el 8.3% de los encuestados tienen edades comprendidas entre los 26 y 30 años, indicando una minoría dentro de la muestra. Por otro lado, el 91.7% se encuentran en el rango de edades de 21 a 24 años, revelando que la gran mayoría son jóvenes adultos en esta franja de edad.

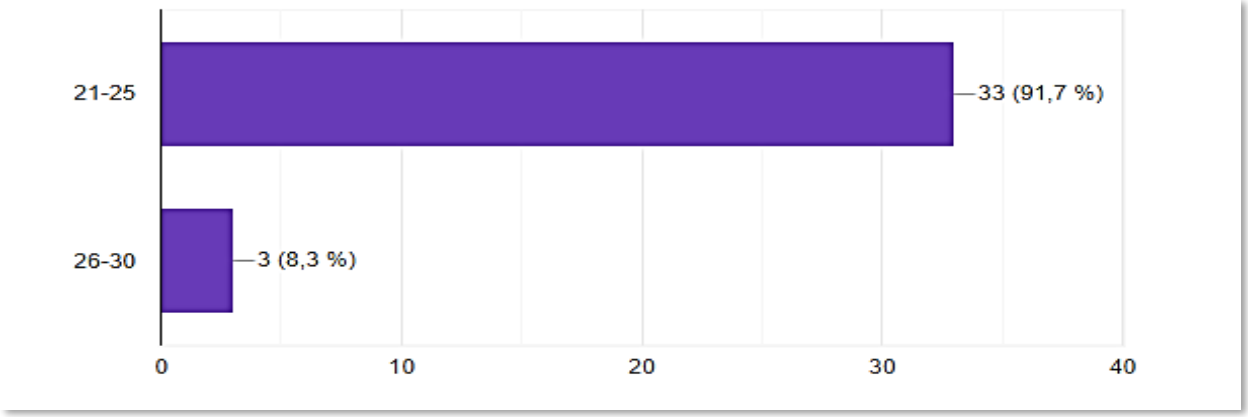

Figura 1. Edad.
Fuente. Elaboración propia.

En la figura 2, se muestra la distribución de género de los encuestados. Se evidencia que el 66.7% son mujeres, revelando una predominancia del sexo femenino en la muestra, en contraste, el género masculino representa el 33.3% correspondiendo a una proporción menor en comparación con las mujeres.

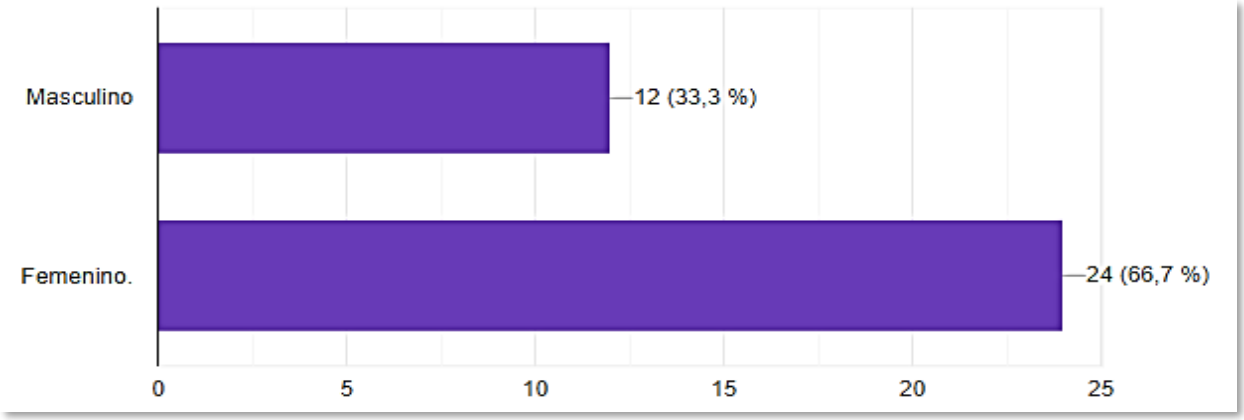

Figura 2. Genero.
Fuente. Elaboración propia.

En la figura 3, se aborda la percepción de los encuestados sobre la carga de trabajo en su formación. El 27.8% consideran que este factor persiste, sugiriendo que una parte significativa de la muestra percibe una carga de trabajo continuo. Este hecho puede atribuirse a la participación en el servicio social, ya que algunos encuestados señalan la necesidad de asistir a clases tanto por la mañana como por la tarde, contribuyendo a una mayor carga de trabajo percibida.

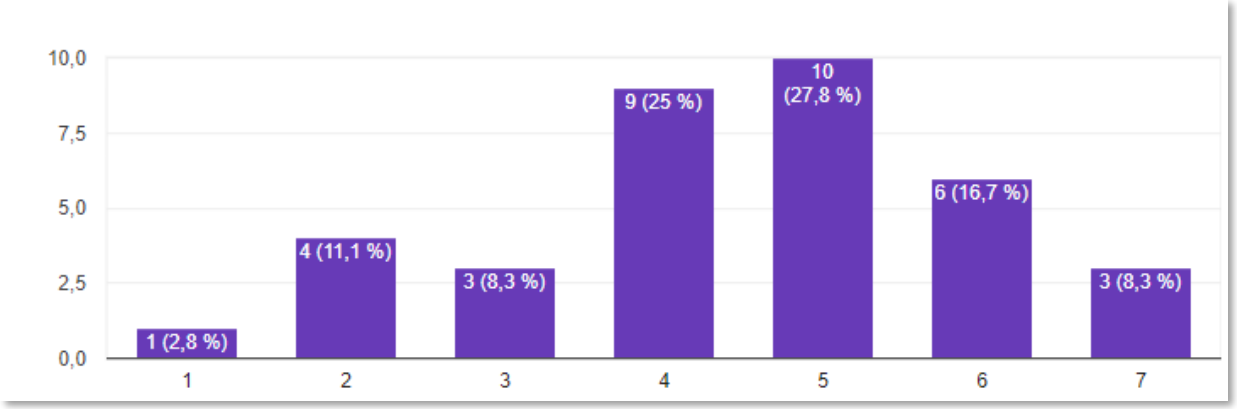

Figura 3. Sobre carga de trabajo.
Fuente. Elaboración propia.

En la figura 4, se aborda la percepción de los encuestados sobre el poco tiempo disponible en la realización de los trabajos solicitados. Se observa a un 30.6% estar ligeramente de acuerdo en cuanto al factor tiempo en el cumplimiento de sus actividades. Esto sugiere que una parte significativa de la muestra, considera la falta de tiempo como un aspecto crucial en su capacidad para completar las tareas asignadas. Por otro lado, solo el 2.8% indica que este factor no es primordial, lo anterior sugiere que una minoría de la muestra no percibe la falta de tiempo como un problema significativo.

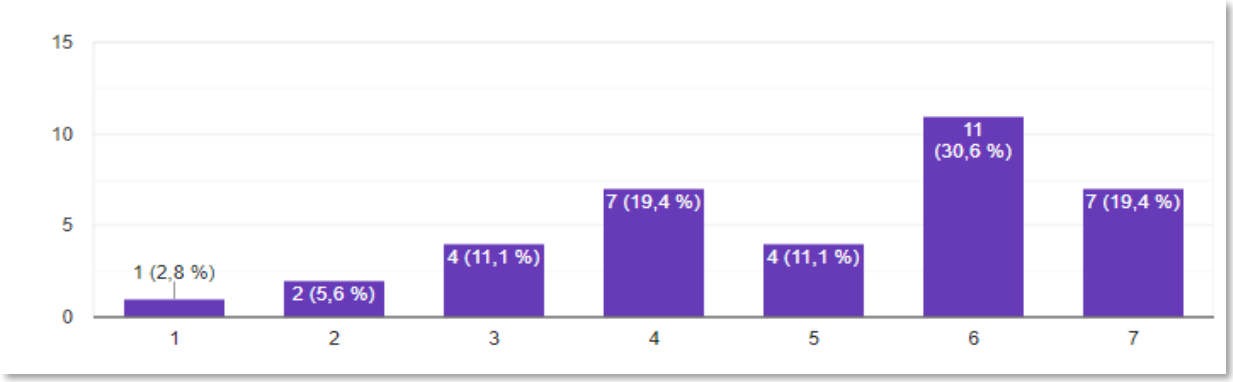

Figura 4. Falta de tiempo para la realizar tareas.
Fuente. Elaboración propia.

En la figura 5, se trata la cuestión de las dificultades de acceso a las fuentes bibliográficas. Se observa que el 22.2% están en desacuerdo con la afirmación, sugiriendo que una parte significativa de la muestra, no experimenta problemas para acceder a las fuentes bibliográficas necesarias para sus estudios.

Por otro lado, el 5.6% de los encuestados indica estar ligeramente de acuerdo con esta afirmación, lo que sugiere que una minoría de la muestra reconoce ciertas dificultades en el acceso a las fuentes bibliográficas, aunque no las considera muy problemáticas.

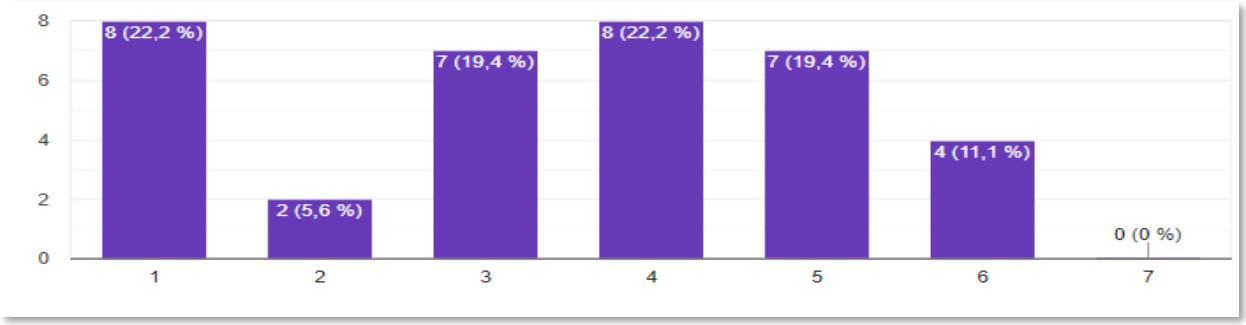

Figura 5. Dificultades de acceso a fuentes bibliográficas.
Fuente. Elaboración propia.

En la figura 6, se aborda el tema de la falta de motivación para la investigación. Se observa que el 25% del estudiantado menciona que no experimenta motivación para realizar investigaciones. Lo anterior indica que una parte considerable de la muestra percibe una carencia de estímulo o interés para emprender actividades investigativas. Por otro lado, el 5.6% de los han sido motivados para la investigación, lo que sugiere que una minoría ha recibido algún tipo de estímulo o incentivo que les ha impulsado a llevar a cabo investigaciones.

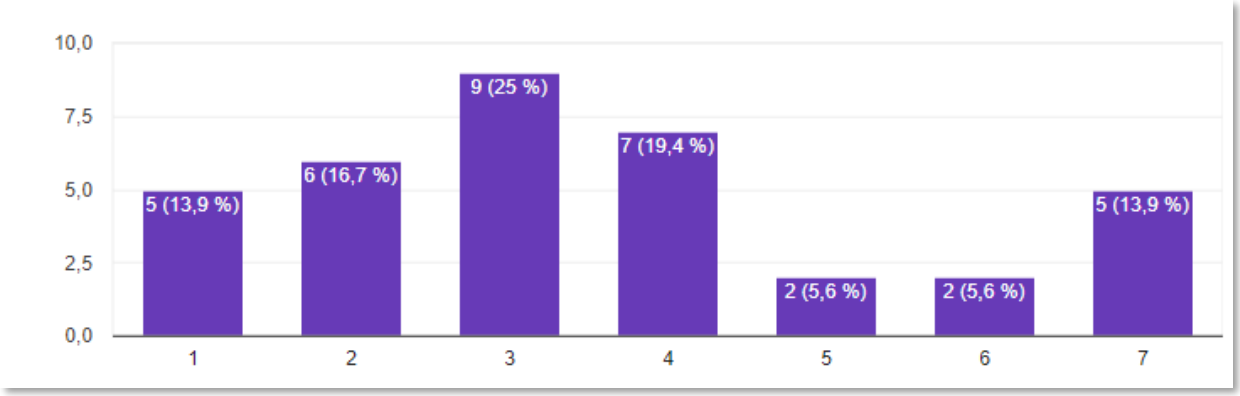

Figura 6. Falta de motivación.
Fuente. Elaboración propia.

En la figura 7, se trata el tema de la sensación de estrés entre el estudiantado. Se observa un 27.8% experimentando sensación de estrés, y se atribuye principalmente a la falta de buenas prácticas. Se indica que una proporción significativa de la muestra se siente afectada por el estrés, probablemente como resultado de la ausencia de hábitos o técnicas efectivas para manejar la carga académica y las exigencias del entorno educativo. Por otro lado, el 2.8% de los encuestados no experimenta esta sintomatología, lo que sugiere que una minoría no se ve afectada por el estrés en el contexto educativo.

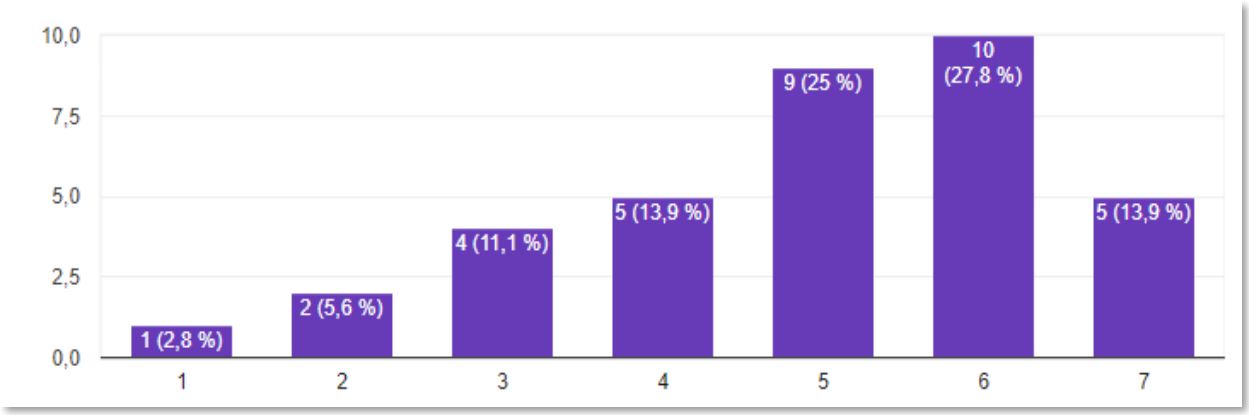

Figura 7. Sensación de estrés.
Fuente. Elaboración propia.

Por su parte. la figura 8, aborda el tema del valor asignado a los trabajos en la evaluación final. Se observa que el 19.4% están en desacuerdo con la importancia de los trabajos en la evaluación final, éstos no los consideran significativos, lo que sugiere que una proporción considerable de la muestra no percibe una alta exigencia en este aspecto. Por otro lado, el 8.3% tienen una perspectiva diferente y consideran que los trabajos son importantes en la evaluación final, indicando a una minoría como aquellos que sí visualizan la relevancia de este aspecto en la calificación final.

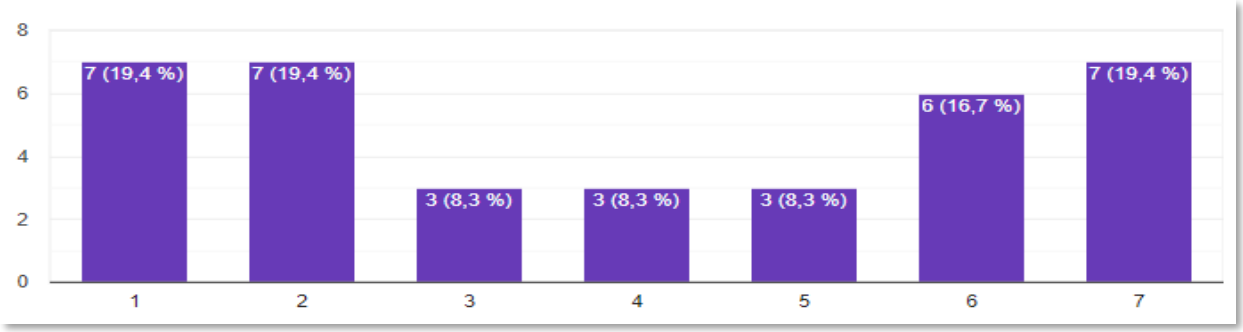

Figura 8. Valor de los trabajos en la evaluación final.
Fuente. Elaboración propia.

Por su parte, la figura 9, presenta el valor de los trabajos en la evaluación final. Se observa que el 30.6% es el porcentaje con mayor incidencia, sugiriendo que es común en los docentes la asignación de una ponderación significativa a los trabajos en la evaluación final, indicando que una parte importante experimenta una tendencia hacia la valoración y relevancia de los trabajos como componente fundamental en la calificación final de los cursos o asignaturas.

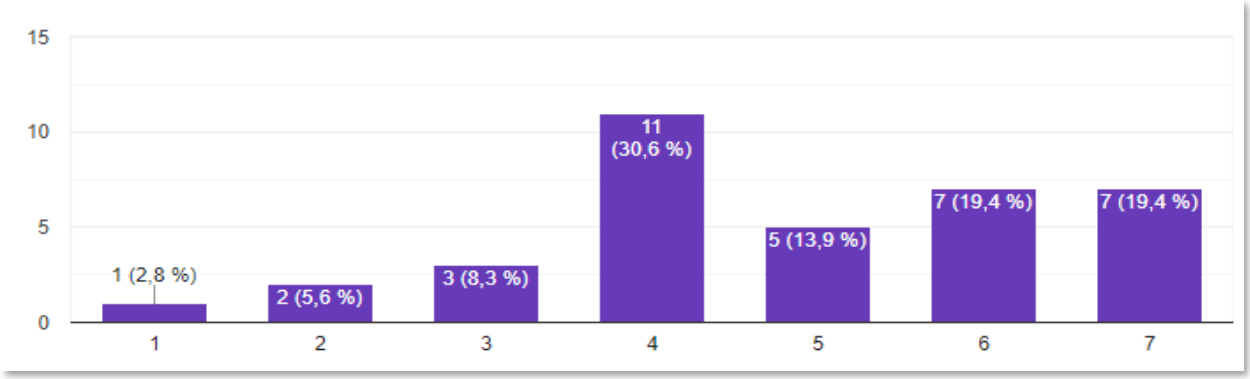

Figura 9. Valor de los trabajos en la evaluación final.
Fuente. Elaboración propia.

Una vez aplicada la encuesta, se validó en el software SPSS, la tabla 2 representa el resumen del proceso de temas, donde fue aplicado a 36 personas se destaca que todos los participantes respondieron a la encuesta. El hecho indica que no hubo ningún evento o circunstancia que pudiera interferir con la investigación, lo que sugiere un alto grado de participación y compromiso por parte de los encuestados. La ausencia de no respuestas o participantes faltantes fortalece la validez y la fiabilidad de los resultados obtenidos en el estudio.

Tabla 2.
Síntesis de información.

		N	%
Información	Válido	36	100.0
	Excluido[a]	0	0.0
	Total	36	100.0
La eliminación por lista se basa en todas las variables del procedimiento.			

Fuente. Elaboración propia.

Por otra parte, en la tabla 3. Estadísticas de fiabilidad, se puede apreciar el alfa de Cronbach de 0.81, la cual representa que es fidedigno, es decir, las cifras de alfa de Cronbach oscilan entre 0,70 y 0,90 indicando un dígito veraz. Establecer la consistencia interna de una escala es una aproximación a la validación del constructo y consiste en la cuantificación de la correlación existente entre los ítems que la componen (Celina y Campo, 2005).

Tabla 3.
Estadísticas de fiabilidad

Alfa de Cronbach	N de elementos
0.816	7

Fuente. Elaboración propia.

Mientras en el instrumento 2. El plagio en el proceso de enseñanza – aprendizaje, en la figura 10. Trabajos de investigación elaboradas en asignaturas pasadas el 73.6% están en desacuerdo, es decir, no era muy común hacer trabajos de investigación.

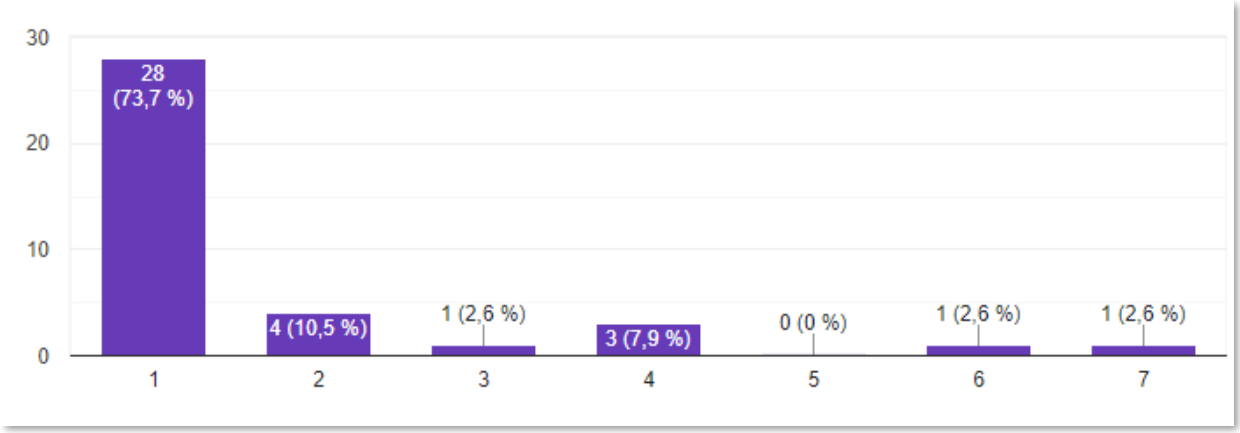

Figura 10. Algunas tareas elaboradas por otros/as en asignaturas pasadas.
Fuente. Elaboración propia.

La figura 11 muestra si los alumnos han copiado diversos fragmentos sin citar en trabajos escritos. Donde el 28.9% está en desacuerdo en ese tipo de prácticas lo que sugiere que una parte considerable rechaza la idea de copiar fragmentos sin citar adecuadamente las fuentes. Por otro lado, el 2.6% está ligeramente de acuerdo con la afirmación, indicando que una minoría podría haber experimentado o considerado esta práctica en sus trabajos escritos, aunque no la perciben como algo significativo.

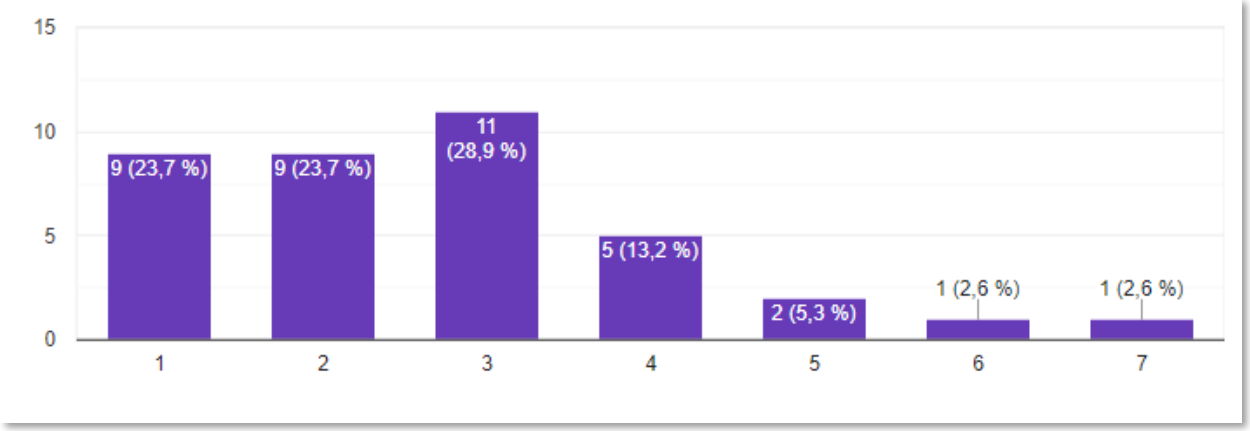

Figura 11. Fragmentos copiados sin citar.
Fuente. Elaboración propia.

Por otra parte, en la figura 12 "Desarrollé cumplidamente alguna tarea con segmentos semejantes de páginas electrónicas o de bibliografía impresas, sin escribir a los/as autores/as", el 42.1% está en desacuerdo en la realización de este tipo de prácticas a menú, donde solo 5.3% esta ligeramente de acuerdo.

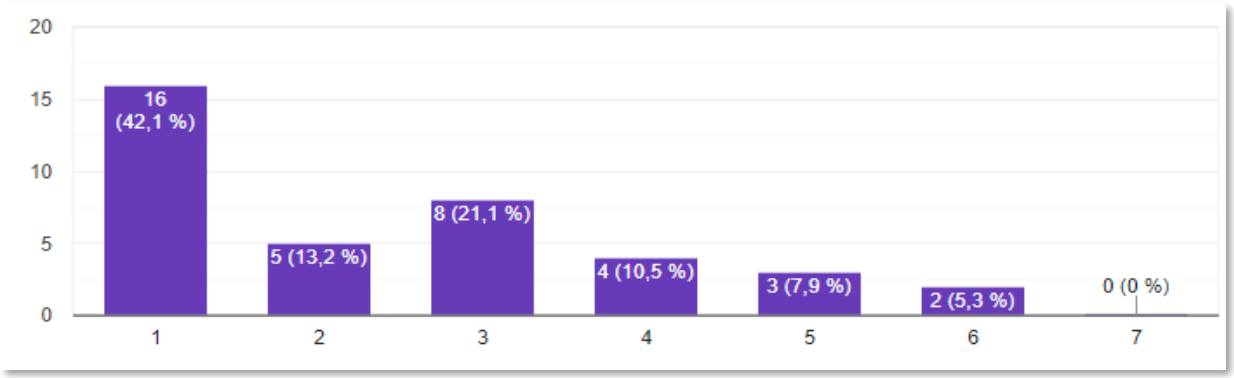

Figura 12. Trabajos citados.
Fuente. Elaboración propia.

En la Figura 13 se presentan los resultados de la afirmación: "Di alguna tarea completa, la cual descargué de una página digital, sin haber realizado algún cambio, como mía", el porcentaje de estudiantes que expresan su desacuerdo con descargar contenido de una página digital sin realizar ningún cambio es del 77.8%, indicando que una gran mayoría de los encuestados rechaza esta práctica. Por otro lado, del 2.8 al 5.6% están ligeramente de acuerdo con la afirmación; sugiriendo que una pequeña proporción podría estar más inclinada hacia la idea de descargar contenido sin realizar modificaciones, aunque no lo consideran como una práctica completamente aceptable.

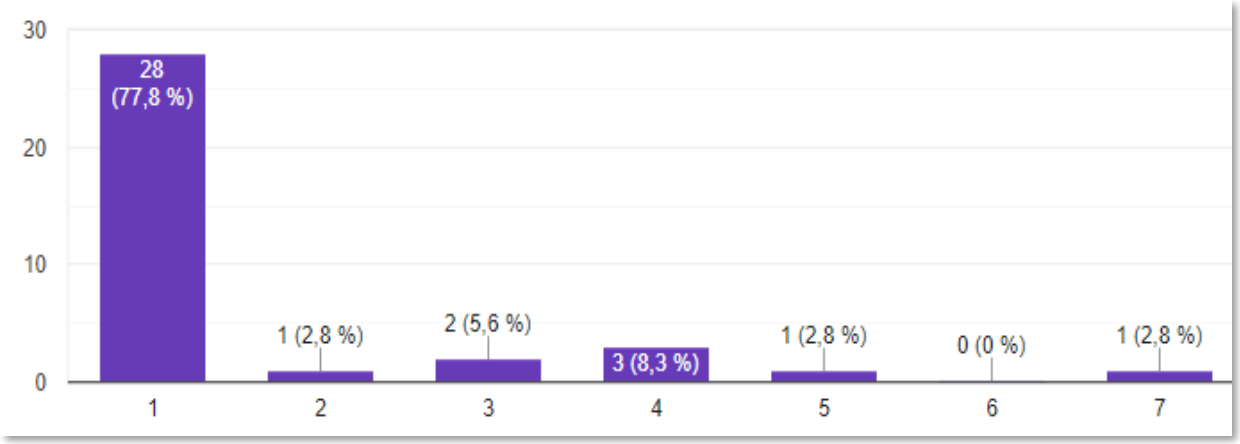

Figura 13. Adjudicarse trabajos de otros autores.
Fuente. Elaboración propia.

En la figura 14, se analiza si los estudiantes han realizado la compra de trabajos a través de Internet. Se destaca que el 88.9% de los encuestados rechaza esta práctica, lo que demuestra una clara oposición a la adquisición de trabajos de manera no ética o no autorizada. Por otro lado, entre el 2.8% y el 8.3% muestran un leve grado de acuerdo, lo que sugiere que una minoría podría haber contemplado la posibilidad de comprar trabajos en línea, aunque no expresan un completo respaldo a esta práctica.

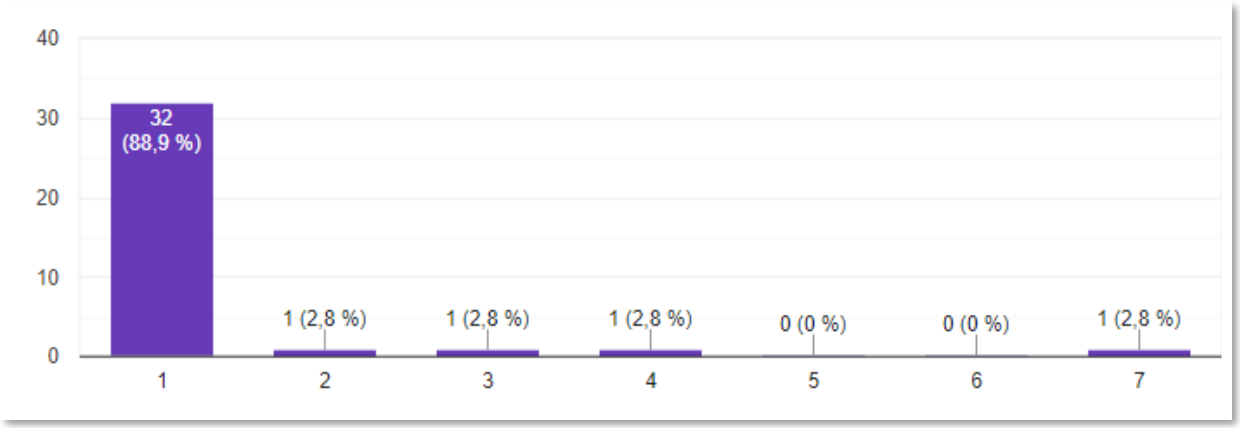

Figura 14. Compra de trabajos en Internet.
Fuente. Elaboración propia.

Finalmente, en la figura 15. trata la cuestión de si los estudiantes han utilizado textos de la información proporcionada por algún docente para realizar alguna tarea, sin darle el crédito correspondiente. Es evidente que el 54.1% de los encuestados están en desacuerdo con esta práctica, lo que indica que una mayoría significativa rechaza la idea de utilizar el trabajo de un docente sin atribuirle el crédito adecuado. Por otro lado, entre el 2.7% y el 16.2% de los encuestados están ligeramente de acuerdo con esta afirmación. Esto sugiere que una minoría de los encuestados podría haber considerado o incluso realizado esta práctica, aunque no la perciben como completamente inapropiada.

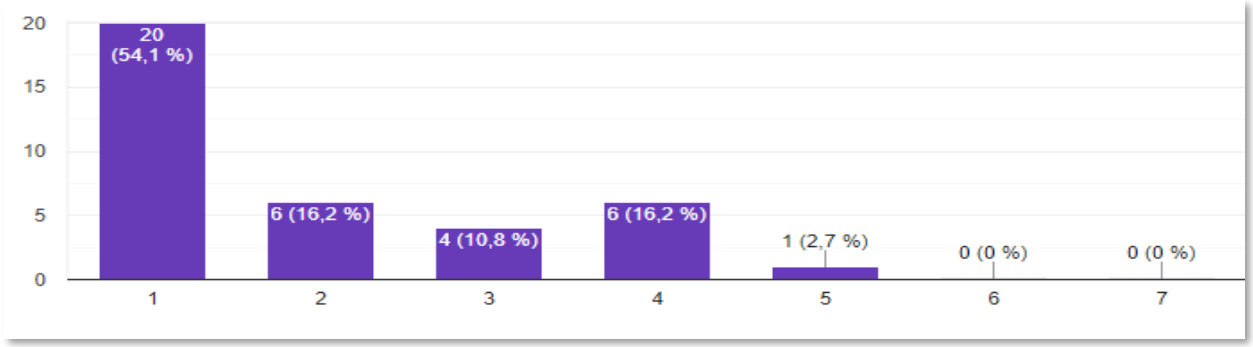

Figura 15. Fragmentos de apuntes del profesorado.
Fuente. Elaboración propia.

En la tabla 4 se muestra el resumen de procesamiento de casos. Donde evidentemente de las 36 del estudiantado encuestados todos ellos participaron y proporcionaron respuestas completas. Esto indica que no hubo ningún caso excluido de la muestra, fortaleciendo la integridad y validez de los resultados obtenidos en la investigación. La ausencia de participantes faltantes garantiza que se obtuvo una representación completa de la población objetivo, lo que contribuye a la fiabilidad de los hallazgos del estudio.

Tabla 4.
Resumen de procesamiento de casos

		N	%
Casos	Válido	36	100.0
	Excluido[a]	0	0.0
	Total	36	100.0

a. La eliminación por lista se basa en todas las variables del procedimiento

Fuente. Elaboración propia.

Finalmente, en la tabla 5 se puede apreciar el instrumento del plagio en el proceso de enseñanza-aprendizaje, donde se obtiene un alfa de Cronbach de 0.83% el cual es satisfactorio para la investigación.

Una vez implementada las encuesta, se analizaron las investigaciones del estudiantado que trabajó en equipo, observándose un promedio de originalidad del 62%, esto permite al docente, fomentar las buenas prácticas investigativas.

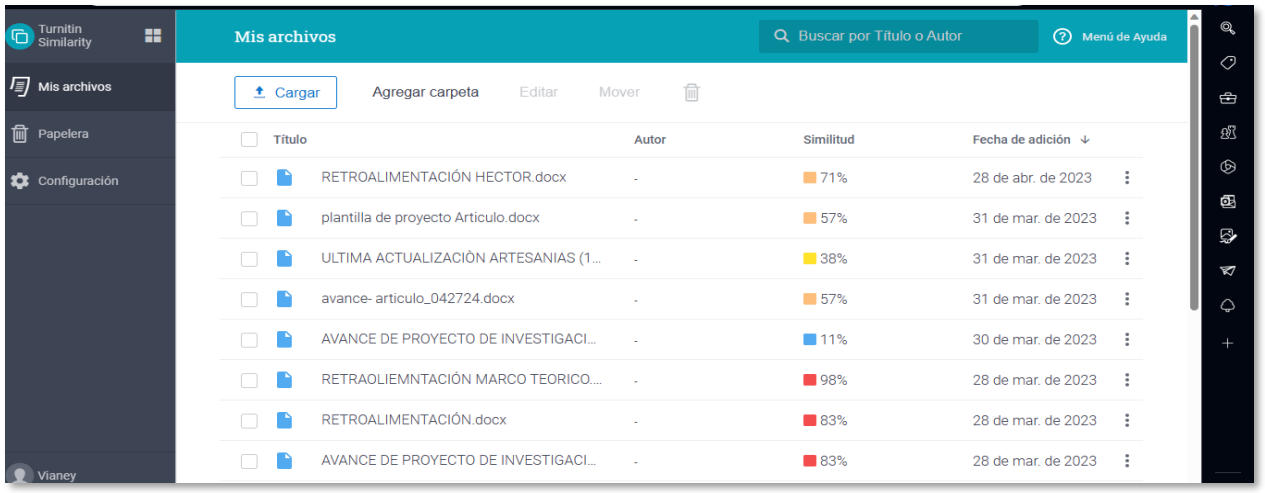

Imagen 1. Resultados del programa antiplagio.
Fuente. Elaboración propia a través del programa Turnitin.

Hoy en día en la educación superior hay diferentes grietas en el proceso de la enseñanza y del aprendizaje debido factores tanto sociales como tecnológicos, penetrando y vulnerando diferentes roles desempeñados por los jóvenes, uno de ellos es el educativo, gran parte de la comunidad estudiantil tiene diversas prácticas investigativas, y aunque si bien es cierto, el cumplir con diversas actividades demanda tiempo, se busca la practicidad y desafortunadamente se tiene mal conceptualizado este término ante la facilidad de obtener algo y peor aún de baja calidad. Según Amiama-Espaillat, (2021) evidentemente el plagio es uno de los desafíos más enfrentados en la comunidad universitaria y es un indicativo de retroceso que vulnera asignaturas de producción escrita. En efecto, como universidad a través de las asignaturas de investigación, se busca generar proyectos de alto impacto.

Es por ello el interés de indagar sobre esta problemática, presente en el nivel superior, más sin en cambio esta investigación fue un estudio de caso para la carrera de Ingeniería en Gestión Empresarial, de la materia de Cadena de Suministro por ser una materia teórico-practica la cual demandas prácticas propias de investigación. Por otra parte, y contestando las preguntas de la investigación ¿Cuáles son las causas del plagio? evidentemente es por la exposición al exceso de información sin garantía y la tendencia a considerar la vía más fácil. ¿Qué incita a los estudiantes hacer plagio? respondiendo a esta incógnita, la búsqueda de la practicidad, descuidando la formalidad de sus investigaciones, así como la fiabilidad del mismo. Finalmente ¿cuál es el impacto de hacer plagio? se exponen a cuestiones legales, y finalmente se vulnera el código de ética profesional.

Discusiones

Si bien es cierto, todos están vulnerables a encontrar información en internet que carece de consistencia y credibilidad, por otra parte , como docentes, es necesario direccionarlos a ejecutar correctamente investigaciones, así mismo conocer qué tipo de recursos son viables por otra parte enseñarles que una investigación no se trata de copiar y pegar, si no de entender y comprender la importancia de citar, parafrasear y referenciar en formato APA. Por otra parte, es relevante ver el impacto de originar plagio y el alcance perjudicial hacia terceras personas.

Los resultados de la presente investigación coinciden con los hallazgos de estudios previos que han identificado el plagio académico como una práctica común entre los estudiantes universitarios (Escalante & Martínez, 2022; Alvarez Huertas et al., 2023; Llovera-López et al., 2023). Las causas del plagio académico

son diversas e incluyen la falta de tiempo, la presión por obtener buenas calificaciones, la falta de habilidades de investigación y el desconocimiento de las normas de citación (Escalante & Martínez, 2022; Tapia Tovar et al., 2023).

En línea con la presente investigación, algunos estudios han destacado el papel del docente en la prevención del plagio académico (Cabrera Félix, & Antúnez Sánchez, 2021). Los docentes pueden contribuir a prevenir el plagio académico proporcionando a los estudiantes información clara sobre las normas de citación, utilizando herramientas de detección de plagio y fomentando una cultura de integridad académica en el aula (Escobedo & Ochoa, 2020; Cabrera Félix, & Antúnez Sánchez, 2021).

Finalmente, con el uso de herramientas como es el software Turnitin, definitivamente se puede lograr una retroalimentación en los trabajos investigativos del estudiantado con el fin de mejorar sus habilidades investigativas, así como una forma de monitorear de una manera precisa e individual, además de mejorar la práctica docente de manera eficiente.

Conclusiones

El plagio es una práctica perjudicial habituada por el estudiantado derivado por diversas causas éticas, como la falta de tiempo y practicidad, aunado al papel significativo del docente en su proceso de la enseñanza. En mucho de los casos, se debe priorizar el antiplagio en los trabajos de investigación, con la finalidad de orientar en relación al impacto de realizar una práctica con sentido deshonesto.

Según los datos encontrados, se puede concluir que una gran mayoría de los estudiantes universitarios, en el contexto de la materia de Cadena de Suministros, perciben la carga de trabajo y la falta de tiempo como factores críticos que afectan su desempeño académico y los llevan a considerar prácticas de plagio. Además, las dificultades de acceso a fuentes bibliográficas y la falta de motivación para la investigación también se identifican como problemas significativos.

En cuanto a las afirmaciones enunciadas en el supuesto, la investigación confirma que las principales causas del plagio incluyen la exposición al exceso de información sin garantía de calidad y la tendencia a considerar la vía más fácil para completar las tareas. Los estudiantes buscan la practicidad, descuidando la formalidad y fiabilidad de sus investigaciones, lo que incrementa la incidencia del plagio. El impacto de esta práctica es considerable, ya que expone a los estudiantes a cuestiones legales y vulnera el código de ética profesional. La investigación resalta la necesidad de implementar medidas educativas y políticas que aborden estas causas y promuevan una cultura de integridad académica.

Los estudios previos han abordado el plagio académico como una práctica común entre los estudiantes universitarios y han identificado diversas causas subyacentes, como la falta de tiempo, la presión por obtener buenas calificaciones y la falta de habilidades de investigación. Sin embargo, no evaluaron de manera exhaustiva el papel del docente en la prevención del plagio ni el impacto de herramientas específicas, como el software Turnitin, en la retroalimentación y mejora de las habilidades investigativas del estudiantado. Este trabajo actual retoma estos aspectos, destacando la importancia del rol docente y la utilidad de herramientas tecnológicas para prevenir el plagio y mejorar la calidad de la investigación estudiantil.

Se tuvo la limitación de información respecto a la percepción de los docentes sobre el uso del software Turnitin y su efectividad en la prevención del plagio. Además, los sujetos entrevistados fueron únicamente estudiantes universitarios, lo que limita la comprensión completa de la dinámica entre docentes y estudiantes en la prevención del plagio. Durante la investigación, se encontró que la disponibilidad de estudios sobre la efectividad de herramientas tecnológicas específicas en la prevención del plagio era

limitada. Por lo anterior, se considera que faltó una exploración más profunda de la perspectiva docente y una revisión más exhaustiva de la literatura sobre herramientas antiplagio.

Se recomienda continuar el estudio a partir de una investigación longitudinal que evalúe el impacto a largo plazo de las intervenciones educativas antiplagio, así como una exploración más profunda de la percepción y el comportamiento relacionados con el plagio en diferentes contextos educativos. Además, se sugiere investigar más a fondo las perspectivas de los docentes y la implementación efectiva de herramientas tecnológicas como el software Turnitin en la prevención del plagio.

Además, se recomienda que, para establecer un programa integral de prevención del plagio en una institución educativa, es crucial capacitar al personal docente en estrategias efectivas, como el uso de herramientas antiplagio como Turnitin, y en la promoción de la integridad académica. Esto se complementa con la necesidad de establecer políticas claras sobre el plagio y sus consecuencias, así como de promover la educación de los estudiantes sobre la ética en la investigación y la importancia de citar adecuadamente las fuentes. Además, programas de tutoría personalizados pueden ofrecer apoyo a los estudiantes en el desarrollo de habilidades de investigación y escritura. Es esencial monitorear y evaluar continuamente la efectividad de estas medidas, ajustándolas según sea necesario, y fomentar la originalidad y la colaboración interdisciplinaria en el trabajo académico. Finalmente, la participación activa de toda la comunidad educativa, incluidos estudiantes, docentes, administradores y padres, es fundamental para crear un entorno que valore y promueva la integridad académica en todas sus formas.

Gracias a este estudio y a la factibilidad se puede implementar en las demás carreras del Instituto Tecnológico de Milpa Alta como son Ingeniería en Sistemas computacionales, Ingeniería Bioquímica e Ingeniería en Industrias alimentarias ya que al igual que la carrera de Ingeniería en Gestión Empresarial comparten la misma dinámica de tareas de investigación, proyectos de investigación por ende se busca que estudiantes universitarios adquieran practicas investigativas.

Referencias Bibliográficas

Aguiar, B. O., Velázquez, R. M., & Aguiar, J. L. (2019). Innovación docente y empleo de las TIC en la Educación Superior. *Revista espacios*, *40*(02). https://www.revistaespacios.com/a19v40n02/a19v40n02p08.pdf

Alvarez Huertas, F. D., Urbina Medina, R. A., & Ruiz Salazar, J. M. (2023). Prácticas de ciberplagio académico en estudiantes universitarios: Una revisión documental. *Horizontes Revista de Investigación en Ciencias de la Educación, 7*(27), 212-228. https://doi.org/10.33996/revistahorizontes.v7i27.508

Amiama-Espaillat, C. (2021). El plagio en la Educación Superior dominicana: una oportunidad para desarrollar la escritura académica. *Cuaderno de Pedagogía Universitaria, 18*(35), 37-48.

Augusto, C., Heverd, O.T., & Toscano, R. (2014). Aplicación de las TIC en la educación superior como estrategia innovadora para el desarrollo de competencias digitales. *Revista científica de tecnología educativa*, *(3)*. http://uajournals.com/ojs/index.php/campusvirtuales/article/view/52/51

Cabrera Félix, C., & Antúnez Sánchez, A. G. (2021). Uso de herramientas tecnológicas en la gestión de información en estudiantes de posgrado de ISFODOSU. *Revista Simón Rodríguez, 1*(1), 22-33. https://revistasimonrodriguez.org/index.php/simonrodriguez/article/view/13

Cebriánb, V., Raposo, R., & Rey, F.J. (2020). Conocimiento de los estudiantes universitarios sobre herramientas antiplagio y medidas preventivas. *Revista de medios de comunicación, (57)* https://recyt.fecyt.es/index.php/pixel/article/view/71964/48043

Celina, H., & Campo, A. (2005). Aproximación al uso del coeficiente alfa de Cronbach. *Revista Colombiana de Psiquiatría*, *(4).* https://www.redalyc.org/articulo.oa?id=80634409

Escalante, J. L., & Martínez, S. (2022). Causas del plagio académico en estudiantes universitarios de educación: percepción docente de una universidad dominicana. *Revista EDUCARE-UPEL-IPB-Segunda Nueva Etapa 2.0, 26*(3), 47-62. https://doi.org/10.46498/reduipb.v26i3.1814

Escobedo, P. S., & Ochoa, I. C. (2020). Utilidad de un software para evaluar la calidad de textos académicos. *Revista de Estudios Clínicos e Investigación Psicológica, 10*(20), 258.

García Sánchez, M. D. R., Reyes Añorve, J., & Godínez Alarcón, G. (2017). Las Tic en la educación superior, innovaciones y retos. *RICSH Revista Iberoamericana de las Ciencias Sociales y Humanísticas, 6*(12). https://www.redalyc.org/articulo.oa?id=503954320013

González, I.M. (2021). Influencia de las TIC en el rendimiento escolar de estudiantes vulnerables. *Revista Iberoamericana de Educación a Distancia, 24*(1), https://doi.org/10.5944/ried.24.1.27960

Hugo Cardenas, F. X., Jimenez Rosero, C. E., Holovatyi, M., & Lara Pazos, P. E. (2020). El impacto de las redes sociales en la administración de las empresas. *RECIMUNDO, 4*(1), 173-182. https://doi.org/10.26820/recimundo/4.(1).enero.2020.173-182

Llovera-López, Y., Aragón-Carretero, Y., & Cano-Olivares, P. (2023). Ciberplagio Académico entre el estudiantado universitario: un acercamiento al estado actual de la temática (2017-2020). *Revista Colombiana de Educación*, (87), 207-226. https://doi.org/10.17227/rce.num87-13143

Martín Vega, R.A. (2016). El reto de la educación digital, más allá de la transformación metodológica. *Scielo*, *(2)*. http://dx.doi.org/10.7476/9788578793470.0012

Oseredchuk, O., Sadovyi, M., Pelekh, V., Koriakina, I., & Tsarova, Y. (2024). Emergent properties of modern education. *Amazonia Investiga*, *13*(76), 63-74. https://doi.org/10.34069/AI/2024.76.04.5

Padilla-Beltrán, J. E., Vega-Rojas, P. L., & Rincón-Caballero, D. A. (2014). Tendencias y dificultades para el uso de las TIC en educación superior. *Entramado, 10*(1), 272-295. https://www.redalyc.org/articulo.oa?id=265431574018

Porto, A.M. (2022). Uso de fuentes digitales y plagio en los trabajos académicos durante la pandemia. *Revista Electrónica Interuniversitaria de Formación del Profesorado, 25*(3), 61-74 https://doi.org/10.6018/reifop.523951

Raggi, A. (s.f.). *El plagio en el entorno académico. Un problema educativo*. Universidad de Navarra. https://acortar.link/Tk6I2W

Rana, J., Gutierrez, P. L., & Oldroyd, J. C. (2021). *Métodos Cuantitativos. En Enciclopedia Global de Administración Pública, Política Pública y Gobernanza*. Springer. https://doi.org/10.1007/978-3-319-31816-5_460-1

Sanvicén Torné, P., & Molina Luque, F. (2015). Efectos del uso de internet como fuente principal de información. Evidencias en estudiantes de primer curso universitario. *Prisma Social*, *(15)*. https://www.redalyc.org/articulo.oa?id=353744533010

Tapia Tovar, E., Orenday Tapia, M. A., & Gómez Flores, M. R. (2023). Percepción sobre corrupción y deshonestidad académica entre estudiantes universitarios. *Psicología, Educación & Sociedad, 2*(3). https://doi.org/10.5281/zenodo.8000549

Torres Cañizález, P. C., & Cobo Beltrán, J. K. (2017). Tecnología educativa y su papel en el logro de los fines de la educación. *To bring out, 21*(68). https://www.redalyc.org/articulo.oa?id=35652744004

Yin, R. K. (2011). *Applications of Case Study Research. En SAGE Publications, Inc. (Ed.), Chapter 1. A (Very) Brief Refresher on the Case Study Method*. COSMOS Corporation.

Zambrano-De La Rosa, E.F., Maji-Llinin, C.V., & Pin-Pin, Á.L. (2020). El uso del Internet asociado al rendimiento académico en estudiantes universitarios ecuatorianos. *Polo del conocimiento, (6).* https://polodelconocimiento.com/ojs/index.php/es/article/view/1485

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.3
Cómo citar:
Dyka, N., Tretiak, O., Yakunin, Y., Shopina, M., Horobets, S., & Rozinkevych, N. (2024). The role of interactive platforms in enhancing self-motivation during distance postgraduate studies. *Revista Eduweb*, 18(2), 50-62. https://doi.org/10.46502/issn.1856-7576/2024.18.02.3

The role of interactive platforms in enhancing self-motivation during distance postgraduate studies

El papel de las plataformas interactivas en la mejora de la automotivación durante los estudios de postgrado a distancia

Natalia Dyka
https://orcid.org/0000-0003-1385-5027
Borys Grinchenko Kyiv Metropolitan University, Kyiv, Ukraine.
Olha Tretiak
https://orcid.org/0000-0002-1160-055X
Borys Grinchenko Kyiv Metropolitan University, Kyiv, Ukraine.
Yaroslav Yakunin
https://orcid.org/0000-0001-5421-0546
Borys Grinchenko Kyiv Metropolitan University, Kyiv, Ukraine.
Maryna Shopina
https://orcid.org/0000-0002-1637-3480
Borys Grinchenko Kyiv Metropolitan University, Kyiv, Ukraine.
Svitlana Horobets
https://orcid.org/0000-0001-7307-7672
Borys Grinchenko Kyiv Metropolitan University, Kyiv, Ukraine.
Nataliia Rozinkevych
https://orcid.org/0000-0002-7292-1015
Borys Grinchenko Kyiv Metropolitan University, Kyiv, Ukraine.

Recibido: 02/04/24
Aceptado: 12/05/24

Abstract

Modern technologies are an active tool for the development of practical skills, which has a positive value for distance learning as well. The aim of the work is to determine the role of interactive platforms in enhancing self-motivation during distance postgraduate studies. The research employed the following methods: comparison, the Stapel scale, calculations of the motivation factor, the activity ratio; Sherman test. The development of the teacher's communication and personal skills in education involved the use of the MOODLE platform; student evaluation mechanisms involved the use of the Liveworksheets application. It was determined that self-motivation was reflected in the search for non-standard methods for presenting information (23.4), the study of new materials (22.1), the research activity (19.7). The study showed that conducting open lessons by teachers who were undergoing postgraduate training was reflected in their obtaining high results. Primary school teachers achieved a high level of knowledge among 68%, Ukrainian language – 71%, mathematics – 64%. The practical significance of the work is the possibility of creating

new approaches to postgraduate training of primary and secondary school teachers. Research prospects may be related to determining the advantages of various interactive platforms for conducting postgraduate studies.

Keywords: Remote platform, active learning methods, pedagogical experience, research activity, professional competence.

Resumen

Las tecnologías modernas son una herramienta activa para el desarrollo de habilidades prácticas, lo que tiene un valor positivo también para la formación a distancia. El objetivo del trabajo es determinar el papel de las plataformas interactivas en la mejora de la automotivación durante los estudios de postgrado a distancia. En la investigación se emplearon los siguientes métodos: comparación, escala de Stapel, cálculos del factor de motivación, ratio de actividad; test de Sherman. Para el desarrollo de las competencias comunicativas y personales del profesor en educación se utilizó la plataforma MOODLE; para los mecanismos de evaluación de los estudiantes se utilizó la aplicación Liveworksheets. Se determinó que la automotivación se reflejaba en la búsqueda de métodos no estándar para presentar la información (23,4), el estudio de nuevos materiales (22,1), la actividad investigadora (19,7). El estudio demostró que la realización de clases abiertas por parte de los profesores en formación de postgrado se reflejaba en la obtención de resultados elevados. Los profesores de primaria alcanzaron un alto nivel de conocimientos entre el 68%, lengua ucraniana - 71%, matemáticas - 64%. La importancia práctica del trabajo es la posibilidad de crear nuevos enfoques para la formación de postgrado de los profesores de primaria y secundaria. Las perspectivas de investigación pueden estar relacionadas con la determinación de las ventajas de diversas plataformas interactivas para la realización de estudios de posgrado.

Palabras clave: Plataforma a distancia, métodos de aprendizaje activo, experiencia pedagógica, actividad investigadora, competencia profesional.

Introduction

Professional skills can be improved through postgraduate training, which requires the use of specialized training programmes, innovative changes. A high level can be achieved by ensuring students' independent motivation, which is aimed at revealing the necessary abilities (Murillo-Ligorred et al., 2023). Therefore, studying the impact of interactive platforms on achieving effective postgraduate training is relevant.

Postgraduate education involves the process of improving professional training as a result of deepening and expanding knowledge or obtaining another profession. At the same time, it is necessary to focus on the previously obtained educational and qualification level, as well as practical experience (McAvoy et al., 2022). The interactivity of training can be provided through educational platforms, which ensures orientation to the students' individuality, their capabilities and acquired professional knowledge. The focus on distance learning helps to ensure the continuity of learning based on the automation of existing approaches. A distance learning approach can ensure targeted learning by providing the possibility of individual perception of information by using cloud storage of learning materials (Lui et al., 2024). Distance learning using interactive technologies has certain advantages for postgraduate education. They are manifested in the growth of student activity, the expanded access to educational materials (Ang et al., 2021). The process may also involve the development of creative skills due to self-expression elements. It is possible to ensure the effectiveness of post-graduate studies as a result of orientation towards the development of erudition, intellectuality, and independence. This approach is necessary for the formation of students' interest in obtaining postgraduate education, which ensures the expansion of professional skills and abilities (Dyka et al., 2023).

Postgraduate education is aimed at a deeper perception of educational materials, their understanding, focusing on the possibilities of innovation. The quality of postgraduate education depends on the implemented areas of study that meet the requirements of education reform (Cui & Wang, 2023). At the same time, an academic and methodical approach to professional training, which is connected with the development of the students' individuality should be ensured. Professional knowledge can be developed during postgraduate education through non-standard educational approaches. Such approaches can be business games, various trainings, project methods, etc. Soft skills are required for the development of professional skills, which will allow solving various educational tasks. Erudition, creativity, and communicativeness can increase the quality of the educational process, which contributes to better self-organization (Lyckander & Spetalen, 2022). The main task of postgraduate education is the preparation of highly qualified and competitive specialists. The organization of postgraduate education is related to the provision of personal training, which is related to the students' motivation. Postgraduate education is aimed at using the accumulated experience to comply with the standards of professional education. Innovative approaches contribute to the achievement of new educational goals and the improvement of professional competence in the system of postgraduate training (Heath et al., 2023).

The theoretical study of the area selected for research revealed significant limitations in the implementation of interactive platforms during postgraduate studies, which contribute to the development of student motivation. Research is mainly aimed at determining the features of postgraduate studies. The aim of the work is to determine the effectiveness of interactive platforms in promoting self-motivation during distance postgraduate studies.

The aim of the work was achieved through the fulfilment of the following research objectives:

- Develop the principles of using interactive platforms in postgraduate education, focusing on the distance form;
- Determine the level of motivation before the beginning and after the completion of postgraduate training of primary school teachers, teachers of Ukrainian language, mathematics;
- Identify positive skills that were developed in teachers on the basis of self-motivation during postgraduate studies;
- Determine the level of developed professional skills among teachers during postgraduate studies.

Literature Review

Postgraduate training can be delivered with the use of STEM technologies, which helps to ensure joint learning and develop thinking skills. The creation of virtual laboratories has a successful impact on students, as it promotes the development of social and cognitive skills. Multimedia technologies contribute to the stimulation of learning, the use of additional equipment to expand practical skills (Nungu et al., 2023).

Multimedia learning has a significant positive impact on changing approaches to teaching, which can facilitate individual learning in postgraduate education. The benefits of multimedia learning are also related to the possibility of collaboration between students, which expands the understanding of a certain subject. Multimedia learning has benefits for motivating students to learn (Spanjaard et al., 2022). Digital technologies are an effective element for learning and assessment, as they contribute to the development of critical thinking and analytical skills. Developed skills contribute to sustainability in learning, which enables learning from the experiences of other students. The development of research skills is related to the orientation to the study of theoretical materials, their supplementing, and modification. This allows for the creation of new opportunities for ensuring the educational process (Naidoo & Reddy, 2023).

The development of professional skills is a complex process that requires a lot of attention to practical activities. These problems can be solved with the use of 3D modelling, which helps to stimulate real scenarios and ensure repeated practice of complex cases. Receiving feedback in learning enhances students' motivation and increases self-efficacy. A simulated environment promotes a deeper learning experience, which facilitates students' integration into the real environment (Lin et al., 2023). The education system has problems with the mismatch between the curriculum and actual practice. This deficiency can be eliminated by the use of STEM principles, which contribute to a better perception of information and the development of awareness. STEM technologies make it possible to take into account the individual capabilities of students and graduate students, to ensure their interaction. Interactive learning promotes full immersion in the mass space, focusing on real professional activity (Brahic et al., 2024). Online education has become widespread during the Covid-19 pandemic, which requires social presence, orientation to research dynamics. Social presence aims to provide a link between learning and cognitive presence. Productive learning can be achieved due to the provision of joint interaction in the learning environment and the use of correct interactive technologies (Mutezo & Maré, 2023).

Competing priorities and social barriers must be taken into account to ensure that students are encouraged to actively participate in learning. They can be implemented using digital technologies. Interactive technologies had a positive value not only for effective learning, but also for increasing the level of students' motivation. Regular assessment determined ways of developing student activity and the ability to express their own opinion (Skaik & Tumpa, 2021). Interactive technologies influence active learning, which contributes to the improvement of the quality of teaching and the students' success. Virtual classrooms can increase learning efficiency among 30% of students. Simulation-based learning promotes learning abilities that increase the level of practical skills (Singhal et al., 2020). Reforming educational systems has different effects on student performance. Therefore, it is necessary to ensure not only a change in the curriculum, but also the development of student motivation. The development of emotional intelligence is related to the success of graduate students, which contributes to their new perception. Emotional intelligence affects self-regulation, self-awareness, self-motivation, social competence, which is reflected in the academic performance of respondents (Patil et al., 2023).

The literature review revealed the impact of interactive technologies on student success. Research is mostly aimed at studying the advantages of digital technologies for obtaining higher education. But this does not contribute to the study of the features of distance postgraduate education.

Methodology

Research design

The first stage of the research involved the development of approaches to the use of interactive platforms during distance postgraduate studies. The studies were organized in accordance with the approved university programme, but the authors proposed changed approaches to the perception and presentation of materials. The second stage of the research provided for determining the level of teachers' motivation during postgraduate training. The focus was the initial and final results of training. The third stage of the study was aimed at determining the positive impact of teachers' self-motivation to improve their professional level. At the third level, the effectiveness achieved by teachers as a result of conducting an open lesson was also determined.

Sampling

The sample of respondents consisted of 112 teachers with teaching experience from 1 to 5 years who underwent postgraduate training at Borys Grinchenko Kyiv University. The respondents' limitations are related to the involvement of school teachers who planned to improve their professional level. The

respondents were teachers of mathematics and the Ukrainian language who taught primary and secondary school students. The experimental part involved teachers who were undergoing the initial stage of postgraduate training, which made it possible to determine the effectiveness of postgraduate education from the implemented innovative approaches. Previously, the authors planned to involve an additional group of respondents who had already undergone retraining during the month. Such a difference could have affected the final results, which would not allow determining the role of interactive platforms in achieving specific results.

Methods

The development of approaches for the acquisition of postgraduate education skills in a distance format involved a comparison of the training programme and possible mechanisms for its practical improvement. The mechanisms of practical improvement were determined on the basis of the most favourable mechanisms for the implementation of practical activities, focusing on academic approaches (Paudel, 2021; Maré & Mutezo, 2021; Turnbull et al., 2021; Yates et al., 2021; Bembenutty, 2023; Patil et al., 2023). The interactive platforms were selected by testing 48 platforms for the possibility of their use among different numbers of people and the implementation of the developed approaches. The knowledge transfer within the distance format was implemented as a result of using the Nearpod platform. Postgraduate studies under the research conditions took place during two months.

The level of teachers' motivation achieved during postgraduate training was determined by summing up the results obtained from respondents and teachers who conducted training. The necessary information was obtained through the use of the Stapel scale, which made it possible to determine the level of respondents' learning motivation. The Stapel scale involved the use of a 5-point rating, where 5 corresponded to the greatest value. The level of self-motivation of the teachers who conducted the training was determined by assessing the respondents' interest in studying the material, the quality of its assimilation. The information transfer using the Stapel scale was implemented using electronic mailboxes. This approach contributed to the identification of all research participants. The motivation factor, which was developed by the authors of the article, was used for the calculations:

$$f^m = \frac{l^e + l^a + cr^{1/2}}{\varpi} \qquad (1)$$

l^e – the level of teachers' encouragement for deeper study of information;
l^a – the level of assimilation of information and the possibility of its use;
cr – the level of using creative skills to fulfil practical tasks;
ϖ – the general level of obtaining possible self-motivation (the maximum value is 7 points).

The observation method was used to reveal how the development of respondents' self-motivation influenced the improvement of their pedagogical skills. The observation provided for determining the approaches to the perception of educational material and its use. The final results were obtained through calculating the activity ratios:

$$\mathrm{c^a} = (s^{\mathrm{c}} \times \mathrm{l^s}) \times 0{,}5, \qquad (2)$$

s^c – the level of a separate self-motivation criterion;
l^s – the maximum coefficient of self-motivation.

The level of results obtained by the respondents through the use of interactive platforms was determined through calculating the obtained points. But first of all, it was foreseen to conduct open lessons by the

respondents, on the basis of which the level of professional skills was determined. Open lessons were conducted among primary and secondary school students.

Data analysis

Statistical analysis of the obtained results involved the use of the Sherman test (Valko & Osadchyi, 2021). It should be taken into account that if the values are lower than those in the table, the values are related to each other. The limit value, which was taken into account during the calculations, is 0.95. Mathematical and statistical analysis involved additional processing of the obtained results, focusing on methods of grouping, analysis of dynamics, etc. Statistical analysis was aimed at excluding random data. Statistical evaluation involved determining the interval where similar and different parameters were observed.

$$w_n = \frac{1}{2n}\frac{\sum_{i=1}^{n}|x_i-\bar{x}|}{\bar{x}}, \qquad (3)$$

n – the number of calculated indicators;
x_i – estimate of the initial value;
$\bar{x}$ –arithmetic mean.

Ethical criteria

Ethical norms required compliance with the established rules of postgraduate training, which were established by the university management. Ethical norms provided for the observance of equal conditions for all research participants, focusing on the established rights and obligations.

Results

The use of interactive platforms in the educational process is a common approach. Therefore, specific approaches to their use were identified to determine their role in the distance system of postgraduate education. The approaches were selected for postgraduate education of secondary school teachers (Figure 1).

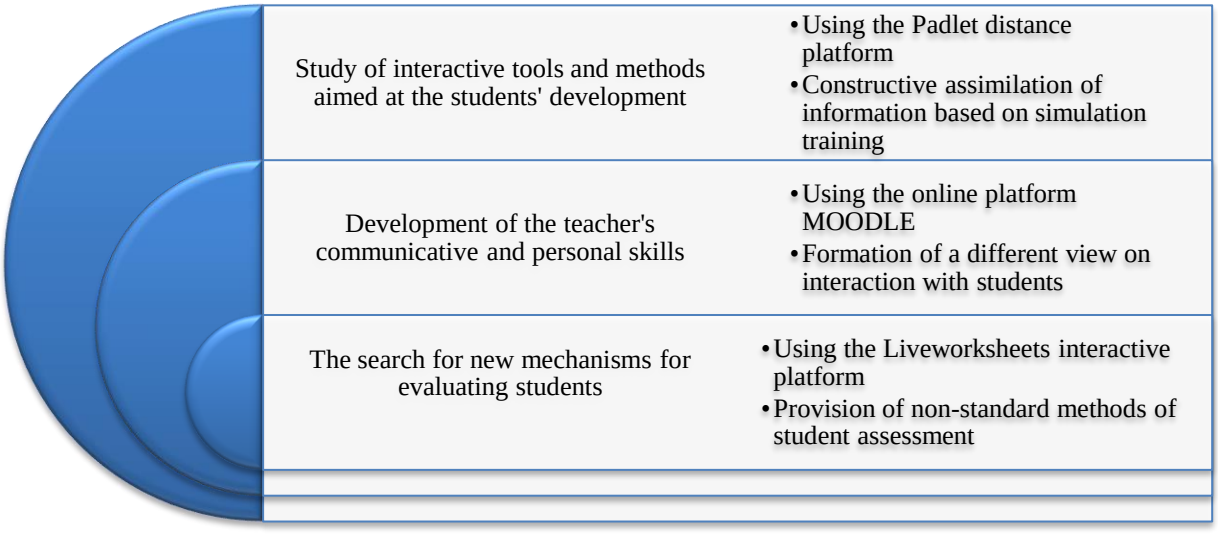

Figure 1. *Approaches to postgraduate studies using interactive platforms*

I. The first approach of post-graduate studies involved the study of interactive means and methods aimed at the students' development. This approach is aimed at developing students' interest, which will contribute to the fulfilment of non-standard tasks. The first approach to learning involved the use of the Padlet distance platform. This platform enables the creation and editing of educational information in various formats, which promotes the students' interest. With the help of Padlet, it is possible to ensure the creation of online games that will contribute to the study of new information. This approach to postgraduate studies is aimed at finding ways to implement educational activities. The training will be aimed at studying new passive and active methods of the educational process, which will contribute to the constructive assimilation of information. This teaching approach involved provision of stimulating learning, which contributes to the development of critical thinking and motivation to carry out professional activities. A positive value is formed as a result of full immersion in the process of creating interactive learning tools and methods.

II. The presentation of educational material, which depends on the development of the teacher's communication and personal skills, is of great importance in the teacher's pedagogical activity. The development of these skills involved the use of the MOODLE online platform, which facilitated online open lessons. Online lessons were conducted among teachers who were pursuing postgraduate education. This involved the presentation of various forms of work, the holding of master classes for teachers who do not have extensive teaching experience. The process provided for the development of personal skills, confidence skills, and communication skills, which are aimed at understanding approaches to providing information and interacting with students. This stage was aimed at implementing practical skills and achieving practical mastery. The creation of open lessons is related to the provision of meaningful psychological and pedagogical activities. Focusing on experienced teachers allows you to form a different perspective on interaction with students, which changes the standard learning trajectory.

III. It is necessary to ensure not only the evaluation of the memorized material, but also its understanding, the ability to master it in order to exclude the standard approach in testing students' knowledge. Therefore, the mechanisms of student evaluation were determined in the process of teacher retraining. The process involves the search for the use of non-standard methods of knowledge assessment, which can be manifested in the use of a game format, ensuring competition between students. This approach also motivates teachers to conduct non-standard training. For this purpose, the teacher needs to ensure the development of psychological skills, which contributes to the students' understanding. The teacher must have coordination skills, which ensures the correction of deficiencies in the studied material by students. The process also helps to find new teaching methods for a better understanding of a particular topic. This teaching approach is aimed not only at assessing the students' knowledge, but also at improving their competence as a result of developing mechanisms for the implementation of practical knowledge. The Liveworksheets interactive platform was used to develop student evaluation mechanisms.

After completing the post-graduate training, it was planned to determine the increase in the motivation of teachers who were improving their qualifications. The results involved taking into account the role of interactive platforms that were used during postgraduate training. The results were obtained at the beginning and at the end of the training, which involved the separate involvement of primary school, Ukrainian language, and mathematics teachers (Table 1).

Table 1.
Level of development of motivation of teachers who received postgraduate education

Groups of teachers	Beginning of postgraduate training	Completion of postgraduate training	Sherman test, 0.537 - table value
Primary school teachers	2.047	2.31	0.851
Ukrainian language teachers	2.054	2.23	0.793
Mathematics teachers	2.042	2.27	0.597

Completion of postgraduate training had a positive effect on teachers, which contributed to the development of self-motivation due to the use of distance platforms. Interactive technologies had a positive value for the practical use of previously acquired knowledge. The interactive platforms also contributed to the selection of non-standard mechanisms for their use, which promoted the development of creative skills. The process was aimed at developing independent skills in learning new materials, expanding professional and cognitive skills. The process was aimed at a deeper understanding of the materials, which allowed not only to develop pedagogical activity, but also research activity. The research activity is aimed at writing scientific articles, which requires variation with acquired knowledge and the use of creative approaches. This makes it possible to exclude the borrowing of other people's thoughts, the duplication of other people's material, and contributes to the creation of unique work. Self-motivation is related to the self-organization of teachers, which contributes to the development of new mechanisms for conducting classes. Self-motivation is based on awareness of approaches to the implementation of an educational task, focusing on specific algorithms developed by their own, rather than on existing ones. The beginning of post-graduate training was not characterized by a high level of motivation, as the traditional learning process did not involve an orientation to the depth of knowledge. The use of interactive platforms has opened up new opportunities for teachers, which is aimed at expanding their teaching skills.

The criteria were determined that reflected the development of self-motivation among teachers who underwent distance postgraduate studies (Figure 2).

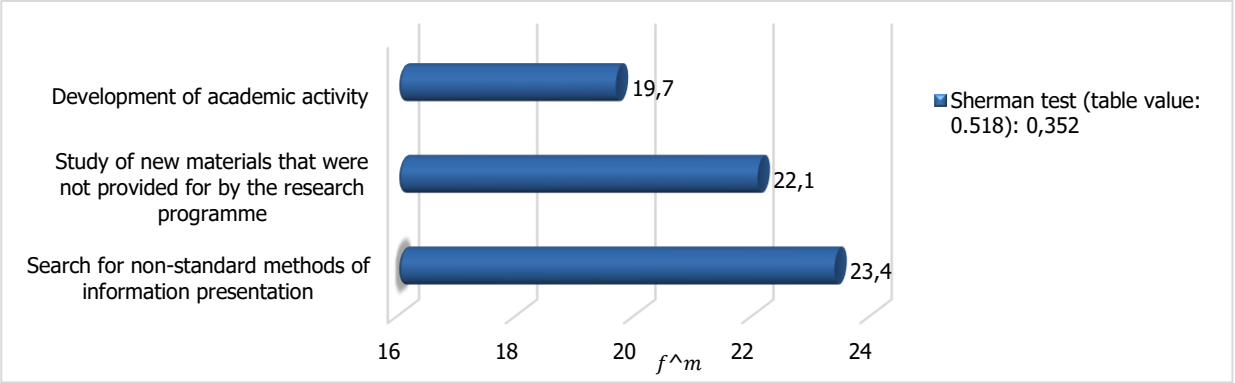

Figure 2. *Development of criteria for self-motivation of teachers who underwent postgraduate training*

Self-motivation of teachers during postgraduate training was manifested in the search for non-standard methods of presenting information, as well as in the study of new materials that were not provided by the research programme, the development of research activity. The established motivation criteria made it possible to expand the teachers' professional skills, which was also reflected in their professional activity. Self-motivation contributed to revealing teachers' potential opportunities based on professional and moral self-development. Self-motivation contributed to the development of creative skills, which was aimed at

developing classes that would motivate students to memorize the necessary materials. The use of the latest teaching approaches was aimed at ensuring individualization and practical orientation. It also expanded the possibility of participation in theoretical and practical seminars and conferences, contributed to the publication of manuals and academic articles.

After the teachers' post-graduate training, it was proposed to conduct an open lesson, which involved determining the results of distance learning using interactive platforms. The results of the acquired knowledge were determined based on the conducted open lesson (Table 2).

Table 2.
The level of teachers' professional competence during open lessons throughout postgraduate training

Teacher categories	High level	Medium level	Low level	Sherman test, 0.518 - table value
Primary school teachers	27 (68%)	15 (32%)	-	0.510
Ukrainian language teachers	24 (71%)	12 (29%)	-	0.527
Mathematics teachers	26 (64%)	19 (36%)	-	0.481

The analysis of the open lessons conducted by the teachers established that they were able to achieve mostly high and medium levels of knowledge. The obtained results are related to the use of remote platforms, which made it possible to provide non-standard delivery of educational materials. The teachers also had developed communication skills, which enabled the interaction between students and their answering the questions. The high results also reflected a deep variation in the acquired knowledge, which contributed to the students' interest in the perception of information. The teacher's introduction of new teaching methods had a positive effect on the educational process. This was also facilitated by the applied student evaluation mechanisms, which made them interested in achieving high results.

Discussion

The educational process should involve the interaction of social, cognitive, teaching aspects, which allows to reduce the feeling of students' isolation and ensure the achievement of their success. The results of the study showed that students who took additional classes with online tutors showed higher academic performance. This is explained by the use of effective student support programmes (Maré & Mutezo, 2021). Digital technologies can contribute to the development of game approaches in learning, which affects the understanding of spatial and conceptual knowledge (Konotop et al., 2022; Konotop et al., 2023). Digital games influence academic performance because they are based on the analysis of relevant behaviour patterns. This approach contributes to the development of logical thinking, which is manifested in the students' approach to pedagogical activity. This makes it possible to apply the studied theoretical material in practice, which contributes to the automation of the educational process (Hwang et al., 2023). The use of innovative technologies has a positive meaning in the educational process, as it is aimed at students' acquisition of hard and soft skills. This contributes to the increase in employment, which is manifested in creativity, leadership, innovation, stability, and organization. Innovative technologies were of particular importance for graduate students, which allowed to organize the educational process, to provide motivation to achieve a higher level of knowledge (Brennan et al., 2023). The presented works reflect the possibility of using interactive technologies in the educational process, which are aimed at the organization of education. In our article, the use of interactive technologies was aimed at provided comprehensive postgraduate education.

To implement professional training, it is necessary to focus on enhancing students' motivation by increasing their productivity. Postgraduate education should be aimed at determining the factors that contribute to motivation, increasing the students' independent work. The use of modelling approaches made it possible to provide targeted learning, which was reflected in the students' success (Afzal & Crawford, 2022). The training of graduate students should be based on the development of cognitive and social presence and the provision of informative support. It is also worth ensuring the availability of educational resources, interaction with other graduate students, which will allow to diversify the approaches to research activity. The educational process should be aimed at determining individual academic trajectories (Seymour, 2024). Postgraduate education should involve highly qualified teachers who can diversify the educational process. Professional development should be linked to planning processes that allow for the creation of a proper educational environment. Postgraduate education should be related to theoretical enrichment of the educational process, holding discussions (Lyckander, 2024). The presented works reflect the mechanisms of theoretical enrichment of the educational process to ensure the effectiveness of postgraduate education. In our article, emphasis was placed on the development of practical skills, which contributed to the development of students' self-motivation.

Postgraduate education provides students with in-depth knowledge, which allows for the development of analytical and imaginative thinking. This is reflected in ensuring a high level of student involvement, deep thoughts. Pedagogical strategies should be aimed at enriching professional value, taking into account the nature of the academic subject (Heath & Tynan, 2023). Academic training requires the use of digital libraries, which contributes to a deeper study of a particular topic. It is necessary to focus on updating materials for the effectiveness of training, which contributes to the active students' motivation to implement the educational process. This develops students' awareness of during postgraduate training (Misra et al., 2023). The development of academic skills in the context of postgraduate education should include the expansion of study programmes for the possibility of analysing the acquired knowledge. Training should also include an individual approach, which promotes obtaining professional knowledge. The learning process should also be convenient, which will enhance students' motivation (Fernandes, 2023).

Comparison of academic articles in our work made it possible to determine the necessity of forming a deep understanding of the material in the educational process. Our work is aimed at determining the mechanisms of distance learning in the postgraduate education of primary and secondary school teachers. The level of self-motivation of teachers who underwent postgraduate training and its influence on the development of professional competence was also determined.

Limitations

The limitations of this study are related to the focus on postgraduate training of primary and secondary school teachers, which precluded the involvement of other majors. Despite the presented limitations, the study revealed the mechanisms of training effectiveness and the influence of developed self-motivation on the development of professional skills.

Recommendations

The use of modern technologies significantly increases the effectiveness of the educational process and ensures a smooth learning process, regardless of the possible format — offline or online learning. Postgraduate training should be aimed at deeper assimilation of knowledge and development of professional competence. Therefore, the use of online platforms promotes gaining deeper knowledge. Such an approach may be reflected in the future development of students' interest in the perception of materials.

Conclusions

The aim of the article was achieved as a result of the primary development by the authors of the article of educational approaches for the implementation of distance learning of postgraduate training. The first teaching approach was related to the study of interactive means and methods aimed at the development of students. In accordance with this educational approach, it was planned to define non-standard mechanisms that contribute to the further interest of students. The approach became possible to implement as a result of the focus on the use of the Padlet interactive platform. The development of the teacher's communication and personal skills was aimed at ensuring interaction with students, studying ways of presenting educational information. The presented learning approach was implemented as a result of using the MOODLE application. Student evaluation mechanisms were also given attention during postgraduate training, the development of which involved the use of the Liveworksheets interactive platform. This approach to postgraduate training made it possible to significantly increase the level of self-motivation of teachers who underwent postgraduate training. After completing postgraduate training, primary school teachers had a level of self-motivation of 2.31, Ukrainian language – 2.23, mathematics – 2.27.

The aim of the article was achieved through the educational approaches developed by the authors of the article for the implementation of distance postgraduate training. The first teaching approach was related to the study of interactive means and methods aimed at the students' development. In accordance with this educational approach, it was planned to define non-standard mechanisms that contribute to the further students' interest. The approach was implemented as a result of the focus on the use of the Padlet interactive platform. The development of the teacher's communication and personal skills was aimed at ensuring interaction with students, studying ways of presenting educational information. The presented learning approach was implemented by using the MOODLE application. Student evaluation mechanisms were also given attention during postgraduate training, involving the use of the Liveworksheets interactive platform. This approach to postgraduate training made it possible to significantly increase the level of teachers' self-motivation who underwent postgraduate training. After completing postgraduate training, primary school teachers had a level of self-motivation of 2.31, Ukrainian language – 2.23, mathematics – 2.27.

It was established that the development of teachers' self-motivation contributed to the search for non-standard methods of presenting information (23.4). It was also reflected in the study of new materials to ensure in-depth learning (22.1), the development of research activity (19.7). It was found that the teachers who underwent postgraduate training achieved mostly high level of professional competence. Primary school, Ukrainian language, and mathematics teachers were able to effectively conduct open lessons, which was manifested in their professional competence.

The practical significance of the study lies is the possibility of practical use of the presented interactive platforms to ensure teachers' postgraduate training. Research prospects may be related to the study of the benefits of distance learning using various interactive platforms for post-graduate training of specialists in various professional fields.

Bibliographic References

Afzal, F., & Crawford, L. (2022). Student's perception of engagement in online project management education and its impact on performance: The mediating role of self-motivation. *Project Leadership and Society*, *3*, 100057. https://doi.org/10.1016/j.plas.2022.100057

Ang, K.C.S., Afzal, F., & Crawford, L.H. (2021). Transitioning from passive to active learning: Preparing future project leaders. *Project Leadership and Society*, *2*, 100016. https://doi.org/10.1016/j.plas.2021.100016

Bembenutty, H. (2023). Self-regulated learning and technology among teacher candidates. *New Directions for Teaching and Learning*, *2023*(174), 33-40. https://doi.org/10.1002/tl.20546

Brahic, B.A.M., Miao, S., Webb, S.J., & Harvey, A.G. (2024). Reflexive, relevant and interactive: A STEM student-centred pedagogical approach for responsible research and innovation (RRI) training in higher education. *Research in Science and Technological Education*, 1-20. https://doi.org/10.1080/02635143.2023.2296430

Brennan, A., Dempsey, M., McAvoy, J., O'Dea, M., O'Leary, S., & Prendergast, M. (2023). How COVID-19 impacted soft skills development: The views of software engineering students. *Cogent Education*, *10*(1), 2171621. https://doi.org/10.1080/2331186X.2023.2171621

Chovriy, S., Pelekh, V., Rogoza, V., Zorochkina, T., & Zdir, D. (2024). Organization of a STEM-oriented environment in higher education institutions. *Amazonia Investiga, 13*(76), 333-347. https://doi.org/10.34069/AI/2024.76.04.27

Cui, T., & Wang, J. (2023). Empowering active learning: A social annotation tool for improving student engagement. *British Journal of Educational Technology*, *55*(2), 712-730. https://doi.org/10.1111/bjet.13403

Dyka, N., Tretiak, O., Horobets, S., Yakunin, Y., Shopina, M., & Tsybulska, S. (2023). The impact of digitalization of education on the development of key teacher competencies. *Revista De La Universidad Del Zulia*, *14*(41), 187-205. https://doi.org/10.46925//rdluz.41.10

Fernandes, M.T. (2023). Interdisciplinary extension program in teaching: Challenges, possibilities, and unexpected situations. *Acta Scientiae*, *25*(6), 396-423. https://doi.org/10.17648/acta.scientiae.7983

Heath, T., & Tynan, C. (2023). "We want your soul": Re-imagining marketing education through the arts. *European Journal of Marketing*, *57*(10), 2808-2837. https://doi.org/10.1108/EJM-04-2022-0293

Heath, T., Moufahim, M., & O'Malley, L. (2023). Critical and creative marketing pedagogies: Confronting rhetoric, addressing inequality, inspiring change. *Journal of Marketing Management*, *39*(1-2), 1-7. https://doi.org/10.1080/0267257X.2023.2187539

Hwang, G.J., Lin, Y.C., & Lin, H.C. (2023). Associating spatial knowledge with concept maps to facilitate learning in digital gaming contexts. *Educational Technology Research and Development*, *71*(6), 2221-2241. https://doi.org/10.1007/s11423-023-10274-5

Konotop, O., Bondar, O., Terletska, L., Kyrychenko, S., & Ovsyanko, G. (2022). Methods of using digital technologies for the development of students' listening comprehension strategies in higher educational institutions. *Journal for Educators, Teachers and Trainers, 13*(3), 247-259. https://doi.org/10.47750/jett.2022.13.03.024

Konotop, O., Bykonia, O., Bondar, O., Shevchenko, Y., & Korobeinikova, T. (2023). Effectiveness of generative learning strategies in independent study of English using mobile technologies. *Revista Eduweb, 17*(3), 160-181.

Lin, H.C., Hwang, G.J., Chou, K.R., & Tsai, C.K. (2023). Fostering complex professional skills with interactive simulation technology: A virtual reality-based flipped learning approach. *British Journal of Educational Technology*, *54*(2), 622-641. https://doi.org/10.1111/bjet.13268

Lui, R.W.C., Zhang, A.W.Y., & Lee, P.T.Y. (2024). A secure and scalable virtual lab platform for computing education. *International Journal of Information and Education Technology*, *14*(1), 59-64. https://ra.lib.hksyu.edu.hk/jspui/handle/20.500.11861/8991

Lyckander, R.H. (2024). Exploring vocational teacher preparation in Norway: A study of dimensions and differences in vocational teacher learning. *Journal of Vocational Education and Training*, *76*(1), 64-86. https://doi.org/10.1080/13636820.2021.2007985.

Lyckander, R.H., & Spetalen, H. (2022). Qualifying vocational teachers for work in school: Two different study pathways, equally prepared for the teaching profession? *Acta Didactica Norden*, *16*(1), 19. https://doi.org/10.5617/adno.9206

Maré, S., & Mutezo, A.T. (2021). The effectiveness of e-tutoring in an open and distance e-learning environment: Evidence from the university of South Africa. *Open Learning*, *36*(2), 164-180. https://doi.org/10.1080/02680513.2020.1717941

McAvoy, J., Creed, A., Cotter, A., Merriman, L., O'Reilly, Ph., Dempsey, M., & Brennan, A. (2022). Investor decision making: An investigation of the modality effect. *Journal of Decision Systems*, *32*(1), 242-263. https://doi.org/10.1080/12460125.2021.2023256

Misra, P., Chopra, G., & Bhaskar, P. (2023). Continuous usage intention for digital library systems among students at higher learning institutions: Moderating role of academic involvement. *Journal of Applied Research in Higher Education*, *15*(5), 1752-1766. https://doi.org/10.1108/JARHE-06-2022-0185

Murillo-Ligorred, V., Ramos-Vallecillo, N., Covaleda, I., & Fayos, L. (2023). Knowledge, integration and scope of deepfakes in arts education: The development of critical thinking in postgraduate students in primary education and master's degree in secondary education. *Education Sciences*, *13*(11), 1073. https://doi.org/10.3390/educsci13111073

Mutezo, A.T., & Maré, S. (2023). Teaching and cognitive presences: The mediating effect of social presence in a developing world context. *Cogent Education*, *10*(1), 2171176. https://doi.org/10.1080/2331186X.2023.2171176

Naidoo, J., & Reddy, S. (2023). Embedding sustainable mathematics higher education in the fourth industrial revolution era post-COVID-19: Exploring technology-based teaching methods. *Sustainability*, *15*(12), 9692. https://doi.org/10.3390/su15129692

Nungu, L., Mukama, E., & Nsabayezu, E. (2023). Online collaborative learning and cognitive presence in mathematics and science education. Case study of university of Rwanda, college of education. *Education and Information Technologies*, *28*(9), 10865-10884. https://link.springer.com/article/10.1007/s10639-023-11607-w

Patil, S.R., Patil, A.S., & Patil, A.R. (2023). Effectiveness of emotional intelligence among postgraduate management and engineering students. *Journal of Engineering Education Transformations*, *37*(1), 181-188. https://doi.org/10.16920/jeet/2023/v37i1/23143

Paudel, P. (2021). Online education: Benefits, challenges and strategies during and after COVID-19 in higher education. *International Journal on Studies in Education*, *3*(2), 70-85. https://doi.org/10.46328/ijonse.32

Seymour, M. (2024). Enhancing the online student experience through the application of universal design for learning (UDL) to research methods learning and teaching. *Education and Information Technologies*, *29*(3), 2767-2785. https://doi.org/10.1007/s10639-023-11948-6

Singhal, R., Kumar, A., Singh, H., Fuller, S., & Gill, S.S. (2020). Digital device-based active learning approach using virtual community classroom during the COVID-19 pandemic. *Computer Applications in Engineering Education*, *29*(5), 1007-1033. https://doi.org/10.1002/cae.22355

Skaik, S., & Tumpa, R.J. (2021). A case study of the practical implications of using interactive technology in teaching international postgraduate students. *Contemporary Educational Technology*, *14*(1), ep335. https://doi.org/10.30935/cedtech/11372

Spanjaard, D., Garlin, F., & Mohammed, H. (2022). Tell me a story! Blending digital storytelling into marketing higher education for student engagement. *Journal of Marketing Education*, *45*(2), 167-182. https://doi.org/10.1177/02734753221090419

Turnbull, D., Chugh, R., & Luck, J. (2021). Transitioning to e-learning during the COVID-19 pandemic: How have higher education institutions responded to the challenge? *Education and Information Technologies*, *26*, 6401-6419. https://doi.org/10.1007/s10639-021-10633-w

Valko, N.V., & Osadchyi, V.V. (2021). Teaching robotics to future teachers as part of education activities. *Journal of Physics: Conference Series*, *1946*(1), 012016. https://iopscience.iop.org/article/10.1088/1742-6596/1946/1/012016/meta

Yates, A., Starkey, L., Egerton, B., & Flueggen, F. (2021). High school students' experience of online learning during Covid-19: The influence of technology and pedagogy. *Technology, Pedagogy and Education, 30*(1), 59-73. https://doi.org/10.1080/1475939X.2020.1854337

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.4
Cómo citar:
Novak, I., Butsyk, I., Hetman, Y., Norenko, I., & Derevianko, D. (2024). The role of smart technologies in maintaining student motivation during distance learning. *Revista Eduweb*, 18(2), 63-76. https://doi.org/10.46502/issn.1856-7576/2024.18.02.4

The role of smart technologies in maintaining student motivation during distance learning

El papel de las tecnologías inteligentes en el mantenimiento de la motivación de los estudiantes durante el aprendizaje a distancia

Ilona Novak
https://orcid.org/0000-0002-3809-3797
Department of Foreign Languages, KROK University, Kyiv, Ukraine.
Ihor Butsyk
https://orcid.org/0000-0002-3105-2802
Department of Pedagogy, National University of Life and Environmental Science of Ukraine, Kyiv, Ukraine.
Yuliia Hetman
https://orcid.org/0000-0002-9501-3888
Department of English Philology, H.S. Skovoroda Kharkiv National Pedagogical University, Kharkiv, Ukraine.
Iryna Norenko
https://orcid.org/0000-0003-1224-7513
Department of the Innovative Technologies in Psychology, Pedagogy, and Social Work, Alfred Nobel University, Dnipro, Ukraine.
Denys Derevianko
https://orcid.org/0000-0002-8086-951X
Department of the Educational and Socio-Cultural Management and Social Work, Bohdan Khmelnytsky National University of Cherkasy, Cherkasy, Ukraine.

Recibido: 28/04/24
Aceptado: 11/06/24

Abstract

Smart technologies are a common element of education, which have a positive impact on the organization of education, its efficiency, and the possibility of self-control. The aim of the study is to determine the role of smart technologies in the distance learning to maintain student motivation. The aim was achieved through the use of the methods of observation and analysis, calculations of the coefficient of oscillation, the coefficient of variation, and Spearman's rank coefficient. Learning mechanisms provided for acquiring language knowledge, develop the consecutive interpreting skills, and master formal and informal communication styles. It was established that such learning mechanisms after the study enhanced students' motivation of 82% for distance learning. Before the study, a high level of motivation was observed among only 21% of students. The results of the Stapel Scale showed that smart technologies (1.0) had the greatest impact on students' motivation, which is related to the continuity of learning. The learning process had also the greatest impact on students' dynamic adaptation (2.25). The conducted research is important for the development of students' professional foreign language skills and enhancement of their

motivation through the use of smart technologies during distance learning.

Keywords: meaningful learning, online platforms, person-oriented learning, students' purposefulness, rational thinking.

Resumen

El objetivo del estudio es determinar el papel de las tecnologías inteligentes en la educación a distancia para mantener la motivación de los estudiantes. El objetivo se logró mediante el uso de métodos de observación y análisis, cálculos del coeficiente de oscilación, el coeficiente de variación y el coeficiente de rango de Spearman. Se proporcionan mecanismos de aprendizaje para adquirir conocimientos lingüísticos, desarrollar las habilidades de interpretación consecutiva y dominar los estilos de comunicación formal e informal. Se estableció que dichos mecanismos de aprendizaje después del estudio aumentaron la motivación de los estudiantes en un 82% para el aprendizaje a distancia. Antes del estudio, sólo se observaba un alto nivel de motivación entre el 21% de los estudiantes. Los resultados de la Escala Stapel mostraron que las tecnologías inteligentes (1.0) tuvieron el mayor impacto en la motivación de los estudiantes, lo que se relaciona con la continuidad del aprendizaje. El proceso de aprendizaje también tuvo el mayor impacto en la adaptación dinámica de los estudiantes. La investigación realizada es importante para el desarrollo de las habilidades profesionales en lenguas extranjeras de los estudiantes y la mejora de su motivación mediante el uso de tecnologías inteligentes durante el aprendizaje a distancia.

Palabras clave: aprendizaje orientado a la persona, aprendizaje significativo, determinación del estudiante, pensamiento racional, plataformas en línea.

Introduction

The transition from traditional to interactive learning is determined not only by the technological progress, but also by social changes (the COVID-19 pandemic, the instability of the political situation, military conflicts, etc.). The effectiveness of smart-technologies implies the high-quality perception of educational information in the classroom and beyond, which is positive for distance learning. Smart technologies during distance learning help to provide personalized learning, comprehend the provided information, ensure its visual perception, and activate thinking (Raza & Khan, 2022). Therefore, the features of Smart technologies is a relevant issue that contributes to ensuring a higher quality learning process.

The use of smart technologies during distance learning is common, as they provide a self-directed, adaptive, technological learning process. This is positive for providing the necessary resources to learn the material, which affects student motivation (Cavus et al., 2022). Distance learning is based on the principles of openness, which involves the use of interactive technologies to provide a learning environment. Distance learning differs from the traditional approach to the presentation of material, lack of a single classroom space, direct interaction with the teacher and other students. The process of distance learning should be associated with flexibility, the use of available technologies, social equality, which ensures the same conditions for the perception of educational material (Konovalenko et al., 2023). In the context of distance education the teacher provides not only the preparation of material for study, but also coordinates the educational process. The teacher must constantly improve the educational material, apply creative skills to maintain student motivation (Ihnatova et al., 2022). A high quality of distance learning must be ensured, which contributes to specialized control over compliance with the educational standards. A properly organized learning process should be aimed at ensuring the conscious perception of information by students, maintaining their motivation, and meeting the deadlines.

Smart technologies contribute to continuous learning and ensure the simultaneous involvement of the

entire group in the lesson. Visual perception of information with the help of modern technologies allows processing more information, which affects the activation of students' creative potential, their thinking (Krasulia et al., 2022). It is also possible to deviate from one format of information presentation with the help of modern technologies, which provides an author's approach to designing training. This approach to learning enables choosing one's own pace of learning, which affects the overall quality (Metruk, 2022). Focusing on students' independent work allows for a meaningful perception of information, which contributes to the search for creative approaches to learning. However, the disadvantages of distance learning can be related to the complexity of control and organization of group work, problems with access to information, lack of student motivation (Petchamé et al., 2023a). Therefore, it is necessary to provide a clear and balanced organization of the educational process, which enables minimizing possible problems.

The study of the theoretical aspects of the presented topic revealed that the advantages of smart technologies in distance learning are a common issue. But the analysis of the advantages of smart technologies is not related to specific types of interactive works that can be used in a separately organized training programme. The aim of the work is to determine the importance of smart technologies for maintaining students' motivation during distance learning.

The aim involved the fulfilment of the following research objectives:

- Develop distance learning mechanisms using smart technologies for future foreign language teachers;
- Determine the level of students' motivation for distance learning;
- Identify of the factor that had the greatest impact on enhancing students' learning motivation;
- Determine the skills that students have developed during their studies focusing on the role of smart technologies.

Literature Review

Smart technologies contribute to the provision of smart education, which is reflected in professional training. Their effectiveness is related to mobile access, the possibility of presenting new information. Achieving high results is also possible through process automation, real-time data collection, and self-organization ability. Self-analysis of one's knowledge allows to achieve higher results and take into account the gaps in the acquired knowledge on a separate topic (Dmitrenko et al., 2023). Smart technologies facilitate joint learning, which is of particular importance during the COVID-19 pandemic and provides interpersonal communication. Smart technologies contribute to a better understanding of educational topics during online learning, affect students' academic performance and satisfaction. This is related to the possibility of providing support to the students, which facilitates the learning of the educational materials and academic quality of education (Abuhassna et al., 2023). Digital pedagogical methods are one of the important tools for distance learning. It was established that students' motivation to use digital technologies is related to the development of personal skills, understanding the value of learning, and providing remote communication. Online learning can also be more effective than traditional learning because it focuses on dealing with critical moments in understanding a particular topic. Interaction with other students and teachers is important in online learning (Giovannella, 2022).

Higher education is being transformed under the influence of modern technologies, which contribute to distance learning. Modern technologies enable an extended study of information for education due to the use of secondary sources. Modern technologies also contribute to personalized learning and the development of independence. On the other hand, the teacher acts as a mentor, who focuses on individual learning models. The use of modern technologies by educational institutions contributes to the professionalization of the educational process and its high-quality organization (Sułkowski, 2021). Smart technologies make it possible to ensure the digital transformation of the educational process, which is connected with the information perception. Their positive impact on students is related to the provi sion of

personalized learning, which helps to reveal the potential of each student. Smart technologies also influence the monitoring of the learning progress of each student, which forms their independence (Lorenzo & Gallon, 2018). Mobile technologies facilitate access to library and information resources, as they automate the information search. They also help to find current and new information that satisfies students' needs. Systematization of information is important, which contributes to better learning (Ashiq et al., 2023).

Information and communication technologies have a positive effect on improving the students' intellectual abilities, which contributes to their qualitative processing. This approach also affects the qualitative learning of the material and the development of practical skills. Effectiveness is associated with meaningful inclusion in the subject and study of quality content that is directly related to the learning process. But the effectiveness of learning should be based on the absence of a gap between theoretical knowledge and practical skills (Kokaj et al., 2023). Multimedia technologies help to control the quality of the educational process. However, access to diverse materials can lead to obtaining incorrect information, which can result in low effectiveness. The teacher should monitor the quality of the provided information, focusing on the flexibility, technological ability, and self-organization principles. The effectiveness of learning depends on the gradual complication of the materials, completed tasks, which leads to an increased rating indicators (Li et al., 2023). A virtual learning format can be provided through the use of Bipolar Laddering. The application is aimed at improving the organization of learning and promoting interaction between students. The application also promotes compliance with the technical aspects of learning, which is associated with attending classes (Petchamé et al., 2023b).

The analysis of the academic papers determined the advantages of smart technologies in the educational process. However, there is no definition of specific mechanisms of their use in the educational process for the organization of distance learning.

Methods

Research design

The first stage of the study involved the development of distance learning mechanisms to determine the role of smart technologies in enhancing students' motivation. The development of mechanisms was aimed at training future foreign language teachers. The learning mechanisms were aimed at enhancing students' motivation in learning and the possibility of using various smart technologies. The learning mechanisms were aimed at ensuring the specifics of the distance learning process. The training covered the period of for 6 months in 2023.

The second stage of the study provided for determining the level of students' motivation for the presented format of distance learning. The results were compared before and after the study, which involved determining the level of students' motivation or lack of motivation. Their neutral attitude to such a learning process was also determined. The element of education which was most important for ensuring positive students' motivation was also identified at this stage.

The third stage of the research programme aimed at identifying the skills developed in students during the research. The identification of skills was associated with a positive influence on the development of foreign language competence.

Sampling

The research involved 137 students who were studyin g to be future foreign language teachers. Students studied at KROK University of Economics and Law, Skovoroda Kharkiv National Pedagogical University,

National University of Life and Environmental Sciences of Ukraine, Alfred Nobel University. The students were selected in terms of the same foreign language competence and being engaged in distance or blended (classroom and distance) learning within one year. The study involved only third-year students in order to compare learning motivation before and after the study. Students of the same year of study were involved in the study in order to prepare the same tasks in the educational process. This approach was aimed at ensuring equal conditions for all respondents.

Methods

It was planned to make an initial analysis of university curricula in order to develop learning mechanisms. The need for curricula analysis was related to the identification of smart technologies that can be applied in education and for selecting ways to develop mechanisms. The choice of smart technologies was aimed at the possibility of providing distance learning, which contributed to the study of a foreign language programme. Focusing on these requirements for smart technologies, 20 applications were excluded because their functions did not contribute to conducting online classes. The choice of smart technologies also involved taking into account the relevance of tasks and video lectures to the training programme.

Determining students' motivation involved the use of the Stapel Scale for obtaining a specific answer to a particular question. The Stapel Scale was also used to determine the indicators that, according to the students, had the greatest positive impact on the learning process. According to the Stapel Scale, students were required to assign points from 0 to 1 to each indicator. This approach excluded students' doubts and contributed to obtaining an accurate answer. The use of e-mail facilitated data collection and confirmed the answers of each respondent. The level of student learning motivation was presented as a percentage. The selection of the most influential indicators in education for the formation of positive students' motivation involved an additional calculation of the oscillation coefficient in order to exclude falsified results (Cavus et al., 2022).

$$\rho = \frac{R_x}{x}, \qquad (1)$$

x – conditional value of a separate indicator of influence, which was obtained on the basis of data from students;
R_x – an indicator of the variation of a conditional random variable (the value that reflects the maximum set estimate).

Determining the level of acquired skills of students involved the use of a general theoretical analysis method. This approach made it possible to determine progress in students' education, their perception and processing of educational information. The coefficient of variance developed by the authors of the article was calculated to obtain the final result:

$$c_{var} = \frac{y_p + y_{pr}}{p_a}, \qquad (2)$$

y_p – a score for the most pronounced skill developed in students;
y_{pr} – prevalence of the most pronounced skills over the least pronounced skills;
p_a – a score for the possibility of applying the acquired abilities for fulfilling non-standard tasks.

Data analysis

The statistical analysis of the data was aimed at ensuring the qualitative organization of the research, which contributed to the confirmation of the obtained results and a more detailed analysis. A statistical calculation of the Spearman coefficient was carried out in order to confirm the qualitative analysis of the

established data (Oyetade et al., 2020). Statistical calculation determined the distance of some indicators relative to others. The calculation of the Spearman coefficient was carried out to compare the level of students' motivation before and after the study in order to determine the influence of indicators that contributed to an effective educational process. A statistical calculation was also carried out to determine the level of particular skills developed by students during training.

$$r_s = 1 - \frac{6\sum_i d^2}{N(N^2-1)}, \qquad (3)$$

N – the number of indicators for calculation;
d^2 – the square of the differences between the indicators, which depends on the serial number and is related to tabular data.

Ethical criteria

The study was conducted in accordance with the ethical criteria of the Committee on Publication Ethics (Committee on Publication Ethics, 2021). This approach made it possible to exclude the conflict of interests of the authors and contributed to ensuring the same conditions of study and data collection for all students.

Results

Determining the role of smart technologies in maintaining student motivation during distance learning provided for the primary development of learning mechanisms. This excluded the abstract definition of the advantages or disadvantages of smart technologies and was based on particular examples. The first stage of the research consisted in the development of distance learning mechanisms for future foreign language teachers (Figure 1).

Figure 1. Mechanisms for distance learning of future foreign language teachers using smart technologies.

The distance learning process involved the general transfer of information through the Webex online platform. The platform became the basis for conducting lectures and practical classes. It was also used for recording the lectures for the possibility of reproducing the educational material outside of classes. During training, the Webex platform provided for the exchange of educational materials, which was used as an interactive whiteboard. Distance learning using the Webex platform provided the possibility of group work, voting or raising hands as in a regular classroom. The learning process also involved the use of notes for further discussion of a particular issue. The learning process was intended for the *acquisition of language skills*. This stage of learning consisted of studying grammar and vocabulary. Learning provided for studying information with a teacher, as well as independently. The learning process was ensured through the use of engVId and LingQ applications. In addition to the teacher's materials, the learning process involved the use of additional lectures from digital applications. The engVId application facilitates the use of video lessons, focusing on a certain topic of classes. These video lessons are aimed at increasing the initial level of knowledge. Additional educational materials were received using the LingQ platform, which enabled focusing on text (audio) materials for studying a particular topic. Digital applications helped in the study of parts of speech, different tenses (from the Simple, Continuous, Perfect and Perfect Continuous groups). The learning process also provided for the construction of sentences, focusing on the sequential combination of words.

The development of consecutive translation skills is important for learning a foreign language, as it is aimed at understanding the read or heard text. The learning process was based on group work, which involved familiarization with the text for further translation. The Webex online platform facilitated group learning, which allowed teachers to monitor the quality of the text translated by students. The vocabulary was enriched through the use of Loyal books smart technology, which helps to enrich the vocabulary based on electronic (audio) books. Oral and written translation of the text from Ukrainian to English and vice versa was provided during the training.

The development of formal and informal communication styles was also an integral part of training, which involved the acquisition of professional skills. The learning process was aimed at academic study of the English language, as well as informal approaches to communication. Communication was built using the Webex online platform. The training also involved the selection of the most informative topics, their diversity, aimed at the development of practical competence and emotional satisfaction. The BeeSpeaker application was used for overcoming the language barrier due to the formation of correct pronunciation based on the capabilities of the programme.

The developed learning mechanisms were aimed at building professional speaking skills and enhancing students' motivation. The level of students' motivation before and after training was determined using the Stapel Scale (Figure 2).

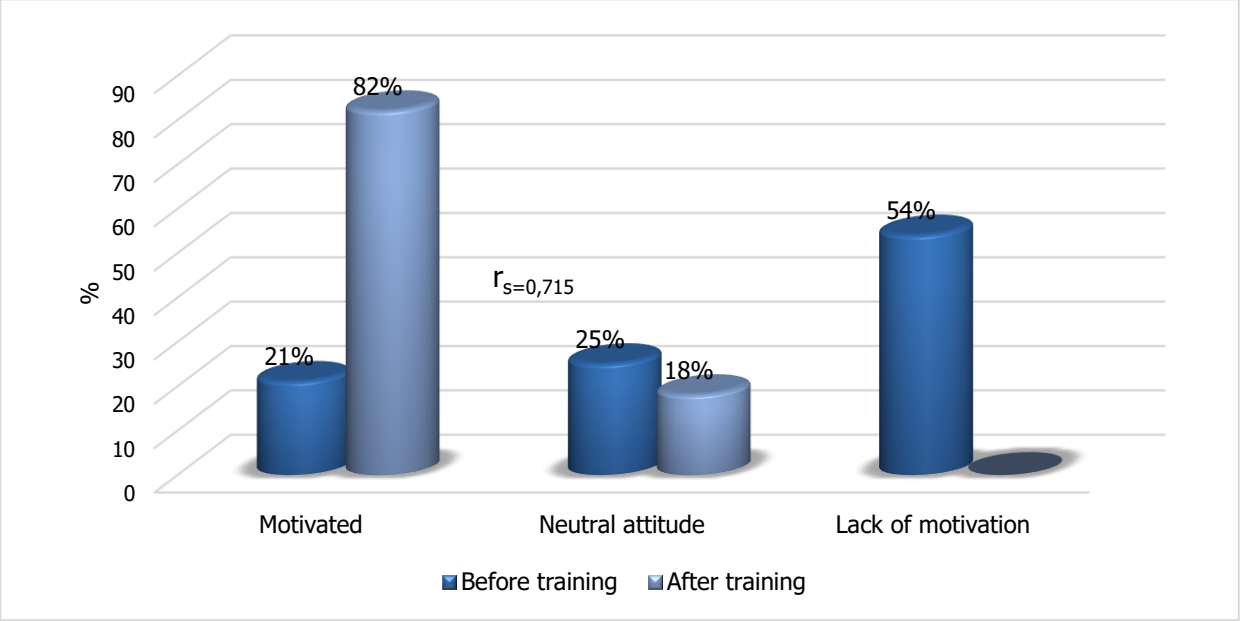

Figure 2. The level of students' motivation for distance learning

It was established that the use of smart technologies contributed to increasing the level of student motivation. The results before and after training differ significantly, which is explained by the use of different applications that are aimed at forming a separate professional skill. The high students' motivation was associated with the constant improvement of knowledge, which involved the performance of various tasks. The learning process also contributed to the development of professional and situational communication skills, which influenced the level of foreign language competence. Students' motivation was also related to a clearly organized learning process, which allowed for a meaningful approach to the study of the topic. This contributed to increasing the efficiency of independent work, which affected the development of students' thinking. An important role was also played by remote access to materials, which contributed to their additional study during the preparation of homework. For students who later wanted to continue their postgraduate studies, the use of smart technologies was of little importance for the development of research activities. This made it possible to build creative skills and develop logical thinking.

The students' neutral attitude towards the presented educational approach was associated with the lack of normal communication as in the classroom. However, these students confirmed that the learning process was clearly balanced, which made it possible to achieve the desired level of knowledge.

A significant part of the students was not motivated in learning before the study. The reason is that the use of a single online platform, e-mail, and messengers did not contribute to the acquisition of professional knowledge. This approach also influenced the need for self-study.

The objectives of the research were also to determine which factor had the greatest influence on the formation of positive students' motivation towards the educational process (Table 1).

Table 1.
Determining the factor that had the greatest impact on students' learning motivation

Impact factor	Digital superiority of impact factors	Comparison using the Spearman coefficient				
		Smart technologies	Personalized learning	Diversity of the educational process	Work in groups	Other
Smart technologies	1.0	-	0.953	0.716	0.683	0.937
Personalized learning	0.81	0.953	-	0.904	0.921	0.950
Diversity of the educational process	0.83	0.716	0.904	-	0.862	0.844
Work in groups	0.75	0.683	0.921	0.862	-	0.871
Other	0.62	0.937	0.950	0.844	0.871	-

It was established that the use of smart technologies had the greatest impact on the formation of positive students' motivation. The positive value of smart technologies is related to the provision of continuous learning. This helps to study and consolidate the material not only during classes, but also during the preparation of homework. The students were also able to perform various exercises with the help of Smart technologies to improve their professional level.

The diversity of the educational process also had an impact on student motivation, as it contributed to immersion in the informational and educational environment. Diversity in education contributed to the generalization of knowledge, focusing on modern educational concepts. Personalized learning was associated with the performance of various tasks according to the level of students' knowledge, which contributed to their improvement. Personalized learning is aimed at acquiring cognitive skills, which contributes to the acquisition of more professional knowledge.

Working in groups also contributed to motivation, which made it possible to focus on the level of knowledge of different students. It also made it possible to expand professional knowledge, focusing on other experiences. Other answers were related to the use of video conferences, certain smart technologies, etc., which contributed to learning the educational material. This ensured orientation towards the set goal, realization of educational skills.

At the third stage of the research, the skills that were acquired by students during their studies as a result of using smart technologies were determined (Figure 3).

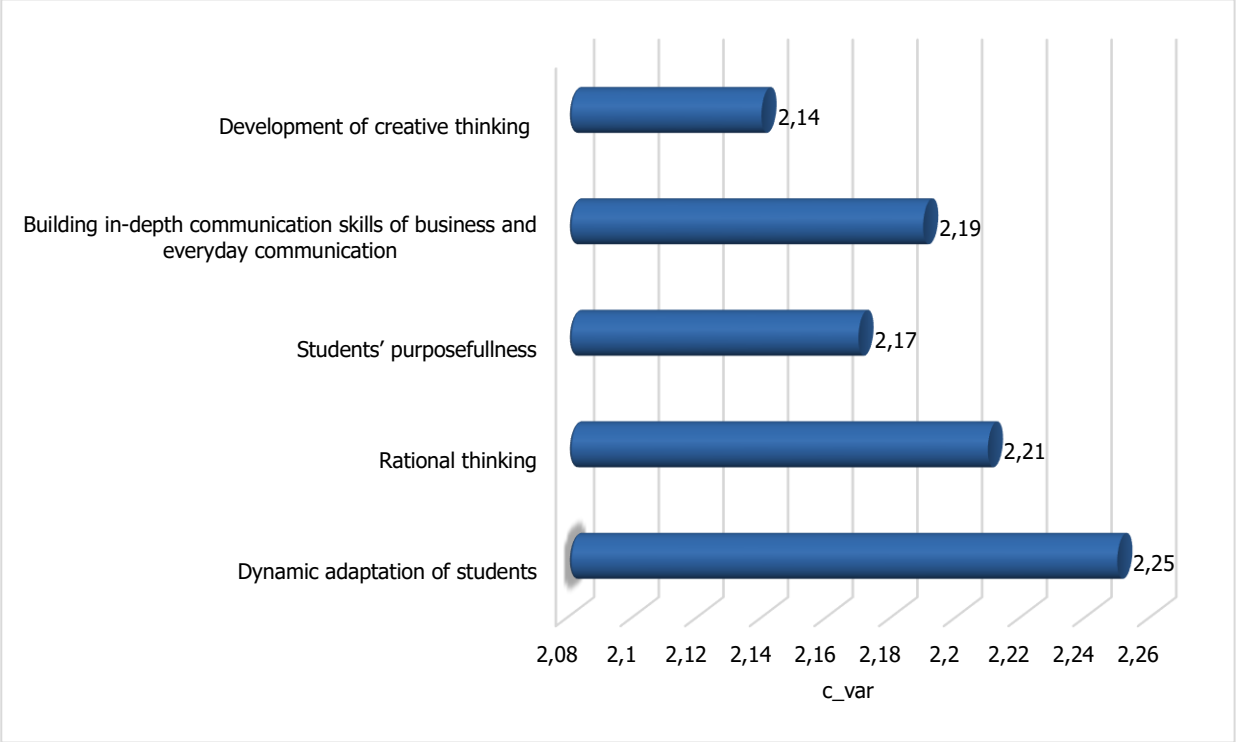

Figure 3. Skills that were acquired by students in the process of learning with the use of smart technologies

It was established that smart technologies also had a positive value for the development of various learning skills, which contributed to the study of the subject. Dynamic adaptation of students was associated with flexibility in the perception of new tasks or smart technologies. This made it possible to perform the assigned tasks with high quality in order to consolidate the necessary knowledge. It also had an impact on the students' involvement in the development of professional knowledge.

Rational thinking was associated with improved foreign language skills, facilitating the performance of tasks of higher complexity. This was reflected in the logical perception of information, which contributed to the clarity of tasks.

Student purposefulness was associated with increased productivity, which contributed to additional study of educational materials. The search for materials was facilitated by smart technologies used in education.

The formation of in-depth communication skills of business and everyday communication was connected with the provision of quality education. This allowed students to communicate on various topics using professional vocabulary.

The development of creative thinking is associated with non-standard perception and display of information, which influenced the achievement of high results and professional knowledge.

Discussion

The obtained results are related to the determination of the positive value of smart technologies for the development of student motivation in distance learning. This was achieved as a result of remote classes using the Webex online platform, which was also used as an interactive whiteboard. The acquisition of

language skills was related to the development of writing skills, the accuracy of sentence construction, and involved the use of the engVId and LingQ applications. The smart application Loyal books was used to develop the sequential translation skills, which contributed to the understanding of the read or heard text. The BeeSpeaker application was used to develop formal and informal communication styles, which helped to overcome the language barrier.

The analysis of recent publications showed the difference in the obtained data. It is necessary to ensure the students' motivation to perceive information during the educational process. Modern technologies contribute to the expansion of educational opportunities for formal or alternative education. With the help of modern technology, it is possible to provide a deeper understanding of the theoretical material and its practical application. The use of modern technologies should be associated with personalized access for students to facilitate interaction between them (Lorenzo et al., 2021).

The use of smart technologies during distance learning should be aimed at developing identity and increasing internal cohesion. Smart technology materials should also be publicly available, which contributes to adequate perception of information. Providing group access to learning promotes higher results (Urbanetti et al., 2023). The disadvantage of distance education is the lack of direct interaction between the participants of the educational process. Therefore, the functions of the used smart technologies should be aimed at motivating students and developing professional knowledge. At the same time, the learning process must be adapted to approved educational standards. Innovative approaches to learning should contribute to the development of students' creative potential (Abuhassna & Alnawajha, 2023). A comparison of the results of the published work showed that smart technologies are aimed at developing students' motivation during distance learning. In our article, specific mechanisms were developed to enhance student motivation, which involved the use of the Webex online platform, engVId, LingQ, Loyal books, and BeeSpeaker applications.

The distance learning process should be based on the correct evaluation of students, which affects their motivation. Formal evaluation should be excluded, and attention should be paid to the creation of favourable pedagogical conditions. The results of the study show that the positive students' motivation has an impact on obtaining a high grade. This can be achieved through the intelligent integration of smart technologies to ensure student self-assessment (Dmitrenko et al., 2021). Mobile learning should be aimed at improving the quality of the educational process. This can be achieved through the analysis of the correctness of the chosen approach to learning and mobile applications, which are designed for studying separate topics. The development of interactivity contributes to the expansion of students' horizons, affects the time limit. It can also stimulate students' interest to improve the quality of learning (Li, 2023). E-learning is a common method of modern education. The use of technologies Effort Expectancy, Social Influence and Facilitating Conditions ensures the reliability of education. The technologies have a positive value in the selection of quality information for learning, promote social interaction. These approaches influence students' overall literacy and motivate them to learn (Oyetade et al., 2023). In contrast to the presented studies, the ways of students' evaluation-based motivation in distance learning are not studied in our article. Of course, students' understanding of their level of knowledge is important, but a well-designed approach to learning has a greater impact. However, it was established that the learning motivation was influenced by smart technologies, personalized learning, the diversity of the educational process, and work in groups.

Modern technologies make it possible to complete regular educational programmes, use multimedia videos, and instrumental software. The level of acquired skills is evaluated through a rating scale and factor analysis by comparing individual results. The evaluation process should be based on the students' personal skills, which is related to predictive, comparative and evaluative components (Long & Lin, 2022). Digital technologies have caused changes in the education system, which is associated with overcoming traditional education systems and adapting new approaches. Digital technologies contribute to the development of

creative skills, which affects the learning process. Focusing students' attention on the learning process should be related to the search for motivation. This may be related to the use of various applications to improve student performance (Nejković & Andrejević, 2022).

The review of academic articles gave grounds to determine the positive value of smart technologies in the educational process, which has an impact on students' motivation. Specific mechanisms were developed in our study to provide distance learning using smart technologies. The level of students' motivation in this learning process was also determined during the study, as well as the impact factors.

Limitations

The limitations of the study are related to the year of study of the students involved in the survey (3rd year). There is no comparison of the impact of distance learning on different students (e.g. third- and fourth-year students), which will be implemented in the future. However, the limitations of the article are not significant, as the authors, based on the developed learning mechanisms, determined the impact of Smart technologies on enhancing students' motivation to achieve their professional skills.

Recommendations

The spread of smart technologies in the modern education system facilitates their use not only during classroom sessions, but also during distance learning. Smart technologies ensure the continuity of the educational process, facilitate access to materials. Their effectiveness also implies the possibility of using various tasks that will contribute to raising the students' level. Therefore, the use of smart technologies during distance learning can contribute to comprehensive education. It is, however, necessary to ensure high-quality organization of the learning process, to study the mechanisms of using modern technologies that will correspond to the main training system. This approach will have a positive effect on students, which will motivate them to study the subject in depth and contribute to achieving high results.

Conclusions

The aim of the study set by the authors was achieved after completing the research. It was achieved as a result of the development of distance learning mechanisms, which made it possible to further check the level of students' motivation on specific examples. The relevance of the obtained results was primarily achieved through the development of educational mechanisms for future English teachers. The training was provided through the use of the Webex online platform, engVId, LingQ, BeeSpeaker, smart Loyal Books application.

The obtained positive results were related to determining the level of student motivation. It was established that the quality of the research is related to obtaining a high level of student motivation, which was provided by the aim of the research. It was found that 21% of students felt motivated before the study, while 82% after the study. The results after the study are related to easier perception of information due to the use of smart technologies. According to the students, achieving their high level of motivation became possible primarily due to the use of smart technologies (1.0) and the diversity of the educational process (0.83).

These indicators were important for the development of language knowledge, which enabled reaching a higher level. It was established among the students that the learning process had a positive value for the development of dynamic adaptation of students, rational and creative thinking, as well as for students' purposefulness, development of in-depth communication skills of business and everyday communication.

The academic novelty of the article is related to the enhancement of students' motivation through the development of specific learning mechanisms using the most effective smart technologies. The practical significance of the article is the possibility of developing students' motivation during distance learning due to the use of the most correct smart technologies. Research prospects may be related to the comparison of smart technologies in distance learning to determine their impact on student performance.

Bibliographic References

Abuhassna, H., & Alnawajha, S. (2023). The transactional distance theory and distance learning contexts: Theory integration, research gaps, and future agenda. *Education Sciences*, *13*(2), 112. https://doi.org/10.3390/educsci13020112

Abuhassna, H., Busalim, A., Yahaya, N., Zakaria, M. A. Z. M., & Latif, A. B. A. (2023). Study from home! the antecedents and consequences of collaborative learning on Malaysian university students. *Journal of Information Technology Education: Research*, *22*, 71-95.

Ashiq, M., Rehman, S. U., Yousaf, A., & Safdar, M. (2023). Exploring the use of mobile technologies for learning: An empirical study of library and information science (LIS) students. *Digital Library Perspectives*, *39*(4), 604-619. https://doi.org/10.1108/dlp-04-2023-0032

Cavus, N., Mrwebi, S. E., Ibrahim, I., Modupeola, T., & Reeves, A. Y. (2022). Internet of things and its applications to smart campus: A systematic literature review. *International Journal of Interactive Mobile Technologies*, *16*(23), 17-35. https://doi.org/10.3991/ijim.v16i23.36215

Committee on Publication Ethics. (2024). *About COPE*. COPE. https://publicationethics.org/about/our-organisation

Correa Cruz, L., López de Parra, L., Rojas Bahamón, M. J., & Arbeláez Campillo, D. (2017). Normatividad y estrategias de formación de profesores en tecnologías de la información y comunicación. *Academia Y Virtualidad, 10*(1).

Dmitrenko, N., Budas, I., Koliadych, Y., & Poliarush, N. (2021). Impact of formative assessment on students' motivation in foreign language acquisition. *East European Journal of Psycholinguistics, 8*(2), 36-50. https://doi.org/10.29038/EEJPL.2021.8.2.DMI

Dmitrenko, N. Ye., Voloshyna, O. V., Kizim, S. S., Mnyshenko, K. V., & Nahorniak, S. V. (2023). Smart education in the prospective teachers' training. *CEUR Workshop Proceedings*, *3364*, 38-53.

Giovannella, C. (2022). A year after the outbreak of COVID-19: How has evolved the students' perception on the online learning? In *Ludic, Co-design and Tools Supporting Smart Learning Ecosystems and Smart Education: Proceedings of the 6th International Conference on Smart Learning Ecosystems and Regional Development* (pp. 105-121). Springer Singapore.

Ihnatova, O., Zhovnych, O., & Drobakha, L. (2022). The effectiveness of blended learning in English teacher training. *Journal of Teaching English for Specific and Academic Purposes*, *10*(3), 377-388. https://doi.org/10.22190/JTESAP2203377I

Kokaj, A., Kurshumlia, M., Vala-Kendusi, V., & Maloku, B. (2023). The effect of ICT in education and teaching: Student evaluation based verification. *Journal of Educational and Social Research*, *13*(5), 255-264. https://doi.org/10.36941/jesr-2023-0135

Konovalenko, T. V., Nadolska, Y. A., Poyasok, T. B., & Striuk, A. M. (2023). Developing digital and ICT literacy skills for future foreign language teachers: A comparative and action research approach. *CEUR Workshop Proceedings*, *3482*, 187-202.

Krasulia, A., Plotnikov, Y., & Zagoruiko, L. (2022). Hidden inequalities in education: Case of in-service English language teachers training in Ukraine. In *Social inequality as a global challenge* (pp. 243-279). River Publishers.

Li, M. (2023). A probe into college English teaching model under converged mobile learning. In *Proceedings of the 9th International Conference on Education and Training Technologies* (pp. 1-7).

Li, Y., Qi, X., Saudagar, A. K. J., Muhammad, K., & Liu, S. (2023). Student behavior recognition for interaction detection in the classroom environment. *Image and Vision Computing*, *136*, 104726. https://doi.org/10.1016/j.imavis.2023.104726

Long, J., & Lin, J. (2022). An empirical study on cultivating college students' cross-cultural communicative competence based on the artificial-intelligence English-teaching mode. *Frontiers in Psychology*, *13*, 976310. https://doi.org/10.3389/fpsyg.2022.976310

Lorenzo, N., & Gallon, R. (2018). Smart pedagogy for smart learning. *Didactics of Smart Pedagogy: Smart Pedagogy for Technology Enhanced Learning*, 41-69. https://doi.org/10.1007/978-3-030-01551-0_3

Lorenzo, N., Gallon, R., Palau, R., & Mogas, J. (2021). New objectives for smart classrooms from industry 4.0. *Technology, Knowledge and Learning*, *26*(4), 719-731. https://doi.org/10.1007/s10758-021-09527-0

Metruk, R. (2022). Smartphone English language learning challenges: A systematic literature review. *SAGE Open*, *12*(1). https://doi.org/10.1177/21582440221079627

Nejković, V., & Andrejević, D. (2022). The impact of the use of clicker tools in academic classroom environments. *Journal of Teaching English for Specific and Academic Purposes*, *10*(3), 407-420. https://doi.org/10.22190/JTESAP2203407N

Oyetade, K., Harmse, A., & Zuva, T. (2023). Factors influencing students' use of e-learning technologies. *International Journal of Learning, Teaching and Educational Research*, *22*(9), 617-632. https://doi.org/10.26803/ijlter.22.9.33

Oyetade, K. E., Zuva, T., & Harmse, A. (2020). Technology adoption in education: A systematic literature review. *Advances in Science, Technology and Engineering Systems*, *5*(6), 108-112. https://doi.org/10.25046/aj050611

Petchamé, J., Iriondo, I., Korres, O., & Paños-Castro, J. (2023b). Digital transformation in higher education: A qualitative evaluative study of a hybrid virtual format using a smart classroom system. *Heliyon*, *9*(6), e16675. https://doi.org/10.1016/j.heliyon.2023.e16675

Petchamé, J., Iriondo, I., Mallol, R., & Solanellas, F. (2023a). Promoting students' interaction in higher education: A reciprocal interview activity carried out during the first class session in management subjects. *Education Sciences*, *13*(7), 730. https://doi.org/10.3390/educsci13070730

Raza, S. A., & Khan, K. A. (2022). Knowledge and innovative factors: How cloud computing improves students' academic performance. *Interactive Technology and Smart Education*, *19*(2), 161-183. https://doi.org/10.1108/ITSE-04-2020-0047

Sułkowski, Ł., Kolasińska-Morawska, K., Seliga, R., & Morawski, P. (2021). Smart learning technologization in the economy 5.0-the polish perspective. *Applied Sciences, 11*(11), 5261. https://doi.org/10.3390/app11115261

Urbanetti, I., Autiero, M. R., Baraniello, V., & Giovannella, C. (2023). Community pacts and we4SLE as tools to support the implementation of smart learning ecosystems. In *Conference on Smart Learning Ecosystems and Regional Development* (pp. 115-128). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-19-5240-1_8

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.5
Cómo citar:
Sydor, M., Pankiv, H., Drotenko, V., Yasenitska, J., & Savchyn, H. (2024). Analysis of modern approaches to interdisciplinary art education: combining art with other fields of knowledge. *Revista Eduweb*, 18(2), 77-87. https://doi.org/10.46502/issn.1856-7576/2024.18.02.5

Analysis of modern approaches to interdisciplinary art education: combining art with other fields of knowledge

Análisis de los enfoques modernos de la educación artística interdisciplinaria: combinando el arte con otros campos del conocimiento.

Mykhailo Sydor
https://orcid.org/0000-0003-1616-6075
PhD in Art History, Associate Professor, Drohobych Ivan Franko State Pedagogical University, Drohobych, Ukraine.
Hanna Pankiv
https://orcid.org/0000-0001-5173-9188
PhD in Art Criticism, Associate Professor, Izmail State University of Humanities, Izmail, Ukraine.
Valentyna Drotenko
https://orcid.org/0000-0002-6582-652X
PhD in Philosophy, Associate Professor, Drohobych Ivan Franko State Pedagogical University, Drohobych, Ukraine; Associate Professor, Lviv Polytechnic National University, Lviv, Ukraine.
Janna Yasenitska
https://orcid.org/0000-0002-1845-0531
Senior Lecturer, Drohobych Ivan Franko State Pedagogical University, Drohobych, Ukraine.
Halyna Savchyn
https://orcid.org/0000-0002-0973-4014
Senior Lecturer, Drohobych Ivan Franko State Pedagogical University, Drohobych, Ukraine.

Recibido: 14/04/24
Aceptado: 30/05/24

Abstract

This article examines the relationship between three different approaches to art: aesthetic, sociological and historical. The aim is to confirm the interdisciplinary connection between art education, on the one hand, and the status and role of discourse in contemporary art, cultural policy, educational reforms and institutional transformations that affect creative activity. The contemporary merger of art and theoretical discourse can be viewed from two interrelated perspectives. On the one hand, the "educational turn" in contemporary art shows a special interest in the production and dissemination of knowledge, which is marked by a focus on the educational aspects of artistic activity and its potential for mediation and intercultural communication. Using the method of literary analysis and processing of such databases as SCOPUS, Google scholar and Research Gate, the paper analyses the growing importance of the practice and spread of interdisciplinarity in contemporary art, its disadvantages and advantages. The results of the presented research indicate that in the contemporary context, the concept of "artistic research" is becoming the subject of increasingly complex discussions. Its use is becoming official and gaining scientific status, which makes it even more problematic. The relationship between the "educational turn" and "artistic

research" can be seen in the context of the political economy of knowledge, as it determines the cognitive value of contemporary art. The conclusion is that the educational turn in art opens up new opportunities and challenges for artists in terms of combining professional activity and the creative process. Although there are problems of disproportionality between teaching and creativity, the analysis shows that openness to interdisciplinary discourse can contribute to the development of shared knowledge and communication between artists and the academic community.

Keywords: Interdisciplinarity in education, integration of art, STEAM education, creative thinking, project-based learning.

Resumen

En este artículo se discute la relación entre tres enfoques diferentes del arte: estético, sociológico e histórico. El objetivo es confirmar la conexión interdisciplinaria de la educación artística, por un lado, y el estatus y el papel del discurso en el arte contemporáneo, la política cultural, las reformas educativas y las transformaciones institucionales que afectan a la actividad creativa que sale al mercado del conocimiento. La fusión contemporánea del arte con el discurso teórico se puede ver desde dos perspectivas interrelacionadas. Por un lado, el "giro educativo" en el arte contemporáneo muestra un interés especial en cuestiones de producción y difusión del conocimiento, centrado en los aspectos educativos de la actividad artística y su potencial para la mediación y la comunicación intercultural. A través del análisis literario y el procesamiento de bases de datos como SCOPUS, Google Scholar y Research Gate, se analiza la creciente importancia de la práctica y la difusión interdisciplinaria en el arte contemporáneo, así como sus desventajas y ventajas. Los resultados de la investigación presentada indican que en el contexto actual, el concepto de "investigación artística" se convierte en objeto de debates cada vez más complejos. Su uso adquiere un carácter oficial y obtiene un estatus científico, lo que lo vuelve aún más problemático. La relación entre el "giro educativo" y la "investigación artística" se puede ver en el contexto de la economía política del conocimiento, ya que determina el valor cognitivo del arte contemporáneo. La conclusión es que el giro educativo en el arte ofrece a los artistas nuevas oportunidades y desafíos relacionados con la combinación de la actividad profesional y el proceso creativo. Aunque surgen problemas de discrepancia entre la enseñanza y la creatividad, el análisis muestra que la apertura al discurso interdisciplinario puede promover el desarrollo de conocimiento compartido y la comunicación entre artistas y la comunidad académica.

Palabras clave: Interdisciplinariedad en la educación, integración del arte, educación STEAM, pensamiento creativo, aprendizaje basado en proyectos.

Introduction

In contemporary art, there is a growing interest in interdisciplinary education that combines art with other fields of knowledge. This interest emerged in the context of the questions raised by relational aesthetics in the 1990s. The educational turn, which lasted for about ten years, reflected the convergence between artistic creation and discourse about art, viewed from the perspective of learning and knowledge dissemination.

This phenomenon is mainly related to the growing importance of teaching theory in art institutions since the 1970s and the emergence of a generation of artists who considered learning and writing not only an important part of their professional activity, but also necessary for artistic practice. To investigate this issue, we need to turn to the works of scholars, critics, philosophers and theorists who have shown interest in transforming art teaching into "teaching as art".

According to Chifor (2023), contemporary art is undergoing an "educational turn", which can be seen as a shift from "teaching as art" to "art as learning". This process is an instance and reflects the complex relationship between education and art. Corey's (2023) work expands the horizons of experimentation with language and speech to include research related to audience reception, institutional context, and other aspects of artistic specificity.

Dorren (2024), considering the educational turn in the art world, offered a similar argument. In the 1990s, the term 'performance' began to emerge through contemporary dance to refer to a variety of previously heterogeneous practices that went beyond traditional art. Practices such as the increased value of conversation as a means of knowledge production in a world of hypercommunication and the role of contemporary research artists in the educational process became central to the new image of art.

As Mullen (2023) notes, the lecture-performance is considered in the context of the tradition of conceptual conferences and the history of performance. However, it seems that such educational interpretations can undermine the potential of this format by putting forward the concept of genre and media specificity. This necessitates a clear definition of the lecture-performance methodology and the need to confront limitations by problematising the status of information.

Pippin (2021) understands interdisciplinarity in art as language, visuality and the body. On the return of discourse to the present. Taylor (2023) looks at teaching as art through the lens of contemporary lecture-performance, trying to identify contradictions in the educational approach. He analyses the genealogy, history and different applications of art, considering it as a more artistic genre or less autonomous, and tries to overcome the distinction between aesthetic experience and knowledge production, between art and non-art.

Tupan (2023) explores the role of interdisciplinarity in art in the context of representation, power and culture, pointing out that conceptual art is becoming key in this regard as it shifts the paradigm in the relationship between artistic work and artists' theoretical production. Historically, the tradition of theoretical artists has its roots in the Renaissance and, in various forms, continues to this day through the avant-gardes.

However, according to Barçin (2020), for the modernist artist, writing was not simply an alternative aimed at aesthetic practice; it was a means of explaining a work that was never produced. This leads to the auxiliary status of modernist artistic discourse in an interdisciplinary context, where it was subordinated to plastic production and served to explain what was excluded rather than to define its own essence. Thus, the works of Malevich, Mondrian, or Kandinsky, according to the author, played the role of declarations rather than texts in the traditional sense, which refer to "a space with multiple dimensions where writing combines and interacts with each other, none of which is original" rather than "a string of words that reveal a unique meaning that is, to some extent, theological (as if it were a 'message' from the Author-God)" (Brondino & Greaney, 2023).

In this context, the paradigm shift that took place in the 1960s can be seen as an attempt to revive the modernist approach that was suppressed with the emergence of interdisciplinary discourse in the field of art (Cahn et al., 2020). This transition did not only take place alongside the emergence of a new approach, as Koblížek (2023) reports in his work on Robert Smithson, Robert Morris, Carl Andre, Sol LeWitt, Yvonne Rainer, and other artists. Drawing attention to the materiality of language as a kind of plastic tool, artists are now beginning to consider theoretical production as an integral part of their practice, displacing aesthetic categories that were established through the act of writing (in Derrida's sense), which, as it spreads, crosses all artistic media and questions the boundaries between them, disciplines and knowledge. By integrating theory and practice, language becomes an important element of an experiment that

transforms the field of art into a field of transdisciplinary research that opens creativity to questions related to knowledge.

From the perspective of the new great transformations in the art world and globalisation, Alesina & Tabellini (2024) discuss various aspects and uses of language in conceptual and post-conceptual art, as well as the importance of structuralism, post-structuralism and deconstruction. Rather, it emphasises the gap that separates the current situation from these historical models and the new role that artistic discourse is called upon to play in the era of "cognitive capitalism13" and the politics of valuation, in the production of value and power. Because if "art as research" is currently labelled as experimental, reflexive and transdisciplinary and presented as the best of the contemporary scene, there is reason to wonder whether the decompartmentalisation of disciplines and the promotion of an experimental spirit are not combined with professional hyper-specialisation and the promotion of certain types of practice at the expense of others or even the constitution of new institutionally recognisable genres.

Theoretical framework

Firstly, the educational interpretation of an interdisciplinary approach to art is seen as a historical process that is responsible for a model of progressive "expansion" or "democratisation" of the artistic sphere to prevent it from being separated from the wider culture and society (Akkoyun & Uyar, 2020). According to this model, contemporary researchers, building on the legacy of the neo-avant-garde of the 1960s, could broaden their focus to consider not only aesthetic autonomy, but also issues related to information, communication, knowledge production and dissemination.

Nevertheless, even without the utopian grounding that characterised the historical avant-gardes, the critique of aesthetic autonomy in the 1960s and 1970s aimed to connect art with the outside world and language with society (Bull & Galimberti, 2022). Today, according to Rotter-Broman (2023), the main aspect is "the specificity of art as a structure of knowledge". Over the past four decades, the expansion of the artistic sphere and the constant shifting of its traditional boundaries have been paralleled by fragmentation. This means that with the blurring of the boundaries between art and life, artistic production has become refined, fragmented and divided into new categories that can be found in the art world (Foster, 2023). The ambiguous status of contemporary art and the lack of clear criteria for its evaluation have not prevented its strong commercialisation and institutionalisation. It has also seen the development of various structures of control and mediation, as well as networks and parallel circuits of distribution, which shape what we understand as living art.

This process of particularisation also reflects a shift from the artist-theorist model to more specific roles such as artist-ethnographer, artist-mapper, artist-scientist, etc. In other words, it is a manifestation of interdisciplinarity in the form of practical and applied knowledge that gives rise to the call for contributions expressed in this paper.

Cole (2023) illustrates the evolution of language in art, which is now seen as a material tool, not just abstract or speculative knowledge. This is due to an awareness of the material conditions of art's dissemination and the importance of theoretical discourse in shaping the visibility and value of a work. According to the scientist, language is used in different forms and with different effectiveness as a material, concrete and practical tool. It can also function as a heteronomous entity that points to something other than language itself and frustrates any hope of fully understanding its meaning.

Theoretical and interdisciplinary reflections on the essence of art merge with its practice, which has become speculation (Wigena et al., 2023). From the very beginning, language was aimed at practical use and had an applied character, even when conceptual art used it to contradict the separation between artistic activity

and the context of its perception by the viewer, as well as the traditional connection between the work and the discourse that accompanies it. In this context, Slugan (2020) adds: "Over the years, we have observed that most people learn about an artist's work mainly through print media or conversation, rather than through direct contact with the work itself. For a drawing or sculpture, where visual presence is important - colour, proportions, size, location - a photograph or description is only a support."

But when art deals with aspects that are not related to physical presence, its intrinsic (communicative) value does not change because of its printed presentation. Using catalogues and books to communicate (and distribute) the work is the most neutral way to present this new art form. The catalogue can now act as the primary source of information about an exhibition, distinct from secondary information about art in magazines, brochures, etc., and in some cases the "exhibition" may actually be the "catalogue" (Simmons III, 2021).

The indexing of an artwork on the information and communication devices it requires tends to blur the distinction between the process of creation and dissemination, as well as between (theoretical) reflection and (practical) application (Say & Seng, 2022). In this context, Rugg (2022) adds that conceptual art remains ambiguous in relation to the knowledge domain (specialised, artistic) and the information domain (general, non-artistic). Indeed, if we understand "practical" and "applied" knowledge as that which is not specifically artistic and which changes in the transition from artist-theorist to artist-researcher (in a broad sense that encompasses various fields of knowledge), then this is the same relationship between knowledge and information.

Cognitive content, once isolated within a single discipline or specific discourse, is now becoming the result of interdisciplinarity, practices and knowledge, where it is formed in a "horizontal" way through mutual exchange, circulation and transmission between different fields, rather than in a "vertical" way within an established hierarchy of values (Rudenko et al., 2022). Paying attention to the didactic and mediating aspects of contemporary art, the educational field fits into a general trend that is associated with national and European cultural policies (O'Donnell, 2023). This trend is aimed at integrating artistic activity into the information and communication systems of cultural industries, assigning it a usefulness and practical function, such as the production of intangible capital.

Thus, the development of e-learning and the variety of STEAM education, project-based learning methods, MOOCs (massive open online courses), in particular those that focus on career strategies, the development of professional and social networks, fundraising and the collection of administrative documents, can be seen as interdisciplinary. This approach sees the specificity of art as a structure of knowledge that tends to be associated with abstract mechanisms that regulate the functioning and internal reproduction of the art world as a set of interdependent participants.

Methodology

The methods and design of the research included the method of literature analysis and processing of such databases as Scopus, Google Scholar and Research Gate. The paper analyses the growing importance of the practice and spread of interdisciplinarity in contemporary art, its disadvantages and advantages.

A literature analysis was conducted to identify current issues and trends in contemporary art in the context of the educational market. The collection and analysis of data from academic research made it possible to assess the deep understanding and attitude to the concept of artistic research in the context of interdisciplinarity. The paper also analyses the results of the study and formulates proposals for the further development of art education and research in the context of the modern educational market. This comprehensive approach allowed for a deeper understanding and assessment of the impact of

interdisciplinarity, highlighting the disadvantages and advantages, and addressing the issue of standardisation in the arts.

Results and discussion

Contemporary art is inextricably linked to the educational market. In a world where the spaces of knowledge production and dissemination are globalised, traditional structures are evolving into a network of diverse collaborations and partnerships that form a new landscape where the concept of artistic research becomes imperative for understanding and evaluation (Kelikli, 2024). Here, the concept of network is not limited to the interaction of individual and semi-independent actors, but rather represents a state where each actor acts as a node in this network or, if you like, forms itself as a network. This leads to a double movement of decompartmentalisation and hyper-specialisation of artistic knowledge, which needs to be taken into account in the context of cultural industries and the current conditions of interaction between art and knowledge markets, and of course, this process is characterised by advantages and disadvantages (Table 1).

Table 1.
Advantages and disadvantages of art in the educational market

Advantages	Disadvantages
Promotes the convergence of art and education	Art's participation in the educational market can lead to commercialisation and standardisation of creativity
Stimulates the development of creativity and critical thinking of participants	Restrictions on artists' creativity and freedom of expression
The globalisation of knowledge production and dissemination spaces fosters new collaborations and partnerships	Globalisation can lead to the loss of local cultural specificity
Increases the accessibility of art to a wider audience and broadens its impact	Globalisation can lead to the loss of the uniqueness of art from different regions
The concept of artistic research becomes more accessible and understandable to the public, which contributes to its evaluation and promotion	Focusing on the evaluation and understanding of artistic research can cause a loss of the creative process itself and its intrinsic meaning

In the field of art education in Ukraine, there is a tendency towards concentration and independence. The transformation of regional art schools and the merger of institutions and local authorities is the first step in the development of art as a profession (Sydorenko, 2024). This means, on the one hand, that faculties of fine arts, deprived of their research monopoly, are gradually coming into direct competition with art schools, and on the other hand, it indicates a redirection of cultural policy towards the integration of learning and professional development, with an emphasis on values such as "intangible labour" and "knowledge capital" (Chi & Belliveau, 2022).

As public institutions, art schools face new challenges, such as the need to reach out to the general public (including through extracurricular and co-curricular activities), to cooperate with state and local authorities, and to generate new resources and develop partnerships (Kowalik, 2023). These requirements lead to significant changes in their organisation, management and work processes.

In recent years, art schools have been reorganising their programmes internally to strengthen teaching and research. This includes the creation of laboratories, the development of research areas and projects, and partnerships with other universities, museums and research institutions. An important aspect of this

process is the revision of the prerogatives of assessment, which is carried out by independent administrative bodies.

According to Gelsanda, Marchianti & Nurdian (2024), the importance of artistic research lies in its capacity to create new knowledge. This leads to the question of dissertations, which are the theoretical and critical work that young artists are encouraged to do alongside their visual work and which are directly linked to the master's degree (Kłeczek & Hajdas, 2024). In the current context, it is evident that the scientific approach is often seen as an attempt to interfere with the creative process and subordinate it to administrative requirements imposed from the outside. According to Gunin (2024), the consideration of artistic practice as an object of research implies that the artist-researcher is able to demonstrate generalised results, separated from his or her practical experience, which, when displayed in the appropriate context, will testify to its originality and usefulness for the scientific community.

Thus, interdisciplinarity in the arts is emerging as a result of the globalisation of the knowledge market and the standardisation of European diplomas, which is caused by the Bologna Process. This situation should be considered in the context of research in the humanities and social sciences. As this new paradigm of learning also calls for a disciplinary formatting of university knowledge, its rigidity and separateness limit its ability to address contemporary issues and create new experiments.

In recent years, interdisciplinarity has become an important concept in the humanities, particularly in the context of art and culture, but the use of this term does not always raise genuine doubts about the boundaries between different disciplines. This may be due to the uniqueness of the Ukrainian higher education system and the organisation of research at the scientific, administrative and economic levels. On the other hand, the need for openness and transversality often masks a process in which the cultural sciences become the ideological foundations of a market economy, and the process of knowledge production becomes similar to the production of market value. This phenomenon is not limited to Ukrainian specifics, but is an intersection of national reforms.

Interaction between different disciplines in art can take many forms. It can be interdisciplinary research, where artists collaborate with scholars from other fields to study certain aspects of art or topics (Jove et a., 2022). It can also include the synthesis of different artistic techniques or genres, where artists combine elements from different fields to create new works (Jürgens & Hildbrand, 2022). In addition, interaction can take place through joint projects, exhibitions, residencies, where artists collaborate or exchange ideas with representatives of other disciplines, such as literature, science, technology, etc. (Kergel, 2023). These forms of interaction help to expand the horizons of art and create new and interesting creative opportunities (Fig. 1):

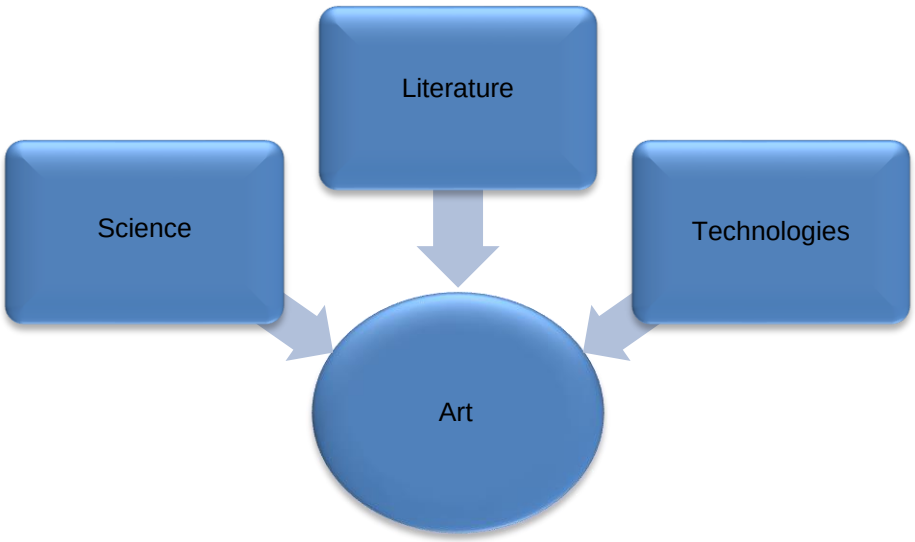

Figure 1. Interdisciplinarity in art.

The idea of interdisciplinarity, linked to key concepts such as 'excellence', 'originality' and 'innovation', seems more or less obvious as a tool for creating added value, provided it is properly planned and profitability is achieved (Abrudan, 2023). The growing importance of bibliometric data, the presence of a publish or perish logic (Arnold, 2023), and the semi-technocratic and semi-communication jargon from central research funding bodies all point in the same direction (Ioris, 2023), pointing to the current tensions between academic research goals and productivity demands. The interdisciplinarity of art raises the problem of its standardisation, which has already been noted by Baker & Joselit (2022). This problem has implications for art itself and its teaching, including the process of standardising, measuring and formatting artistic work according to scientific, administrative and educational standards (Hanna & Paans, 2020).

On the other hand, Baca (2023) suggests that standardisation in art education has its own merit, considering it as a distinct type of knowledge that can be generated in the field of art. This knowledge is focused on the specifics of a specialised network of professionals (artists, teachers, critics, curators, editors, managers, technicians, galleries) who develop "special skills" in search of greater recognition and legitimation. This is seen as a way of strengthening their position, rather than a process that raises doubts arising from the fragmentation and synthesis in this type of knowledge (Farokhinejad, 2022).

In this context, where artistic knowledge is becoming institutionalised and art is highly dependent on the interaction and collaboration of different actors in the contemporary art scene, art, as a branch of knowledge production, often turns into a specialised field of intangible labour (Di Sabatino & Mastrantoni, 2022). This labour is aimed at creating new forms of value or even value itself in its purest and most exchangeable form (Brannigan & Lawson, 2023). We are in solidarity, because the gradual transformation of art practice into the provision of certain services, often aimed at meeting the specific needs of curators, leads to the fact that the knowledge it incorporates also evolves in this direction. This knowledge becomes subject to quantification and rationalised content, which is formed through the interaction of a network of actors and operates in the accumulative mode of the market (Earley, 2023).

On the other hand, when artists often criticise the academic and institutional interdisciplinary discourse of art, questioning their system of legitimation and authority, one wonders whether, in this context, they do not feel the need to re-emphasise part of their aura and intellectual legitimacy. This topic is currently very relevant and represents an interesting object for further research.

Conclusions

In this paper, the educational turn is associated with the emergence of a new generation of artists for whom teaching and writing have become an important part of their professional activities, even an essential part of the creative process. However, there is a significant difference between "professional activity" and "artistic work" that is worth noting. Indeed, for many artists today, teaching is an additional or even the main source of income, not just a freely chosen means of artistic expression.

On a sociological level, the educational turn leaves a mark of a mismatch between professional demands and the creative process. For many artists, it becomes a means of turning sincerity into duty as they adapt to an increasingly competitive atmosphere that encourages the creation of artworks aimed at adding cognitive value. Although theory and practice are often seen as complementary, in practice they often turn out to be opposites. In such a situation, the artist-researcher and the teacher-researcher face similar challenges: the daily disconnect between teaching and research, which means that the more they try to reconcile these aspects, the more they are confronted with a sense of their asymptotic divergence.

The conclusions drawn from the literature analysis show that artistic research, consciously or unconsciously, can become a means of implementing cognitive and economic neoliberalism, or the interdisciplinary discourse it generates risks being reduced to a search for authority in crisis, in accordance with a completely different scenario.

The comparative analysis carried out in the academic environment was intended to show that the problem is not limited to the arts, but covers the broader context of knowledge organisation and management. The confrontation is not between practice and theory, but between different approaches to their relationship. This is especially true for the possibility of transferring artistic knowledge and communicating it by transferring it to other areas of experience in order to reconnect it with the real world and society.

Bibliographic References

Abrudan, E. (2023). Relational aesthetics and the production of meaning in contemporary art. *Philobiblon*, *28*(1), 119-130. https://acortar.link/4thPI4

Akkoyun, B., & Uyar, S. (2020). Analysis of the effect of organizational structure and culture on refugee problem and pandemic crisis management with artistic expression. *Technium Social Sciences Journal*, *9*, 596. https://heinonline.org/HOL/LandingPage?handle=hein.journals/techssj9&div=57&id=&page=

Alesina, A., & Tabellini, M. (2024). The political effects of immigration: Culture or economics? *Journal of Economic Literature*, *62*(1), 5-46. https://www.aeaweb.org/articles?id=10.1257/jel.20221643

Arnold, C. (2023). Newman and" modernism": a matter of definition? *Newman Studies Journal*, *20*(2), 11-25. https://doi.org/10.1353/nsj.2023.a917838

Baca, A. (2023). Poststructuralism/postmodernism/postcolonialism: Mapping poststructuralism, postmodernism, and postcolonialism. In *A Companion to Contemporary Art in a Global Framework* (pp. 359-376). John Wiley & Sons. https://doi.org/10.1002/9781119841814.ch27

Bahamón, M. J., Pulido Jiménez, A., & Serrato Rodríguez, Y. (2023). Prácticas de seguridad de la información en estudiantes de escuela secundaria en Colombia. *Entre Ciencia E Ingeniería*, *17*(33), 16-23. https://doi.org/10.31908/19098367.2832

Baker, G., & Joselit, D. (Eds.). (2022). A questionnaire on global methods. *October*, *180*, 3-80. https://doi.org/10.1162/octo_a_00453

Barçin, A. B. (2020). *How to live together: Examining the role of culture and the arts in the case of Syrian refugees in bursa*. (Master's thesis), Institute of Graduate Programs. https://acikbilim.yok.gov.tr/handle/20.500.12812/94622

Botvyn, T., Aleksandrova, M., Krymets, L., Dobrovolska, R., & Rudenko, O. (2022). Philosophical comprehension of the formation and development of Ukrainian culture in the context of military realities: the geopolitical aspect. *Amazonia Investiga, 11*(58), 84-92. https://doi.org/10.34069/AI/2022.58.10.9

Brannigan, E., & Lawson, L. (2023, November). *Precarious movements: Contemporary dance as contemporary art.* In *Performance* (pp. 278-292). Routledge.

Brondino, A., & Greaney, J. (2023). Total modernism. *CoSMo/ Comparative Studies in Modernism*, *22*, 5-12.

Bull, M., & Galimberti, J. (2022). Contemporary art and class: reassessing an analytical category. *Oxford Art Journal*, *45*(2), 167-177. https://doi.org/10.1093/oxartj/kcac013

Cahn, S. M., Ross, S., & Shapshay, S. L. (Eds.). (2020). *Aesthetics: a comprehensive anthology*. John Wiley & Sons. 2nd Edition. https://www.wiley.com/en-us/exportProduct/pdf/9781118948323

Chi, X. B., & Belliveau, G. (2022). Between tradition and modernity: developments in Xiqu (Chinese opera) actor training. *Theatre, Dance and Performance Training*, *13*(4), 616-622. https://doi.org/10.1080/19443927.2022.2135873

Chifor, M. (2023). Modernism-context and overlooked literary manifestations. *The Creative Launcher*, *8*(4), 61-72.

Cole, S. (2023). Telling time in modernism. *Modernism/Modernity*, *30*(1), 201-208. https://doi.org/10.1353/mod.2023.a902617

Corey, P. N. (2023). CRAFT: Craft and the making of "global" contemporary art. *A Companion to Contemporary Art in a Global Framework*, 119-131. https://doi.org/10.1002/9781119841814.ch11

Di Sabatino, P. A., & Mastrantoni, C. (2022). Tradition and modernity/place and time. The island of Murano: past–present–future. *Design International Series*. https://re.public.polimi.it/handle/11311/1218910

Dorren, L. (2024). Locating the modernist state. On whether or not modernist principles govern contemporary policy practice. *Administrative Theory & Praxis*, *46*(1), 76-94. https://doi.org/10.1080/10841806.2023.2176076

Earley, C. (2023). *Crisis and engagement: a philosophy of contemporary art* (Doctoral dissertation), University of Warwick. http://webcat.warwick.ac.uk/record=b3941363

Farokhinejad, P. (2022). Analyzing the opportunities and threats of postmodernism from the point of view of moral and religious values with emphasis on implications for educational managers. *Journal of New Approaches in Educational Administration*, *13*(6), 165-175. https://doi.org/10.30495/JEDU.2022.30511.6117

Foster, H. (2023). Modernism in a non-melancholic key. *October*, 186, 197-204. https://doi.org/10.1162/octo_a_00504

Gelsanda, C. I., Marchianti, A. C. N., & Nurdian, Y. (2024). The relationship between well water quality and cognitive function in well water users. *Futurity Medicine*, *3*(2). https://doi.org/10.57125/FEM.2024.06.30.01

Gunin, A. (2024). The future of mortgage financing in the era of fintech: a systematic review. *Futurity Economics & Law, 4*(2), 31-47. https://doi.org/10.57125/FEL.2024.06.25.02

Hanna, R., & Paans, O. (2020). This is the way the world ends: A philosophy of civilization since 1900, and a philosophy of the future. *Cosmos & History*, *16*(2). https://cosmosandhistory.org/index.php/journal/article/view/865

Ioris, A. A. (2023). World out of difference: Relations and consequences. *Philosophy & Social Criticism*, *49*(10), 1220-1243. https://journals.sagepub.com/doi/abs/10.1177/01914537221101316

Jove, G., Gutiérrez-Ujaque, D., Bonastra, Q., & Simón-Martín, M. (2022). From hybrid spaces to in-between spaces: a journey with contemporary art and situated knowledge. *International Journal of Art & Design Education*, *41*(2), 242-256. https://doi.org/10.1111/jade.12411

Jürgens, A. S., & Hildbrand, M. (2022). Arts for all senses: Circus and the avant-gardes–introduction. In *Circus and the Avant-Gardes* (pp. 1-16). Routledge. https://doi.org/10.4324/9781003163749

Kelikli, M. (2024). Revisiting aristotle's master-slave relationship: a casual evaluation in the context of human-AI dynamics. *Futurity Philosophy, 3*(2), 25-39. https://doi.org/10.57125/FP.2024.06.30.02

Kergel, D. (2023). Postmodern Cyberspace. In *Digital Cultures: Postmodern Media Education, Subversive Diversity and Neoliberal Subjectivation* (pp. 35-121). Springer Fachmedien Wiesbaden. https://link.springer.com/chapter/10.1007/978-3-658-35250-9_2

Kłeczek, R., & Hajdas, M. (2024). Transforming practices of co-creating values in a contemporary art exhibition. *Qualitative Market Research: An International Journal, 27*(2), 254-279. https://doi.org/10.1108/QMR-05-2022-0084

Koblížek, T. (2023). Contemporary art and the problem of indiscernibles: An adverbialist approach. *Aesthetics: The European Journal of Aesthetics*, *16*(1), 19-35. https://www.ceeol.com/search/article-detail?id=1122875

Kowalik, G. (2023). Post-postmodernism, the "affective turn", and inauthenticity. *Humanities*, *12*(1), 7. https://doi.org/10.3390/h12010007

Mullen, A. L. (2023). Locating meaning in contemporary art: how artists conceptualize the aesthetic experience. In *The Cultural Sociology of Art and Music: New Directions and New Discoveries* (pp. 133-162). Springer International Publishing. https://link.springer.com/chapter/10.1007/978-3-031-11420-5_6

O'Donnell, L. A. (2023). On the question of the ground of Fredric Jameson's postmodern dialectic. *Cosmos & History*, *19*(2), 279-303. https://cosmosandhistory.org/index.php/journal/article/view/1094

Pippin, R. B. (2021). *Philosophy by Other Means: The Arts in Philosophy and Philosophy in the Arts*. University of Chicago Press. https://doi.org/10.1093/jaac/kpab046

Rotter-Broman, S. (2023). Wilhelm Stenhammar: A European modernist. *Swedish Journal of Music Research Swedish Journal of Music Research, 105*, 65-87. https://doi.org/10.58698/stm-sjm.v105.19195

Rugg, J. J. (2022). Further remarks on modern sepulture: Twenty years of cemetery studies and eight core questions defining cemetery research. *Eastern and Northern European Journal of Death Studies*, *1*(1), 16-46. https://acortar.link/YTObLa

Say, J., & Seng, Y. J. (Eds.). (2022). *Intersections, Innovations, Institutions: A Reader in Singapore Modern Art*. World Scientific. https://acortar.link/bdXGG0

Simmons III, S. (2021). *The value of drawing instruction in the visual arts and across curricula: Historical and philosophical arguments for drawing in the digital age*. Routledge. https://acortar.link/xeruX4

Slugan, M. (2020). *Noël Carroll and film: A philosophy of art and popular culture*. Bloomsbury Publishing. 78(1). https://doi.org/10.1111/jaac.12701

Sydorenko, T. (2024). Critical evaluation of modern strategies and methods of formation of communicative competency in the system of continuing education of document managers. *Futurity of Social Sciences*, *2*(1), 28-55. https://doi.org/10.57125/FS.2023.12.20.04

Taylor, D. R. (2023). *The future needs the past: remaking William Morris through contemporary art practice*. (Doctoral dissertation), Sheffield Hallam University. https://doi.org/10.7190/shu-thesis-00544

Tupan, M. A. (2023). *Phenomenology and Cultural Difference in High Modernism*. Cambridge Scholars Publishing. https://acortar.link/2OgdZw

Wigena, I. B. W., Sumilat, G. D., & Wibowo, A. S. (2023). Social studies in the postmodernism era. *Technium Social Sciences Journal*, *49*, 158. https://acortar.link/j5L3DU

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.6
Cómo citar:
Zhyhora, I., Vdovenko, V., Baraniuk, I., Kotelianets, N., & Nikitina, O. (2024). Innovations in education in times of war: research and evaluation of results. *Revista Eduweb*, 18(2), 88-99. https://doi.org/10.46502/issn.1856-7576/2024.18.02.6

Innovations in education in times of war: research and evaluation of results

Innovaciones educativas en tiempos de guerra: investigación y evaluación de resultados

Iryna Zhyhora
https://orcid.org/0000-0002-5796-2062
Associate Professor of the Department, Volodymyr Vynnychenko Central Ukrainian State University, Kropyvnytskyi, Ukraine.
Viktoriia Vdovenko
https://orcid.org/0000-0002-0884-6209
Associate Professor of the Department, Volodymyr Vynnychenko Central Ukrainian State University, Kropyvnytskyi, Ukraine.
Iryna Baraniuk
https://orcid.org/0000-0001-8112-7318
Associate Professor of the Department, Volodymyr Vynnychenko Central Ukrainian State University, Kropyvnytskyi, Ukraine.
Natalka Kotelianets
https://orcid.org/0000-0002-0575-5205
Professor of the Department, Volodymyr Vynnychenko Central Ukrainian State University, Kropyvnytskyi, Ukraine.
Olena Nikitina
https://orcid.org/0000-0003-1045-5300
Associate Professor of the Department, Volodymyr Vynnychenko Central Ukrainian State University, Kropyvnytskyi, Ukraine.

Recibido: 10/03/24
Aceptado: 27/05/24

Abstract

Implementation of the educational process during the war is a challenge for modern educational institutions, but despite the unfavourable situation, educational institutions are implementing important innovative solutions for the development of education in general. Therefore, the purpose of this study is to investigate innovations in education in times of war through the prism of a survey and evaluation of the results. The participants of this study are 265 students and teachers from different parts of Ukraine. The search for respondents was carried out both on a targeted basis and using the snowball sampling method. The results of the study demonstrated the diversity of means of developing education in war conditions: the use of video conferencing platforms, mobile applications, communication platforms, learning management systems, virtual and simulation technologies. The most important is the use of learning

management systems and platforms for conducting classes. The high scores of respondents demonstrate the importance of innovation in education during wartime. The conclusions emphasise that these innovations ensure the continuity of the learning process and provide access to knowledge in any crisis situation.

Keywords: digitalization, innovative tools, survey, war, Ukraine.

Resumen

La implementación del proceso educativo durante la guerra es un reto para las instituciones educativas modernas, pero a pesar de la situación desfavorable, las instituciones educativas están implementando importantes soluciones innovadoras para el desarrollo de la educación en general. Por lo tanto, el propósito de este estudio es investigar las innovaciones en la educación en tiempos de guerra a través del prisma de una encuesta y la evaluación de los resultados. Los participantes en este estudio son 265 estudiantes y profesores de diferentes partes de Ucrania. La búsqueda de encuestados se llevó a cabo tanto de forma selectiva como utilizando el método de muestreo de bola de nieve. Los resultados del estudio demostraron la diversidad de medios para desarrollar la educación en condiciones de guerra: el uso de plataformas de videoconferencia, aplicaciones móviles, plataformas de comunicación, sistemas de gestión del aprendizaje, tecnologías virtuales y de simulación. El más importante es el uso de sistemas y plataformas de gestión del aprendizaje para impartir clases. Las altas puntuaciones de los encuestados demuestran la importancia de la innovación en la educación en tiempos de guerra. Las conclusiones destacan que estas innovaciones garantizan la continuidad del proceso de aprendizaje y facilitan el acceso al conocimiento en cualquier situación de crisis.

Palabras clave: digitalización, herramientas innovadoras, encuesta, guerra, Ucrania.

Introduction

The Russian-Ukrainian war has had a dramatic impact on the development of education in Ukraine. Since the full-scale invasion, active military operations have demonstrated the need to introduce distance education (later blended learning), which directly depends on the introduction of many innovative solutions and technologies. Therefore, the functioning of the educational system in times of war is determined by an intensive search for various new approaches to the organisation of education, innovative methods and forms of organising the educational process, effective pedagogical and information solutions (Diachenko et al., 2022; Iastremska et al., 2023). Thus, supporting the active introduction of various innovations in the field of education during the war has become one of the important activities of the Ministry of Education and Science of Ukraine.

At the same time, educators and teachers themselves began to actively search for new ways to organise the educational process for students. In particular, many educational institutions have opened various platforms with educational resources and materials in the public domain. At the same time, modern researchers have also repeatedly drawn attention to the quality of training in wartime. For example, Al Qaidani (2019) described the development of higher education in the context of the conflict in Yemen. Chakhaia and Bregvadze (2018) identified the main aspects of the formation of the educational system of Georgia. Lucić (2020) in his comprehensive study raised the important question of the effectiveness of education in the conditions of war based on the consideration of educational realities in Sarajevo.

At the same time, Boiko (2023) characterized the experience of higher education in Ukraine, which involves the implementation of various innovative solutions and technologies. Iskakova (2023) described the main electronic technologies used in Ukrainian education to meet the individual needs of students. Kaminskyy and Viesova (2022) also identified some innovative solutions. Budnyk (2022) described the main modern

innovative technologies that contribute to the development of knowledge among students in wartime. The interest of modern scholars in the development of education in wartime demonstrates that this topic remains not only popular but also relevant among modern researchers.

However, it is important not only to describe the main decisions or innovations of the educational system in the context of war, but also to determine their effectiveness based on empirical research and evaluation, which is the aim of this paper. Therefore, the aim of this paper is to empirically investigate the main innovations in wartime education based on the evaluations of teachers and students. This will involve solving the following tasks: conducting a systematic literature review, conducting a questionnaire among respondents, identifying the main assessments and attitudes of teachers and students towards the introduction of innovations in modern education.

Literature Review

Contemporary scholars have delved into the study of various aspects of the use of innovative solutions (mainly distance education) in wartime. At the same time, modern works have drawn attention to the relevance of blended or distance learning, digitalisation of the educational system, health-promoting practices and the effective implementation of psychological and pedagogical support (Galynska & Bilous, 2022; Barakat et al., 2022; Lymar, 2024). In these areas, the use of technologies that facilitate the individualisation of learning is currently relevant. Krylova-Grek and Shyshkina (2021) identified the main trends in the development of online education in Ukraine.

The main difficulties of implementing the educational process and training specialists in wartime are described in detail in Lymar (2024). At the same time, the most innovative technologies are presented in detail in the papers that studied the specifics of the organisation of the educational process during the Covid pandemic (Tarteer et al., 2022; Wahas & Syed, 2024).

Tinterri, Eradze, Limone, and Dipace (2022) identified effective strategies for implementing distance learning that would support all participants in the learning process. Meletiou-Mavrotheris, Eteokleous, and Stylianou-Georgiou (2022) demonstrated the main capabilities of e-learning based on empirical research. Onufer (2023) believes that in the period of distance or remote education, it is important to take into account the needs of all participants in the learning process, i.e. to implement a person-centred approach. Rafael and Justino (2022) demonstrate the importance of virtual laboratories for the organisation of an effective innovation space.

Castilho Barilli (2012) identified the importance of virtual reality as an important didactic resource in distance education. In their opinion, this technology contributes to the development of professionalism for the future generation of specialists. Vasilache (2022) described the main strategies for implementing active distance learning and determined how they contribute to the outcomes of students. Such research experiments help to understand the peculiarities of modernising the modern learning space and highlight all the spectrums of innovative activities that are implemented in accordance with the requirements of the modern education system and the needs of society.

At the same time, interest in the study of innovative technologies indicates their active implementation in different parts of the world. For this reason, innovation is an important driving force in the development of education and science. Nevertheless, there is a lack of research that would empirically determine the attitudes of participants in the educational process and, consequently, the effectiveness of using innovations in the educational environment.

Methodology

This study aims to identify the main innovations in the field of education and their effectiveness based on the analysis of the evaluative judgements of participants in the educational process. Thus, the work is classified as quantitative research.

a. Participants

The participants of this study are teachers (120 people) and students (145 people) from different educational institutions in Ukraine, living both near the war-affected areas and in safer areas of Ukraine. This was done to ensure that all participants in the learning process were involved as widely as possible.

Table 1 shows the aggregate geographical data of the participants.

Table 1.
Geographical data of the participants

No.	Geographical data	N	%
1	Kyiv (Kyiv region)	61	23%
2	Kharkiv	39	14%
3	Lviv (Lviv region)	32	12%
4	Dnipro	27	10%
5	Odesa	21	8%
6	Zaporizhzhia	16	6%
7	Ivano-Frankivsk	13	5%
8	Chernivtsi	13	5%
9	Kirovohrad	8	3%
10	Chernihiv	12	4%
11	Kherson	6	2%
12	Ternopil	12	4%
13	Poltava	6	2%
14	Zhytomyr	3	1%
15	Lutsk	3	1%

Source: Authors' development

Thus, a total of 265 teachers and students from different parts of Ukraine took part in the study.

b. Sample procedure

The search for respondents was carried out both on a targeted basis and using the snowball sampling method. In particular, information about the survey was disseminated through social media. The most popular ones in Ukraine were chosen for this purpose: Facebook, Instagram and TikTok. Thus, at the beginning, participants were found in a targeted manner. Later, they were asked to find other stakeholders in the research (snowball sampling was used. In this way, it was possible to involve everyone in the evaluation of innovative technologies in education.

c. Instruments

In order to collect quantitative data, a questionnaire consisting of several parts was used. The first part concerned demographic and geographical data. The second part focused on the role of innovation in education. Most of the questions were designed to be answered by both students and teachers. However,

some questions still focused on the experience of teachers only or were directed at students only (see Table 2).

Table 2.
Sample of the survey

Section	Main questions
Geography and demographics of participants	1. In which city do you study/work? 2. Specify your position or employment
Characteristics of the main innovations	3. 3. What innovations do you use during classes (for teachers) 4. What innovations do your teachers use to conduct classes (for students) 5. On which digital platforms do you mostly conduct classes? (for teachers) 6. On which digital platforms do teachers conduct classes? (for students) 7. How often do you use these innovations? 8. How often is the distribution of educational materials in digital format?
Characteristics of the main innovations	9. How do you assess the use of modern platforms in the implementation of education during the war? (rating from 1 to 5) 10. How do you rate modern messengers for communication during distance education (Telegram, Whats Up, Viber) 11. How can you generally evaluate the use of innovations in the implementation of education during the war? (rating 1 - not at all effective, 5 - very effective)

Source: Authors' development

d. Data analysis

Based on the statistical analysis, the data were statistically processed. For this purpose, Microsoft Excel software was used, where tables were used to process the data. This software was also used to create graphs and charts. Thematic analysis was also used to characterise the main themes highlighted by the respondents. In order to process the data, a systematic research method was used, which defines educational innovations as being in constant motion. The method of comparison was used to compare the information obtained with the data presented in previous scientific works.

Results

Although the Ukrainian education system suffered significant losses due to the armed conflict, it continued to develop on the basis of the introduction of some new solutions. The authorities have partially succeeded in making effective decisions to stabilize the education system in such difficult conditions. The cohesion of the Ukrainian educational community, the motivation to continue teaching and learning, and the sufficiently effective digital internal policy of Ukrainian educational institutions play a major role in this process. Since then, the Ukrainian education system has begun to actively use various innovative technologies and forms of education. Many regions have switched to distance (later blended) education. These forms of education have become important tools for continuing the process of providing educational services.

The use of various platforms for remote lectures or seminars and video conferencing has become the norm for the educational system during the war. At the same time, adaptive technologies have begun to play an important role. The use of individual learning technologies facilitates the assessment of each student and promotes a person-centered approach. Based on the experiment, it was found that during the war, Ukrainian education mainly used video conferencing platforms (241 responses), learning management

systems (251 responses), electronic textbooks (239 responses), online testing and knowledge verification systems (230 responses), mobile applications for education (210 responses), messengers for communication (190 responses), interactive whiteboards (58 responses), virtual reality technologies (76 responses), and simulation technologies (61 responses) (see Table 3).

Table 3.
Innovative tools of education in war conditions

Innovative tools	N	%
Learning management systems	251	98.05%
Video conferencing platforms	241	90.94%
Electronic textbooks	239	90.19%
Online testing systems	230	86.79%
Mobile applications	210	82.03%
Communication messengers	190	74.22%
Interactive whiteboards	58	22.66%
Virtual reality technologies	76	29.69%
Simulation technologies	61	23.83%

Source: Authors' development

Thus, the survey results show that the most common innovative tools are learning management systems, video conferencing platforms, e-textbooks, online testing systems and various mobile applications. It is worth noting that the vast majority of Ukrainian educational institutions use Moodle for learning management (91%). At the same time, teachers' answers differed when it came to choosing a video conferencing platform. In particular, 149 teachers use the Zoom platform to conduct online lectures or seminars. 50 people indicated that they conduct classes on the Microsoft Teams platform, and another 35 people use the Google Meet application. Another 22 respondents indicated that they do not use the above-mentioned platforms, but conduct online training on the internal platforms of the institution (see Figure 1).

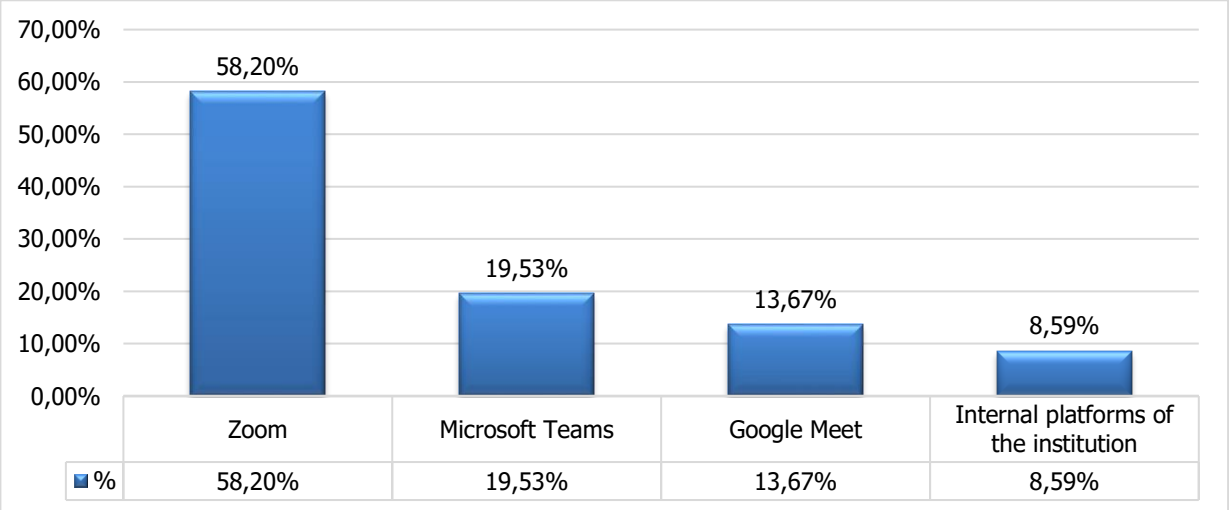

Figure 1. Diagram of the use of electronic video conference platforms.
Source: Authors' development

The next part of the survey was to find out how often innovative solutions are used in education. To the question of how often do you use innovations in education, 110 teachers answered that every class, while 113 teachers answered several times a week and 33 teachers answered several times a month. At the same time, there was an option - "once a month", but none of the respondents indicated it. Thus, this

indicates the active use of innovations in Ukrainian education during the war. When asked how often they distribute educational materials in digital format, the vast majority of respondents (about 31%) indicated that they distribute them every week, while 35% distribute them several times a week. 25% of teachers distribute digital learning materials once a month. At the same time, 13% introduce students to educational resources several times a quarter. However, it should be noted that this frequency also depends on the number of classes taught. The participants of the experiment had to rate from 1 to 5 the use of modern platforms in the implementation of education during the war (see Figure 2).

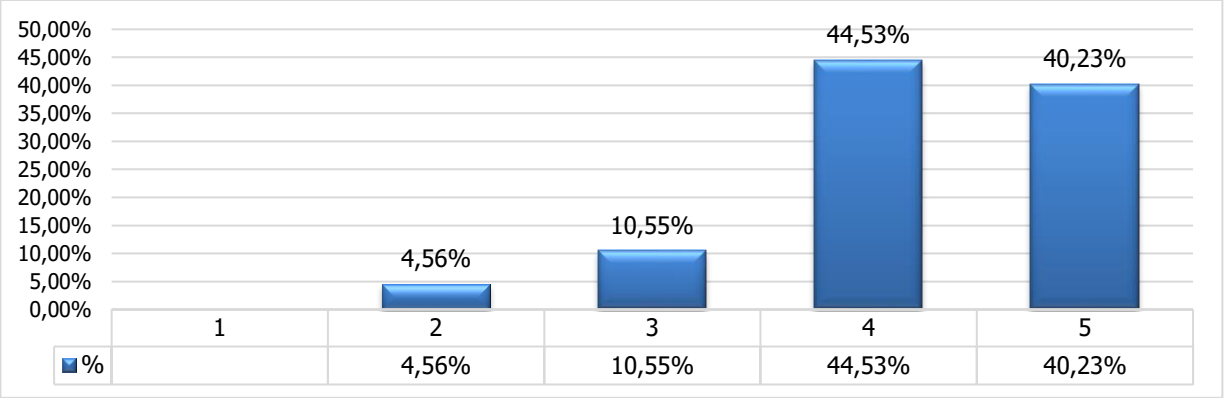

Figure 2. Evaluation of the use of modern platforms in the implementation of education during the war. Source: Authors' development

It should be noted that students gave high marks to the process of using modern platforms. Some teachers pointed to some difficulties in using them, including problems with access to the Internet and the underdeveloped material and technical base for the integrated use of various innovations. At the same time, the lack of funding has become an important challenge for the Ukrainian education and science system. The martial law has led to a reduction in spending on the education system, and thus on funding for the latest educational programmes, and has reduced access to important resources that contribute to the implementation of innovative solutions.

It is also worth considering that the use of innovations requires adaptation on the part of both implementers and students. The respondents emphasised that the stress of war and the need to adapt to a new learning environment were difficult challenges. Modern scholars believe that in order to actively adapt to new learning environments and technologies, teachers should communicate with students to understand not only their results but also their psychological state, and in case of need to contact a psychological counsellor from the educational institution, all respondents had to evaluate modern messengers for communication during distance education, in particular, such applications as e-mail or special messengers Telegram, WhatsApp, Viber. The majority of respondents said that they mainly use Telegram and email to communicate.

Table 3.
Tools for communication between students and teachers

Tools for communication	N	%
Telegram	190	74.22%
E-mail	210	82.03%
Viber	76	29.69%
WhatsApp	50	13.67%

Source: Authors' development

Given the popularity of Telegram and Viber as the main communication apps respondents were asked to rate their effectiveness on a scale from 1 to 5. These apps mostly received high marks (from 4 to 5), which indicates their importance for effective communication between students and teachers during the war. The final question concerned the overall assessment of the use of innovations in the implementation of education during the war (a score of 1 meant not at all effective, 5 - very effective). The data obtained are shown in Figure 3.

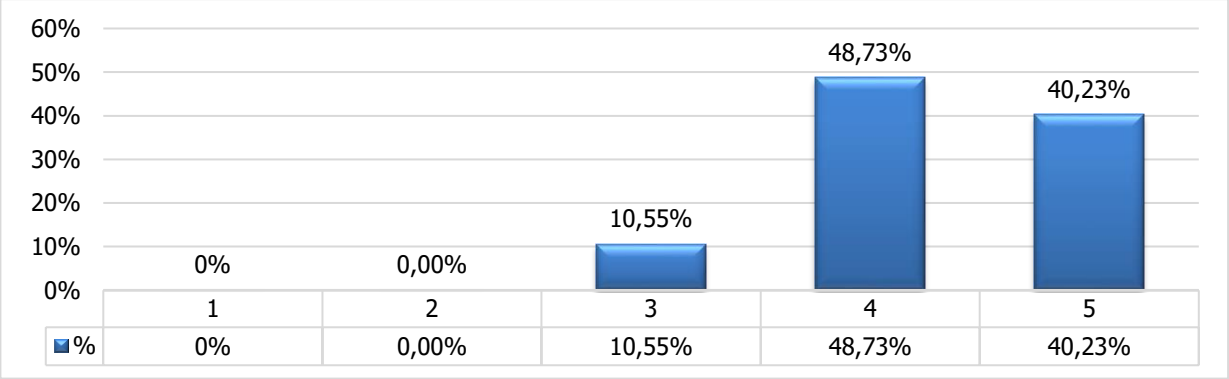

Figure 3. Overall assessment of the use of innovations in the implementation of education during the war. Source: Authors' development

Such high scores demonstrate the importance of innovative solutions in education during the war. Obviously, the war has a negative impact on the educational system (as we found out, it leads to a lack of funding and a shortage of material and technical resources), but martial law also facilitates the introduction of completely new technologies and innovations. However, it is important that modern Ukrainian teachers and students support the idea of introducing innovations into the education system, which is an important indicator of the development of education in Ukraine, even despite the war.

Discussion

After the outbreak of full-scale armed aggression, the situation in Ukraine's education sector has become more complicated, as evidenced by numerous studies (Malynovskyi, Duka & Yaroshenko, 2022; Martin et al., 2022; Kubiv et al., 2020). The educational process has been suspended, educational buildings have been destroyed all this time, and students and teachers have found themselves in different conditions. As in 2014, after the annexation of Crimea and the outbreak of hostilities in Donbas, the Ukrainian education system faced the challenge of relocating educational institutions to the government-controlled territory. All of this forced the educational process to adapt to new conditions and use innovative solutions, in particular, the peculiarities of the introduction of distance education in Ukraine are described in detail in Movchan, Komisarenko, Fernos and Kolisnyk (2023) and Krymets (2022).

The results underline the importance of innovative solutions in education during wartime. It was found that modern teachers use various innovative tools to support education. The results of modern scholars also demonstrate the importance of using platforms for e-learning (Bobro, 2023; Kuzheliev et al., 2023). More detailed ways of implementing distance education based on the analysis of the experience of using the Moodle and Microsoft teams platforms are covered in the study by Dezelak, Bobek and Sternad Zabukovsek (2022). However, current research also emphasizes cybersecurity when implementing these technologies (Lysenko et al., 2024; Kozlovskyi et al., 2024). Despite this, modern scientists prove that, despite various challenges, it is worth developing the direction of education as an important factor in the development of social capital (Shpykuljak & Mazur, 2014).

The study also pays special attention to the problem of adaptation of participants in the educational process and new solutions and innovations. Although it has been demonstrated that teachers and students have successfully adapted to new realities and consider innovations important, adaptation is still essential for the successful organisation of learning. This correlates with the study by Sytnik, Miroshnychenko and Svidenska (2022), which investigated key aspects of students' emotional states during the war. This work demonstrated that students' emotional states have undergone significant shifts in comparison to the pre-war period: the dominant emotions have changed, which have generally become more labile, and anxiety has increased. There is also a negative impact on communication (Dubiaha et al., 2023; Krylova & Krylova, 2023; Dovha et al., 2019).

Therefore, the authors of this article consider the introduction of ongoing psychological support and the creation of internal platforms to support the mental health of applicants to be an important innovation. Separately, this study also emphasises the challenges and difficulties in implementing innovations during the war, in particular, the logistical difficulties, the importance of adaptation and the lack of funding. At the same time, contemporary scholars also highlight other difficulties in implementing innovations (including e-learning): limited access to certain technologies, issues of a safe learning environment, and certain systemic and bureaucratic obstacles (Makhynko, 2023; Marchenko, 2023).

Based on the analysis of the evaluative responses of the participants in the experiment, this study demonstrated the importance of introducing innovations in education in war, which has been confirmed in other studies based on other conflicts. In particular, Rajab's (2018) empirical study of the role of e-learning in war-affected areas also demonstrated the effectiveness of innovative solutions.

Based on a study of more than 20 courses and student outcomes, the author demonstrated that 26 e-learning courses had a 100% pass rate compared to 16 face-to-face courses. In this way, this study also shows the effectiveness of innovative means. Thus, the novelty of this study is based on the assessment of judgements from teachers and students about the introduction of innovations in education and demonstrated the effectiveness of the latter in supporting the modern educational environment.

Conclusions

Therefore, modern innovations play the role of an important element of the transformation of education in the crisis of wartime. In particular, innovative means not only contribute to the reform and renewal of the education system, but also ensure the effective functioning of the education sector in general.

The obtained evaluations of the participants of this study demonstrated a high level of importance, and therefore the value of innovative solutions in the Ukrainian education system. The participants of this study evaluated the basic tools and innovative instruments used in Ukrainian education, which in turn demonstrated not only their familiarity with these tools, but also the fact that Ukrainian students and teachers are well versed in innovative technologies.

It has been determined that the use of digital technologies in educational institutions is multi-platform and cross-cutting, i.e., various mobile applications, learning platforms, or communication messengers are used. It is demonstrated that communication is an important element of the functioning of education. As a result, it is determined that modern teachers are actively using innovative tools to support students, and thus implement the approach of personalised or personality-oriented learning, which is popular in Europe.

Bibliographic References

Al Qaidani, K. A. (2019). *Higher Education Systems and Institutions, Yemen. In Encyclopedia of International Higher Education Systems and Institutions* (pp. 1–10). Springer Netherlands. https://doi.org/10.1007/978-94-017-9553-1_487-1

Barakat, N., Al-Shalash, A., Biswas, M., Chou, S.-F., & Khajah, T. (2022*). Engineering experiential learning during the COVID-19 pandemic. In Mobility for smart cities and regional development - challenges for higher education* (p. 991–1003). Springer International Publishing. https://doi.org/10.1007/978-3-030-93907-6_105

Boiko, S. M. (2023). The Ukrainian experience of implementing innovative practices in experimental educational institutions in the wartime conditions. *Higher Education of Ukraine in the Context of Integration to European Educational Space, 91*((II)1), 228-241. https://doi.org/10.38014/osvita.2023.91.20

Bobro, N. (2023). Effectiveness of artificial intelligence usage in the educational process. *Science and technology today, 14*(28). https://doi.org/10.52058/2786-6025-2023-14(28)-168-174

Budnyk, O. (2022). Education innovations: new wartime experience of Ukrainian universities. *Journal for Educators, Teachers and Trainers, 13*(5), 464-471. https://doi.org/10.47750/jett.2022.13.05.042

Chakhaia, L., & Bregvadze, T. (2018). *Georgia: Higher Education System Dynamics and Institutional Diversity. In Palgrave Studies in Global Higher Education* (pp. 175–197). Springer International Publishing. https://doi.org/10.1007/978-3-319-52980-6_7

Castilho Barilli, E. C. V. (2012). *Virtual reality technology as an didactical and pedagogical resource in distance education for professional training*. In Distance education. InTech. https://doi.org/10.5772/50625

Dezelak, Z., Bobek, S., & Zabukovsek, S.S. (2022). User experience (UX) comparative analysis of distant learning solutions moodle and microsoft teams. *In 16th international technology, education and development conference*, IATED. https://doi.org/10.21125/inted.2022.1175

Diachenko, I., Kalishchuk, S., Zhylin, M., Kyyko, A., & Volkova, Y. (2022). Color education: A study on methods of influence on memory. *Heliyon, 8*(11). https://doi.org/10.1016/j.heliyon.2022.e11607

Dovha, T., Kotelianets, N., Plachynda, T., & Kotelianets, Y. (2019). Integration of reflection and self-regulation as factors of personality's self-actualization. *Opcion, 35*(Special Issue 20), 617-631.

Dubiaha, S., Huz, V., Shevchenko, Y., Fedorenko, S., & Kolomiiets, Y. (2023). Formation of speech regulation of educational activity in junior schoolchildren with speech disorders. *AD ALTA: Journal of Interdisciplinary Research*, *13*(XXXV), 88-95. http://eprints.mdpu.org.ua/id/eprint/12944/1/стаття_2023.pdf

Iastremska, O., Tryfonova, O., Mantaliuk, O., & Baranets, H. (2023). The impact of strategic decisions on the future development of organisations and economic dynamics. *Futurity Economics & Law, 3*(4), 117-134. https://doi.org/10.57125/FEL.2023.12.25.08

Iskakova, M. (2023). Electronic Technologies to Ensure Individual Learning of Education Seekers with Special Needs. *Futurity of Social Sciences, 1*(1), 4-20. https://doi.org/10.57125/FS.2023.03.20.01

Ivanchuk, S., Kakhiani, Y., Hryboiedova, T., Bilychenko, H., & Huzii, I. (2024). Policy for the formation of social consciousness during students training in educational institutions: pedagogical aspect. *Amazonia Investiga*, *13*(73), 387-400. https://doi.org/10.34069/AI/2024.73.01.32

Galynska, O., & Bilous, S. (2022). Remote learning during the war: challenges for higher education in Ukraine. *International Science Journal of Education & Linguistics, 1*(5), 1-6. https://doi.org/10.46299/j.isjel.20220105.01

Kaminskyy, V., & Viesova, O. (2022). Innovative activities in healthcare institutions of the future: models for overcoming dilemmas. *Futurity Medicine, 1*(1), 17-26. https://doi.org/10.57125/FEM.2022.03.25.02

Kozlovskyi, S., Kulinich, T., Vechirko, I., Lavrov, R., Zayukov, I., & Mazur, H. (2024). Relationship between net migration and economic development of European countries: Empirical conclusions. *Problems and Perspectives in Management, 22*(1), 605-618. https://doi.org/10.21511/ppm.22(1).2024.48

Krylova-Grek, Y., & Shyshkina, M. P. (2021). Online learning at higher education institutions in Ukraine: Achievements, challenges, and horizons. *Information Technologies and Learning Tools, 85*(5), 163-174. https://doi.org/10.33407/itlt.v85i5.4660

Krylova, S., & Krylova, V. (2023). The phenomenon of the academic charisma of a scientist in science and education. *Higher Education of Ukraine, 2*, 46-52. https://doi.org/10.32782/NPU-VOU.2023.2(89).06

Krymets, L. (2022). What must the education of the future be like to be really future? (Attempts of philosophical reflection). *Futurity Philosophy, 1*(4), 28-41. https://doi.org/10.57125/FP.2022.12.30.03

Kubiv, S. I., Bobro, N. S., Lopushnyak, G. S., Lenher, Y. I., & Kozhyna, A. (2020). Innovative Potential in European Countries: Analytical and Legal Aspects. *International Journal of Economics and Business Administration, VIII* (Issue 2), 250-264. https://doi.org/10.35808/ijeba/457

Kuzheliev, M., Zherlitsyn, D., Nechyporenko, A., Lutkovska, S., & Mazur, H. (2023). Distance learning as a tool for enhancing university academic management processes during the war. *Problems and Perspectives in Management, 21*(2), 23-30. https://doi.org/10.21511/ppm.21(2-si).2023.04

Lucić, L. (2020). War Schools: teaching innovations implemented across makeshift educational spaces during the military siege of Sarajevo. *Pedagogy, Culture & Society,* 1-20. https://doi.org/10.1080/14681366.2020.1768582

Lymar, L. (2024). Undergraduate and postgraduate education during war in Ukraine: The challenges to overcome. *Collection of Scientific Papers «ΛΌГОΣ»*, (March 29, 2024; Cambridge, UK), 423–425.. https://doi.org/10.36074/logos-29.03.2024.088

Lysenko, S., Bobro, N., Korsunov, K., Vasylchyshyn, O., & Tatarchenko, Y. (2024). The Role of Artificial Intelligence in Cybersecurity: Automation of Protection and Detection of Threats. *Economic Affairs, 69*(1). https://doi.org/10.46852/0424-2513.1.2024.6

Martin, A., Vyshnivska, N., Shkurenko, O., Sukhopara, I., Vashchenko, O., Romanenko, L., & Romanenko, K. (2022). The influence of natural objects on the emergence and overcoming of the Child's anxiety during interaction with others at the beginning of Children's teaching at school. *Pegem Education and Training Magazine, (12/3),* 12-19. https://doi.org/10.47750/pegegog.12.03.02

Makhynko, L. (2023). *Open educational resources: Facing challenges of distance learning. In Higher education reforms in Ukraine: Challenges, status, and prospects* (p. 234–264). Publishing house "Baltic Publishing". https://doi.org/10.30525/978-9934-26-360-6-11

Malynovskyi, S., Duka, R., & Yaroshenko, K. (2022). Distance education in war conditions: Learning practical surgery skills. *Sworld-Us Conference Proceedings*, (usc11-01), 34-37. https://doi.org/10.30888/2709-2267.2022-11-01-014

Marchenko, T. (2023). Higher education during the war time in Ukraine. *Scientific Journal of Polonia University, 59*(4), 49-57. https://doi.org/10.23856/5907

Meletiou-Mavrotheris, M., Eteokleous, N., & Stylianou-Georgiou, A. (2022). Emergency remote learning in higher education in Cyprus during COVID-19 lockdown: A zoom-out view of challenges and opportunities for quality online learning. *Education Sciences, 12*(7), 477. https://doi.org/10.3390/educsci12070477

Movchan, L., Komisarenko, N., Fernos, Y., & Kolisnyk, V. (2023). Distance education in Ukraine during the war. *In 15th International Conference on Education and New Learning Technologies*. IATED. https://doi.org/10.21125/edulearn.2023.1665

Onufer, L. (2023). *Faculty development for inclusive online teaching: lessons learned during the pandemic. In Diversity in Higher Education Remote Learning* (p. 65–69). Springer International Publishing. https://doi.org/10.1007/978-3-031-31214-4_6

Rafael, S., & Justino, J. (2022). *Conceptual maps applied to remote/virtual laboratories for active learning. In Mobility for Smart Cities and Regional Development - Challenges for Higher Education* (p. 361–369). Springer International Publishing. https://doi.org/10.1007/978-3-030-93904-5_37

Rajab, K. D. (2018). The effectiveness and potential of e-learning in war zones: an empirical comparison of face-to-face and online education in Saudi Arabia. *IEEE Access, 6*, 6783-6794. https://doi.org/10.1109/access.2018.2800164

Shpykuljak, O., & Mazur, G. (2014). Institutional Principles of the Formation of Social Capital in the Mechanism of Development of Rural Territories. *Economy APK, 8*, 63-68. http://nbuv.gov.ua/UJRN/E_apk_2014_8_12

Sytnik, S. V., Miroshnychenko, O. M., & Svidenska, H. M. (2022). Peculiarities of emotional states of higher education accessories during the war in Ukraine. *Habitus, (37)*, 48-51. https://doi.org/10.32843/2663-5208.2022.37.8

Tarteer, S., Much, Y. A., Ghanem, M., Odeh, A., Elian, S., Hashaykeh, S., Salha, S., Affouneh, S., & Khlaif, Z. N. (2022). *Challenges facing online learning during COVID-19. In Radical Solutions in Palestinian Higher Education* (p. 119–133). Springer Singapore. https://doi.org/10.1007/978-981-19-0101-0_10

Tinterri, A., Eradze, M., Limone, P., & Dipace, A. (2022). *Students' coping and study strategies: Did emergency remote teaching support the students during the pandemic?* In Higher Education Learning Methodologies and Technologies Online (p. 117–128). Springer International Publishing. https://doi.org/10.1007/978-3-030-96060-5_9

Vasilache, S. (2022). *Suddenly online: Active learning implementation strategies during remote teaching of a software engineering course*. In Mobility for smart cities and regional development - challenges for higher education (p. 395–402). Springer International Publishing. https://doi.org/10.1007/978-3-030-93904-5_40

Wahas, Y. M. A., & Syed, A. J. A. (2024). E-assessment challenges during e-learning in higher education: A case study. *Education and Information Technologies*, 1-20. https://doi.org/10.1007/s10639-023-12421-0

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.7
Cómo citar:
Podplota, S., Osipchuk, N., Tarasiuk, N., Kostyk, Y., & Absaliamova, Y. (2024). The influence of digital technologies on the improvement of communication skills of students in the process of foreign languages studying (in non-linguistic higher educational institutions). *Revista Eduweb*, 18(2), 100-116. https://doi.org/10.46502/issn.1856-7576/2024.18.02.7

The influence of digital technologies on the improvement of communication skills of students in the process of foreign languages studying (in non-linguistic higher educational institutions)

La influencia de las tecnologías digitales en la mejora de las competencias comunicativas de los estudiantes en el proceso de estudio de lenguas extranjeras (en centros de enseñanza superior no lingüística)

Svitlana Podplota
https://orcid.org/0000-0002-5184-9907
Bogdan Khmelnytsky Melitopol State Pedagogical University, Zaporizhzhia, Ukraine.
Nataliia Osipchuk
https://orcid.org/0000-0002-3186-6806
National University of Water and Environmental Engineering, Rivne, Ukraine.
Nataliia Tarasiuk
https://orcid.org/0000-0003-4514-6911
National University of Water and Environmental Engineering, Rivne, Ukraine.
Yevheniia Kostyk
https://orcid.org/0000-0002-7611-0770
Hryhorii Skovoroda University in Pereiaslav, Pereiaslav, Ukraine.
Yana Absaliamova
https://orcid.org/0000-0001-5860-6337
National University of Kyiv Mohyla Academy, Kyiv, Ukraine.

Recibido: 20/04/24
Aceptado: 05/06/24

Abstract

The study aims to analyse the influence of digital technologies on the improvement of students' communication skills during foreign language studies in non-linguistic educational institutions. The questionnaire-based survey and the method of expert evaluation of the competencies formation were used. Student's coefficient and correlation analysis were used for statistical data analysis. The reliability and validity of the instruments were checked using Cronbach's alpha. The study showed that the use of Linguee contributes to the development of foreign language communicative competence of students of non-linguistic higher educational institutions. Linguistic competence ($t \approx 6.71$), Cultural sensitivity ($t \approx 7.21$), Adaptability ($t \approx 7.46$), and Communication efficiency ($t \approx 6.36$) exceed critical value $t_{critical} \approx 2.447$ at $\alpha = 0.05$. In such a way, the difference in the assessment between the groups is statistically significant,

with a significance level of α=0.05. The positive influence of the Linguee platform on the formation and development of students' communication skills was found in studies in non-linguistic higher educational institutions. The results confirm that the use of digital tools in the educational process contributes to the improvement of students' communicative competence. Further studies can be oriented on a deeper understanding and optimisation of the influence of digital technologies on the development of communication skills.

Keywords: educational environment, innovation, foreign language competence, higher education, digital environment.

Resumen

El objetivo del estudio es analizar la influencia de las tecnologías digitales en la mejora de las competencias comunicativas de los estudiantes durante los estudios de lenguas extranjeras en centros de enseñanza no lingüística. Se utilizó la encuesta basada en un cuestionario y el método de evaluación por expertos de la formación de competencias. Para el análisis estadístico de los datos se utilizaron el coeficiente de Student y el análisis de correlación. La fiabilidad y validez de los instrumentos se comprobaron mediante el alfa de Cronbach. El estudio demostró que el uso de Linguee contribuye al desarrollo de la competencia comunicativa en lenguas extranjeras de los estudiantes de centros de enseñanza superior no lingüística. La competencia lingüística (t≈6,71), la sensibilidad cultural (t≈7,21), la adaptabilidad (t≈7,46) y la eficacia comunicativa (t≈6,36) superan el valor crítico tcritical≈2,447 a α=0,05. De tal forma, la diferencia en la valoración entre los grupos es estadísticamente significativa con un nivel de significación de α=0,05. Se constató la influencia positiva de la plataforma Linguee en la formación y el desarrollo de las competencias comunicativas de los alumnos, que estudian en centros de enseñanza superior no lingüísticos. Los resultados recibidos confirman el hecho de que el uso de herramientas digitales en el proceso educativo contribuye a la mejora de la competencia comunicativa de los estudiantes. Futuros estudios pueden orientarse a una comprensión más profunda y a la optimización de la influencia de las tecnologías digitales en el desarrollo de las competencias comunicativas.

Palabras clave: entorno educativo, innovación, competencia en lenguas extranjeras, educación superior, entorno digital.

Introduction

Relevance

The relevance of the theme of the influence of digital technologies on the improvement of communication skills of students in the process of studying foreign languages in non-linguistic educational institutions is extremely important nowadays. Higher educational institutions face the constant challenge of necessity to respond to the increasing demand for professionals with profession-oriented skills, which include the ability to interact in the international environment and adapt to various cultural contexts (Lee, 2019; Shadiev & Wang, 2022).

It is important to develop the ability to use various informational resources and multimedia technologies for the effective study of foreign languages in the educational space. That is necessary not only for linguistic experience enhancement but also for the formation of key competencies such as critical thinking, independence and creativity. The use of information and communication technologies in studying foreign languages allows students to form a professional culture, as well as ensures a possibility of access to Internet resources, expanding their knowledge and enhancing their perception of foreign language communication (Slipetska et al., 2023).

Modern digital technologies in foreign language teaching become not only a tool but an important component of the pedagogical process. They enable the revision of traditional methods of teaching and contribute to innovations and integration in pedagogical practice. Still, to achieve optimal results, not only should technologies be introduced, but students should also be taught to critically evaluate information and develop skills in teamwork and effective communication in the network environment (Chen et al., 2020).

The problem of this study goes beyond simple technology integration in the educational process. It relates to the complex of factors, defining the success of this process and ensuring the formation of effective communication skills of students.

First, there is an issue of unequal access to digital technologies among students. Some of them have better access to computers, tablets and other gadgets, while others can face difficulties due to financial problems or their location, which prevents modern technology use. Second, the quality of the content and software used in the educational process should be considered (Chen et al., 2019). It is not enough to introduce digital resources but also to ensure their quality and that they are adapted to foreign language studying and contribute to the development of communication skills. Consideration and solving these issues is an important step in the improvement of the use of digital technologies for the development of communication skills of students, contributing to more effective and multilateral foreign language studying (Klimova et al., 2023).

This study is focused on the study of the particular influence of digital technologies on the improvement of communication skills of students in the process of foreign languages studying in non-linguistic educational institutions. The study is directed at the evaluation of the efficiency of improvement of communication skills of students with the use of digital technologies introduced into the educational process. The study focuses on the issue of students' accessibility of digital technologies and the level of their technology literacy.

Purpose

This study aims to study and determine the particular influence of digital technologies on the improvement of communication skills of students in the process of studying foreign languages in non-linguistic educational institutions.

Tasks /questions

1. To examine the formation of digital competencies in students.
2. To examine the formation of communicative foreign language competencies according to selected criteria.
3. Correlation analysis is conducted to find the relationship between the formation of digital competence and the level of communicative foreign language competence.

Literature Review

Studying foreign languages is an inevitable part of interaction with global society, where digital technologies are developing rapidly. Understanding the influence of these technologies on communication skills is important for students' preparation for international communication.

The study by Haleem et al. (2022) gives valuable insight into the role of digital technologies in modern education. The review is dedicated to studying the influence of digital technologies on educational

processes and defines the key aspects of this influence. The authors study trends, advantages and challenges related to digital technology use in modern education. Furthermore, the article is notable for the detailed description of the influence of digital technologies on effective studying and the improvement of communication skills of students.

Zhang and Zou's work (2022) focuses on studying subtypes, objectives, and efficiency of advanced technologies for studying second and foreign languages. The authors systematically analyse technology types, their designation and their influence on the processes of language studying. Special attention is given to the means of computer-assisted studying, their interaction with students, and the achievement of the purpose of improving communication skills. This study makes an important contribution to understanding the efficiency of modern technologies within the context of foreign language studies.

Chen et al. (2019) reveal the influence of headlines and the level of English language knowledge on the efficiency of education, motivation and attitude of students towards the English language within the context of extended use of augmented reality. Their study analyses the interaction between factors such as the presence of headlines and the level of English language knowledge and their influence on the educational process in detail. The importance of studying this issue lies in expanding and understanding the influence of additional elements such as headlines and the level of English language knowledge can have on studying English as a foreign language using technologically improved methods.

Jamalai and Krish (2021) consider the use of online forums for the development of 21st-century skills within the English language course for particular purposes. The authors conduct a detailed analysis of the influence of the forum on the development of important skills such as critical thinking, communicative competence, and cooperation. The important aspect of this study is a practical approach to the introduction of an online platform for English language studying with an accent on the development of modern skills necessary in the 21st century.

In the guest editorial Shadiev et al. (2022) study the theme of creative education in authentic contexts with the use of advanced educational technologies. The authors emphasise the importance of the creation and realisation of creative educational practices related to the use of advanced technologies. This material serves as an important introduction to the stimulation of the creative process in education by modern technologies.

Shadiev and Yang's (2020) work is a review of scientific works dedicated to technology usage for the improvement of foreign language studying and teaching. The authors systematically analyse the results of previous studies, focusing on technologies which contribute to language studying and teaching. Defining key themes and conclusions, this study makes a significant contribution to understanding the efficiency of technology usage in studying foreign languages.

Yang et al. (2022) study the use of digital storytelling as an interdisciplinary project for improving skills in English language studying and the development of creative thinking in students. The authors systematically analyse the results of this method's implementation in studying, particularly its influence on language studying and the development of students' creative thinking. The study is important for understanding the way interdisciplinary approaches can improve the quality of language studying and develop the creative potential of students.

In their work, Zhang and Zou (2020) study subtypes, objectives and efficiency of advanced technologies for second and foreign languages studying. They conduct a systematic review of modern technologies and their role in language teaching. The authors provide a complex review of technology types and their influence on language teaching. The study helps to reveal possibilities and challenges related to the use of advanced technologies in studying foreign languages.

Ma's (2021) article is dedicated to the development and implementation of the immersive method of English language teaching in higher educational institutions on the basis of artificial intelligence and machine learning in virtual reality technology. The author studies how these technologies can create an immersive educational context for students and how this influences the efficiency of language studying. The study supplements our understanding of how virtual reality technologies can improve the processes of teaching English languages in universities.

The article by Rofi'i and Herdiawan (2024) explores a new methodology that integrates hybrid synchronous and asynchronous methods to improve students' English speaking skills. The authors emphasise the importance of having developed English-speaking skills. Dynamic learning involves a combination of real-time interactions and exercises that can be performed at different times. The purpose of the study is to clarify teachers' views on the integration of hybrid methods in English language teaching, especially in the context of speaking lessons. The study was conducted in the form of a descriptive case study involving participants in semi-structured interviews and questionnaires. The findings indicate a significant influence of social and psychological factors on teachers' ability to communicate effectively online.

Analysing the article by Toleuzhan et al. (2023), it becomes clear that modern technology has significantly influenced the need to learn English, which has become an important part of education. The researchers drew attention to the various media tools used to teach language skills, and among them, they highlighted the YouTube video platform, which received the most positive ratings from students. Access to the internet allows learners to use YouTube videos as a valuable tool for developing a variety of language skills. The study focused on exploring the types of YouTube videos most watched by secondary school students in Kazakhstan to improve their English speaking skills. To achieve this goal, a mixed-methods study was used, which included video content analysis and a questionnaire survey of 288 secondary school students. The results of the questionnaire were analysed descriptively.

According to the study by Asratie et al. (2023), it can be determined that the research focused on the use of educational technology to improve speaking skills. A quasi-experimental design was used with two groups (experimental and control) and pre- and post-tests. Students in the experimental group were taught using educational technologies to develop their speaking skills, while students in the control group used traditional teaching methods.

In their study, Gamage (2020) consider the pedagogical application of the grammar-translation method as an effective instructional methodology in teaching English as a second language. The authors analyse the advantages and limitations of this method, and its efficiency in teaching grammar and developing linguistic skills. This study is useful for understanding different approaches to teaching English as a foreign language.

There is a small number of studies on certain aspects that remain understudied in the scientific environment. One such area is the influence of interactive virtual environments on students' development of critical thinking. The influence of these technologies on the development of critical thinking, as well as their interaction with general educational processes, were not sufficiently studied. Limited studies revealing the use of artificial intelligence in the process of individualised studying in detail are available in the education sphere. Such aspects as personalisation of educational material, adaptation to individual needs, and results optimisation are understudied, which prevents receiving the full volume of possibilities that innovations in this sphere can offer.

There is a growing focus in the academic literature on the use of digital technologies in education. Trends include the integration of computer-assisted methods, the use of virtual reality, and the use of interdisciplinary approaches to improve students' communication skills and creative thinking. Studies point to the importance of developing individualised educational programmes using artificial intelligence and

machine learning. Researchers note the great influence of digital technologies on foreign language learning. The use of social media and the YouTube video hosting platform is particularly noteworthy. It is also worth noting the widespread use of specialised applications for learning a foreign language.

The current study examines in detail the impact of digital technologies on educational processes, focusing on specific aspects, such as critical thinking and individualised learning, which remain under-researched. It offers practical solutions for introducing the latest technologies into the learning process, which helps to overcome the limitations of previous research, in particular in the use of interactive virtual environments and adaptive teaching methods.

Methods

Design

The study design determines the general strategy and plan according to which the scientific study will be conducted. Effective study design is a key element for receiving reliable and meaningful results. All the stages of this study are presented in Table 1.

Table 1.
Stages of the study conduction

Stage	Length	Content
Research and theoretical	June-August, 2023	A theoretical analysis of the literature of different scientific areas was conducted. A survey methodology was developed and meaningful criteria for the study were found. Preparation of data collection.
Ascertaining	September - October, 2023	Survey conduction, data collection and analysis, calculations conduction and determination of statistically significant results. Introduction of the Linguee platform in studying the experimental group for enhancing vocabulary and communication skills.
Summative	November, 2023	Drafting conclusions and formation of results of the study

Source: Developed by the authors of the article

Participants

The study was conducted on the basis of the National University of Water and Environmental Engineering. Respondents were selected using a lottery method among the students of the Foreign Languages Department. 100 students of 3rd and 4th years of study, including 25 boys and 75 girls, participated in the research-experimental work. The division into control and experimental groups was conducted after checking the digital competencies of students. Students with advanced and intermediate levels of digital competencies were assigned to the experimental group (EG), while those with elementary competencies were assigned to the control group (CG). Pedagogical conditions for the use of digital technology, namely the Linguee platform, to improve communicative foreign language competencies were used by the experimental group. The group of experts, consisting of 20 persons from the number of lecturers in the department, participated in the study. One group of lecturers worked with the groups within the process of theoretical and practical studying. Such sampling, the number of respondents and the method of control and experimental group formation contribute to receiving objective data.

Instruments

GoogleForms tool and WhatsApp messenger were used to collect responses during the survey process. Software such as 'Microsoft Excel' and 'SPSS Statistics 19.0' were used for received data entry and

processing. All the analysis results were presented in percentages from the total number of individuals questioned, which provides a clearer and more relative view of the conclusions that were received.

The Linguee (https://www.linguee.com) platform with artificial intelligence (AI) was used as a digital technology. This interactive Internet service and online vocabulary enables users to find accurate translations and examples of terms and phrases that are used in real contexts. The main peculiarity of Linguee lies in its usage of a wide database, which contains translations of texts, previously published on the web.

Data collection

1. *Questionnaire-based survey method. Questionnaire for studying digital literacy of students* (Annex A) The questionnaire was used in this study to evaluate the level of digital competencies of students in the group of questions related to informational technology use. The aim of the survey was to collect objective and qualitative data, which allowed for an understanding of the level of digital skills mastery among study participants. Each question of the questionnaire relates to a certain aspect of digital competencies, beginning from the work on the computer to the use of applications and services for online communication. Survey results allow the conduct of a complex analysis of the level of student preparation in the sphere of digital technologies (Hollands & Escueta, 2020).
2. *Method of expert evaluation on the criteria of competencies formation* (Steinberg & Down, 2020). Conditions of foreign language communication skills formation show that the main factors influencing the efficiency of this process are represented in Table 2.

Table 2.
Criteria of foreign language communication skills formations of students of higher educational institutions

Criterion	Description
Linguistic competence	The level of foreign language knowledge, including grammar, vocabulary, and pronunciation.
Cultural sensitivity	The ability to understand and respect the cultural peculiarities of other speakers.
Adaptability	The ability to adapt linguistic skills to different situations and audiences.
Communication efficiency	The ability to accurately and clearly express one's own opinions and understand others.

Source: Developed by the authors on the basis of (Anderson et al., 2018)

Four main criteria for determining the quality of students' foreign language communication are presented in the table. Each criterion involves certain aspects, which should be considered in the evaluation of students' ability to effectively communicate in a foreign language.

The null hypothesis H_0 lies in the fact that the formation of foreign language communication skills does not depend on the digital competence of students. The alternative hypothesis H_1 lies in the fact that the formation of foreign language communication skills depends on the digital competence of students.

Analysis of data

1. **Student's coefficient**, t-statistic value, is calculated.

$$t = \frac{\overline{x_1} - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}, \qquad (1)$$

Where X_1 and X_2 indicate sampling;
n_1 – number of respondents on the access control;
n_2 – number of respondents on the final control;
s stands for mean squared error:

$$s_x = \sqrt{\frac{1}{(n-1)n}\sum_{i=1}^{n}(x - x_i)^2}, \qquad (2)$$

2. ***Correlation analysis***. Correlation analysis is the method used to determine the level of interrelation between two or more variables. The main purpose of correlation analysis is the determination of the possible influence of the change of one variable on the change of another variable. Coefficient r is calculated according to Pearson's formula:

$$r = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}}, \qquad (3)$$

Where *n* - number of observations,
∑ – the sum of all values,
X and *Y* – values for variables.

3. ***Reliability coefficient Cronbach's alpha*** characterises the internal consistency of test tasks. Cronbach's alpha is calculated according to the formula:

$$\frac{N}{N-1}\left(\frac{\sigma_x^2 - \sum_{i=1}^{N}\sigma_{Y_i}^2}{\sigma_x^2}\right), \qquad (4)$$

Where σ_x^2 – dispersion of the grade of the whole test;
$\sigma_{Y_i}^2$ – dispersion.

Ethical criteria

Ethical criteria in this study are determined to ensure the protection of the rights, well-being and dignity of its participants, as well as to ensure trust in its results and conclusions. Compliance with ethical standards is a necessary element of study conduction, which is defined by a number of key principles. The study should guarantee that participants have a complete understanding of their rights and where the received data will be used. Ensuring confidentiality and anonymity is a key aspect. The study should be based on fair and objective methods. All the results should be presented objectively, even if they do not correspond to expectations or previous hypotheses. It should be conducted in compliance with principles of equality and consideration of possible influence on different sociocultural groups. Participants sign informed consent forms before participating in the study.

Results

Respondents division based on the levels of digital competencies can reflect a wide range of different types of skills and knowledge in the sphere of digital technologies. Student division based on the level of digital competence formation is presented in Figure 1.

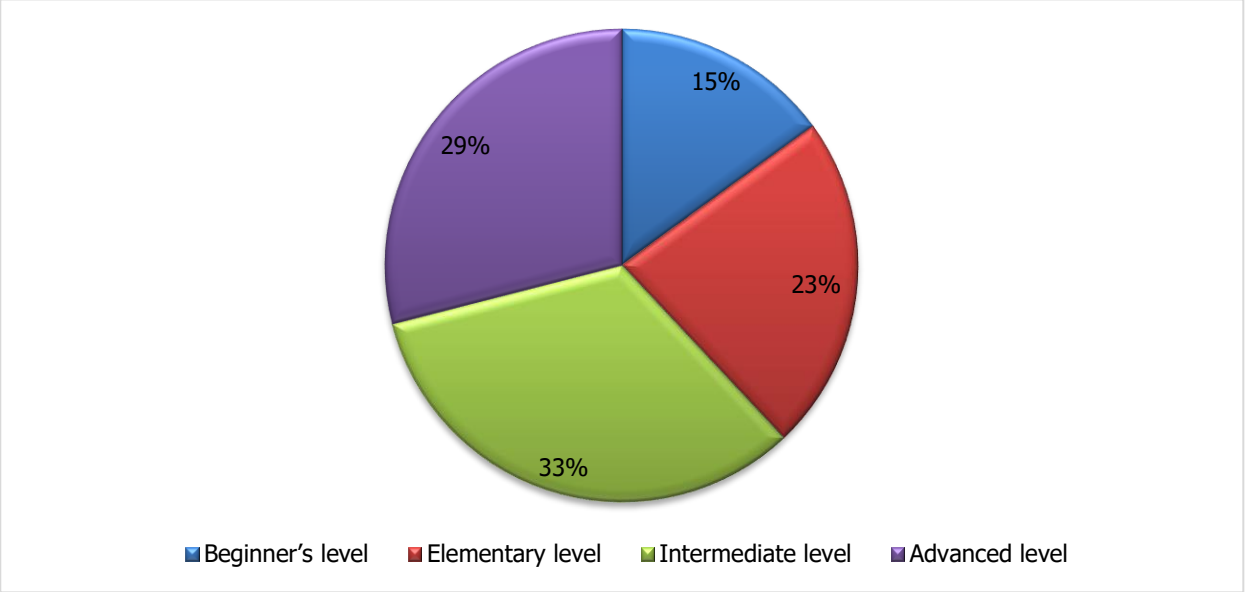

Figure 1. *Student division based on the level of digital competence formation*
Source: Developed by the authors on the basis of the study results

Student division based on the digital competence level indicates the variety of skills and knowledge in this area among the audience. The following conclusions can be made based on the mentioned data. Most students have the beginner's or elementary levels of digital competence. This can indicate that a part of students can have basic or limited skills in working with digital technologies. One-third of students have an intermediate level of digital competence. This can indicate that some students have quite developed skills but still require improvement in certain aspects. Approximately one-third of students have an intermediate level of digital competence. This indicates that some students in the group have a considerable level of skills and can use digital technologies for various tasks. Analysis of such a division serves as a basis for further correlation analysis. In such a way, the experimental group consisted of 62 students, while the control group involved 38.

The study of the formation of foreign language communicative competence within the context of this study is extremely important because of several key reasons, which are defined as the ability to effectively interact using another language, which is a critical aspect under conditions of globalisation and international communication. The study of this aspect allows us to gain an understanding of the level of linguistic skills of students oriented toward studying foreign languages and their ability to use such skills in the digital environment. The consideration of students' foreign language communicative competence can contribute to the development of more effective methods of teaching and the implementation of digital tools to improve these skills. The diagram of the formation of foreign language communicative competencies for control and experimental groups at the beginning of the study is presented in Figure 2.

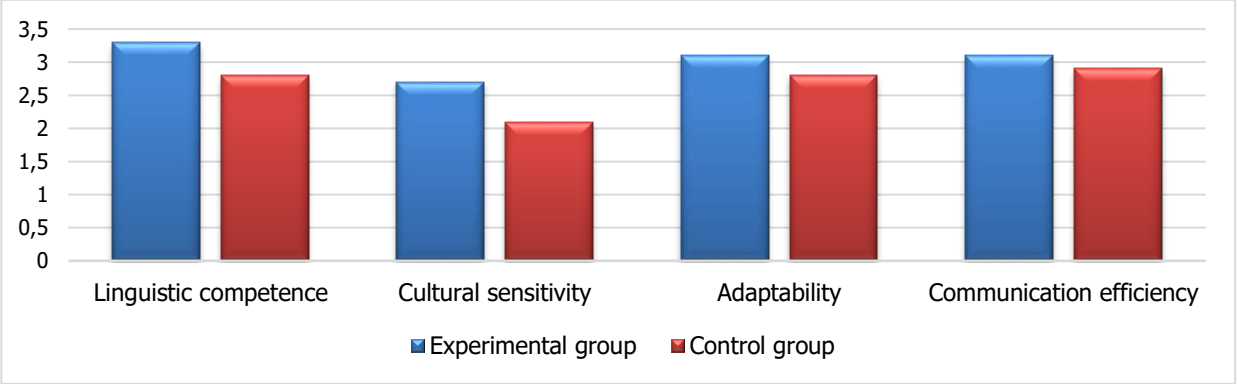

Figure 2. *The diagram of the formation of foreign language communicative competencies for control and experimental groups at the beginning of the study*
Source: Developed by the authors on the basis of the study results

Student's coefficient calculations for comparison of different parameters between EG and CG confirm that the difference in student's evaluation is not statistically meaningful with significance level α=0,05.

The calculated value for the criterion 'linguistic competence' - $t \approx 1{,}118$ is lower than the critical value of 2,447. The calculated value for the criterion 'Cultural sensitivity' - $t \approx 2{,}236$ is also lower than the critical value of 2,447. The calculated value for the criterion 'Adaptability' - $t \approx 0{,}894$ is lower than the critical value of 2,447. The calculated value for the criterion 'Communication efficiency' - $t \approx 0{,}632$ is lower than the critical value of 2,447. Thus, based on the results received, it is possible to conclude that there is no statistically significant difference between groups EG and CG, which indicates that the conditions were equal at the beginning of the experiment. The results received at the end of the experiment are presented in Figure 3.

Student's coefficient value: Linguistic competence: $t \approx 6.71$, Cultural sensitivity: $t \approx 7.21$, Adaptability: $t \approx 7.46$, Communication efficiency: $t \approx 6.36$. All t values exceed critical value $t_{critical} \approx 2{,}447$ with α=0,05. Thus, the difference in the assessment between the groups is statistically significant, with a significance level of α=0.05.

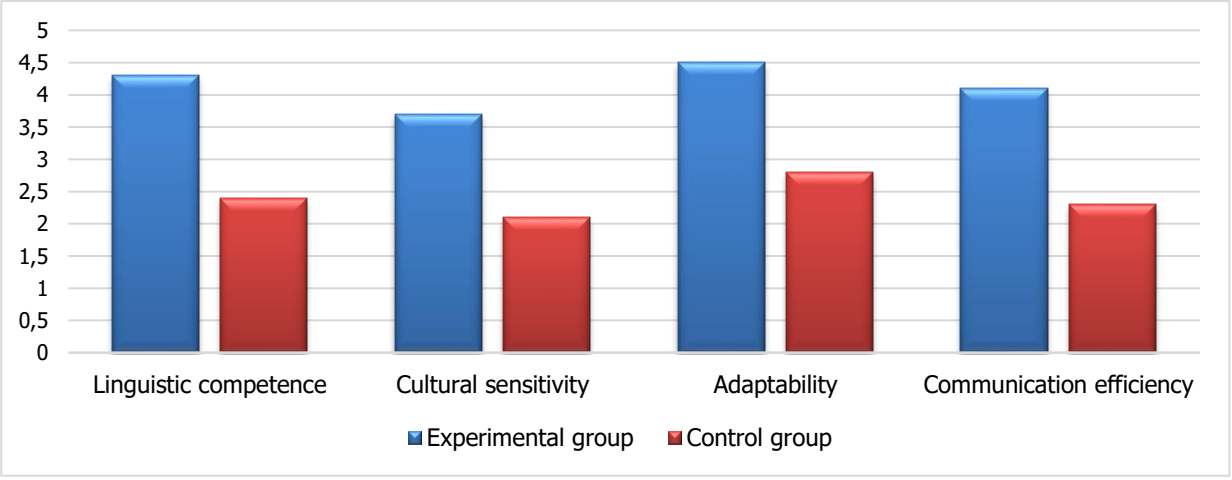

Figure 3. *The diagram of the formation of foreign language communicative competencies for control and experimental groups at the end of the study*
Source: Developed by the authors on the basis of the study results

Integration of the studying of foreign language communicative competence in the study reveals how students perceive and adapt digital technologies to improve their communication and intercultural interaction. This can have important consequences for the development of educational programs and methodologies, adapted to the requirements of modern information society. The study of foreign language communicative competence of students within the context of digital technologies is a step toward more integrated and balanced education, which considers the complex requirements of the modern educational environment.

Analysis of the correlation between the levels of digital competence of students and their foreign language communicative competence is presented in Table 3. Each level of digital competence (Beginner's, Elementary, Intermediate, Advanced) was evaluated based on the relevant questionnaire questions, while foreign language communicative competence was determined according to four aspects: Linguistic competence (EG, CG), Cultural sensitivity (EG, CG), Adaptability (EG, CG) та Communication efficiency (EG, CG). Correlation values indicate possible trends of interaction between the two parameters considered in the study.

Table 3.
Correlation between the levels of digital competence of students and their foreign language communicative competence

	Beginner's level	**Elementary level**	**Intermediate level**	**Advanced level**
Linguistic competence (EG)	0.12	0.21	0.45	0.33
Linguistic competence (CG)	-0.07	0.09	-0.05	0.05
Cultural sensitivity (EG)	0.33	0.38	0.18	0.15
Cultural sensitivity (CG)	0.21	0.38	0.00	0.10
Adaptability (EG)	0.26	0.44	0.49	0.37
Adaptability (CG)	0.02	0.28	-0.02	0.15
Communication efficiency (EG)	0.18	0.41	0.39	0.27
Communication efficiency (CG)	0.08	0.15	0.10	0.20

Source: Developed by the authors on the basis of the study results

The analysis of the correlation between the levels of digital and foreign language communicative competencies of students provides an interesting insight into the interrelation between these two key aspects of their educational experience. The intermediate level of digital competence, in particular, was found to be interrelated with all aspects of foreign language communicative competence. This indicates that students with an intermediate level of digital skills probably have better possibilities for interaction in a foreign language environment. It is important to especially emphasise that students' adaptability has the strongest interrelation with the intermediate level of digital competence. This can indicate that students with intermediate levels of digital skills are distinguished by better preparation and ability to adapt to the international communicative environment.

It is important to note that the cultural sensitivity of students is highly correlated with elementary and intermediate levels of digital competence. This indicates that students with developed digital skills of different levels express better attention and sensitivity to cultural aspects of international communication. Although linguistic competence correlates with the level of digital competence, this relation is less expressed compared to other aspects of foreign language communicative competence. This indicates that the development of digital skills can be a less critical factor in linguistic competence formation than other aspects of international communication.

In general, it is possible to conclude that H_0 was false. The alternative hypothesis was proved. Thus, the level of digital competence affects the development of foreign language communicative competence (H_1).

Discussion

According to the recent studies by Deja et al. (2021) and Ervianti et al. (2023), almost all survey respondents were informed about everyday use of the Internet. The amount of screen time increases during weekends as expected. According to the received data, every fourth respondent spends more than 5 hours on the Internet on weekends, and every third respondent informs us about Internet use for 6-8 hours. Digital competencies, represented as search skills and skills of using digital technologies in education, play an important role in the educational process.

Works of Ferdiansyah (2019) and Bećirović et al. (2021) are dedicated to the empirical study of the influence of digital technologies on academic competencies formation. The authors conclude with a positive evaluation of the influence of multimedia on social and psychological peculiarities. Digital technologies contribute to the development of visual memory, spatial orientation, and ability to act in a situation of uncertainty and positively influence non-verbal intellect in general. It is the change in the structure of non-verbal intellect that is the indicator of the influence on psychical functions, although the influence level depends on a particular digital technology.

An et al. (2021) and Patell et al. (2022) note that excessive involvement in the digital world leads to negative emotional and social behaviour peculiarities. This position is mostly substantiated by the time consumption of such activities, which leads to the reduction of time for socialisation in the real rather than the virtual world. Within this context, statistically significant positive interrelation between the components of technotronic-digital factors should be mentioned. Based on the received data, the authors conclude that considering age peculiarities, children are unable to control and reflect the level of their involvement in a digital environment.

An ambiguous effect of the influence of the digital environment is observed in relation to memory. Studies by Zou et al. (2019) and Su (2021) evaluated the mnemonic abilities of adolescents before and after playing video games. The study showed that there were no significant differences in parameters of long-term memory between the participants groups, but participants playing aggressive video games demonstrated lower parameters of arbitrary concentration. Studies indicate that teenagers and boys playing video games demonstrate higher indicators of predictive thinking and planning skills.

A number of researchers (Wang et al., 2023; Zhao & Lai, 2023) of the influence of digitalisation on studying foreign languages state that the use of digital technologies requires students to have a high planning level, the ability to make decisions, developed information analysis skills, ability to be a situation of uncertainty, make and verify own assumptions. These requirements contribute to the development of logical thinking, multitasking and strategic planning, and a sensitive period for the development of skills and competencies.

The theoretical significance of the study lies in the expansion of the scientific understanding of the interaction of digital technologies and communication skills in students' environments. Received results

may be used as the theoretical basis for further research in the sphere of study of the influence of technologies on the processes of student communication and development.

Practical significance

The practical significance of the study lies in the possibility of implementing the received results into certain educational and pedagogical practices. In particular, the development of new courses and educational programs oriented toward the development of digital and communication skills can establish new trends for pedagogical initiatives. Implementation of interactive technologies in the educational process can also reveal effective methods of enhancing students' level of digital competence. Exchange programs and projects that consider the development of intercultural sensitivity and digital skills can become real in an international educational environment.

Limitations

The methodological limitations of the study include some factors that influence study principles and approaches. The use of certain metrics for determination of the level of digital competence can influence results generalisation. Different approaches to digital skills evaluation can lead to different conclusions. The use of self-evaluation by students in relation to communicative competence can be subjective, and the results can be affected by personal preferences and attitudes.

While talking about instrument limitations, the following should be noted. As the data was collected using a questionnaire-based survey, there is the possibility of distortion development due to dishonest or misunderstood students' answers. The considered aspect of digital and communicative competence cannot cover all possible variations of these skills, which limits the universality of the received results. External factors, such as seasonality or curriculum changes, can influence the results or make them less representative.

Conclusion

The relevance of the study is stipulated by the task to satisfy the increasing demand for specialists with profession-oriented skills, including the ability to effectively interact in an international environment and adapt to various cultural contexts. The interaction between the levels of digital and foreign language communicative competencies of students in the educational process was studied in the work.

The results we received enabled us to draw several key conclusions. The intermediate level of digital competence was found to correlate with all aspects of foreign language communicative competence. This indicates the importance of digital skills for successful interaction in an international environment and underlines the necessity of their development among students. The strongest interaction is observed between the adaptability and intermediate level of digital competence. This indicates that students with intermediate level of digital skills have more possibilities to adapt to new challenges and situations in an international environment. As a result, the null hypothesis was refuted, and the alternative hypothesis was confirmed – digital technologies contribute to the development of communication skills of students of non-linguistic higher educational institutions. The use of digital technology, namely the Linguee platform, contributed to significant improvement of the students' communicative foreign language competencies.

The results received have a wide practical range of applications. For example, courses and educational programs oriented toward the complex development of digital and communication skills may be developed in the pedagogical sphere. The use of interactive technologies in teaching can have a positive influence on the level of digital competence of students. Future studies on this issue can be oriented toward a deeper

understanding and optimisation of the influence of digital technologies on the development of communication skills of students studying foreign languages. One of the perspectives is further study of the role of interactive and intellectual systems in the formation of effective communication between students and lecturers.

Te main limitation of the study is that students may not always objectively assess their own skills, which may affect the reliability of the results. Self-assessment can be distorted by various factors, such as subjective perception of their own abilities or a desire to present themselves in a better light. It is also important to consider the possible influence of external factors, such as the teacher's personality, learning style, or the level of students' socioeconomic background, which may affect their performance and perception of the use of digital technologies in the learning process. Also, the limitations of the sample of students located in one HEI should be taken into account. For future research, it is worth considering the possibility of involving students from several HEIs. It is worth paying attention to methodological limitations. Despite the validity and relevance of the chosen methods to the stated topic, there are still no perfect methods that would not pose a threat of inaccurate results.

In future research, it is important to consider a wider range of issues, such as examining the relationship between digital competence and different aspects of language competence, such as listening, speaking, reading and writing. It is also possible to investigate the impact of other factors, such as the accessibility and quality of learning resources and the type and form of interaction with digital technologies, on learning effectiveness and language skill development. Future research should focus on the effectiveness of MOOC platforms in improving students' foreign language competences.

Bibliographic References

An, Z., Wang, C., Li, S., Gan, Z., & Li, H. (2021). Technology-assisted self-regulated English language learning: Associations with English language self-efficacy, English enjoyment, and learning outcomes. *Frontiers in Psychology, 11*, 558466. https://doi.org/10.3389/fpsyg.2020.558466

Anderson, J., Chung, Y. C., & Macleroy, V. (2018). Creative and critical approaches to language learning and digital technology: Findings from a multilingual digital storytelling project. *Language and Education*, *32*(3), 195-211. https://doi.org/10.1080/09500782.2018.1430151

Asratie, M. G., Wale, B. D., & Aylet, Y. T. (2023). Effects of using educational technology tools to enhance EFL students' speaking performance. *Education and Information Technologies*, *28*(8), 10031-10051. https://doi.org/10.1007/s10639-022-11562-y

Bećirović, S., Brdarević-Čeljo, A., & Delić, H. (2021). The use of digital technology in foreign language learning. *SN social sciences*, *1*, 1-21. https://doi.org/10.1007/s43545-021-00254-y

Chen, M. P., Wang, L. C., Zou, D., Lin, S. Y., Xie, H., & Tsai, C. C. (2020). Effects of captions and English proficiency on learning effectiveness, motivation and attitude in augmented-reality-enhanced theme-based contextualised EFL learning. *Computer Assisted Language Learning*, *33*(12), 131. https://doi.org/10.1080/09588221.2019.1704787

Chen, M., Wang, L., Zou, D., Lin, S., & Xie, H. (2019). Effects of caption and gender on junior high students' EFL learning from iMap-enhanced contextualised learning. *Computers & Education*, *140*-16. https://doi.org/10.1016/j.compedu.2019.103602

Chen, X., Zou, D., & Xie, H. (2020). Fifty years of British journal of educational technology: A topic modeling based bibliometric perspective. *British Journal of Educational Technology*, *51*(3), 692-708. https://doi.org/10.1111/bjet.12907

Deja, M., Rak, D., & Bell, B. (2021). Digital transformation readiness: Perspectives on academia and library outcomes in information literacy. *Journal of Academic Librarianship, 47*(5), 102403. https://doi.org/10.1016/j.acalib.2021.102403

Ervianti, E., Sampelolo, R., & Pratama, M. P. (2023). The influence of digital literacy on student learning. *Klasikal: Journal of Education, Language Teaching and Science*, *5*(2), 358-365. https://doi.org/10.52208/klasikal.v5i2.878

Ferdiansyah, S. (2019). Pedagogical tasks for collaborative digital storytelling creation: Practical design and implementation. *Beyond Words*, *7*(1), 14-19. https://doi.org/10.33508/bw.v7i1.1822

Gamage, K. S. (2020). The pedagogical application of the grammar translation method as an effective instructional methodology in teaching English as a second language. *Open Access Library Journal*, *7*(11), 1-10. Retrieved from http://www.scirp.org/journal/PaperInformation.aspx?PaperID=104010&#abstract

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*, 275-285. https://doi.org/10.1016/j.susoc.2022.05.004

Hollands, F., & Escueta, M. (2020). How research informs educational technology decision-making in higher education: The role of external research versus internal research. *Educational Technology Research and Development*, *68*, 163-180. https://doi.org/10.1007/s11423-019-09678-z

Jamalai, M., & Krish, P. (2021). Fostering 21st century skills using an online discussion forum in an English for specific purpose course. *Malaysian Journal of Learning and Instruction, 18*(1), 219-240. https://doi.org/10.32890/mjli2021.18.1.9

Klimova, B., Pikhart, M., Polakova, P., Cerna, M., Yayilgan, S. Y., & Shaikh, S. (2023). A systematic review on the use of emerging technologies in teaching English as an applied language at the university level. *Systems*, *11*(1), 42. https://doi.org/10.3390/systems11010042

Kozmenko, O., Popovych, I., Arbeláez-Campillo, D. F., Rojas-Bahamón, M. J., & Volchenko, L. (2022). Structural and functional model of the successful person training in USA colleges and universities. *Amazonia Investiga*, *11*(55), 143-155. https://doi.org/10.34069/AI/2022.55.07.15

Lee, S. M. (2019). A systematic review of context-aware technology use in foreign language learning. *Computer Assisted Language Learning*, *35*(3), 294-318. https://doi.org/10.1080/09588221.2019.1688836

Ma, L. (2021). An immersive context teaching method for college English based on artificial intelligence and machine learning in virtual reality technology. *Mobile Information Systems*, *2021*(1), 1-7. https://doi.org/10.1155/2021/2637439

Patell, R., Maddaleni, G., Dodge, L., Buss, M., & Freed, J. (2022). Communication skills training for internal medicine residents using a brief animated video. *Journal of Cancer Education, 37*, 379-386. https://doi.org/10.1007/s13187-020-01825-y

Rofi'i, A., & Herdiawan, R. D. (2024). The optimisation of hybrid technology in synchronous and asynchronous speaking class. *Journal of Information System, Technology and Engineering*, *2*(1), 142-152. https://doi.org/10.61487/jiste.v2i1.59

Shadiev, R., & Wang, X. (2022). A review of research on technology-supported language learning and 21st century skills. *Frontiers in Psychology*, *13*, 897689. https://doi.org/10.3389/fpsyg.2022.897689

Shadiev, R., & Yang, M. (2020). Review of studies on technology-enhanced language learning and teaching. *Sustainability*, *12*(2), 524. https://doi.org/10.3390/su12020524

Shadiev, R., Hwang, W.-Y., & Ghinea, G. (2022). Guest editorial: Creative learning in authentic contexts with advanced educational technologies. *Educational Technology and Society*, *25*, 76-79. Retrieved from https://www.jstor.org/stable/48660125

Slipetska, V., Bortun, K., Zhylin, M., Horlachova, V., & Kosharnyi, K. (2023). Structure and semantics of verbal means of expressing states of emotional tension in English publicistic texts. *Amazonia Investiga, 12*(67), 212-222. https://doi.org/10.34069/AI/2023.67.07.19

Steinberg, S. R., & Down, B. (Eds.). (2020). *The SAGE Handbook of Critical Pedagogies*. Sage. http://dx.doi.org/10.4135/9781526486455

Su, H. (2021). Design of the online platform of intelligent library based on machine learning and image recognition. *Microprocessors and Microsystems, 82*, 103851. https://doi.org/10.1016/j.micpro.2021.103851

Sulym, V., Melnykov, A., Popov, M., Vechirko, O., & Malets, D. (2023). Improving education through implementation of information technologies into the educational process. *Amazonia Investiga*, *12*(68), 281-293. https://doi.org/10.34069/AI/2023.68.08.26

Toleuzhan, A., Sarzhanova, G., Romanenko, S., Uteubayeva, E., & Karbozova, G. (2023). The educational use of YouTube videos in communication fluency development in English: Digital learning and oral skills in secondary education. *International Journal of Education in Mathematics, Science and Technology*, *11*(1), 198-221. https://doi.org/10.46328/ijemst.2983

Wang, S., Wilson, A., Jesson, R., Liu, Y., & Meiklejohn-Whiu, S. (2023). Opportunities to learn literacy in digital classrooms in New Zealand primary schools: Does class achievement level make a difference? *Teaching and Teacher Education, 130*, 104171. https://doi.org/10.1016/j.tate.2023.104171

Yang, Y. T. C., Chen, Y. C., & Hung, H. T. (2022). Digital storytelling as an interdisciplinary project to improve students' English speaking and creative thinking. *Computer Assisted Language Learning, 35*, 840-862. https://doi.org/10.1080/09588221.2020.1750431

Zhang, R., & Zou, D. (2022). Types, purposes, and effectiveness of state-of-the-art technologies for second and foreign language learning. *Computer Assisted Language Learning*, *35*(4), 696-742. https://doi.org/10.1080/09588221.2020.1744666

Zhao, Y., & Lai, C. (2023). Technology and second language learning: Promises and problems. In *Technology-Mediated Learning Environments for Young English Learners* (pp. 167-206). New York: Routledge. https://acortar.link/HVyEV3

Zou, D., Huang, Y., & Xie, H. (2019). Digital game-based vocabulary learning: Where are we and where are we going? *Computer Assisted Language* Learning, *34*(5-6), 751-777. https://doi.org/10.1080/09588221.2019.1640745

ANNEX A

Questionnaire for Studying Digital Competencies of Students.

Thank you for participating in our study. Your responses with help us to receive more information on the level of digital competencies of students.

1. Can you work with a desktop computer?
2. How fast do you type on a desktop PC keyboard?
3. Do you find work with computers and other techniques to be easy?
4. How well do you use search engines?
5. Do you use cloud storage?
6. Do you use Office programs?
7. Do you use programs for text editing?
8. Can you work with spreadsheets?
9. Can you work with programs for presentations?
10. Do you work with graphics software?
11. Do you use programs for information and search engines?
12. Do you use programs for informational security services?
13. Are you interested in new applications, programs, and resources?
14. Can you create digital content?
15. Do you own an account on social networks or messengers?
16. How frequently do you receive new information in the sphere of informational technologies?
17. Do you know the basics of databases?

Do you use the programs as Zoom, Skype, Discord, Google Hangouts, MS Teams and their functions? (from '0' - don't know to '5' know everything)

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.8
Cómo citar:
Bilan, V., Hromadskyi, R., Zavadska, H., Suslenska, O., & Yalokha, T. (2024). Revolutionizing art education: technologies and virtual platforms for the digital age. *Revista Eduweb*, 18(2), 117-128. https://doi.org/10.46502/issn.1856-7576/2024.18.02.8

Revolutionizing art education: technologies and virtual platforms for the digital age

Revolucionando la educación artística: tecnologías y plataformas virtuales para la era digital

Vasyl Bilan
https://orcid.org/0000-0003-3055-2618
Kyiv National I.K. Karpenko-Karyi University of Theater, Cinema and Television, Kyiv, Ukraine.
Rostyslav Hromadskyi
https://orcid.org/0000-0001-6575-5744
Kyiv National I.K. Karpenko-Karyi University of Theater, Cinema and Television, Kyiv, Ukraine.
Hanna Zavadska
https://orcid.org/0009-0009-1695-7388
Kyiv National I.K. Karpenko-Karyi University of Theater, Cinema and Television, Kyiv, Ukraine.
Olena Suslenska
https://orcid.org/0009-0008-0201-5966
Kyiv National I. K. Karpenko-Karyi University of Theatre, Cinema and Television, Kyiv, Ukraine.
Tetiana Yalokha
https://orcid.org/0000-0002-9097-6095
Kyiv National I.K. Karpenko-Karyi University of Theater, Cinema and Television, Kyiv, Ukraine.

Recibido: 20/04/24
Aceptado: 05/06/24

Abstract

The development of modern art education is closely related to the use of digital technologies. The purpose of the article is to analyse the adaptation of higher art education to the requirements of the modern digital era, to study the integration of technologies and virtual platforms into the educational process through the prism of training in higher art education. In order to achieve this goal, the researcher used certain methods of scientific knowledge, which provided a thematic analysis of professional literature and a comparison of existing experiences with the Ukrainian realities of the use of digital technologies in acting education. As a result of the step-by-step study, it was noted that the tools of digital platforms and virtual reality are well integrated into teaching in art education. This allows interaction with higher education students in a remote mode without compromising the quality of education and its level. It also enables students to build digital portfolios and continue their lifelong learning. The conclusions state that the use of digital technologies in education has a significant challenge - the need for teachers to be proficient in the following tools and to use them to the maximum benefit of learning.

Keywords: digitalisation of education, e-learning, virtual laboratories, online learning platforms, distance learning technologies.

Resumen

El desarrollo de la educación artística moderna está estrechamente relacionado con el uso de las tecnologías digitales. El propósito del artículo es analizar la adaptación de la enseñanza artística superior a los requisitos de la era digital moderna, estudiar la integración de las tecnologías y las plataformas virtuales en el proceso educativo a través del prisma de la formación en la enseñanza artística superior. Para lograr este objetivo, el investigador utilizó ciertos métodos de conocimiento científico, que proporcionaron un análisis temático de la literatura profesional y una comparación de las experiencias existentes con las realidades ucranianas del uso de las tecnologías digitales en la educación actoral. Como resultado del estudio paso a paso, se observó que las herramientas de las plataformas digitales y la realidad virtual están bien integradas en la enseñanza en la educación artística. Esto permite la interacción con los estudiantes de educación superior en modo remoto sin comprometer la calidad de la enseñanza y su nivel. También permite a los estudiantes crear carteras digitales y continuar su aprendizaje permanente. Las conclusiones afirman que el uso de las tecnologías digitales en la educación tiene un reto importante: la necesidad de que los profesores dominen las siguientes herramientas y las utilicen en beneficio máximo del aprendizaje.

Palabras clave: digitalización de la educación, e-learning, laboratorios virtuales, plataformas de aprendizaje en línea, tecnologías de aprendizaje a distancia.

Introduction

The development of modern digital technologies has led to changes in art education systems. The integration of online platforms and learning resources into teaching has enabled the process of rapid information exchange, analysis of the teaching styles of foreign professionals, and accelerated self-education, which has significantly contributed to the formation of new relationships in higher education institutions and art schools in general. The experience of overcoming the consequences of the COVID-19 pandemic and related quarantine restrictions has demonstrated the effectiveness of using distance learning elements in education, which has greatly facilitated the work of both teachers and students. However, the use of such methods also had certain difficulties, primarily related to gaining practical experience, since while theoretical materials could be worked with remotely, practical work, especially in groups (acting or directing), required a much higher degree of organization. This issue has become an object of attention for scholars and individual scenarios for action, which has sparked discussions among both practitioners and teachers of theoretical disciplines.

The Ukrainian realities of training students in the field of performing arts are further complicated by the Russian invasion. While in 2014 the consequences of the Russian attack were localized, the aggression of 2022 proved devastating for both the state mechanism in general and the education sector in particular. At the same time, the relocation of educational institutions, the establishment of remote work, and the resumption of educational activities made it possible to continue the educational process. The active use of digital platforms has made it possible to draw attention to the foreign experience of European countries, which has made it possible to use the best new practices. In combination with the Ukrainian experience, this opened up opportunities for a new understanding of many components of acting. However, this issue will require additional interpretation since many aspects of teaching and learning with the use of the latest technologies in art education are still underestimated and require additional interpretation.

The purpose of the article is to study the adaptation of higher art education to the requirements of the modern digital era, to analyze the integration of technologies and virtual platforms into the educational process through the prism of training, and, first of all, to train future specialists in the field of performing arts in modern conditions.

Therefore, the structure of the article consists of several sections. First, a literature review is carried out, in particular, it is established that in modern literature various aspects of the use of virtual technologies are emphasized, followed by a description of the main results that demonstrated the role of virtual platforms for optimizing learning. After that, in the discussion, the obtained results are compared with the conclusions of other researchers. It was determined that in scientific opinion experts recognize the effectiveness of using digital resources and innovative technologies for teaching art. The conclusions emphasize the importance of virtual and augmented reality, 3D platforms for modern students of art education.

Theoretical Framework or Literature Review

Researchers have been looking into how beneficial modern technologies are in educational settings more and more because of how widely they are used. Researchers contend that while cutting-edge technologies play a critical role in forming the workforce of the future, they cannot be separated from the modern learning environment (Cherusheva et al., 2023; Sofilkanych, 2022). This claim is especially true in the field of art education, where there is a close relationship between theoretical understanding and real-world application. But rather than offering particular case studies or empirical detail, these works mostly offer an overview and theoretical underpinnings.
Using a thorough examination of European experiences, Lavrentieva, Spolska, Korol, Markovskyi, and Tkachenko (2023) identified important developments in the education of professionals working in the arts and culture. Although their work is insightful, it cannot be applied outside of Europe.

Similarly, Datsko (2023) examined the impact of higher education reforms on art education in Ukraine, providing a detailed contextual analysis but focusing primarily on systemic changes rather than pedagogical practices.

Studies by Bermes (2022) on choral art and Harbuziuk, Lavrentii, Roy, Rosa-Lavrentii, and Tsyhanyk (2023) on theatre education highlight specific art forms within the Ukrainian context. These works offer rich historical and contemporary perspectives but are restricted by their narrow focus and limited scope. Karas, Romaniuk, Novosiadla, Obukh, and Zvarychuk (2021) discussed the implementation of innovative technologies in music education, yet their study is hampered by a small sample size and general findings, which may not reflect broader trends.

Moreover, Poutiainen and Krzywacki (2023) explored the role of virtual reality in music teacher education, while Iyuan (2023) investigated the innovative potential of modern technologies in humanizing art education. These studies underscore the transformative potential of digital tools but often lack comprehensive empirical validation. Sovhyra, Ivashchenko, Strelchuk, Pyvovarova, and Tykhomyrov (2023) identified key technologies in training performing arts professionals, providing practical recommendations but again, their findings are context-specific to Ukraine. The work by Sermet and Demir (2020) on virtual and augmented reality offers theoretical insights into these technologies' applications but does not sufficiently address their practical implementation in art education. Overall, while contemporary scholarship provides a broad understanding of digital and innovative technologies in art education, there are significant limitations. Many studies suffer from small sample sizes, limited geographical focus, and general overviews rather than in-depth analyses. Thus, contemporary scholars have tried to comprehend in detail various aspects of the use and implementation of digital innovative technologies in the training of art professionals. This is an important limitation that leaves unexplored points for the implementation of this study. However, the issue of integrating digital technologies and virtual reality for performing arts professionals through the prism of an integrated approach has not been fully explored. Future research should aim to include larger, more diverse samples and focus on empirical studies to ensure broader applicability and validation.

Therefore, by incorporating digital technology and virtual reality into performing arts practitioners' training in a complete and holistic method, the current study aims to close these gaps. This study intends to provide a more thorough, contextually rich, and empirically validated analysis by expanding on the corpus of previous research and providing useful suggestions and insights for transforming art education in the digital age.

Methodology

This study attempts to characterise the role of the integration of innovative technologies in the training of arts professionals, with a focus on the importance of these technologies for future performing arts professionals. With this in mind, this paper is a qualitative study and is based on a critical analysis of the literature.

Data collection

Data collection was carried out in stages. At each stage, the literature was carefully selected and analysed. In particular, at the first stage, keywords such as "art", "Ukraine", "digital technologies", "virtual reality", "e-learning", "performing arts", "actor training", "development of directors and producers" were entered into the search databases. A total of 145 results were obtained. These results were subjected to a superficial analysis, in particular, works by Russian authors and works older than 10 years were excluded. This left 60 relevant works.

Next, each abstract was critically analysed, followed by an analysis of the results of the work itself. This left 30 comprehensive papers that are important for this study.

The criteria for including the literature were based on the following parameters:

1. Relevance. Only up-to-date literature that highlights new relevant trends is considered.
2. Written in English, some works are included in other languages. But preference was given to English-language content.
3. Indexing in modern scientometric databases and availability of DOI.
4. The study describes in detail how the results were obtained, i.e. the methodology of the study.

Exclusion criteria:

1. The study does not describe art education.
2. The study does not characterize modern training methods.
3. The research is written in languages other than English.
4. The research does not describe the stages of its implementation and there is no methodology.

Data Analysis

The initial phase involved open coding, where data were reviewed line-by-line to identify relevant themes and patterns. Texts mentioning "virtual reality in art education" or "online performance tools" were highlighted. In the next phase, focused coding was used to refine and categorize the initial codes into broader themes. For example, initial codes related to different technological tools were grouped under a broader theme such as "innovative technologies in art education.

The study is based on the comprehensive application of modern methods of comprehending knowledge. In particular, the main trends and topics that are mainly mentioned in the literature on the training of

specialists in the artistic field were characterised using thematic analysis. After that, the material obtained during the thematic analysis of the problem of using technology in the performing arts was systematised and classified. The deductive method was used to highlight the main innovative technologies and methods for the development of art education and to systematise the main studies on this issue.

Results and Discussion

The COVID-19 pandemic has shaped new learning environments, making the process of adapting digital educational technologies for use alongside the traditional education system almost the only possible option for implementing learning activities. The newest challenge has led to the formation of completely new educational environments that still recognise possible ways for the further development of artistic higher education institutions. The conceptuality of the search for and implementation of the latest educational strategy required an understanding of the paradigmatic foundations of Ukrainian cultural and artistic education and science, which have developed significantly with the use of integrative capabilities of information and communication technologies and the cultural and artistic field.

An important feature of the transformation processes of contemporary stage art is the integration of innovative digital technologies into the usual artistic space in order to create exciting and new performances of the twenty-first century. The equivalence of audio and visual elements of the contemporary stage space within the framework of shaping the audience's creative imagination and influencing its consciousness has been taking on different manifestations and forms throughout the development of theatre art (Prior et al., 2015). As a result, there are now many possibilities for integrating innovative visual and tonal effects to create exciting and complex performances on stage. For this reason, digital technologies have become an important tool in the creative process, opening up not only new perspectives but also creative opportunities for set designers, directors, producers, choreographers, and actors. At the same time, the semantic ambiguity of innovative stage productions is a phenomenon of a specific space of the stage text, which is based on various manifestations of the cultural and historical space of postmodernity (Proskurina & Nikitina, 2023). The individual artistic vision of each stage director, producer, set designer, or actor contains the visions, perceptions, and needs of contemporary society that form new content (i.e. digital). So, nowadays, there are performances, shows, concerts that are impossible without the use of technical tools and means.

Modern researchers classify them as follows:

1. Events, performances, concerts based on multimedia technologies.
2. Interactive performances and immersive theatre.
3. Laser or pyrotechnic performances.
4. Vocaloid show.
5. Singing fembots and the use of robotics.
6. Virtual tours to pop performances and virtual theatres.

Thus, modern art education should be aimed at integrating modern innovative technologies into the training of specialists who should understand modern technologies and build their own careers based on their use.

One of the important aspects used in art education at the present stage is the introduction of game technologies that significantly complement and improve audiovisual art education (Morris, 2016). This, according to scholars, makes it possible to overcome difficulties in training film and performing arts professionals, which was also pointed out by potential stakeholders in their assessments of educational and research training programmes, emphasising the need for further modernisation of established traditions. Collective ways of creative work in acting training are actualised by team forms of play that allow groups to work with the active involvement of thinking and mental activity.

In order to achieve the required learning outcome (the overall aesthetic appearance of the actor and his/her emotions and abilities, which in turn, through successful interpretation of the text and action, makes the desired impression on the audience), the teacher must constantly monitor the performance activities of the students. The combination of traditional approaches to education and the use of interactive and problem-based learning methods contribute to the realisation of the goals of artistic education, the acquisition of necessary knowledge by students, and the mastery of real technical skills. Although, according to researchers, organising group classes to train performing skills, such as a choreographic or acting class, is a rather difficult process in the context of distance learning and the use of digital technologies (Santos López & Torrente-Patiño, 2020).

First of all, there are certain limitations on the possibilities of collective control over the acting work of students, distortion of sound during the broadcast due to slower transmission (technical challenges, lack of reliable Internet connection due to active hostilities, difficulty in establishing interaction with other participants, etc.).

To overcome such challenges, teachers use new forms and methods to achieve maximum interaction at the level of all members of the cast. In today's digital environment, participants in the educational process are usually outside the classroom and do not have direct contact with each other.

Rehearsals and practice sessions can be conducted on ZOOM digital platforms, and researchers classify such a session as a video lesson. Its structure is usually standard: introduction, content, questions and answers, and performance training. Opportunities for continuous interaction through remote technologies are beneficial for students and the teaching team, as in martial law, classes can take place at a convenient time, ensuring that the continuity of the educational process is not disrupted (Velychko-Semennyk et al., 2022). It is also important that a virtual actor group created using a digital platform is easily accessible to all subjects of the educational process at any time and in any place. Teachers propose the formation of a digital class using the following algorithm: familiarisation with the acting episode by watching the relevant video recording; paying attention to the peculiarities of each actor's performance in the analysed scene; practical work on recreating the scene, analysing the results and mistakes (Labunets et al., (s.f)). This technology also allows students to create their digital portfolio from scenes known to the general public. For employers, posting or transmitting such data online is extremely useful as it allows graduates to showcase their abilities and skills.

As an example, Kyiv National I. K. Karpenko-Kary Theatre, Cinema and Television University offers a combination of deep teaching traditions (the university was founded in 1904) and the use of modern state-of-the-art digital technologies aimed at training top-level specialists in the field of acting and theater. The university conducts regular annual evaluations of the activities of not only students, but also teachers, and forms a corresponding rating that allows to identify and attract the best teachers. The main focus is on practical disciplines that help to improve the performance skills and artistic development of the student body. Scientific and theoretical work is also regularly carried out, which makes it possible to compare the results of the university's scientific and pedagogical team with the best results of other institutions in Ukraine and the world.

Also, we can describe the educational process at the Kyiv National University of Culture and Arts. This is a detailed and organised system of didactic activities that contribute to the implementation of the content of education and the formation of modern conditions for the further development of students, their artistic and creative self-realisation, and the acquisition of patriotic and universal values. The main tasks that are being actively implemented include creating accessible opportunities for young people to receive quality art education, preparing them for the real conditions of professional activity, obtaining lifelong learning, developing and implementing innovative educational technologies in professional work, and democratising

the educational process. In particular, Kyiv National University of Culture and Arts actively uses digital distance learning technologies in acting training. This allows all participants in the educational process to interact fruitfully, work individually and in groups. Digital learning for students is carried out using Internet communication tools, including those integrated into the educational process management system (Moodle), e-mail capabilities, certain popular messengers, video conferencing platforms (for example, Google Meet and others). An important aspect of learning is self-education, which is obtained by watching relevant training videos created by the institution's teachers and working with special educational platforms (e.g. Prometheus).

Various media technologies are used in the training of performing arts professionals in Ukraine, which open up opportunities for the creative disclosure of a particular idea. For example, some film and photo documentaries allow us to feel the reality and authenticity of an artistic performance. At the same time, the incredible multimedia interaction between the hero and the actor helps to create a sense of the atmosphere of the action. In such situations, students interact with animated fragments. The colour and light design of the performance, computer projections, or the use of three-dimensional computer graphics, all combined into one system, help to create a sense of creativity and imagination in future artists. The student's imagination goes beyond the usual limits and becomes more effective. The question arises as to the correlation between multimedia in education and traditional methods. However, it is clear that the unique potentialities of combining various "environments" and the characteristics of technological interactivity make it possible to develop practical skills in students. In this context, virtual technologies, which are actively used in Ukrainian educational institutions, are also becoming important. The use of virtual reality in the training of performing arts specialists helps to open up opportunities that improve the learning process and develop professional skills. European universities, including Ukrainian ones, use various simulation technologies based on virtual reality. In particular, students use special virtual stage platforms to develop their acting skills, experiment with selected roles and scenarios. It also helps to develop skills of cooperation with the audience and stage space.

An important part of the introduction of virtual reality in Ukrainian universities is the use of interactive lessons and simulators. In particular, with the help of virtual reality, teachers create various interactive lessons that influence the development of practical acting or directing skills. In addition, virtual technologies facilitate the organisation of various kinds of remote performances for students anywhere. With the help of distance learning programmes, teachers or invited professionals can give a lecture from anywhere in the world. Figure 1 summarises the main aspects of using virtual reality in the training of performing arts professionals. The use of virtual technologies in the training of performing arts professionals helps to make learning more effective, engaging, and accessible and promotes the development of creative thinking and innovative approaches to performing arts.

Virtual reality technologies can be important not only for teaching certain practical disciplines but also for teaching the history of theatre. These technologies serve as a medium for introducing a visually enhanced reenactment of ancient theatre events and artefacts. Virtual reality can provide a wide variety of learning materials, but also encourage interactive research among students, engaging them in the process of acquiring new knowledge and skills (Losheniuk et al., 2023). Such learning environments facilitate the engagement of learners, both imaginatively and intellectually, in a wide range of varieties and potential ways of interpreting learning data.

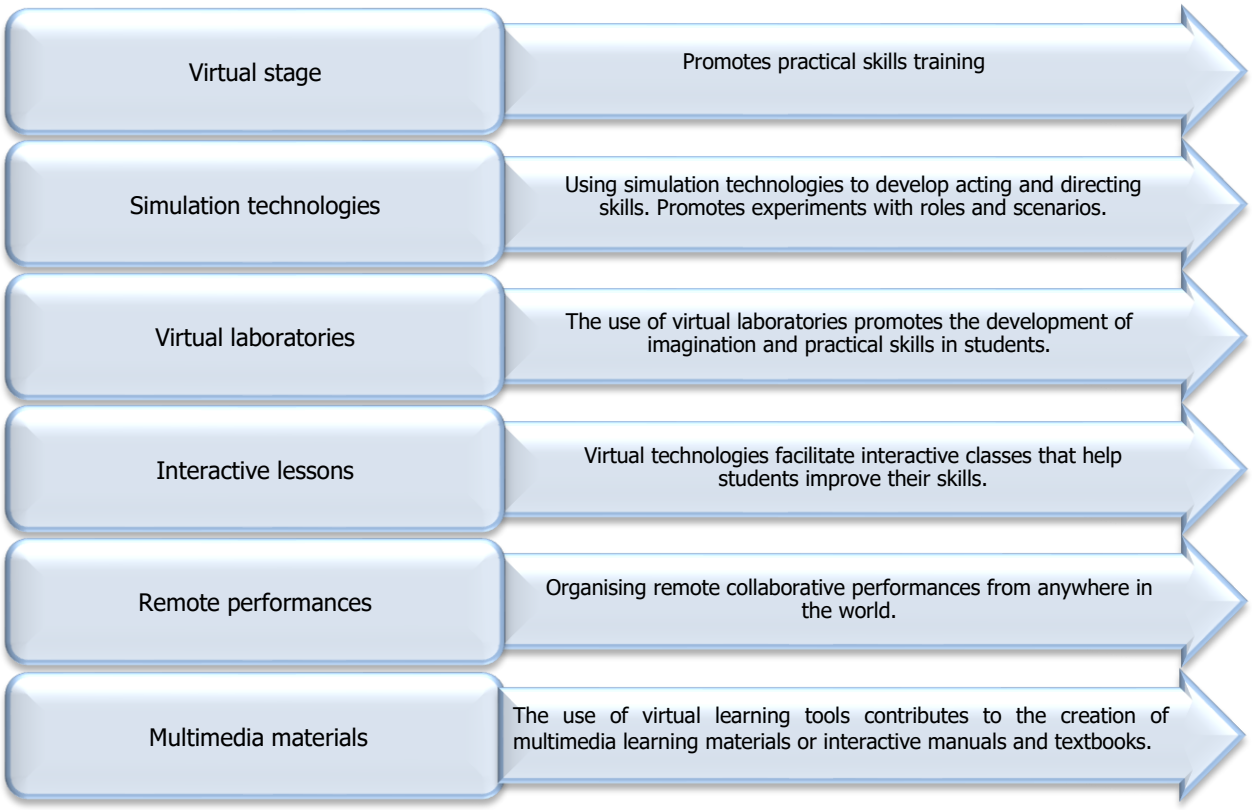

Figure 1. The main aspects of using virtual reality in art education.
Source: compiled by the authors

This type of interaction goes far beyond the established methods and forms of learning. At the same time, the use of innovative visualisation methods in teaching, such as 3D simulation or virtual image synthesis with hypertext resources, improves not only the transfer of knowledge but also the development of practical skills in future performing arts professionals (Williams et al., 2021). However, it should be noted that such digital reconstructions should be based on detailed explanatory information from the teacher. At the same time, the latter should also be perfectly proficient in modern virtual reality technologies (Afanasieva, 2023). The integration of virtual reality simulations into the training of art professionals has been shown to improve learning by enabling students to interpret various theatrical models or film artefacts creatively and intellectually (Goian et al., 2023).

In general, stage education has always been in the prism of a balance between the rules of theory and practice. As a rule, the process of visualising the space of a performance, its decorative elements and ornaments, costumes, and, of course, certain stage aspects are in the space of technical interaction (de Valck, 2013). Existing modern training programmes for art professionals emphasise the importance of integrating modern innovative technologies and methods.

Figure 2 presents the main aspects of stage education based on modern innovative technologies. They extend the boundaries of a modern theatre, directing, or producing class, which contributes to a personalised approach to the training of such specialists.

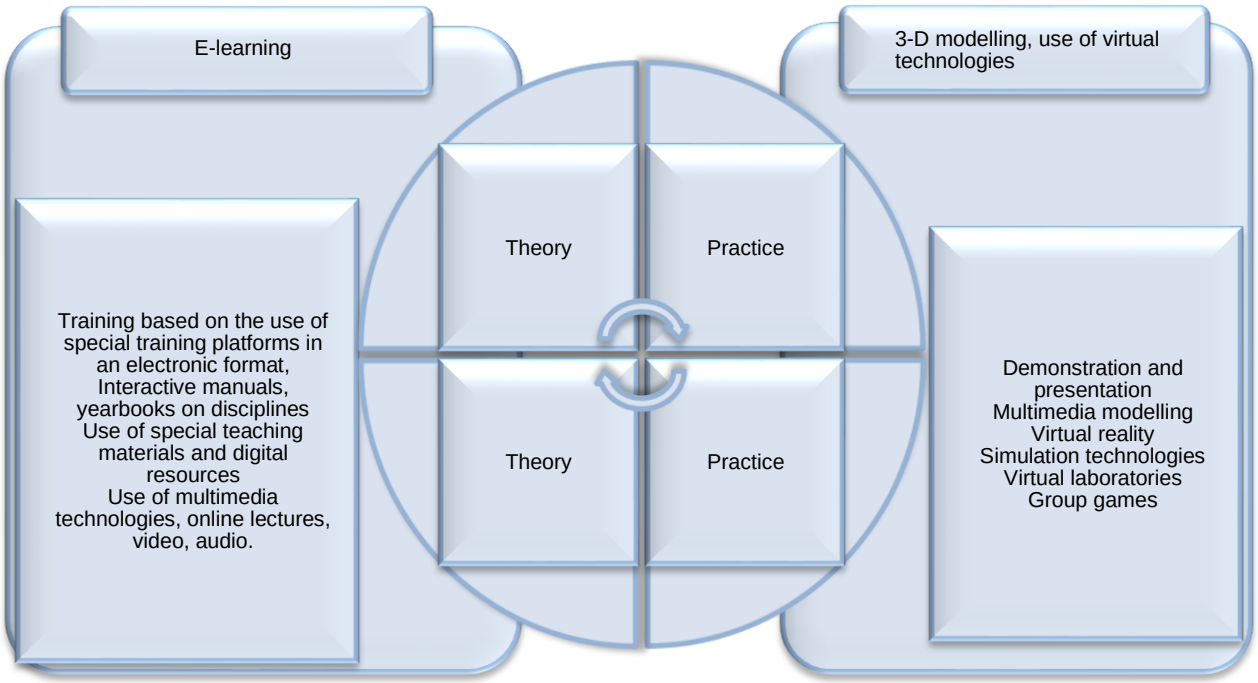

Figure 2. The main aspects of stage education (based on the use of innovative technologies). Source: compiled by the authors.

Thus, the use of modern technologies in the training of performing arts professionals and their integration into practice and theory involves the implementation of innovation in the modern educational environment, shifting traditional methods of knowledge transfer and synthesis towards a more visually enhanced experience, which is important for future actors, directors or producers.

Discussion

The results of the study made it possible to establish that digital technologies are well adapted for use in art education, in particular in the training of specialists in the field of performing arts. In particular, the effectiveness of involving virtual reality in teaching has been established, and the use of special educational portals and software that allows teachers and students to communicate effectively has also had a positive effect. The proposed research findings confirm the views of Panyok (2023) on the effective combination of game-based learning models with modern digital technologies. It is worth agreeing with, who note that games and modelling of various real-life situations and processes, including those using virtual reality and modern digital technologies, are particularly effective in this regard. Some gaming aspects of the work accompany the training of acting and stage skills during regular practical classes that offer simulations of various stage situations during filming or performance, work in the video and sound editing room, studio or editorial work, etc. Similarly, the gaming capabilities of digital learning technologies make it possible to combine theoretical learning with the acquisition of the necessary practical skills, and for students to learn in practice certain professional tools and techniques, gaining some effective experience from performing creative and production activities. The proposed results support the high efficiency of the use of game-based teaching methods. In particular, digital gaming technologies contribute to better testing and development of individual patterns of behaviour with appropriate involvement in the opportunities of the future professional environment.

The proposed results also confirm the findings of scientists about the importance of using virtual reality to improve the adaptation of students to artistic acting. In particular, Wang et al. (2023) determined that under quarantine restrictions, it is important to support the collective work of students, which is implemented through the use of digital learning technologies. 3-D simulation technologies and virtual laboratories contribute to the development of practical skills, creative thinking, and the ability to hone individual problems in executive work. At the same time, it is difficult to agree with the conclusions of Radomska & Ponkalo (2023) that the combination of modern technologies with the educational process in art education does not lead to the desired effect because Internet technologies distract students more than they benefit them. The proposed results confirm another scientific point of view, according to which the adaptation of modern digital opportunities is a natural phenomenon in education and requires a comprehensive approach, given its proven effectiveness (Brown & Duffy, 2013; Van de Kamp et al., 2014).

However, such a discussion will continue, as effectiveness depends not only on technologies and methodologies but also on the desire of students to learn and their abilities, which can lead to different results under equal conditions of access to technology. The proposed study also has certain limitations. First of all, it is the fact that the most recent publications on incense issues were used for its implementation. This has left out the scientific studies of researchers more chronologically distant, although their conclusions may also be relevant for further research. Also, primarily publications in English were taken into account, as an important criterion for selecting scientific literature was the presence of the publication in scientometric databases and search engines. Obviously, the teaching experience is also published in foreign-language scientific studies. Therefore, a promising area for further research is the use of comparative analysis and the search for additional information to assess the state and prospects of art education.

Conclusions

Martial law and the introduction of distance education have demonstrated that even in crisis situations, there are ways to overcome challenges. One of the important tools in this process for art education is the adaptation and active use of modern digital technologies, which offer both unique characteristics and tangible advantages.

The effective functional features and characteristics of game-based learning underscore the importance of integrating digital technologies in both theoretical and practical training in art education. To enhance the quality and modernize art education in line with current production capabilities, it is proposed to blend traditional game methods with the latest innovations generated by the digitalization of education and society. Social networks and internet platforms facilitating real-time communication have emerged as viable alternatives to traditional classes, fostering the development of essential skills.

Even with these improvements, there is still a big problem with actual interaction. Using digital virtual reality technologies, which offer chances for immersive learning and the development of specific acting and performing arts skills, can help with this. Hypertext materials should be combined with cutting-edge tools like 3D simulations and virtual environments to improve knowledge transfer and the development of useful skills. Nevertheless, thorough teacher preparation and their capacity to integrate contemporary digital tools into their instructional strategies are prerequisites for the productive use of these technologies.

The current study has several drawbacks. The primary focus was on recent publications, which may have excluded important findings from earlier studies that are still relevant today. Furthermore, the literature selection was skewed in favor of English-language works that were featured in scientometric databases, which may overlook valuable from research published in other languages. Future studies should aim to

incorporate a more diverse range of sources, including non-English publications, to provide a more comprehensive understanding of art education globally.

Future research should strive to include a wider variety of materials, such as publications written in languages other than English, in order to offer a more thorough picture of art education around the world. Subsequent investigations ought to delve into the enduring effects of digital technology on art education, scrutinizing the ways in which these resources influence the academic achievements and career advancement of learners across diverse cultural settings. Studies that compare various nations and educational systems could provide important information about how well digital advances work in various contexts. Further research into the ways in which emerging technologies, including augmented reality and artificial intelligence, could improve art instruction is also beneficial.
In conclusion, even though digital technologies have a great deal of potential to transform art education, their effective application necessitates careful consideration of numerous factors, including teacher training, practical application, and inclusivity of diverse research perspectives. By addressing these challenges and continuing to explore innovative solutions, the field of art education can continue to evolve and thrive in the digital age.

Bibliographic References

Afanasieva, N. (2023). Analysis of Methods and Tools for Visualising Anatomy in the Professional Training of Future Design Teachers. *Futurity of Social Sciences, 1*(2), 59-70. https://doi.org/10.57125/FS.2023.06.20.05

Bermes, I. (2022). Ukrainian choral art as object of scientific interests. *Humanities Science Current Issues*, *1*(48), 66-72. https://doi.org/10.24919/2308-4863/48-1-10

Brown, B., & Duffy, J. (2013). The heart of teaching: Empowering students in the performing arts. *Theatre, Dance and Performance Training*, *4*(3), 431-434. https://doi.org/10.1080/19443927.2013.849072

Cherusheva, G., Nowak, B., Maksymenko, A., Kabysh, M., & Vakerych, M. (2023). Higher pedagogical education in the European Union: Innovative technologies. *Revista Eduweb*, *17*(2), 257-266. https://doi.org/10.46502/issn.1856-7576/2023.17.02.22

Chovriy, S., Pelekh, V., Rogoza, V., Zorochkina, T., & Zdir, D. (2024). Organization of a STEM-oriented environment in higher education institutions. *Amazonia Investiga*, *13*(76), 333-347. https://doi.org/10.34069/AI/2024.76.04.27

Datsko, O. (2023). Higher education system reforms in Ukraine: challenges for art education. *Bulletin of Lviv National Academy of Arts*, (51), 164-176. https://doi.org/10.37131/2524-0943-2023-51-16

De Valck, M. (2013). Sites of Initiation: Film Training Programs at Film Festivals. In *The Education of the Filmmaker in Europe, Australia, and Asia* (pp. 127–145). New York: Palgrave Macmillan US. https://doi.org/10.1057/9781137070388_7

Goian, V., Goian, O., Biletska, T., & Kobynets, A. (2023). Watching TV Series in Distance Education during the Periods of Pandemic and Martial Law. *Studies in Media and Communication*, *11*(4), 131. https://doi.org/10.11114/smc.v11i4.5968

Harbuziuk, M., Lavrentii, R., Roy, U., Rosa-Lavrentii, S., & Tsyhanyk, M. (2023). Establishment and Development of University Theatre Studies in Ukraine: History and Present Time. *Herança*, *7*(1), 154-164. https://doi.org/10.52152/heranca.v7i1.786

Iyuan, G. (2023). Formation of innovative potential of music teacher in the context of humanization of art education. *Innovative Solution in Modern Science*, *2*(57), 69. https://doi.org/10.26886/2414-634x.2(57)2023.5

Karas, H., Romaniuk, L., Novosiadla, I., Obukh, L., & Zvarychuk, Z. (2021). Introduction of innovative technologies in the study of music disciplines in higher educational institutions of Ukraine. *Revista online de Política e Gestão Educacional*, *25*, 1681-1697. https://doi.org/10.22633/rpge.v25iesp.3.15585

Labunets, V., Havrylenko, Y., Mazepa, T., Sikorska, I., & Radzivil, T. (s.f). Development of instrumental and performing arts in Ukraine. *Ad alta., 14*(1), 34-38. https://doi.org/10.33543/1401393438

Lavrentieva, N., Spolska, O., Korol, O., Markovskyi, A., & Tkachenko, V. (2023). Higher art education in the European Union: Innovative technologies. *Revista Eduweb*, *17*(2), 234-243. https://doi.org/10.46502/issn.1856-7576/2023.17.02.20

Losheniuk, I., Kabanova, O., Berher, A., Karpenko, V., & Didyk, D. (2023). The Future of Virtual Reality in Marketing and Advertising: Benefits and Challenges for Business. *Futurity Economics&Law, 3*(3), 176-189. https://doi.org/10.57125/FEL.2023.09.25.10

Morris, C. B. (2016). Games, Pedagogy, and Art Education. *Informática na educação: teoria & prática*, *19*(1). https://doi.org/10.22456/1982-1654.57830

Panyok, T. V. (2023). Art education in Ukraine in early 20th century: Educational techniques for new formation artists. *International Journal of Conservation Science*, *14*(1), 217-230. https://doi.org/10.36868/ijcs.2023.01.14

Poutiainen, A., & Krzywacki, H. (2023). Virtual reality in pre-service teacher education: Challenges of realization in music education. In *International Conference on Education and New Developments END2023* (pp. 330-334). inScience Press. https://doi.org/10.36315/2023v1end070

Prior, R., Maxwell, I., Szabó, M., & Seton, M. (2015). Responsible care in actor training: effective support for occupational health training in drama schools. *Theatre, Dance and Performance Training*, *6*(1), 59-71. https://doi.org/10.1080/19443927.2014.993568

Proskurina, M., & Nikitina, V. (2023). Production Activity Essence and Producer's Role in the Field of Project Management in the Creative Industries. *Socio-Cultural Management Journal*, *6*(2), 31-51. https://doi.org/10.31866/2709-846x.2.2023.291246

Radomska, V., & Ponkalo, S. (2023). Reflections on War in Creative Context of Design Education in Ukraine. *Journal of Education Culture and Society, 14*(1), 551-567. https://doi.org/10.15503/jecs2023.1.551.567

Santos López, I. M., & Torrente-Patiño, Á. (2020). Gamification in education: State of the art. *H2D/Revista de Humanidades Digitais*, *2*(1). https://doi.org/10.21814/h2d.2163

Sermet, Y., & Demir, I. (2020). Virtual and augmented reality applications for environmental science education and training. In *New perspectives on virtual and augmented reality* (pp. 261–275). Routledge. https://doi.org/10.4324/9781003001874-17

Sofilkanych, M. (2022). The formation of a new information culture of the future: the socio-philosophical content. *Futurity Philosophy, 1*(1), 56-67. https://doi.org/10.57125/FP.2022.03.30.05

Sovhyra, T., Ivashchenko, I., Strelchuk, V., Pyvovarova, K., & Tykhomyrov, A. (2023). The Problem of Introduction of Digital Technologies in the Performing Arts. *Journal of Computing and Cultural Heritage 16*(1), 1-8. https://doi.org/10.1145/3587169

Van de Kamp, M.-T., Admiraal, W., van Drie, J., & Rijlaarsdam, G. (2014). Enhancing divergent thinking in visual arts education: Effects of explicit instruction of meta-cognition. *British Journal of Educational Psychology*, *85*(1), 47-58. https://doi.org/10.1111/bjep.12061

Velychko-Semennyk, Z., Velychko, N., Bondarenko, A., Kyrylenko, Y., & Shumska, L. (2022). Development of Ukrainian choral art in conditions of digitalization. *Amazonia Investiga*, *11*(58), 151-160. https://doi.org/10.34069/ai/2022.58.10.16

Wang, X., Hommel, B., Colzato, L., He, D., Ding, K., Liu, C., Qiu, J., & Chen, Q. (2023). The contribution of divergent and convergent thinking to visual creativity. *Thinking Skills and Creativity*, 101372. https://doi.org/10.1016/j.tsc.2023.101372

Williams, E. R., Love, C., Love, M., & Durado, A. (2021). Graphic overlay in cine-VR. In *Virtual Reality Cinema* (pp. 153–160). Routledge. https://doi.org/10.4324/9781003028284-9

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.9
Cómo citar:
Bykovska, O., Bykovskyi, T., Bykovskyi, Y., Klivadenko, N., & Shevchenko, O. (2024). Implementation of innovative technologies in out-of-school education: opportunities and prospects. *Revista Eduweb*, 18(2), 129-140. https://doi.org/10.46502/issn.1856-7576/2024.18.02.9

Implementation of innovative technologies in out-of-school education: opportunities and prospects

Aplicación de tecnologías innovadoras en la educación extraescolar: oportunidades y perspectivas

Olena Bykovska
https://orcid.org/0000-0001-6916-911X
WoS Researcher ID: CAI-1773-2022
Professor, Head of Department, Mykhailo Dragomanov State University of Ukraine, Kyiv, Ukraine.
Timur Bykovskyi
https://orcid.org/0000-0003-2822-4850
WoS Researcher ID: JDW-5543-2023
Associate Professor, Mykhailo Dragomanov State University of Ukraine, Kyiv, Ukraine.
Yaroslav Bykovskyi
https://orcid.org/0000-0002-8489-1247
WoS Researcher ID: GQC-8716-2022
Associate Professor, Mykhailo Dragomanov State University of Ukraine, Kyiv, Ukraine.
Nataliia Klivadenko
https://orcid.org/0009-0004-5656-8057
WoS Researcher ID: KLZ-1896-2024
Associate Professor of Department, Mykhailo Dragomanov State University of Ukraine, Kyiv, Ukraine.
Oleksandr Shevchenko
https://orcid.org/0000-0003-0881-0326
WoS Researcher ID: HRD-4072-2023
Associate Professor, Mykhailo Dragomanov State University of Ukraine, Kyiv, Ukraine.

Recibido: 20/04/24
Aceptado: 05/06/24

Abstract

In the context of globalisation trends and the overall digitalisation of the education system, out-of-school education is becoming an important tool in the development of learning environments. The purpose of this paper is to describe the main innovative tools in out-of-school education, based on the analysis of key challenges and opportunities. The study is based on a qualitative analysis of pedagogical literature and individual legal documents. Content analysis of literature and comparative analysis became important methods in this study. The data collection was formed only on the basis of modern literature in the range of 2012-2024. The obtained results highlighted various innovative solutions used in extracurricular education and described the basis of the possibility of their effective implementation. Special attention is paid to the difficulties of their implementation. Given the challenges and opportunities for the successful implementation of innovations, the main mechanisms for the effective implementation of innovative

technologies in out-of-school education institutions are developed. The conclusions note that the current challenges are the lack of material and technical resources for the active use of out-of-school education opportunities. In addition, the availability of appropriate professional training for teachers is also important. Thus, this study has demonstrated the importance of out-of-school education based on innovative technologies.

Keywords: difficulties, digitalisation, out-of-school education, edification innovative solutions, peculiarities of implementation.

Resumen

En el contexto de las tendencias de la globalización y la digitalización general del sistema educativo, la educación extraescolar se está convirtiendo en una herramienta importante en el desarrollo de entornos de aprendizaje. El objetivo de este documento es describir las principales herramientas innovadoras en la educación extraescolar, basándose en el análisis de los principales retos y oportunidades. El estudio se basa en un análisis cualitativo de la literatura pedagógica y de documentos jurídicos individuales. El análisis de contenido de la literatura y el análisis comparativo se convirtieron en métodos importantes en este estudio. La recopilación de datos se formó únicamente sobre la base de la literatura moderna en el rango de 2012-2024. Los resultados obtenidos destacaron varias soluciones innovadoras utilizadas en la educación extracurricular y describieron la base de la posibilidad de su aplicación efectiva. Se presta especial atención a las dificultades de su aplicación. Teniendo en cuenta los retos y las oportunidades para el éxito de la aplicación de las innovaciones, se desarrollan los principales mecanismos para la aplicación efectiva de las tecnologías innovadoras en los centros de educación extraescolar. Las conclusiones señalan que los retos actuales son la falta de recursos materiales y técnicos para el uso activo de las oportunidades de educación extraescolar. Además, también es importante la disponibilidad de una formación profesional adecuada para los profesores. Así pues, este estudio ha demostrado la importancia de la educación extraescolar basada en tecnologías innovadoras.

Palabras clave: dificultades, digitalización, educación extraescolar, soluciones innovadoras, peculiaridades de la aplicación.

Introduction

In modern conditions, pedagogical staff of out-of-school education institutions should not only have thorough knowledge, but also demonstrate such traits as flexibility, critical thinking, innovation, mobility, adaptability to new conditions, and constant readiness for innovative activities. Therefore, the modernisation of out-of-school education in line with modern integration processes is a relevant area today. Improving the system of out-of-school education requires the use of new technological solutions and innovative approaches that contribute to the professional development of out-of-school education staff. Thus, the learning process itself should be personalised, personally oriented and have a sound practical focus on innovation.

The term "learning out-of-school education" is a purposeful process and result of learning, nurture, development and socialization of the student's personality in free time in out-of-school education institutions and other social institutions (Bykovska, 2019).

The term "innovative educational technology" means a qualitatively new set of forms, methods and means of teaching and management that brings important changes to the outcome of the educational process and is a multicomponent model. Contemporary scholars have repeatedly emphasised the importance of innovative technologies in education (Vasilache, 2022; Borysova et al., 2024). Modern scientists have

determined the important role of innovative technologies in improving the motivation to study in students of education (Rahayu & Dong, 2023; Hansen et al., 2017). The researchers identified relevant innovative pedagogical approaches that have demonstrated their effectiveness in modern education, however, noted that not all approaches can effectively influence modern knowledge acquisition. (Feraco et al., 2022; Zhylin et al., 2023).

Thus, this problem is important for research: a thorough study of this topic will help to highlight the main effective technologies of knowledge transfer from teacher to student in the space of out-of-school education. Thus, the purpose of the study is to analyse the main innovative technologies in out-of-school education through the prism of researching opportunities and challenges in this area. Accordingly, the following tasks will be implemented: critical analysis of literary sources, characterisation of the main innovative solutions in the system of out-of-school education, study of opportunities and challenges for the introduction of innovative technologies in this area.

Literature Review

Bykovskyi (2019) analysed the training of future teachers for professional work in institutions of out-of-school education in the scientific and technical direction.

The study of the use of innovative technologies has intensified during the Covid-19 pandemic, and now, given all the current events and challenges, has begun to develop even more. In a conceptual study by Androshchuk, Androshchuk, Kurach, Khrenova, and Livshun (2020), the main principles of professional teacher training based on students' extracurricular activities are described. The researchers note that systemic, competence-based, synergistic, developmental, and personality-oriented approaches to the organisation of educational space should play an important role in out-of-school learning. Chisiu (2013) identified extracurricular activities as an alternative approach to implementing interdisciplinarity.

Bykovska (2019) revealed the theoretical and methodological foundations of out-of-school education in Ukraine. The historical and pedagogical essence of theory and practice of out-of-school education was explained; the basic chronological stages of out-of-school education forming and developing were showed. The analysis of modern state of out-of-school education in Ukraine in comparison with the out-of-school education in other European states was made. The scientific basements of out-of-school education system were proved, its structure and parts were determined. The model of modern system for organizing and administering the out-of-school education was characterized. The out-of-school contents and methodology were developed, being based on the competent approach (Baryakhtar & Bykovskyi, 2019).

Díaz-Iso, Eizaguirre and García-Olalla (2019) analysed the pedagogical conditions for the organisation of extracurricular education, and the authors also analysed in detail the theoretical and practical aspects of additional activities in higher education. Feraco, Resnati, Fregonese, Spoto and Meneghetti (2022) found that in extracurricular activities, the focus should be on the development of soft skills in students.

At the same time, the study by Onyshchenko, Serdiuk and Krykun (2021) describes the training of teachers for innovative activities in the field of out-of-school education. The authors determined that innovative forms, methods and technologies play an important role in this activity. It should be noted that modern researchers have studied various aspects of the use of innovative technologies in education (Vasilache, 2022). The key aspects of distance learning in Ukraine are described in detail in Galynska and Bilous (2022).

Besides, Makhynko (2023) identified the role of open learning resources as important innovative tools for organising learning. Rafael and Justino (2022) described the peculiarities of introducing virtual reality into the learning system, mainly analysing the practical aspects of using this technology to develop active learning. Also, according to Castilho Barilli (2012), virtual technologies play an important role as a didactic

tool in the organisation of modern e-learning. Malynovskyi, Duka, and Yaroshenko (2022) identified effective conditions for organising distance learning in Ukraine based on the introduction of various technologies and teaching methods.

Thus, modern researchers have identified various innovative technologies used in modern education. These works will be an important methodological basis for this paper, however, they did not pay attention to out-of-school education. Therefore, this study will try to fill in these gaps and focus on the specifics of introducing innovative technologies in out-of-school education.

Methodology

Considering the broad object of the study, namely a comprehensive analysis of innovative technologies in out-of-school education, the paper uses a qualitative analysis of modern pedagogical literature and individual educational documents.

Data collection

Data collection was carried out in stages. First, we found the main legal documents that ensure the functioning of out-of-school education in Ukraine. In particular, the Law of Ukraine "On Out-of-school Education" (Law of Ukraine 1841-III, 2000) defines the state policy in the field of out-of-school education, its legal, socio-economic, as well as organizational, educational and educational principles.

The Recommendations on the organisation of educational activities of out-of-school education institutions in the main areas in the academic year 2023/2024 (Ministry of Education and Sciences of Ukraine, 2023), Strategy for the development of out-of-school education (Bykovska, 2021) and the order of the Ministry of Education and Science of Ukraine "On the organisation of work of out-of-school education institutions" (2022) were important for the analysis (Ministry of Education and Sciences of Ukraine, 2022).

After selecting these documents, the stage of selecting scientific literature came. For this purpose, certain keywords related to the topic were used and entered into the Google Scholar search database.

Table 1.
Keywords for data collection

Key words	Similar phrases
Innovative technologies	Innovations VS innovative education technologies VS educational technologies VS digital technologies VS information and communication technologies VS digitalization VS innovative approaches VS technological solutions.
Out-of-school education	After-school education VS after-school program VS out-of-school time VS extracurricular education VS additional education VS extracurricular activity VS extracurricular education VS extracurricular activities VS extracurricular learning VS learning outside school hours.
Opportunities and challenges of using innovative technologies	Difficulties in the use of innovative technologies VS opportunities for the development of innovative education VS barriers to the use of technologies

Source: Authors' development

After entering the search database, we selected those sources that met the clearly defined criteria for including literature:

1. Preference is given to sources that are directly related to out-of-school education.
2. If the work does not relate to out-of-school education, it should clearly cover modern innovative educational technologies.
3. The work should be relevant and cover current trends in the development of education.
4. Date range: from 2012 to 2024.
5. Practical value: the sources should contain practical recommendations and advice used in out-of-school education.

Based on these criteria, we managed to select relevant studies that contain up-to-date information on the use of modern technologies in the educational system.

Data Analysis

This paper uses several research methods: thematic, comparative analysis and generalization. In particular, the thematic analysis allowed to identify the main technologies found in the selected sources. The comparative analysis allowed the authors to compare information from documentary sources with literature. The generalisation was used to summarize the information obtained and to draw the main conclusions to this study.

Results and Discussion

The introduction of innovative technologies in out-of-school education is an important trend that characterises the modern market of educational services. Important components that contribute to the introduction of innovation in the educational process include conceptual, content and technological components. They contribute to the creation of an innovative and investment-friendly educational environment through ongoing support of modern innovation initiatives. The innovative potential of an out-of-school institution consists of the interest of participants in innovative activities and the positive result of implementation, the digital competence of participants, the linking of the main goals of the institution with a new pedagogical idea, and the coherence of the interests of the subjects of innovative activity (Ministry of Education and Sciences of Ukraine, 2023). Innovative technologies contribute to the revolutionisation of out-of-school education, improve the teaching and learning process, and engage and interact with students beyond the traditional learning environment (Shevchenko et al., 2020).

In general, the process of introducing innovative technologies into the system of out-of-school education is important because students should be interested in additional classes that should be more interesting and therefore more innovative for them (Androshchuk et al., 2020). According to the analysis of modern scientific works, important innovative technologies used in out-of-school education are the use of online learning platforms, virtual (or augmented reality) technologies, mobile applications, gaming technologies (in some cases, simulation technologies). They contribute not only to the development of theoretical knowledge, but also to the development of practical skills of students (Castilho Barilli, 2012) (see Figure 1).

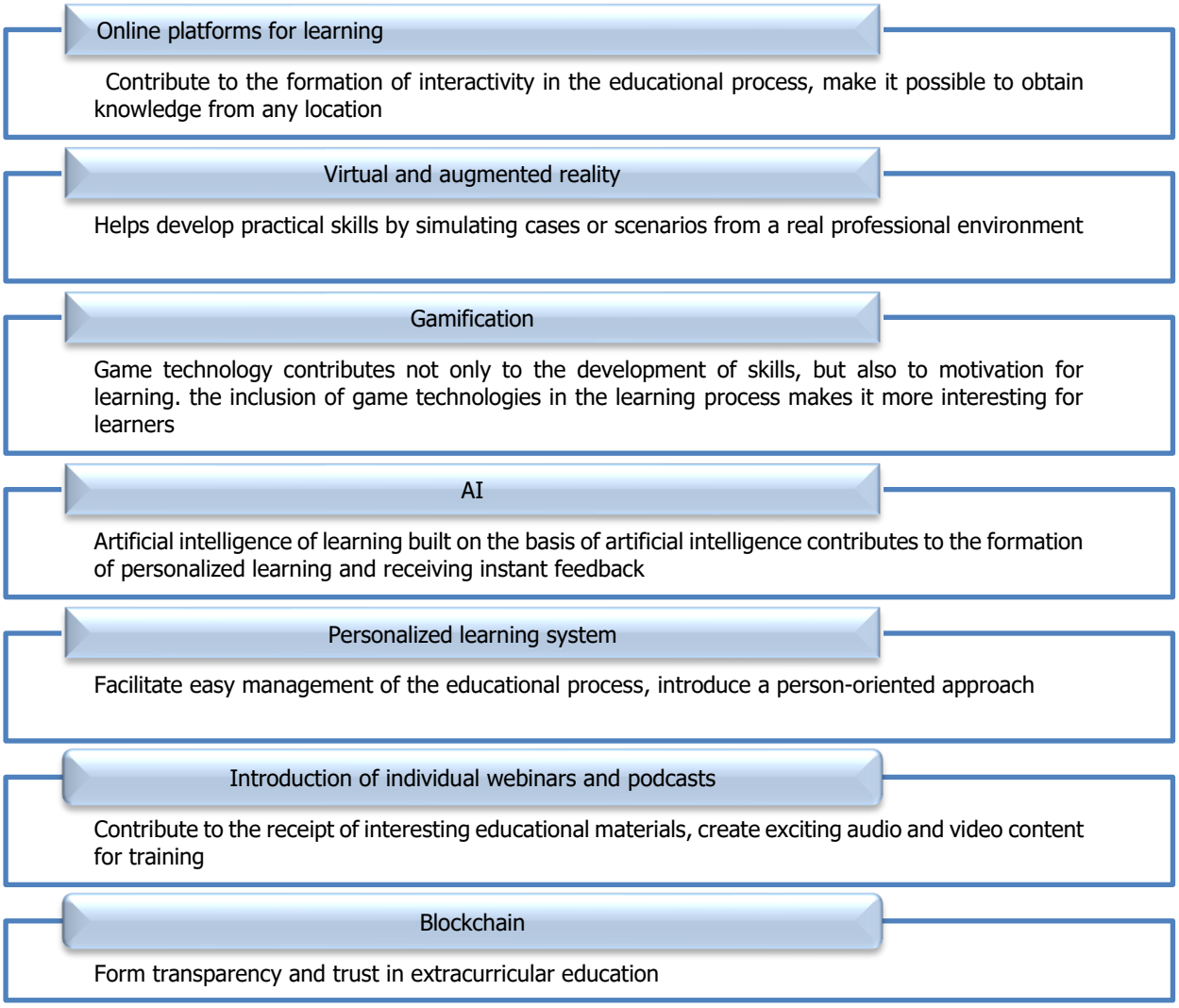

Figure 1. Key innovative technologies and their opportunities.
Source: Authors' development.

As can be seen from Figure 1, various innovative tools are used in out-of-school education. In particular, the use of online platforms and mobile applications in the out-of-school education system facilitates quick access to various learning resources. These platforms are characterised by their accessibility, flexibility, and facilitate self-learning opportunities. In particular, students can quickly find the necessary educational material or attend video classes from different locations (Meletiou-Mavrotheris et al., 2022). Virtual reality technologies also contribute to the development of practical skills of students, increase their interest in learning and allow them to actively interact with the digital learning environment (Rafael & Justino, 2022). In this sense, technologies based on artificial intelligence are also important (Sofilkanych et al., 2023).

However, in out-of-school education, they are used more for the purpose of organising and managing the learning environment. For these reasons, the use of blockchain technologies that support the security of out-of-school educational institutions is of great importance.

Game-based forms of learning are designed to keep students motivated to learn through various games. It has been proven that when a student wins a certain game activity, it not only contributes to their growth, but also increases their interest in acquiring further knowledge. Another important trend is the introduction of various electronic learning resources, including webinars and podcasts (Vasilache, 2022). On the one hand, they play an important role as supplementary learning materials, and on the other hand, they motivate students to search for educational information on their own.

Therefore, as can be seen from Figure 1, modern innovative technologies contribute to the formation of not only theoretical knowledge but also practical skills of students. They influence the transformation of out-of-school education, making it more innovative and attractive for students. However, the introduction of these innovative tools requires the appropriate digital competence of teachers (Tarteer et al., 2022). For this reason, professional development courses are important. Such individual learning initiatives are not spontaneous and do not contradict the traditional system of out-of-school education. In general, the quality of designing an individual learning trajectory for an out-of-school teacher is positively influenced by the humanisation of continuing education, which affects the choice of important values by out-of-school teachers, educational legislation that allows teachers to choose an individual learning trajectory and teaching methods, and the high level of professionalism of the organisers of in-service training for out-of-school teachers through the prism of the modern paradigm of person-centred learning (Evans & Achiam, 2021).

For this reason, the use of innovative technologies in the system of out-of-school education has both a number of opportunities and challenges. In particular, some difficulties may include additional costs for the institution to implement these technologies and the need for additional training of teachers, etc. Table 2 presents a summary analysis of the main challenges and opportunities for introducing innovative tools in the activities of out-of-school educational institutions.

Table 2.
Final comparative analysis of opportunities and challenges on the way to introducing innovative technologies in the system of out-of-school education

Online platforms for learning	
Challenges	Access to the Internet can be an important challenge (this has become especially noticeable in crisis situations). In addition, some regions may not have a high-quality fast connection, which limits students from gaining knowledge through these platforms. Another important challenge is the difficulty of maintaining motivation in online forms of classes.
Opportunities	Support flexibility in the schedule of extracurricular studies, contribute to the acquisition of knowledge from any location. Contribute to the distribution of various online educational materials. Thus, these platforms will contribute to the development of a person-oriented approach.
Virtual and augmented reality	
Challenges	Such technologies are very expensive for modern institutions of extracurricular education. Individual applications built on modern virtual reality technologies can also be expensive, and their free versions are not as effective.
Opportunities	Based on these technologies, students have the opportunity to learn in an exciting and interactive way. Such technologies contribute to the development of practical training and improve the motivation of students. On the basis of modeling and simulation of real situations, students' knowledge acquisition is improved.
Gamification	
Challenges	The formation of an effective gaming learning space can also be costly, in addition, it requires long and careful planning. Teachers need to clearly define the process of matching the game with educational goals.

Opportunities	The game improves not only practical skills, but also improves the psychological and emotional state of the students. Contributes to the formation of curiosity and motivation to study in students, develops a sense of achievement and a desire to learn more.
Artificial intelligence	
Challenges	Modern scientists have ethical concerns about the confidentiality of data entered into out-of-school educational systems. Likewise, AI-based technologies may not always be accurate.
Opportunities	Contribute to the automation of educational tasks, AI-based technologies are flexible, adaptive and contribute not only to innovation, but also to the interest of students.
Personalized learning system	
Challenges	There are concerns about the privacy of data entered into these personalized systems.
Opportunities	Make management of the educational institution easier. Contribute to the rapid receipt of educational information from the teacher to the student.
Introduction of individual webinars and podcasts	
Challenges	Quality issues with webinars and podcasts.
Opportunities	Exciting learning based on webinars and video podcasts of experts from various fields of knowledge.
Blockchain	
Challenges	Requires a high-tech infrastructure of an out-of-school education institution.
Opportunities	Increases the adaptability, safety and transparency of learning in an out-of-school education institution.

Source: Author's development based on analysis Castilho Barilli (2012); Galynska & Bilous (2022); Vasilache (2022)

Taking into account the various challenges and opportunities of introducing innovative technologies in an out-of-school educational institution, the management of an out-of-school educational institution should take the following measures for successful operation:

1. Formulating an understanding of the need for change and innovation in the teaching staff, as well as creating an appropriate information and technical space.
2. Implementation of systematic monitoring of the quality of educational processes in an out-of-school institution and publication of its quantitative and qualitative indicators (Rafael & Justino, 2022).
3. Updating the means of conducting innovation activities, identifying a number of problems, creating a creative innovation team to develop an idea and transform it into an appropriate programme.
4. Managing the development of innovations based on a continuous analysis of the state of functioning of the educational institution, determining the goals achieved.
5. Implementation of intra-school management of innovative pedagogical activities through the prism of teaching teachers innovative and experimental work within the framework of intra-school methodological training.
6. High-quality training of teachers for innovative teaching, development of new technologies (Androshchuk et al., 2020; Losheniuk et al., 2023).
7. Continuous improvement of the material and technical base of out-of-school educational institutions.

Thus, the availability of these conditions and the degree of readiness determine the complexity and scale of innovative reform of an out-of-school educational institution. Formation and provision of conditions for innovative development is the main and permanent function of an out-of-school institution. At the same time, in order to ensure the effectiveness of individual innovative technologies and the overall innovative pedagogical process, it is also necessary to take into account, analyse and monitor the results and consequences of innovations for the system of out-of-school education.

This study has demonstrated that there are various opportunities and challenges to introducing innovative technologies into the out-of-school education system. In general, modern scholars agree that the introduction of innovations can cause a number of difficulties and challenges (Tarteer et al., 2022). This research problem is also discussed work by Vasilache (2022), in which it was described the key challenges in the system of implementing of distance learning technologies. In addition, Meletiou-Mavrotheris, Eteokleous, and Stylianou-Georgiou (2022) agree that innovative technologies present both opportunities and challenges for the education system. The study identifies the importance of out-of-school education, which shapes the generation of the future, capable of understanding various innovative technologies. This statement echoes current research (Bolat & Köroğlu, 2020; Engeström & Käyhkö, 2021).

In particular, Berg, Achiam, Poulsen, Sanderhoff, and Tøttrup (2021) argue that it is difficult to develop relevant skills (including social skills and digital competences) in the formal education system within modern curricula. However, out-of-school education serves as an supplements to develop these important qualities that will be useful in the future. Also, according to current research, school curricula are increasingly suffering from overload as part of the accumulation of scientific knowledge and the introduction of various technologies and know-how (Berg et al., 2021; Firmansyah et al., 2020).

This situation presents an important challenge to making 21st century skills work. A solution that is often used to address this challenge is person-centred learning, which is difficult to implement in modern education. However, as proven in this research, it is in out-of-school education that this innovative approach is fully accepted and used by modern educators. This research problem was also of interest to other scientists, in particular, in the work of Hansen, Wallman, Teshome and Sporrong (2017), special aspects of the relationship between out-of-school education, motivation and achievement of students were considered. A similar research problem was also raised by the team of authors Hermanto, Udin and Sudirman (2023), who described the influence of certain teaching methods and extracurricular activities on the development of students' motivation to study. At the same time, a study by Mereniuk & Parshyn (2024) demonstrated that it is important to use modern integrated and innovative textbooks that promote interest among students.

Despite the fact that the study identified important challenges of introducing innovative technologies into the education system, it also identified the potential for the development of these institutions. This is in line with recent studies by Evans and Achiam (2021) and Munadi and Khuriyah (2023). These scientists characterized the innovative potential of scientific and educational extracurricular institutions and determined their role for the development of a sustainable modern society. The paper selects the main innovative technologies used in out-of-school education, with a special focus on virtual and augmented reality technologies, artificial intelligence, the introduction of innovative learning platforms, blockchain technologies, etc. Orhani (2023) noted that it is now difficult to imagine an education system without innovation.

Thus, the novelty of this study is a comprehensive analysis of the identification of the main innovative technologies used in out-of-school education, and the study of their main challenges and opportunities. It is also worth considering the presence of a subjective factor in the selected works for analysis.

Conclusions

Thus, the process of introducing innovative technologies in the system of out-of-school education has both opportunities and risks. In particular, important challenges include the adequacy of the material and technical base for the implementation of these innovations, the availability of relevant personnel with the appropriate level of professional training (digital competence) and motivation for self-improvement and lifelong learning.

However, the identified technologies have a number of advantages and opportunities for further use. In particular, in the context of vocational education, they contribute to the development of motivation and maintain students' interest in out-of-school education. In general, it is proved that out-of-school education is gradually becoming an important tool for learning and acquiring the necessary practical skills in the modern world of digital and non-digital learning environments. The work emphasizes the main mechanisms of effective implementation of innovations in the field of extracurricular education, it is determined that the important conditions are the constant improvement of teacher's skills and implementation of intra-school management of innovative pedagogical activities through the prism of teaching teachers innovative and experimental work etc.

Bibliographic References

Androshchuk, I., Androshchuk, I., Kurach, M., Khrenova, V., & Livshun, O. (2020). The system of training future teachers for organizing extracurricular activities of pupils. *Romanian Magazine for Multidimensional Education*, *12*(2), 60-85. https://doi.org/10.18662/rrem/12.2/266

Baryakhtar, V., & Bykovskyi, Y. (2019). STEM in natural science education in after-school education. In *ICTEP 2019 International Council of Environmental Engineering Education «Technology of Environmental Protection»* (p. 30-33). IEEE. https://doi.org/10.1109/ICTEP48662.2019.8968958

Berg, T. B., Achiam, M., Poulsen, K. M., Sanderhoff, L. B., & Tøttrup, A. P. (2021). The role and value of out-of-school environments in science education for 21st century skills. *Frontiers in Education*, *6*. https://doi.org/10.3389/feduc.2021.674541

Bolat, Y., & Köroğlu, M. (2020). Out-of-school learning and scale of regulating out-of-school learning: validity and reliability study. *International Journal of Education Technology and Scientific Researches, 5*(13), 1630-1663. https://doi.org/10.35826/ijetsar.258

Borysova, S, Tytar, O., Stoliarchuk, N., Alforova, Z. & Tykhoniuk, O. (2024). Analysis of the impact of the digital revolution on creativity in contemporary art: technological changes, interactivity and virtual aesthetics: technological changes, interactivity and virtual aesthetic. *Synesis 16*(1), 403-420. https://seer.ucp.br/seer/index.php/synesis/article/view/2951

Bykovska, O. (2019). Ukrainian after-school education system: state and topical education tendencies in the development. In *ICTEP 2019 International Council of Environmental Engineering Education «Technology of Environmental Protection»* (p. 53-58). IEEE. https://doi.org/10.1109/ICTEP48662.2019.8968961

Bykovska, O.V. (2021). Strategy for the development of out-of-school education. IVC ALKON. Retrieved from https://acortar.link/xPC8K7

Bykovskyi, T. (2019). Contents of professional training of future after-school teachers in pedagogical universities of Ukraine. In ICTEP *2019 International Council of Environmental Engineering Education «Technology of Environmental Protection»* (p. 59-62). IEEE. https://doi.org/10.1109/ICTEP48662.2019.8969000

Castilho Barilli, E. C. V. (2012). Virtual reality technology as and didactical and pedagogical resource in distance education for professional training. *Distance education*, 141-156. https://doi.org/10.5772/50625

Chisiu, C. M. (2013). Extracurricular activities, an alternative for interdisciplinary learning. *Postmodern Openings*, *4*(4), 67-79. https://doi.org/10.18662/po/2013.0404.07

Díaz-Iso, A., Eizaguirre, A., & García-Olalla, A. (2019). Extracurricular activities in higher education and the promotion of reflective learning for sustainability. *Sustainability*, *11*(17), 4521. https://doi.org/10.3390/su11174521

Engeström, R., & Käyhkö, L. (2021). A critical search for the learning object across school and out-of-school contexts: A case of entrepreneurship education. *Journal of the Learning Sciences*, *30*(3), 401-432. https://doi.org/10.1080/10508406.2021.1908296

Evans, H. J., & Achiam, M. (2021). Sustainability in out-of-school science education: identifying the unique potentials. *Environmental Education Research*, 27(8), 1192-1213. https://doi.org/10.1080/13504622.2021.1893662

Feraco, T., Resnati, D., Fregonese, D., Spoto, A., & Meneghetti, C. (2022). Soft skills and extracurricular activities sustain motivation and self-regulated learning at school. *The Journal of Experimental Education, 90*(3), 550-569. https://doi.org/10.1080/00220973.2021.1873090

Firmansyah, F., Rahayu, W., & Nurjannah, N. (2020). Evaluation of the entrepreneurship education program through extracurricular activities of Student Company. *Journal of Educational Research and Evaluation*, *24*(1). https://doi.org/10.21831/pep.v24i1.19783

Galynska, O., & Bilous, S. (2022). Remote learning during the war: challenges for higher education in Ukraine. *International Science Journal of Education & Linguistics*, *1*(5), 1-6. https://doi.org/10.46299/j.isjel.20220105.01

Hansen, J. M., Wallman, A., Teshome, D., & Sporrong, S. K. (2017). A study on student environment, extracurricular activities, motivation and academic achievements. *Research in Social and Administrative Pharmacy*, *13*(3), e10. https://doi.org/10.1016/j.sapharm.2017.02.086

Hermanto, A. W., Udin, T., & Sudirman, S. (2023). Effect of learning methods, extracurricular activities, and perceptions in the campus environment on character motivation of student. *Science Education Research Journal, 9*(3), 1551-1557. https://doi.org/10.29303/jppipa.v9i3.3144

Knysh, I., Budanova, O., Vakulenko, S., Syrotina, O., & Popychenko, S. (2023). Innovative educational technologies as a way of higher education enhancement. *Amazonia Investiga*, *12*(68), 21-32. https://doi.org/10.34069/AI/2023.68.08.2

Law of Ukraine 1841-III. "On Out-of-school Education". Verkhovna Rada of Ukraine, no. 46, article 393, 2000. Retrieved from http://zakon2.rada.gov.ua/laws/show/1841-14

Losheniuk, I., Kabanova, O., Berher, A., Karpenko, V., & Didyk, D. (2023). The future of virtual reality in marketing and advertising: benefits and challenges for business. *Futurity Economics&Law, 3(*3), 176-189. https://doi.org/10.57125/FEL.2023.09.25.10

Makhynko, L. (2023). Open educational resources: Facing challenges of distance learning. In *Higher education reforms in Ukraine: Challenges, status, and prospects* (pp. 234-264). Baltija Publishing. https://doi.org/10.30525/978-9934-26-360-6-11

Malynovskyi, S., Duka, R., & Yaroshenko, K. (2022). Distance education in war conditions: Learning practical surgery skills. *Sworld-Us Conference Proceedings*, (usc11-01), pp. 34-37. https://doi.org/10.30888/2709-2267.2022-11-01-014

Meletiou-Mavrotheris, M., Eteokleous, N., & Stylianou-Georgiou, A. (2022). Emergency remote learning in higher education in Cyprus during COVID-19 lockdown: A zoom-out view of challenges and opportunities for quality online learning. *Education Sciences*, *12*(7), 477. https://doi.org/10.3390/educsci12070477

Mereniuk, K., & Parshyn, I. (2024). MEDII AEVI in Ukrainian school textbooks: modern paradigms and contextual analysis. *Futurity of Social Sciences*, *2*(1), 4-27. https://doi.org/10.57125/FS.2024.03.20.01

Ministry of Education and Sciences of Ukraine (2023). *Recommendations regarding the organization of educational activities of out-of-school education institutions in the main directions in the 2023/2024 academic year*. Retrieved from https://mon.gov.ua/storage/app/uploads/public/64e/df5/e30/64edf5e3098b3964282432.pdf

Ministry of Education and Sciences of Ukraine. (2022). *On the organization of the work of out-of-school education institutions, Letter of the Ministry of Education and Sciences of Ukraine No. 1/4142*-22. Retrieved from https://acortar.link/Uq5rTd

Munadi, M., & Khuriyah. (2023). The extracurricular activities and student development of secondary school: Learning from Indonesia. *International Journal of Education and Practice*, *11*(1), 23-34. https://doi.org/10.18488/61.v11i1.3245

Onyshchenko, N., Serdiuk, N., & Krykun, V. (2021). Pre-service teachers' training for the innovative extracurricular work. *Advanced Education*, *(19)*, 20-32. https://doi.org/10.20535/2410-8286.225789

Orhani, S. (2023). Philosophy of e-learning vs m-learning. *Futurity Philosophy, 2*(4), 4-23. https://doi.org/10.57125/FP.2023.12.30.01

Rafael, S., & Justino, J. (2022). Conceptual maps applied to remote/virtual laboratories for active learning. In *Mobility for smart cities and regional development - challenges for higher education* (p. 361–369). Publishing. https://doi.org/10.1007/978-3-030-93904-5_37

Rahayu, A. P., & Dong, Y. (2023). The relationship of extracurricular activities with students' character education and influencing factors: a systematic literature review. *AL-ISHLAH: Journal of Education*, *15*(1), 459-474. https://doi.org/10.35445/alishlah.v15i1.2968

Shevchenko, Y., Zhuravlova, L., Taranenko, G., & Dubiaha, S. (2020). Students' readiness for the formation of primary schoolchildren's argumentative skill while identifying the real motive of the action. *AD ALTA: Journal of Interdisciplinary Research*, *10*(1), 100-106. https://acortar.link/kVkboi

Sofilkanych, N., Vesova, O., Kaminskyy, V., & Kryvosheieva, A. (2023). The impact of artificial intelligence on Ukrainian medicine: benefits and challenges for the future. *Futurity Medicine, 2*(4), 28-39. https://doi.org/10.57125/FEM.2023.12.30.04

Tarteer, S., Much, Y. A., Ghanem, M., Odeh, A., Elian, S., Hashaykeh, S., Salha, S., Affouneh, S., & Khlaif, Z. N. (2022). Challenges facing online learning during COVID-19. In *Radical solutions in Palestinian higher education* (p. 119–133). Springer Singapore. https://doi.org/10.1007/978-981-19-0101-0_10

Vasilache, S. (2022). Suddenly online: Active learning implementation strategies during remote teaching of a software engineering course. In *Mobility for smart cities and regional development - challenges for higher education* (p. 395–402). Springer International Publishing. https://doi.org/10.1007/978-3-030-93904-5_40

Zhylin, M., Mendelo, V., Cherusheva, G., Romanova, I., & Borysenko, K. (2023). Analysis of the role of emotional intelligence in the formation of identity in different European cultures. *Amazonia Investiga, 12(*62), 319-326. https://doi.org/10.34069/AI/2023.62.02.32

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.10
Cómo citar:
Zinchenko, V., Lazirko, N., Manko, R., Huda, O., & Ivanyshyn, M. (2024). Perspectives of using vr to increase accessibility in distance education. *Revista Eduweb*, 18(2), 141-151. https://doi.org/10.46502/issn.1856-7576/2024.18.02.10

Perspectives of using vr to increase accessibility in distance education

Perspectivas del uso de la realidad virtual para aumentar la accesibilidad en la educación a distancia

Volodymyr Zinchenko
https://orcid.org/0000-0002-2101-903X
PhD in Pedagogy, Associate Professor, Department of Pedagogy, Psychology, Social Work, and Management, Educational and Scientific Institute of Pedagogy and Psychology, Oleksandr Dovzhenko Hlukhiv National Pedagogical University, Hlukhiv, Ukraine.
Nataliia Lazirko
https://orcid.org/0000-0001-8043-3946
PhD in Philology, Associate Professor, Associate Professor of the Department of the Foreign Literature and Polonistics, Faculty of Ukrainian and Foreign Philology, Drohobych Ivan Franko State Pedagogical University, Drohobych, Ukraine.
Ruslana Manko
https://orcid.org/0000-0003-1004-9441
Senior Lecturer, The Department of the Foreign Literature and Polonistics Faculty of Ukrainian and Foreign Philology, Drohobych Ivan Franko State Pedagogical University, Drohobych, Ukraine.
Oksana Huda
https://orcid.org/0000-0002-3602-7892
PhD in Engineering, Associate Professor, Associate Professor of Department of Physics and Higher Mathematics, Faculty of Transport and Mechanical Engineering, Lutsk National Technical University, Lutsk, Ukraine.
Myroslava Ivanyshyn
https://orcid.org/0000-0002-4219-104X
PhD in Philology, Associate Professor Approved at the meeting of the Department of the Foreign Literature and Polonistics, Department of World Literature and Slavonic Faculty of Ukrainian and Foreign Philology, Drogobych Ivan Franco State Pedagogical University, Drohobych, Ukraine.

Recibido: 20/04/24
Aceptado: 05/06/24

Abstract

The article is devoted to the study of the prospects of using virtual reality technologies in the organisation of the educational process. The main concepts and technologies that formed the basis for the development of this innovative technology are considered. The article also analyses the advantages and disadvantages of immersive education, virtual reality technologies, and their application in modern economic conditions. A comprehensive analysis of the use of VR technology in education is carried out, including an analysis of empirical and theoretical studies on the prospects for the use of virtual reality technologies in reforming the education system. The article summarises the practices of VR development and provides information on proposals for the development of

immersive technologies in education. Further research should focus on the practical aspects of integrating virtual reality technologies into the educational process. Attention should also be paid to the peculiarities of using these technologies.

Keywords: innovations, immersive education, educational environment, higher education, information technologies.

Resumen

El artículo está dedicado al estudio de las perspectivas de uso de las tecnologías de realidad virtual en la organización del proceso educativo. El artículo también analiza las ventajas e inconvenientes de la educación inmersiva, las tecnologías de realidad virtual y su aplicación en las condiciones económicas modernas. Se lleva a cabo un análisis exhaustivo del uso de la tecnología de RV en la educación, que incluye un análisis de los estudios empíricos y teóricos sobre las perspectivas del uso de las tecnologías de realidad virtual en la reforma del sistema educativo. El artículo resume las prácticas de desarrollo de la RV y ofrece información sobre propuestas para el desarrollo de tecnologías inmersivas en educación. Las investigaciones futuras deberían centrarse en los aspectos prácticos de la integración de las tecnologías de realidad virtual en el proceso educativo. También debería prestarse atención a las peculiaridades del uso de estas tecnologías.

Palabras clave: innovaciones, educación inmersiva, entorno educativo, educación superior, tecnologías de la información.

Introduction

Educational institutions are complex pedagogical systems that integrate various social and technological components. They shape the knowledge of the younger generation and cannot exist without modern information technology (IT). These technologies are an integral part of society, including education and science, and make a significant contribution to the formation of the personality of the younger generation.

Virtual reality (VR) technology is an innovative and promising area of education that provides a multidimensional representation of a subject area. Virtual reality is a technology that provides contactless information interaction through complex multimedia operating environments. It creates the illusion of direct entry and presence in a stereoscopically presented "virtual world", while providing tactile sensations when the user interacts with virtual objects (Scavarelli, Arya, & Teather, 2021).

The above-mentioned technology allows users to fully immerse themselves in the virtual space and feel like a part of the environment created by the developers. This feature of VR provides an interesting and visually appealing learning experience, demonstrating various phenomena and processes with any degree of detail. VR technology can improve educational curricula by providing enhanced opportunities to interact with objects and create a sense of presence.

Visually appealing lectures, seminars, and workshops made possible by VR provide a comprehensive understanding of real-world objects and processes, improving the quality and efficiency of educational processes while reducing costs. Visual information is the main source of memorisation, and combining it with other activities significantly improves information retention. Virtual reality systems have clear advantages over other learning tools in this regard (Mystakidis, Berki, & Valtanen, 2021).

1. VR systems allow users to visualise objects of different sizes, which makes it possible to study objects in both the micro and macro worlds. This feature is particularly useful in teaching biology, astronomy, and physics.
2. The VR systems can be used to create models of processes that cannot be directly observed by human senses. This allows you to clearly demonstrate phenomena in an accessible and understandable form.

For example, the distribution of heat in space or matter can be modelled by highlighting areas with different temperatures with different colours and gradients.

3. VR technologies allow you to create objects that do not exist in the real world and visualise abstract models, which is especially important in mathematics. Virtual reality technology allows you to accurately simulate direct interaction with an object, modelling its behaviour in a real environment with high accuracy.
4. This technology makes it possible to create a highly detailed simulated reality that can significantly affect the emotional states of the subject, thereby further enhancing the simulation of his or her behaviour in a real environment (Alalwan et al., 2020).

Theoretical Framework or Literature Review

Theoretical foundations of research on the use of VR in education

Although there is no universally accepted and unambiguous definition, the term "virtual reality" was coined by Jaron Lanier, a pioneer in VR development, in 1989, initially defining VR as a computer illusion. VR is a professional and scientific term that has gained widespread use and refers to a three-dimensional computer simulation that creates a realistic effect without its physical reality.

Scavarelli, Arya and Teather (2021) distinguish two main meanings of the term VR. In a broad sense, it is the entire information environment created with the help of digital technologies. In a narrow sense, VR is defined as the highest programming product related to the modelling of the external and internal world of a person, using immersive 3D information environments that are the pinnacle of modern programming and electronics.

The created digital world is a model of real-world objects, such as buildings or plants, or the topology of human internal organs. A human operator can perceive the environment as if it were part of the real world using visual, auditory, or tactile devices. VR can be a model of an abstract world that is not directly represented in reality, such as a chemical molecule or a set of parameters. Or it can be an environment from a completely fictional science fiction world.

According to some authors, VR is a uniquely powerful computer application through which people can interact. Virtual reality is, first and foremost, a digital environment that simulates real life experience and engages all the senses to achieve certain goals. Figure 1 shows a diagram of VR features.

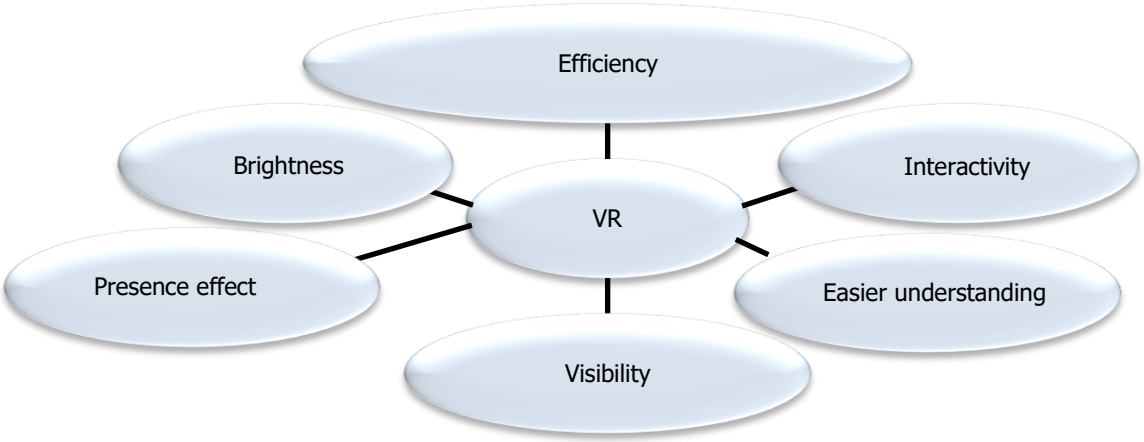

Figure 1. Key Features of Virtual Reality in Enhancing User Experience.
Source: Prepared by the authors

VR is a construct that combines philosophical and natural science views on human cognitive abilities and their support. The following properties of VR can be distinguished: performance in relation to the real objective world, relevance when directly observed in real time, autonomy with unique patterns and spatial and temporal constraints, interactivity with other realities.

The authors refer to the primary level as traditional works of art and products of the imagination, such as mythological characters, fairy tales and epics. In addition, altered states of consciousness include clinical psychotic states and hypnotic trance states. The secondary level consists of artificial reality created by humans using digital technologies with a low degree of interactivity and animation. This includes information space such as the Internet and personal computer software. Finally, the third level is artificial information reality, created to imitate ordinary reality as closely as possible with the help of digital technologies. It is characterised by high animation and interactivity.

Methodology

Design

The effectiveness of this study is assessed using qualitative and quantitative indicators. During the observations, these indicators are measured, compared and analysed, and the data are then interpreted. The study went through several stages, as shown in Table 1.

Table 1.
Stages of the study

№	Stage	Period of implementation	Content of the research stage
1	Stating	February 2023	Defining the purpose and objectives of the study. Formation of control and experimental groups of students. Selection of research tools and methods. Conducting primary testing.
2	Formative	September 2023 - March 2024	Implementation of pedagogical conditions using VR technology (for the experimental group) and traditional teaching methods (for the control group). Study of attitudes towards the educational environment. Conducting statistical processing of the results. Drawing conclusions based on the results.
3	Summarising	April 2024	Processing the research results. Summarising the results.

Source: Prepared by authors

Participants

The experimental work was conducted on the basis of the National Pedagogical Dragomanov University (Kyiv). The study involved 100 second- and third-year students studying in the field of "Teacher Education" with a bachelor's degree at the Faculty of Teacher Education. Students of 6 academic groups were divided into experimental (EG) and control (CG) groups. All respondents were warned about the need for an honest and unbiased attitude to the survey. The study was conducted in accordance with general ethical standards and rules. All respondents agreed to the processing of their personal data and the use of the research results for the publication of the article.

Data collection

1. The Educational Environment Trust Scale (EETS). This test was developed by researchers at the University of Illinois. The EETS contains 18 statements that assess the level of trust students have in their teachers, peers, and the educational environment in general.
2. Monitoring of academic performance. The method allows for an objective assessment of the effectiveness of the implemented technology.

Analysis of data

The following formula is used to determine the standard deviation (SD) for each group:

$$S = \sqrt{\frac{\sum(X_i - \overline{X})^2}{N-1}}; \qquad (1)$$

where X_i is the value of each level, $\overline{X}$ is the average value, N is the number of observations.

2. *χ^2 criterion is calculated using the formula:*

$$\chi^2 = N \cdot \left[\sum_{j=1}^{m}\left(\sum_{i=1}^{n}\frac{x_{ij}^2}{Q_i . R_j}\right) - 1\right], \qquad (2)$$

where N is the total number of students who participated in the formative stage of the pedagogical experiment;
m – is the number of possible values of the first feature; n is the number of possible values of the second feature;
x_{ij} – is the number of combinations of the i-th value of the first feature with the j-th value of the second feature;
Qi – is the total number of observations of the i-th value of the first feature;
Ri – is the total number of observations of the j-th value of the second feature.

Typically, critical values are given for different levels of significance. The probability of error associated with rejecting or not rejecting the null hypothesis is called the significance level. This means that the probability of considering differences to be significant when they are actually random is determined by the significance level. In pedagogical research, a significance level (denoted by α) of 0.05 is usually used, which indicates that the possibility of error should not exceed 5%. This is the level of significance used in this study.

Results and Discussion

Features of educational VR

In recent years, there has been a growing interest in the use of VR for educational purposes around the world (Alzahrani, 2020). Educational virtual reality is a separate and effective area of digital technology application that facilitates the learning process, expands knowledge, and is based on reliable information. It can be integrated with other teaching methods and is intended for participants in the educational process, including teachers and students.

Learning using educational virtual reality is significantly different from traditional methods. Unlike traditional education, which often requires a high degree of personal interest, responsibility and hard work,

often in conditions of personal autonomy, with conventional sources of information that often require additional clarification, education in the context of educational VR allows you to simulate a complex visual-spatial-auditory environment (Joo et al., 2018).

VR creates an effective didactic environment with wide possibilities that produce qualitatively new properties that are not inherent in traditional methods. Educational VR is a system of sequential actions that requires technological interfaces to provide an immersive experience. It is not a rigid algorithm of actions and prescriptions, but rather a flexible learning technology that can be adapted to achieve the desired educational goals (Saab et al., 2021).

There are three types of main interfaces that support learning objectives:

- VR, which provides a sensory immersion environment, the illusion of body presence and an experience of intense participation;
- Multiuser VR (MUVE), which provides mental presence in the created environment indirectly by personal avatars, without sensory stimulation, with the ability to interact with other avatars;
- Mixed, or augmented, reality, where digitally generated information enriches, shapes, accelerates or slows down real-life situations (Anderson & Rivera Vargas, 2020).

Table 2.
Characteristics of educational VR presented in the review by P. Axel

VR type	Features
VR that creates a simulated environment with spatial and visual logic	- The student can take on the roles of observer, participant and creator.
VR that creates challenging circumstances	- It provides opportunities for immersion and understanding, multisensory experience, social interaction and collaboration.
VR interconnected with physical reality (PR)	- Subtractive FR (sociocultural situations and experiences that are difficult or impossible to access physically or mentally). - Additive and/or augmented FR (illustrative or merging with physical reality). - Concretising FR (representing objects of physical reality that can be accessed only in an abstract way, with creative participation in this, for example, controlling the work of neurons or getting to know political processes). - Independent FR (creation of an alternative to reality, imaginary, fictional).
VR that reduces or eliminates potential physical and mental effects	- Removes the burden of responsibility for the performance of activities in the simulated environment, thereby creating the possibility of a safe and secure experience. - It has the ability to increase the burden of responsibility (without the ability to control the person being influenced) in order to enhance the cognitive aspect of responsibility (an environment saturated with specific stimuli).

Source: Prepared by Aczél (2017)

It should be noted that the highest level of VR can be achieved with the help of several types of technological products. The first type includes widely available computer monitors that display highly animated images containing 3D models of real objects (for example, created using the Unity multi-platform tool). The second type is portable VR headsets or glasses (HMD - Head Mounted Display). There are three types of HMD systems: those that display only computer-generated images, those that display real video images, and those that display a combination of computer-generated and real video images.

This type is augmented virtual reality, which differs from traditional virtual reality in that it projects additional objects that are not in the field of view simultaneously with the demonstration of a real situation.

Selivanov's CAVE reality projects specially shaped virtual objects onto multiple screens, using motion parallax to create the illusion of three-dimensional objects for the user. This technology allows for the modelling of a wide range of complex dynamic virtual scenes. CAVE systems provide a much more immersive virtual environment than HMD technology (Jang et al., 2021). The CAVE system adapts to the user's parameters, providing interactive interaction with virtual objects. In addition, the user can touch and manipulate virtual objects using special devices called pens.

In his review, P. Ackzel identifies three groups of educational VR products, each of which has its advantages and disadvantages. The advantage of the programme is that it clearly meets the learning objectives. Akzel notes that the disadvantage is that it can be difficult for the user to determine its educational focus, which can reduce motivation to learn. The first group includes educational VR products developed exclusively for educational purposes (for example, Quest Atlantis and Rome). The second group includes educational VR products that simulate communicative social situations and entertainment, as well as include educational features such as virtual online museum tours and Jump Start. The second group includes educational VR products that create simulated social situations and entertainment and include educational features such as virtual online museum tours and Jump Start. However, such products are not recommended for group online sessions due to safety concerns and the high likelihood of encountering unknown online players or participants. The third group includes immersive virtual products designed primarily for gaming, but can also be used for educational purposes, such as the development of VR content (e.g. Minecraft or Second Life) (Aczél, 2017).

Axel highlights several problems that other researchers have noted that customers of educational VR products may face when developing VR content. Developers may have difficulty setting precise goals, lack competence, or lack innovative intentions, which can lead to cognitive overload and/or low motivation for the user. It is important to note that educational VR is mainly targeted at users aged 10 to 15, while older users, including adults, prefer virtual spaces suitable for creating their own content (Aczél, 2017).

The study tested students' satisfaction with the learning environment. The results of the study are presented in Table 3.

Table 3.
Results of the Educational Environment Trust Scale (EETS) test for CG and EG

Group	n	Average value	Standard deviation	t-test (p-value)
CG	50	72,5	9,4	-2,34 (0,021)
EG	50	68,2	11,3	

Source: Prepared by authors

The results show that the control group (CG) has a mean of 72.5 with a standard deviation of 9.4, while the experimental group (EG) has a mean of 68.2 with a standard deviation of 11.3. The t-test value is -2.34 and the p-value is 0.021. This indicates a statistically significant difference between the groups, where the CG has a higher mean, which may indicate the impact of the experiment. We also monitored students' academic performance, the results of which are presented in Table 4.

Table 4.
Results of monitoring the dynamics of students' academic performance for CG and EG

Group	n	Average value	Standard deviation	t-test (p-value)	Chi-square (p-value)
EG	50	78,5	9,2	-2,45 (0,018)	12,7 (0,002)
KG	50	72,1	11,5		

Source: Prepared by authors

The EG shows a mean academic performance value of 78.5 with a standard deviation of 9.2, while the CG has a mean value of 72.1 with a standard deviation of 11.5. The t-test value (-2.45) and p-value (0.018) indicate a statistically significant difference between the groups, and the chi-square (12.7) with p-value (0.002) confirms this significance. The results indicate that the EG achieved higher academic performance compared to the CG, which did not use VR technologies.

Learning models that use VR technology

P. Akzal formulated theoretical concepts of learning based on three approaches in a review of educational VR technologies that use complex immersive environments for interactive user learning. They are formed on the basis of three approaches in a review of educational VR technologies that use complex immersive environments for interactive user learning (Aczél, 2017). For example, the author recommends a constructivist approach based on Piaget's theoretical model of the evolution of mental models in children's cognitive development as one of the first approaches to the use of educational virtual reality. Akzal has formulated theoretical concepts of learning based on three approaches in a review of educational VR technologies that use complex immersive environments for interactive user learning. In his research, P. Akzal relied on the constructive approach. It allows students to actively and creatively accumulate knowledge, discover, define, and identify relationships, and teachers to creatively generate new knowledge.

Educational virtual reality presents students with a problem in a specific context for which they must develop an individual or collective solution. Thus, it is not standardised or universal, but there is always an opportunity to analyse the effectiveness of learning in the process of solving the problem. VR undoubtedly enhances the learning process by providing high motivation and engagement through sensory stimulation, creating individual or group activities that have a positive impact (Bower, DeWitt, & Lai, 2020).

The second approach is experiential learning. Here, the subject creates meanings and acquires knowledge outside the standard dissemination of knowledge from expert to layperson. The knowledge is based on individual and/or collective experience, gained empirically through insights that reduce criticism in the interpretation of experience. Individually and in groups, experience is interpreted in accordance with socio-cultural attitudes. This interpretation leads to reflective active behaviour. Educational methods associated with this approach are a cyclical process consisting of several stages and elements (Shevchenko, Dubiaha, & Fefilova, 2021).

The cyclical process acquires new knowledge through observation, reflection and action (Smolych & Zavadskaya, 2021).

Experiential learning methods are designed to empirically create new knowledge by overcoming obstacles, unlike everyday life experiences, which are not always conducive to acquiring new knowledge, as P. Axel notes. Real-world experiences can be classified as primary (direct) or secondary (indirect). VR creates an effective hybrid of mediated experience that can be used in education.

It is important to note that secondary experiences are also spatially, temporally, culturally and contextually distant. For example, receiving news in the form of a text or multimedia message is a secondary experience (Radzievska et al., 2022).

Virtual reality offers a unique advantage over real-life secondary experiences by providing a physically tangible presence of media technologies, such as a display or VR helmet, a rope or a treadmill, as well as their physical effects, such as sweating. This direct impact on the user's senses provides a powerful and immersive experience, even though it is indirect and reflexive. Virtual reality (VR) is a highly effective tool

for experiential learning. It creates a realistic perception and facilitates the entire cycle of comprehension, thinking, action, and reflection. This contrasts with traditional school assignments that are presented in the form of text or verbal instructions from the teacher (Elshami et al., 2021).

Context-aware learning is a third approach that emphasises the importance of presence, engagement with the context of the situation, and a type of learning that can be more intensive, depending on the degree of integration into the situation (Bhandari, 2023).

The situation requires exploration and interpretation of changes in the context, active participation, interactive communication, situational engagement, and thus immersion. These methods make it possible to implement metacognitive learning, which involves asking reflective questions that contribute to the acquisition of new knowledge. It is important to note, however, that contextual learning requires additional human and economic resources and much more time, for example, for travelling, visiting companies, internships, etc.

VR allows the use of media resources that can be compared to real-life situations, depending on the intensity and subtle variability of the situational context. When developing educational VR content, the constructivist approach can be based on knowledge generation, the empirical approach on experience, and the situational approach on the situational context. When developing educational VR content, the constructivist approach can be based on knowledge generation, the empirical approach on experience, and the situational approach on the situational context (Al Rawashdeh et al., 2021)

.

SNKC describes a clear multi-step process for VR newcomers to become part of a social network. The learner starts out as a neophyte, but with dedication and effort, they can progress to become a mentor who not only contributes to the reality they create, but also controls it.

Training methodology using VR technologies

Virtual reality can support a number of different types of learning. The first type is observation-based learning, which provides students with sensory experiences through cutting-edge media resources that allow them to transcend physical boundaries. For example, virtual campuses, museums, historical sites, works of art and natural formations. The benefits of learning through virtual reality should be emphasised, as it offers multiple perspectives without requiring additional physical or economic resources, as demonstrated in the context of learning (Nambiar, 2020).

The second approach is activity-based learning, which involves active participation and experiencing the consequences in a virtual reality environment. Education aims not only to understand complex concepts, but also to test existing knowledge, such as physical and mathematical laws, language rules, and social norms. Through trial and error with feedback, education provides valuable experience without physical or social consequences, similar to experiential learning (Soliman et al., 2021).

Social learning is the third type of learning. It enables collaboration in solving problems and overcoming physical barriers, as demonstrated by the Harvard HBX Live virtual online project. The potential of interaction on newly created technological platforms should be emphasised and represents a new method of learning called "pyragogy" (Turchyn et al., 2023). Learning is based on joint research, the presence of another student, active critical feedback and high responsibility. The key elements of learning are knowledge sharing, co-presence, interaction and collaboration (in the context of learning).

Experiential learning - the fourth type - involves the design of learning materials and the study of areas that are either inaccessible to human senses or too complex to perceive (Di Natale et al., 2020). Modelling is used to create a tangible reality that allows us to evaluate phenomena that were previously understood

only at an abstract level. For example, nanoparticles and democratic institutions of society can be better understood through the use of VR.

The fifth type is future-oriented learning, which contributes to the development of sustainable skills of a promising personality. The authors call this approach the "Homo-perspective" social person. According to the authors, human perception, memory, and emotions are future-oriented, not primarily related to the present or past. In other words, people do not understand, store, or experience through knowledge, evaluation, and emotions, but rather represent and predict (Nambiar, 2020).

Conclusion

The main purpose of this paper was to analyse the extent to which virtual reality technologies can be integrated into the educational process. A review of studies conducted in the field of educational VR demonstrates the comprehensive ontological and methodological elaboration of the issues faced by researchers. It can be stated that virtual reality technologies are safe and effective for learning. Modern digital equipment meets the highest standards of environmental safety, including psychological and technical characteristics.

This theoretical study allowed us to identify the types, levels and features of immersion experienced by users of virtual reality products. The experimental studies presented in this article examined the personal characteristics of users and the degree of their influence on academic performance. The article discusses teaching methods and tools to increase learning motivation and improve learning.

Modern digital virtual reality products, despite their effectiveness, can still be expensive and inaccessible. The integration of VR technologies into the educational process requires improvements and changes from both technology developers and participants involved in the learning process. Developers need to provide more convenient and safer equipment, and educators need to develop promising educational programmes that meet the needs of students and are consistent with the nature of these technologies. The future of educational virtual reality depends on the speed with which VR becomes a widely available educational technology. This article explores the potential of higher-level virtual reality technologies in higher education by examining the impact of virtual reality programmes on student characteristics. Didactic VR technologies create an enhanced modern educational environment and expand learning opportunities for students. Virtual reality technologies will revolutionise human interaction with the real world in the next few years, and their potential will be used in various fields.

Bibliographic References

Aczél, P. (2017). Virtual reality and education - world of teachcraft? *Perspectives of Innovations, Economics and Business*, *17*(1), 6-22.

Al Rawashdeh, A. Z., Mohammed, E. Y., Al Arab, A. R., Alara, M., & Al-Rawashdeh, B. (2021). Advantages and disadvantages of using e-learning in university education: Analysing students' perspectives. *Electronic Journal of E-learning*, *19*(3), 107-117. https://doi.org/10.34190/ejel.19.3.2168

Alalwan, N., Cheng, L., Al-Samarraie, H., Yousef, R., Alzahrani, A. I., & Sarsam, S. M. (2020). Challenges and prospects of virtual reality and augmented reality utilisation among primary school teachers: A developing country perspective. *Studies in Educational Evaluation*, *66*, 100876. https://doi.org/10.1016/j.stueduc.2020.100876

Alzahrani, N. M. (2020). Realidade aumentada: Uma revisão sistemática de seus benefícios e desafios em contextos de e-learning. *Applied Sciences*, *10*(16), 5660. https://doi.org/10.3390/app10165660

Anderson, T., & Rivera Vargas, P. (2020). A critical look at educational technology from a distance education perspective. *Digital Education Review*, *2020*(37), 208-229. https://doi.org/10.1344/der.2020.37.208-229

Bhandari, M. P. (2023). Past and present of social inequality: Analysing structure and future trends. *Future of Social Sciences*, *1*(3), 47-60. https://doi.org/10.57125/FS.2023.09.20.04

Bosa, V., Marieiev, D., Balalaieva, O., Krokhmal, A., & Solovei, A. (2024). Implementation of virtual reality in foreign language teaching. *Amazonia Investiga*, *13*(73), 187-199. https://doi.org/10.34069/AI/2024.73.01.15

Bower, M., DeWitt, D., & Lai, J. W. (2020). Razões associadas à intenção de professores em serviço de usar a realidade virtual imersiva na educação. *British Journal of Educational Technology*, *51*(6), 2215-2233. https://doi.org/10.1111/bjet.13009

Di Natale, A. F., Repetto, C., Riva, G., & Villani, D. (2020). Realidade virtual imersiva na educação K-12 e superior: Uma revisão sistemática de 10 anos de pesquisa empírica. *British Journal of Educational Technology*, *51*(6), 2006-2033. https://doi.org/10.1111/bjet.13030

Elshami, W., Taha, M. H., Abuzaid, M., Saravanan, C., Al Kawas, S., & Abdalla, M. E. (2021). Satisfaction with online learning in the new normal: Perspective of students and faculty at medical and health sciences colleges. *Medical Education Online*, *26*(1), 1920090. https://doi.org/10.1080/10872981.2021.1920090

Jang, J., Ko, Y., Shin, W. S., & Han, I. (2021). Realidade aumentada e realidade virtual para a aprendizagem: Um exame usando um modelo de aceitação de tecnologia estendido. *IEEE Access*, *9*, 6798-6809. https://doi.org/10.1109/ACCESS.2020.3048708

Joo, Y. J., Park, S., & Lim, E. (2018). Fatores que influenciam a intenção de professores em serviço de usar tecnologia: Autoeficácia do professor TPACK e modelo de aceitação de tecnologia. *Journal of Educational Technology & Society*, *21*(3), 48-59. Available at: https://www.jstor.org/stable/26458506

Mystakidis, S., Berki, E., & Valtanen, J. P. (2021). E-learning profundo e significativo com ambientes de realidade virtual social no ensino superior: Uma revisão sistemática da literatura. *Applied Sciences*, *11*(5), 2412. https://doi.org/10.3390/app11052412

Nambiar, D. (2020). The impact of online learning during COVID-19: students' and teachers' perspective. *The international journal of Indian psychology*, *8*(2), 783-793.

Radzievska, I., Trepet, G., Radzikhovska, N., Sukhostavets, N., Yuryk, O., & Saienko, V. (2022). Modern achievements and prospects for the development of higher medical education: Ukrainian realities. *Amazonia Investiga*, *11*(55), 114-123. https://doi.org/10.34069/AI/2022.55.07.12

Saab, M. M., Hegarty, J., Murphy, D., & Landers, M. (2021). Incorporating virtual reality in nurse education: a qualitative study of nursing students' perspectives. *Nurse Education Today*, *105*, 105045. https://doi.org/10.1016/j.nedt.2021.105045

Scavarelli, A., Arya, A., & Teather, R. J. (2021). Virtual reality and augmented reality in social learning spaces: a literature review. *Virtual Reality*, *25*(1), 257-277. https://doi.org/10.1007/s10055-020-00444-8

Shevchenko, Y., Dubiaha, S., & Fefilova, T. (2021). Information approach to the problem of improving the readiness of future teachers for the spiritual and moral development of junior schoolchildren. *AD ALTA: Journal of Interdisciplinary Research*, *11*(1), 74-78. https://www.magnanimitas.cz/ADALTA/110117/papers/A_15.pdf

Smolych, D., & Zavadskaya, O. (2021). Social-psychological aspect of adjusting interaction of cluster participants. *Problems of theory and practice of financial and credit activity, 2*(37), 476-481. https://doi.org/10.18371/fcaptp.v2i37.230652

Soliman, M., Pesyridis, A., Dalaymani-Zad, D., Gronfula, M., & Kourmpetis, M. (2021). A aplicação da realidade virtual na educação em engenharia. *Applied Sciences*, *11*(6), 2879. https://doi.org/10.3390/app11062879

Turchyn, I., Zaitseva, S., Rudenko, N., Saienko, V., Kuzemko, N., & Denefil, O. (2023). Using distance learning models as opportunities for blended learning for foreigners. *Romanian Magazine for Multidimensional Education*, *15*(4), 178-191. https://doi.org/10.18662/rrem/15.4/787

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.11
Cómo citar:
Barakatova, N., Oharienko, T., Kinashchuk, A., Chekalyuk, V., & Stanko, D. (2024). Corpus Analysis for Developing Language Competencies in Future Professionals. *Revista Eduweb*, 18(2), 152-166. https://doi.org/10.46502/issn.1856-7576/2024.18.02.11

Corpus Analysis for Developing Language Competencies in Future Professionals

Análisis de corpus para el desarrollo de competencias lingüísticas en futuros profesionales

Neonilla Barakatova
https://orcid.org/0000-0002-7433-288X
Associate Professor, Department of Philology and Language Communication, Dnipro University of Technology, Dnipro, Ukraine.
Tetiana Oharienko
https://orcid.org/0000-0002-8400-1670
Associate Professor, Department of Social and Humanitarian Disciplines, Donetsk State University of Internal Affairs, Kropyvnytskyi, Ukraine.
Anastasiia Kinashchuk
https://orcid.org/0000-0002-5675-240X
Ph.D., Senior Lecturer, Department of Foreign Languages of the Institute of Economics and Management, National University of Water and Environmental Engineering, Rivne, Ukraine.
Veronika Chekalyuk
https://orcid.org/0000-0003-1223-6646
Ph.D., Kyiv National Taras Shevchenko University, Kyiv, Ukraine.
Daryna Stanko
https://orcid.org/0000-0002-7858-8663
Associate Professor, English Philology Department, Uzhhorod National University, Uzhhorod, Ukraine.

Recibido: 20/04/24
Aceptado: 05/06/24

Abstract

Aim. The aim of the study is to demonstrate the effectiveness of using corpus analysis for the development of language competencies of future specialists using specific examples of the Ukrainian and English languages. Methods. The research employs the methods of experimental comparison of training results, questionnaire survey, as well as monitoring and analysis of changes in language skills. Statistical methods were used to process the obtained data. Results. A significant improvement in language competence was observed in the group where corpus analysis was used: the percentage of students who achieved positive results increased from 40% to 70% after the implementation of this method. The difference between pre- and post-training indicators was 30%, which is statistically significant ($\chi^2 = 27.05$, $p < 0.001$). Conclusions. The study confirmed the effectiveness of using corpus analysis for the development of language competencies of future specialists. The results indicate a significant improvement in the level of language comprehension, oral expression skills, and use of specialized vocabulary in the experimental group (EG) compared to the control group (CG). Prospects. Further research may focus on determining the impact of

corpus analysis on the language learning process in a variety of contexts.

Keywords: communication, educational corpus, higher education, higher education institution (HEI), professional competencies.

Resumen

El objetivo del estudio es demostrar la eficacia del uso del análisis de corpus para el desarrollo de competencias lingüísticas de futuros especialistas utilizando ejemplos específicos de los idiomas ucraniano e inglés. La investigación utiliza métodos de comparación experimental de los resultados de la formación, encuestas por cuestionario, así como seguimiento y análisis de los cambios en las habilidades lingüísticas. Se utilizaron métodos estadísticos para procesar los datos obtenidos. Se observó una mejora significativa en la competencia lingüística en el grupo donde se utilizó el análisis de corpus: el porcentaje de estudiantes que lograron resultados positivos aumentó del 40% al 70% después de la implementación de este método. La diferencia entre los indicadores previos y posteriores al entrenamiento fue del 30%, lo cual es estadísticamente significativo ($\chi^2 = 27,05$, $p < 0,001$). El estudio confirmó la eficacia del uso del análisis de corpus para el desarrollo de competencias lingüísticas de futuros especialistas. Los resultados indican una mejora significativa en el nivel de comprensión del lenguaje, habilidades de expresión oral y uso de vocabulario especializado en el grupo experimental (GE) en comparación con el grupo control (GC).

Palabras clave: competencias profesionales, comunicación, corpus educativo, educación superior, institución de educación superior (IES).

Introduction

Determined by the key role of language skills in the professional development and social adaptation of specialists in all areas of activity. They are critical to successful communication and career development in a world of globalization and growing international cooperation. The ability to learn not only one's native language, but also foreign languages, in particular English, which is the language of international, scientific, and business communication, is especially relevant today (Lefter et al., 2022).

Corpus are an important tool in acquiring communication competence. Along with traditional grammars and dictionaries, they are mandatory for presenting data as an effective reference system. The traditional methodological principle of visualization under the influence of corpus grammars was replaced by the principle of statistical visualization (Praat, n.d).

Linguo-statistic results are widely presented in the form of histograms, graphs, and word clouds not only in dictionaries, but also in modern textbooks on the English and Ukrainian languages. The technology of creating linguo-methodical materials has undergone significant changes in connection with the transformation of the corpus in the practice of compilation of dictionaries in a professional direction. Corpus analysis tools derived from corpus linguistics can serve as a basis for the creation of linguistic-methodical educational materials for the formation of language skills of future specialists (Cavasso & Taboada, 2021). The article is focused on revealing the role of corpus analysis in building professional communication skills.

Corpus analysis plays a special role in building language competencies of future journalists. It provides students with the opportunity to work with real texts that reflect the variety of speech situations in professional activities. It is important for journalists to understand the peculiarities of speech genres such as news, interviews, analytical materials, and corpus analysis helps to study their stylistics and variability.

Moreover, corpus data analysis helps to improve editing and proofreading skills, which is important for journalists (Bednarek & Carr, 2021).

Pedagogical conditions aimed at effective development of students' language competence were created in the course of the experimental work. This goal was achieved through various methods of corpus analysis, which complemented traditional approaches to language learning (Matsera et al., 2023).

1. Being part of database-driven learning, corpus analysis tools rely heavily on the linguistic visibility of correspondence. Traditionally, these tools generate match strings that consist of compilation of corpus texts with the studied lexical units (LU). This approach has proven to be effective in language learning and should be considered a valuable tool. Students with A1-A2 proficiency can perform sorting exercises (Ma et al., 2022).
2. The phenomenon of semantic prosody, which includes subtle features of language use and is confirmed by numerous corpus examples, is widely used in building professional communication skills. Corpus statistics is used to confidently assess the authenticity of speech and to pose complex research tasks to students (Lin & Adolphs, 2023).
3. The corpus tools offer an enhanced context option that provides access to multiple sentences of the source text. Extended context provides important information about the time and circumstances of the creation of the text, the author, and the source of the publication. It also ensures inclusiveness of professional situations considered in the process of training future specialists (Horokhova, 2022).
4. Compilation of a "small" corpus has numerous advantages, in particular, the possibility of independent compilation of professional dictionaries by a team of teachers who are oriented to the future specialists' needs. Large, diverse and representative annotated corpora have been successfully created for languages such as English and Ukrainian. It is, however, important to note that no corpus can effectively serve all purposes (Oleškevičienė et al., 2021). Therefore, it is extremely important for universities to create specialized language corpora adapted to the needs of a particular faculty, department or university. Professionally oriented linguistic databases are created within university projects, for example, a corpus of teachers' speech in classes, a corpus of students' mistakes or a corpus of the studied subject area (Vosiljonov, 2022).

So, the main problem of experimental work is the study of effective methods of building students' language competence. The main focus of the study was the use of corpus analysis as an innovative method to improve English grammar and vocabulary, as well as to improve the level of communication skills. In particular, the research was aimed at determining how the use of corpus analysis can contribute to a better understanding of language structure, differences in the use of words and expressions in context, as well as the quality of students' communication in both Ukrainian and English. This approach made it possible not only to reveal the advantages of corpus analysis in language learning, but also to find out which aspects of language competence can be improved with the help of this method.

The aim of the study is to demonstrate the effectiveness of corpus analysis in the development of language competences of future specialists using the example of the Ukrainian and English languages. This will allow us to show the advantages of corpus analysis in comparison with the traditional method of language learning.

Objectives/questions

1. Comparison of the results of building students' language competencies before and after the application of pedagogical conditions.
2. Conducting a survey among students to assess their receptivity to the use of corpus data in the language learning process.
3. Analysis of changes in students' language skills.

Literature Review

The formation of language competence in pedagogical science is of great importance and continues to attract the researchers' interest f. It is the basis of successful communication when achieving a common goal. The ability to communicate effectively expands opportunities in personal and professional life, opens new horizons for study, work, and communication.

Caratozzolo and Alvarez-Delgado (2021) propose the concept Education 4.0 Framework, which defines an approach to the use of virtual and technological tools to enrich active learning. The authors indicate that the use of such tools helps to increase the efficiency of the educational process and stimulates the active participation of students in their own learning. Such innovations improve awareness among future specialists of the need to develop language skills.

In the later study, Caratozzolo, Rodriguez-Ruiz and Alvarez-Delgado (2022) research the use of natural language processing to assess STEM learning. The authors emphasize the importance of using AI-based tools for automated analysis and assessment of students' educational performance in STEM subjects.

The dissertation of Chua (2020) focuses on a corpus analysis of online discussions to explore the dialogic nature of online communication. The corpus method was used in the work to analyse the structure, means of communication and interaction of the participants of online discussions in order to reveal the features of this form of communication. The research can be useful in the process of developing the methodology of involving corpus methods in the process of language training of future specialists.

The article by Dong and Lu (2020) examine a methodology for developing competence in the use of subject-specific genres through corpus-based genre analysis. Corpus-oriented genre analysis tasks are proposed as an effective method of stimulating students' understanding and use of academic genres within a specific academic subject.

Ferraresi, Aragrande, Barrón-Cedeño, Bernardini and Petrović (2021) explore the competencies and skills required of linguists in the labour market based on an analysis of a corpus of job advertisements. The authors address changes in the demands of linguistics specialists and distinguish the key competencies that are essential for a successful career in this field.

Khaknazarova (2022) studies the role of corpus analysis in learning, focusing on its importance for improving the effectiveness of the learning process. The author describes the methods and approaches to the use of corpora in educational practice and emphasizes the importance of integrating corpus analysis into educational programmes to achieve a higher level of students' language competence.

The article by Melnyk, Tkachenko and Kalinichenko (2023) deals with the intercorpus analysis of lexico-semantic relations in modern languages. Attention is drawn to the importance of using the corpus approach to study the semantic relations between words in different contexts of communication, which contributes to a better understanding of the language system and the use of language for practical purposes. The research aims to help future specialists to improve their own communication skills by means of corpus linguistics.

The article by Mishchenko (2022) studies the corpus-linguistic approach to the study of English grammar, focusing on the specifics of using corpus data for the analysis of grammatical structures and linguistic regularities. The author highlights the importance of such an approach for improving the quality of teaching and language learning by students.

The work of Romaniuk and Trofimchuk (2021) examines the use of the corpus approach in teaching foreign

languages in HEIs. The authors identifies the advantages of using corpus data to improve students' communication skills and ensure their language competence.

Savchuk (2023) examines the importance of terminology in professional speech in the Ukrainian language. The author emphasizes the importance of corpus analysis for the study and systematization of professional terminology, which contributes to effective communication in the professional sphere.

The work of Zhen and Han (2024) examines the issue of representation of national self-identity in mass media. It includes the reflection and expression of identity, values, beliefs and personal characteristics of different social groups or individuals through mass media. According to the researchers, it should include representation of different cultures, ethnic groups, gender identities, social classes, etc. Corpus analysis is an important tool for researching the representation of self-identity in the media, as it allows the analysis of large volumes of texts to identify patterns and trends in the way represented by different social groups and identities.

Understudied issues in the field of corpus linguistics and learning methodology cover various aspects that require more detailed research and attention in the academic community. One such issue is research on the use of corpora to study speech dynamics in online communication. For this purpose, it is necessary to study the changes that occur in the speech behaviour of people in the Internet environment, how these changes affect language structures and ways of expressing thoughts and ideas. Attention should also be paid to the use of corpora for studying the interaction of linguistic means and cultural aspects in communication. This process should include research into the linguistic features that are perceived or detrimental to different cultural groups, and how these features are reflected in the use of linguistic means.

Methodology

Design

The research was conducted in three stages. Figure 1 presents the content of each stage and its duration.

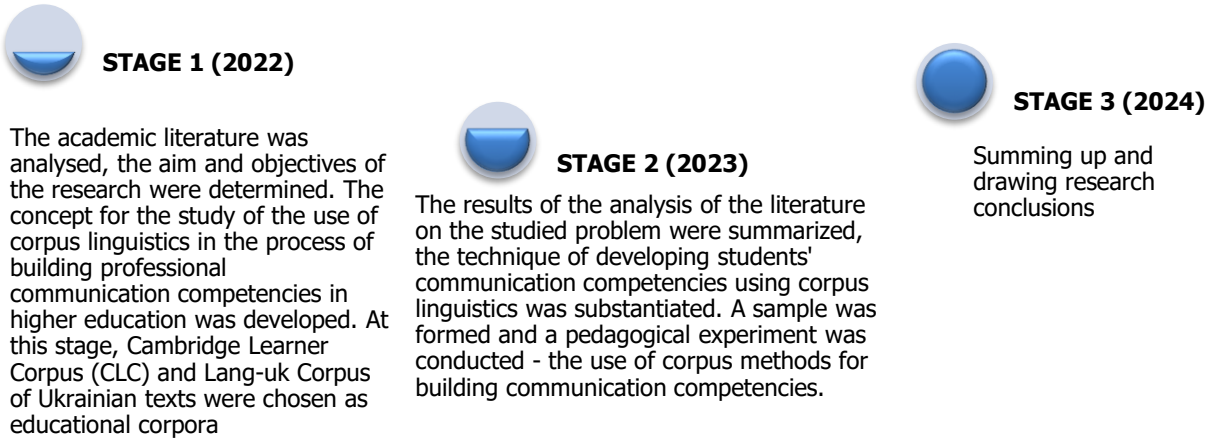

Figure 1. Research stages.
Source: developed by the authors of the research.

So, all stages of research and experimental work are defined. This study can be classified as a cross-sectional study: data are collected at the same time and examined at the time they are collected, without follow-up or further analysis.

Participants

The lottery method was used to form a sample from the general population, which was carried out in several stages. At the first stage, all elements of the general population were marked. At the second stage, the necessary number of cards was randomly drawn from the deck. These cards were put aside and did not participate in further selection. So, irreversible selection was carried out. The study used a nested sample, that is, several courses were selected from the general population, within which the survey was conducted using a continuous method. The study of the effectiveness of corpus linguistics methods in building the communicative competence in Ukrainian and English languages was conducted at Drahomanov National Pedagogical University (Kyiv). The study involved 190 second- and third-year students of all faculties. Such a sample enables covering the required number of respondents to ensure the reliability of the results. The respondents were divided into two groups — control and experimental. Corpus linguistic tools were used in the experimental group for teaching English.

Instruments

The participants took part in the study through a remote questionnaire survey, which was carried out using Google Forms. The corpus manager Wordsmith 5.0 was used to work with the corpus.

Data collection

1. Experimental comparison of learning outcomes of students who use corpus analysis with the CG that uses traditional learning methods. This method involves dividing students into two groups: experimental and control. The EG studies using corpus analysis to learn language and develop language skills, while the CG uses traditional training methods. After completing the training course, both groups are tested to assess their language knowledge and skills. Test results are compared between groups to determine the effectiveness of corpus analysis in comparison with traditional learning methods.
2. The questionnaire survey among students to assess their receptivity to the use of corpus data in the process of language learning and development of language competencies. The method involves the creation of a questionnaire consisting of questions for students' assessment of their level of interest, knowledge, and experience in using corpus data in the educational process. The Cronbach's alpha coefficient for this questionnaire is 0.77, which is an indicator of high reliability for pedagogical research.
3. Monitoring and analysis of changes in students' language skills after the introduction of corpus analysis into the educational process. This method involves regular monitoring and data collection of students' language skills before and after implementing corpus analysis. The obtained data are analysed in order to identify the impact of corpus analysis on the development of language skills.

Analysis of data

1. The chi-squared test was calculated using the formula:

$$x^2 = (f_1 - f_2)^2 / (f_1 + f_2), \qquad (1)$$

where f_1 i f_2 – frequencies of compared samples.

2. The Cronbach's alpha reliability coefficient indicates the internal consistency of the test items. The Cronbach's alpha is calculated using the formula:

$$\frac{N}{N-1}\left(\frac{\sigma_x^2 - \sum_{i=1}^{N}\sigma_{Y_i}^2}{\sigma_x^2}\right), \qquad (2)$$

where σ_x^2 – total test score variance;

$\sigma_{Y_i}^2$ – i element variance.

3. The Mann-Whitney U test is calculated by using the formula:

$$U = (n_1 \times n_2) + (n_x \times (n_x+1)/2) - T_x, \qquad (3)$$

where n_1 – the number of respondents in the EG; n_2 – the number of respondents in the CG; T_x — the larger of the two rank sums; n_x — the number of respondents in the group with a higher rank sum.

Ethical criteria

The research participants were clearly informed about the importance of providing independent and truthful answers to the research questions. The respondents were informed about pedagogical conditions, in particular with the use of corpus linguistics methods for the development of their communicative competence. Ethical requirements regarding integrity, competence, respect for the individual, academic knowledge, and anonymity were observed when working with respondents and conducting questionnaire survey. The respondents' personal data were encrypted to ensure confidentiality. The results of the study are objective and unbiased.

Results

At the beginning and at the end of the study, the success of language competence building was monitored (Table 1).

Table 1.
Comparison of the levels of language competencies of the CG and EG students

Method	Group		Before	After	Difference	χ^2	p-value	U	p-value
Corpus analysis	Experimental (n = 95)	group	40%	70%	30%	27.05	<0.001	4425	<0.001
Traditional methods	Control (n = 95)	group	40%	55%	15%	8.10	0.004	2975	0.002

Source: developed by the authors of the research

Table 1 shows a comparison of the results of building language competencies of students in groups that studied using corpus analysis and traditional methods. The study was conducted for two groups of students: the EG that used corpus analysis and the CG that studied using traditional methods.

In the experimental group, a significant improvement in language skills was observed: the percentage of students who achieved positive results increased from 40% to 70% after the introduction of corpus analysis. The difference between pre- and post-training results was 30%, which is statistically significant ($\chi^2 = 27.05$, $p < 0.001$).

In the CG, there was also an improvement in language skills, but to a lesser extent than in the EG. The difference between pre- and post-training levels was 15%, which is also statistically significant ($\chi^2 = 8.10$, $p = 0.004$).

The next step was to study the students' receptivity to the use of corpus data in the language learning process. The results of the questionnaire survey are presented in Table 2.

Table 2.
Results of the student questionnaire survey at the end of the study

Question	EG (n = 95)	CG (n = 95)	χ^2	p-value	U	p-value	Conclusion
The importance of corpus analysis	> 80%	< 50%	25.4	<0.001	4425	<0.001	The EG students value corpus analysis much more
The impact of corpus analysis on language skills	> 70%	< 40%	18.5	<0.001	4025	<0.001	The EG students are more confident in the benefits of corpus analysis for language
Desired implementation of corpus analysis	> 85%	< 60%	22.1	<0.001	4275	<0.001	The EG students are much more willing to use corpus analysis in learning
Agreeing that corpus analysis can help improve the quality of learning	> 90%	< 70%	31.4	<0.001	4500	<0.001	The EG students believe significantly more in the benefits of corpus analysis for better learning

Source: developed by the authors of the research

Table 2 provides the results of the student questionnaire, conducted at the end of the study, regarding the use of corpus analysis methods of acquired communicative competencies in the Ukrainian and English languages. Significant differences in student responses were found in the comparison between the EG and the CG. In the group that used corpus analysis, the vast majority of students considered this method important, compared to less than half of the students in the CG ($\chi^2 = 25.4$, $p < 0.001$).

The majority of the EG students believed that corpus analysis had a positive effect on their language skills, compared to less than 40% in the CG ($\chi^2 = 18.5$, $p < 0.001$). This indicates greater confidence of the EG students in the benefit of corpus analysis for language development. Besides, the vast majority of the EG students agree that corpus analysis can help to improve the quality of learning, compared to less than 70% in the CG ($\chi^2 = 31.4$, $p < 0.001$). This testifies to the greater faith of the EG students in the benefit of corpus analysis to improve the quality of education. The next step was to compare changes in communication skills of the EG and CG students (Table 3).

Table 3.
Results of comparison of changes in communication skills of the EG and CG students

Skills	Group	Before testing	After testing	Difference	χ^2	p-value	U	p-value	Significance
Language comprehension	EG (n = 95)	40%	70%	30%	27.05	<0.001	4425	<0.001	High
	CG (n = 95)	40%	55%	15%	8.10	0.004	2975	0.002	Medium
Speaking	EG (n = 95)	45%	75%	30%	25.00	<0.001	4300	<0.001	High
	CG (n = 95)	45%	60%	15%	7.25	0.007	3125	0.004	Medium
Use of professional vocabulary	EG (n = 95)	35%	65%	30%	23.00	<0.001	4225	<0.001	High
	CG (n = 95)	35%	50%	15%	6.00	0.014	3000	0.003	Medium

Source: developed by the authors of the research

Table 3 presents the results of a comparison of the change in communication skills between the EG and the CG students before and after testing. The changes in the language comprehension are analysed first. The EG group showed a significant increase in the level of language comprehension after testing, which is confirmed by high significance ($\chi^2 = 27.05$, $p < 0.001$). Compared to the CG, the difference was more noticeable. Similar trends are observed in speaking. The EG group also showed a high level of improvement in speaking after the test, which was confirmed by a high level of significance ($\chi^2 = 25.00$, $p < 0.001$), compared to the CG, where the growth was less noticeable. The EG students showed a significant improvement in the use of professional vocabulary, confirmed by high significance ($\chi^2 = 23.00$, $p < 0.001$), compared to the medium level of growth in the CG.

Compared to the CG, the EG achieved significantly better results through the use of the corpus analysis. The difference in indicators is statistically confirmed by χ^2 values and p-values, which indicate a high statistical significance of the results.

Discussion

According to Drijvers, Grauwin and Trouche (2020), creating a "small" corpus of professional vocabulary has several advantages. According to researchers, teachers can independently adapt the corpus to the needs of future specialists. Although there are large, diverse, and representative annotated corpora for languages such as English and Ukrainian, none of them can effectively meet all needs. Escudero-Mancebo et al. (2022) state that HEIs should develop specialized language corpora adapted to the needs of specific faculties, departments or the university as a whole. Professionally oriented linguistic databases are created under these projects, for example, corpora of classroom discourse, student mistakes, or the language of a certain major.

As Durna and Güneş (2020) state, the creation of a small corpus today is technically possible and justifiable for a university team of specialists thanks to the development of linguistic database management software such as the WordSmith Tools corpus manager. When searching for word combinations or conjugations, semantic prosody indicates the likely use of a word in certain contexts, both positive and negative.

Pérez-Paredes (2020) found that the verb "couse" often accompanies such negative connotation words as cancer, crisis, and delay. This regularity was found in more than 90% of the 250 examined occurrences in the corpus of 1 million word usages and 38 thousand occurrences in the corpus of 120 million word usages.

Furthermore, the Lexical Density Index draws the attention of the future specialist to the essential register features of written and oral speech. For example, according to the latest corpus grammars of the English language, news reports are the most lexically rich, and everyday dialogues are the most lexically sparse, as Zhukovska (2023) and Saddhono et al. (2023) noted. Unlike checked and edited texts of news articles, everyday dialogues between participants take place "live", when the lack of time makes it impossible to edit grammatical means and planning, the correction of what is said takes place in subsequent replicas, and the expressed statement cannot be deleted.

Koneva (2020) and Odden, Marin and Rudolph (2021) emphasized that it is necessary to know the rules of querying the corpus and acquire the basic skills of working with such a database in order to use the possibilities of the corpus for both students and teachers. A consistent consideration of the possibilities of corpus linguistics in a linguistic didactic context allows one to convincingly demonstrate its potential for the development of key foreign language competencies. Working on building the capabilities of the corpus allows both the teacher and the student to effectively use the corpus as a large authentic reference system and develop the skills of an autonomous researcher.

Proposing the idea of developing communicative competence, Newman-Griffis, Sivaraman, Perer, Fosler-Lussier and Hochheiser (2021) and Messina, Jones and Poe (2023) see the need for its development in the training of future specialists, as the use of corpora and corpus technologies is a means of supporting improvement existing methods of communication development. The authors rely on the significant potential of corpus learning.

The theoretical significance of this study is the expanded understanding of the effectiveness of corpus analysis as an innovative method in the development of language competencies. The results of the study reveal important aspects where corpus analysis can have the greatest impact on improving the quality of language learning. They can also be used to theoretically rethink the role of corpus analysis in modern education and linguistics.

The practical significance is that the obtained results can be used to develop improved methods of language learning using corpus analysis. They provide teachers and educational institutions with the grounds for implementing this method in the educational process in order to increase the effectiveness of education and improve students' language skills.

Limitations of this study include several factors that may affect its general adaptability and applicability. First, it is a sample limitation, as the study was conducted on a particular group of students at a particular educational institution. The results may be less representative for other contexts and groups of respondents. The second limitation is related to the duration of the study. The time available for data collection and analysis may be limited, which may affect the completeness and representativeness of the results. The time limitation can also make it difficult to assess the duration of the impact of corpus analysis on the development of students' language competencies.

Conclusions

The obtained results emphasize the importance of using corpus analysis in the educational process for building language competencies. The high efficiency of this method confirms its potential in improving language comprehension, speech development, and the use of professional vocabulary. Such results stimulate further research and implementation of corpus analysis in the educational process to improve the quality of education and training of future specialists. *Findings*. The study confirmed the effectiveness of using corpus analysis in the formation of language competencies of future specialists. The results showed a significant improvement in the level of language comprehension, speaking skills, and use of professional vocabulary in the EG compared to the CG. Students who used corpus analysis showed greater interest and willingness to use this method in education. The active influence of corpus analysis on improving the quality of education and the development of language skills indicates the need to include this method in educational practice. The general trend indicates the potential of corpus analysis as an innovative tool in improving the process of language learning and the development of language competencies. *Applications*. This research can be used in the educational field to improve the methods of language learning and build students' language competencies. The results may be useful for teachers and educational institutions seeking to optimize curricula and incorporate innovative teaching methods such as corpus analysis. *Research prospects.* Further research may focus on determining the impact of corpus analysis on language learning in different contexts, such as teaching English as a second language to speakers of other languages, or studying specific groups of speakers, such as linguistic minorities.

Bibliographic References

Bednarek, M., & Carr, G. (2021). Computer-assisted digital text analysis for journalism and communications research: introducing corpus linguistic techniques that do not require programming. *Media International Australia*, *181*(1), 131-151.

Caratozzolo, P., & Alvarez-Delgado, A. (2021, October). Education 4.0 framework: enriching active learning with virtual and technological tools. In *Proceedings of the International Conference on Education*. *7*(1), 614-628. TIIKM Publishing. https://tiikmpublishing.com/proceedings/index.php/icedu/article/view/862

Caratozzolo, P., Rodriguez-Ruiz, J., & Alvarez-Delgado, A. (2022, March). Natural language processing for learning assessment in STEM. In *2022 IEEE Global Engineering Education Conference (EDUCON)*. IEEE, Tunisia. https://doi.org/10.1109/EDUCON52537.2022.9766717

Cavasso, L., & Taboada, M. (2021). A groovy delve into the world of online news comments: Unpacking with the Appraisal framework. *Journal of Corpora and Discourse Studies*, *4*, 1-38. https://doi.org/10.18573/jcads.61

Chua, S. M. (2020). *The dialogic nature of online discourse: A corpus analysis of online discussions*. United Kingdom: Open University. Retrieved from https://acortar.link/BMfkeY

Dong, J., & Lu, X. (2020). Promoting discipline-specific genre competence with corpus-based genre analysis activities. *English for Specific Purposes*, *58,* 138-154. https://doi.org/10.1016/j.esp.2020.01.005

Drijvers, P., Grauwin, S., & Trouche, L. (2020). When bibliometrics met mathematics education research: the case of instrumental orchestration. *Zdm*, *52*, 1455-1469. https://doi.org/10.1007/s11858-020-01169-3

Durna, F., & Güneş, O. (2020). A Corpus Linguistics Investigation into Phrasal Verbs in British Academic Spoken English. *Journal Of Foreign Language Education and Technology*, *5*(1), 204-223. Retrieved from https://www.ceeol.com/search/article-detail?id=887057

Escudero-Mancebo, D., Corrales-Astorgano, M., Cardeñoso-Payo, V., Aguilar, L., González-Ferreras, C., Martínez-Castilla, P., & Flores-Lucas, V. (2022). PRAUTOCAL corpus: a corpus for the study of Down syndrome prosodic aspects. *Language Resources and Evaluation*, *56*(1), 191-224. Retrieved from https://link.springer.com/article/10.1007/s10579-021-09542-8

Ferraresi, A., Aragrande, G., Barrón-Cedeño, A., Bernardini, S., & Miličević Petrović, M. (2021). *Competences, skills and tasks in today's jobs for linguists: Evidence from a corpus of job advertisements*. Zenodo. https://doi.org/10.5281/zenodo.5030879

Horokhova, T. O. (2022). Corpus technologies in the formation of grammatical competence of future language teachers. Theoretical and didactic philology: assets, problems, development prospects. In *Proceedings of the VII International Scientific and Practical Conference: Collection of Scientific Papers*. Grigory Skovoroda University in Pereyaslav, Pereyaslav. Retrieved from http://surl.li/rzrek

Khaknazarova, L. A. (2022). The role of corpus in teaching. *Journal of Innovations in Scientific and Educational Research*, *5*(4), 98-101. Retrieved from https://bestpublication.org/index.php/jaj/article/view/2598

Koneva, M. Z. (2020). Linguistic competence as an important component of foreign language communication of future foreign language teachers. *Scientific Notes*, *31*(70), 28-33. https://doi.org/10.32838/2663-6069/2020.1-3/05

Lefter, I., Baird, A., Stappen, L., & Schuller, B. W. (2022). A cross-corpus speech-based analysis of escalating negative interactions. *Frontiers in Computer Science*, *4*. https://doi.org/10.3389/fcomp.2022.749804

Lin, P., & Adolphs, S. (2023). *Corpus linguistics. In The Routledge Handbook of Applied Linguistics*. London: Routledge. Retrieved from https://acortar.link/aSn2Mn

Ma, Q., Tang, J., & Lin, S. (2022). The development of corpus-based language pedagogy for TESOL teachers: A two-step training approach facilitated by online collaboration. *Computer Assisted Language Learning*, *35*(9), 2731-2760. https://doi.org/10.1080/09588221.2021.1895225

Makhachashvili, R., Bakhtina, A., & Semenist, I. (2021). La función de la inteligencia emocional en la educación digital como el sustrato de la validez de la vida on-line. *Amazonia Investiga*, *10*(45), 20-30. https://doi.org/10.34069/AI/2021.45.09.2

Matsera, O., Tkachuk, T., & Paslavska, I. (2023). Translation as a tool for teaching English: the role of language corpora and translation tools. *Herald of Science and Education*, *10*(16). https://doi.org/10.52058/2786-6165-2023-10(16)-192-202

Melnyk, I. Ye., Tkachenko, L. M., & Kalinichenko, T. M. (2023). Intercorpus analysis of lexical-semantic relations in modern languages. *Transcarpathian Philological Studies*, *30*, 244-249. https://doi.org/10.32782/tps2663-4880/2023.30.45

Messina, C. M., Jones, C. E., & Poe, M. (2023). Prompting reflection: Utilizing corpus linguistic approaches in assessing reflective writing locally. *Written Communication*, *4*0(2), 620-650. https://journals.sagepub.com/doi/abs/10.1177/07410883221149425

Mishchenko, O. V. (2022). *Corpus-linguistic approach to the study of English grammar: special*. Mykolaiv: CHNU named after Petra Mohyly. Retrieved from https://krs.chmnu.edu.ua/jspui/handle/123456789/2181

Newman-Griffis, D., Sivaraman, V., Perer, A., Fosler-Lussier, E., & Hochheiser, H. (2021). TextEssence: A Tool for Interactive Analysis of Semantic Shifts Between Corpora. In *Proceedings of the conference. Association for Computational Linguistics. North American Chapter. Meeting* (Vol. 2021, p. 106). NIH Public Access. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8212692/

Odden, T. O. B., Marin, A., & Rudolph, J. L. (2021). How has Science Education changed over the last 100 years? An analysis using natural language processing. *Science Education*, *105*(4), 653-680. https://doi.org/10.1002/sce.21623

Oleškevičienė, G. V., Mockienė, L., & Stojković, N. (2021). *Corpus Analysis for Language Studies at The University Level*. Cambridge: Cambridge Scholars Publishing.

Pérez-Paredes, P. (2020). *Corpus linguistics for education: A guide for research*. London: Routledge. https://doi.org/10.4324/9780429243615

Praat. (n.d.). *Praat: Doing phonetics by computer*. Retrieved from http://www.praat.org/

Romaniuk, S., & Trofimchuk, V. (2021). Corpus approach in teaching foreign languages in higher education institutions. *Innovation in Education*, *1*(13), 192-199. https://doi.org/10.35619/iiu.v1i13.332

Saddhono, K., Rohmadi, M., Setiawan, B., Suhita, R., Rakhmawati, A., Hastuti, S., & Islahuddin, I. (2023). Corpus linguistics use in vocabulary teaching principle and technique application: A study of Indonesian language for foreign speakers. *International Journal of Society, Culture & Language, 11*(1), 231-245. Retrieved from https://www.ijscl.com/article_697566.html

Savchuk, N. (2023). Terminology as an important component of professional speech in the Ukrainian language. *Science and Perspectives*, *7*(26). https://doi.org/10.52058/2695-1592-2023-7(26)-113-126

Vosiljonov, A. (2022). Basic theoretical principles of corpus linguistics. *Academicia Globe*, *3*(02), 173-175.

Zhen, H., & Han, B. (2024). Original Research Article The role of iconography in shaping Chinese national identity: Analyzing its representation in visual media and political propaganda. *Journal of Autonomous Intelligence*, *7*(3). https://doi.org/10.32629/jai.v7i3.1516

Zhukovska, V. V. (2023). Corpus technologies and genre-analytical approach in teaching English for academic purposes. *Discourse of professional and creative communication: linguistic, cultural, cognitive, translation and methodical aspects*, 126-128. Retrieved from http://eprints.zu.edu.ua/38987/1/Zhukovska.pdf

APPENDIX A

Questionnaire for assessing the level of students' interest, knowledge, and experience in using corpus data in the educational process

1. How do you rate your level of knowledge about corpus analysis?
- Very low
- Low
- Medium
- High
- Very high

2. Have you had experience using corpus data for educational purposes before?
- Yes
- No

3. Do you consider corpus analysis an important tool in language learning?
- Yes
- No

4. Do you have skills in working with corpus tools (e.g., search interfaces, filters, etc.)?
- Yes
- No

5. To what extent do you consider yourself interested in studying language and its structure using corpus analysis?
- Very interested
- Interested
- Neutral
- Not very interested
- Not interested

6. Do you have experience using Internet resources with corpus data (for example, websites with corpus texts)?
- Yes
- No

7. Do you know how to effectively use corpus data to learn language and improve language skills?
- Yes
- No

8. Do you think corpus analysis can help improve your language skills?
- Yes
- No

9. Do you have experience using corpus data analysis software?
- Yes
- No

10. How often do you use corpus data in your teaching or research?

- Every day
- Several times a week
- Several times a month
- Rarely
- Never

11. What specific aspects of language would you like to study using corpus analysis? (e.g. vocabulary, syntax, stylistics, etc.)

12. How do you rate the availability of corpus analysis resources for your language learning?
- Freely available
- Available
- Neutral
- Not available
- Not available at all

13. Have you used corpus data in your previous learning or research?
- Yes
- No

14. How do you rate the difficulty of corpus analysis for your level of knowledge?
- Very difficult
- Difficult
- Medium
- Easy
- Very easy

15. Are you confident in your ability to analyse and interpret corpus data?
- Yes
- No

16. How often do you look for additional information or resources on corpus analysis to support your learning?
- Every day
- Several times a week
- Several times a month
- Rarely
- Never

17. How desirable do you consider the introduction of corpus analysis into the educational process of your educational institution?
- Highly desirable
- Preferable
- Neutral
- Less desirable
- Not desirable

18. How do you rate your readiness to use corpus analysis in learning and research?
- Ready
- Partially ready
- Not ready

19. What advantages do you see in using corpus analysis compared to traditional language teaching methods?
20. What disadvantages do you see in the use of corpus analysis in language learning?
21. Would you like additional training in corpus analysis to improve your skills?
22. How do you rate the level of support and availability of corpus resources in your educational institution?
23. Do you agree that corpus analysis can help to improve the quality of your teaching and the development of language competencies?
24. Are you ready to accept an additional task to study corpus analysis during your year of study?
25. Would you like to be able to share your own findings and conclusions from corpus analysis with other students or researchers?

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.12
Cómo citar:
Konstantynova, T., Dundiuk, V., Hurievska, O., Zhulkanych, B., & Shevchuk, O. (2024). Gamification of the educational process in distance education. *Revista Eduweb*, 18(2), 167-182. https://doi.org/10.46502/issn.1856-7576/2024.18.02.12

Gamification of the educational process in distance education

Gamificación del proceso educativo en educación a distancia

Tetiana Konstantynova
https://orcid.org/0000-0002-6374-343X
Department of Humanities, Danube Institute of National University "Odessa Maritime Academy", Izmail, Ukraine.
Vira Dundiuk
https://orcid.org/0009-0004-5580-5102
School principal of the Rivne Lyceum "Center of Hope" named after Nadiia Marynovych, Rivne, Ukraine.
Oleksandra Hurievska
https://orcid.org/0000-0002-2999-6409
Department of Higher Mathematics and Physics of Central Ukrainian National Technical University, Kropyvnytskyi, Ukraine.
Borys Zhulkanych
https://orcid.org/0009-0003-4008-1028
Department of Physical Geography and Rational Nature Management, State Higher Educational Institution "Uzhhorod National University", Uzhgorod, Ukraine.
Oleksandra Shevchuk
https://orcid.org/0000-0002-2102-7363
Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine, Khmelnytskyi, Ukraine.

Recibido: 12/04/24
Aceptado: 01/06/24

Abstract

The aim is to study and analyse the potential and efficiency of gamification in the educational process, in particular within the context of distance education. During the course of the study, the testing method, the method of expert evaluation, and the method of determination of the efficiency of the influence of gamification on educational process efficiency were used. Statistical methods such as standard deviation and a chi-squared test were used for processing the received results. Test reliability was verified using Cronbach's alpha. The results demonstrate that gamification improves educational material mastering, develops creative skills, and enhances the quality of joint work in a virtual environment. Students get more motivated to participate in the educational process due to gamification. The average number of correctly solved tasks for the experimental and control groups was determined to evaluate study results in quantity. Thus, experiment results showed that students of the experimental group correctly performed final tests for 2,66 tasks more than those of the control group, and in general, students of the experimental group correctly performed 1,76 tasks. In distance education, gamification becomes a perspective and effective approach, oriented towards the enhancement of the academic achievements and motivation of students.

Keywords: educational technologies, gaming technologies, higher education, innovations, motivation.

Resumen

El objetivo es estudiar y analizar el potencial y la eficiencia de la gamificación en el proceso educativo, en particular en el contexto de la educación a distancia. Durante el estudio se utilizaron el método de prueba, el método de evaluación de expertos y el método de determinación de la eficacia de la influencia de la gamificación en la eficiencia del proceso educativo. Para procesar los resultados recibidos se utilizaron métodos estadísticos como la desviación estándar y la prueba de chi-cuadrado. La confiabilidad de la prueba se verificó mediante el alfa de Cronbach. Los estudiantes se motivan más para participar en el proceso educativo gracias a la gamificación. Se determinó el número promedio de tareas resueltas correctamente para los grupos experimental y de control para evaluar los resultados del estudio en cantidad. Así, los resultados del experimento mostraron que los estudiantes del grupo experimental realizaron correctamente las pruebas finales en 2,66 tareas más que los del grupo de control y, en general, los estudiantes del grupo experimental realizaron correctamente 1,76 tareas. En la educación a distancia, la gamificación se convierte en una perspectiva y enfoque eficaz, orientado a la potenciación de los logros académicos y la motivación de los estudiantes.

Palabras clave: educación superior, innovaciones, tecnologías de juego, tecnologías educativas, motivación.

Introduction

Relevance

The development of the information society makes the issue of the efficiency of digital gaming technologies relevant in the conditions of distance education. The use of game methods in the educational process has become one of the important spheres of research in recent years (Mohammed & Hirai, 2021).

The notion of 'gamification' was introduced into scientific discourse by a group of scientists in 2011. It provides for the use of approaches that are characteristic of the game in non-gaming processes. According to this conception, it is possible to state that gamification is a new discipline with a large potential. Due to these, studies of the essence and distinctive features of gamification, which are studied by different concepts of the use of game elements in the process of education modernisation, remain relevant (Lampropoulos, 2024).

Gamification is the process of using game elements and mechanics in non-game contexts to increase the engagement, motivation and effectiveness of participants Vasylenko and Vasenko (2023). In distance education, gamification is used to stimulate students' activity and interest in the educational process. Key elements of gamification include:

1. Implementation of a system of points that students can earn for completing certain tasks or achieving certain goals.
2. Dividing the learning process into different levels that students can gradually go through while getting a sense of progress.
3. Using symbolic awards to recognise achievements and motivate further development.
4. Creation of leaderboards that allow students to see their achievements compared to other course participants.
5. Implementation of various tasks that stimulate students to actively participate and independently search for solutions Chizhikova (2023).

There are different approaches to gamification in distance education. One of them is the use of full-fledged game environments, where learning occurs through the game process. Another approach is to integrate individual game elements into traditional educational platforms. Despite the numerous advantages of gamification, there are also certain limitations and possible negative consequences of its use. One of the

main challenges is the risk of students focusing too much on collecting points and badges, which can distract them from the main goal of learning. Inadequate implementation of gamification elements can lead to loss of motivation if tasks become too difficult or, on the contrary, too easy. Ensuring equal access to resources and opportunities for all students is also an important aspect to avoid creating inequalities in the learning environment. This study will use the pedagogical conditions for the introduction of gamification elements into the educational process.

Modern studies underline both the positive and negative consequences of gaming technology application in education. The consequences of gaming technology usage are understudied. The issue of the efficiency of gaming technologies in education and the educational process remains relevant. Due to this, the role of gaming technologies in the educational process, based on the provisions of the systemic nature of implementation of the distance form of education, should be considered on the theoretical level (Kryshtanovych et al., 2022).

It is possible to state the solution to numerous pedagogical problems and tasks lies in the sphere of informational, and digital educational technologies and the psychological and pedagogical conditions of their usage (Nonthamand & Suaklay, 2021). One of the relevant directions of the use of informational, digital educational technologies in the educational process is the concept of gamification. Pedagogical conditions of gamification implementation into the educational process under conditions of distance education contain the following provisions:

- use of gaming approaches for non-game processes to enhance participants' engagement in the solution of given tasks;
- adaptation and wide use of video games in everyday life;
- use of game elements and techniques of game design in a non-game context.
- introduction of gamification elements in the educational process provides for the use of various devices aimed at:
- attention attraction and retention;
- differentiation of long-term unclear and short-term clear objectives;
- development and introduction of the system of victories and relevant risks;
- establishing compliance between abilities and difficulty of tasks, which should be solved;
- modelling of game situations within the process of which knowledge, skills, and abilities in a certain sphere should be formed (Ministry of Education and Science of Ukraine, 2023).

Individual and team games especially motivate students to achieve results. Two different approaches can be defined within the process of gamification of online education and distance education. The first lies in gamification elements introduction into the system of education management, while the second - in parallel gamification of the system of education management and education system itself (Mehed, 2020).

One of the key issues arising within the context of distance education is motivating students and ensuring their effective studying. Due to this, the use of gamification is an innovative approach to the improvement of the distance educational process. Motivation is an important component of academic achievements, and it may be especially fragile in distance education (Christopoulos & Mystakidis, 2023). Students can experience a lack of motivation for active participation in education, as well as a lack of interaction with fellow students and teachers. Gamification offers a new method of solving this issue, using elements of the game to cause curiosity and strive to achieve educational goals (Yaroshenko et al., 2022).

It is important to determine the influence of gamification on education efficiency, particularly within the context of distant educational environments. Can gamification enhance the level of students' motivation? What particular elements of gamification contribute to the enhancement of educational outcomes? Are there limitations or possible negative consequences of the use of gamification in distance education?

These questions become the basis of this study, directed at the determination of the role of gamification in the improvement of the quality and effectiveness of distance education. Understanding the influence of gamification on motivation and the educational process will help to develop effective strategies for this approach implementation into modern educational practice (Pereyaslavska & Smagina, 2019).

The study mainly focuses on the influence of gamification on the motivation and effectiveness of students within the context of distance education. Concentrating on solving tasks related to remote educational environments, it is necessary to analyse the level to which game elements can stimulate active participation and improve the quality of education. Study results will provide valuable information for gamification introduction into distance education, enhancing the efficiency of the educational form.

Purpose

The study aims to study and analyse the possibilities and efficiency of gamification use in the educational process, in particular within the context of lecturing using distance technologies.

Tasks /questions

1. To study the influence of gamification on the level of motivation formation.
2. To study peculiarities of the formation of academic achievements of students of control and experimental groups.
3. To determine statistically significant differences in academic achievements.

Literature Review

In their work Kryshtanovych, Kryshtanovych, Stepanenko, Brodiuk and Fast (2021) consider the methodological approach to determination of the main factors of creative thinking development in students of creative professions. The study determines key aspects, influencing creativity development in the educational process. In particular, the article focuses on the determination and analysis of the factors, which contribute to the formation of creative thinking in students, which select creative spheres. The authors use a systemic approach and empiric methods to study the influence of different factors such as education, environment, and studying style on creative potential development. This article is an important contribution to understanding the process of creative thinking formation in students of creative professions.

The article written by a group of authors, Samodumska, Zarishniak, Tarasenko, Buchatska, Budas and Tregubenko (2022), studies gamification use in non-formal adult education. The authors analysed the designation and influence of gamification on the educational process of adults in detail. The work aims to determine effective practices of gamification within non-formal education and define their potential for improving the motivation and effectiveness of education. The use of gamification in non-formal adult education is a relevant theme, and this article contributes to understanding the influence of gamification strategies on educational processes within this context.

The study by Sadovets, Martynyuk, Orlovska, Lysak, Korol and Zembytska (2022) reveals the issue of gamification use in the non-formal educational environment of higher education within the context of digital transformation of education. The authors studied the influence of gamification on educational processes under conditions of non-formal education, in particular outlining aspects of the digital transformation of education. The authors use study methods to determine how gamification can enhance the efficiency of informal education in higher educational institutions. The study makes a valuable contribution to understanding the role of gamification in non-formal educational space and underlines its significance within the context of the modern digital paradigm.

The use of gamification and machine-based learning for attention retention and education improvement in class environments is considered in Duggal, Gupta and Singh (2021). The authors provide a detailed review of the gamification method, in which they use methods of at-home machine learning for the creation of effective learning strategies. The article analyses the influence of these approaches on in-class interaction and students' abilities development. The article differs by its uniqueness, as it combines gamification with the use of innovative methods of machine learning to achieve more efficient results in education.

The study by Alahmari et al. (2023) is a systematic review of modern trends and gaps in empirical studies of gamification in education with a focus on science. A systematised approach was used for literature evaluation and analysis to detect popular trends and understudied areas in gamification studies in science education. This approach allows the authors to identify the advantages and disadvantages of previous studies and determine the perspectives of further scientific studies in this area. The work makes a valuable contribution to understanding the current state and directions of further studies in the area of gamification in science education.

In their study, Montiel-Ruiz, Sánchez-Vera and Solano-Fernández (2023) reveal the use of social networks and gamification in physical education with the use of a particular case. They present a detailed analysis of the influence of these methods on students studying and interactions in physical education. This study aims to reveal the efficiency of the use of social networks and gamification for engaging students and improving their physical development. Using the case study, they ensure the use of particular examples of successful implementation of these strategies in physical education.

In her work, Kurbonova (2023) studies the principles of gamification of educational processes. The author investigates multifaceted aspects of gaming elements' integration into the educational environment. The importance of gamification for the enhancement of interest and motivation of students is underlined in the article. The author emphasises the potential of gamification for academic honesty enhancement and promoting studying during the whole life. Considering the principles in the basis of this approach, the article provides valuable information on the theoretical principles of gamification in education.

Chizhikova (2023) focuses on the study of the interaction between gamification of the educational process and the development of educational autonomy of students in higher educational institutions. The author analyses how gamification introduction contributes to the activation of self-studying and the development of students' initiative. The work offers a new opinion on the role of gamification in the upbringing of students as independent individual participants in the educational process.

Vasylenko and Vasenko (2023) study the influence of gamification in the educational process of the higher educational institution. They consider technological, economic, and technical aspects of gamification in information society. The study uses materials from the International Scientific Internet Conference and aims to analyse the influence of gamification on the formation of educational strategies under conditions of society modernisation and covers key aspects of gamification in higher educational institutions.

Trischuk, Figol and Volyk (2020) and Diachenko, Kalishchuk, Zhylin, Kyyko and Volkova (2022) study the efficiency of gamification as the means of attention attraction in electronic media. The authors emphasise the necessity of gamification for enhancing interaction and participation of the audience in electronic media platforms. The study indicates the significant influence of gamification on consumers' attention attraction and the creation of effective strategies for the media industry. The use of gamification in electronic media is studied from the perspective of not only attention enhancement but also improvement of interaction and satisfaction of the users.

Many issues in the area of gamification in education remain understudied and require the attention of researchers. One of the aspects lies in the detailed consideration of the influence of gamification on the

socio-emotional development of students, including the formation of communication and interpersonal skills. The influence of gamification on the education of individuals with special educational needs is not studied enough. The study on this issue may be useful for the development of inclusive pedagogical approaches, directed and ensuring access to educational possibilities for all. It is necessary to study the long-term influence of gamification on students' development and education, as well as to determine the approaches that can influence further career and professional development. Table 1 presents a summary of the studies.

Table 1.
Generalisation of research

The authors	Year	The main topic	Methods	Main conclusions	Limitation
Kryshtanovych, Kryshtanovych, Stepanenko, Brodiuk, Fast	2021	Development of creative thinking among students of creative professions	Systematic approach, empirical methods	Determination of factors affecting the development of creative thinking (education, environment, learning style)	Focus on short-term effects, lack of long-term analysis
Samodumska, Zarishniak, Tarasenko, Buchatska, Budas, Tregubenko	2022	The use of gamification in non-formal education of adults	Analysis of gamification practices	Increasing the motivation and effectiveness of adult learning	Insufficient attention to social-emotional development
Sadovets, Martynyuk, Orlovska, Lysak, Korol, Zembytska	2022	Gamification in conditions of digital transformation of education	Research on the impact of gamification	Increasing the effectiveness of education in higher educational institutions	Lack of consideration of cultural and socio-economic contexts
Duggal, Gupta, Singh	2021	Gamification and machine learning to improve education	Overview of methods, machine learning	Increasing attention retention and educational results	Focusing on technological aspects, little consideration of the human factor
Alahmari et al.	2023	Review of literature on gamification in education	A systematic literature review	Identifying trends and gaps in gamification research	Review work does not contain new empirical data
Montiel-Ruiz, Sánchez-Vera, Solano-Fernández	2023	Social networks and gamification in physical education	Case analysis	Improvement of student interaction, improvement of physical development	Focus on one case, limited generality
Kurbonova	2023	Principles of gamification in education	Theoretical study	Increasing student interest and motivation, promoting academic integrity	Theoretical nature, lack of empirical data
Chizhikova	2023	Gamification and educational autonomy of students	Analysis of the influence of gamification	Promotion of independence and initiative of students	Insufficient empirical justification
Vasylenko, Vasenko	2023	The impact of gamification in higher education	Materials of the conference	Analysis of technological, economic and	Review nature, insufficient empirical support

				technical aspects of gamification	
Trischuk, Volyk	Figol, 2020	Effectiveness of gamification in electronic media	User attention research	Increasing interaction and audience participation	Focus on media, limited applicability to education

Source: Developed by the authors

Previous research has made a significant contribution to the understanding of various aspects of gamification in education and the development of creative thinking. They emphasise the importance of a systematic approach and empirical methods for the analysis of factors affecting the educational process. However, there are several limitations that require further investigation. In particular, most works focus on short-term effects and do not take into account the long-term impact of gamification on the development of students and their career prospects. Also, insufficient attention is paid to the socio-emotional development of students, especially the impact of gamification on communication and interpersonal skills. In addition, few studies focus on the inclusive aspects of gamification, which limits the possibility of developing inclusive pedagogical approaches.

The analysis of the literature indicates a growing interest in gamification in education, particularly in higher and non-formal education. There is a trend toward integrating gamification with other technologies, such as machine learning and social media, to improve educational outcomes. Many studies focus on increasing student motivation and the effectiveness of the learning process through gamification. However, there are important gaps that require further research. In particular, there is a lack of long-term studies evaluating the impact of gamification on the development of students and their professional trajectories.

The current study makes a unique contribution to the field of gamification in education by focusing on the analysis of its impact on the socio-emotional development of students. It considers how gamification can contribute to the development of communication and interpersonal skills, which is important for the formation of complex competencies in modern conditions. This study also highlights the importance of inclusive approaches by examining the impact of gamification on students with special educational needs. Thus, it fills a significant gap in existing research and offers new perspectives for further scientific developments.

Methodology

Research design

The effectiveness of this study is determined and evaluated by both quantitative and qualitative parameters. They are measured during the process of observation, and further they are compared and analysed. Further interpretation of the received data is conducted. The study was conducted in several stages, presented in Table 2.

Table 2.
The stages of the study of gamification of the formation of the preparedness of students of higher educational institutions for self-realisation

No.	Stage	Period of conduction	Content of the stage of the study
1.	Ascertaining	February, 2023	Determination of the aim and tasks of the study. Formation of control and experimental groups from the number of students. Selection of the instruments and methods of the study.
2.	Forming	March, 2023 - December, 2023	Realisation of pedagogical conditions with the use of gamification (for the experimental group) and traditional methods of teaching (for the control group). Study of the main components of motivation and academic achievements of students *Statistical processing of received results* Formation of study conclusions on the basis of received results
3.	Concluding	January, 2024	Study procedure. Summarising the results.

Source: Developed by the authors

Participants

The experiment was conducted in the Department of Humanities, Danube Institute of National University 'Odesa Maritime Academy' and Rivne Lyceum Center of Hope. Experimental groups involved 100 students, and control groups – also 100 students, at the age of 18-20 years. The study of self-realisation of students under the influence of pedagogical conditions of experimental educational technology gamification was conducted during one year. 2nd-4th-year students of all specialities participated in the experimental works. Such sampling enabled the conduction of a reliable study of the influence of gamification on the formation of students' preparedness for self-realisation. A group of experts in the amount of 20 persons from the lecturers of the Department of Humanities and Rivne Lyceum Center of Hope were engaged.

Instruments

Google Forms were used for the survey. Data entry and processing were made with the use of 'Microsoft Excel' and 'SPSS Statistics 19.0' software. All the data were presented in absolute (the number of response choices) and relative (% of the number of respondents) values.

Data collection

1. *The Mehrabian Achievement Scales* adapted to the task of the study were used to determine the level of formation of students' motivation to professional training as part of professional identity (http://personal.in.ua/article.php?ida=470). For this test, Crohnbach's alpha amounts to 0,78 which is quite a high reliability parameter for pedagogical studies.
2. *Determination of the efficiency of the influence of gamification on educational process efficiency.* As educational processes are the evaluation acts, they should be studied and evaluated in detail with the use of criteria. A criterion is a feature based on which something is evaluated, determined, or classified. Being not a grade, the criterion serves as an efficiency metre. A criterion can be used as the basis for evaluation of the effectiveness of the educational process, particularly the results of its realisation. The term 'efficiency of education' belongs to the ground of relative non-measurable parameters, which describe the relation between the features of the quality of education (effectiveness) and the time needed to achieve a certain level of preparation.
3. *Method of expert evaluations.* Verification of the results of the received data was conducted using this method. It also enabled the conduction of a detailed analysis of the efficiency of the use of gamification devices in the educational process.

The use of Mehrabian's achievement scales provides an accurate measure of student motivation, but may be subjective due to self-reporting. Evaluating the effectiveness of gamification in the educational process allows for a comprehensive analysis, but it is difficult to measure intangible parameters. The method of expert evaluations provides verification of results and in-depth analysis, but can be subjective and depend on the chosen expert. The combination of these methods makes it possible to obtain more objective results of research on gamification in education.

Limitations of using Mehrabyan's achievement scales may include the subjectivity of student responses and possible changes in test content during its adaptation. Evaluation of the effectiveness of gamification in education is limited by the complexity of measuring intangible parameters. The method of expert evaluations can be subjective and depends on the chosen expert, which can affect the objectivity of the results.

Analysis of data

1. To determine the standard deviation (C) for each group, the following formula was used:

$$S = \sqrt{\frac{\sum(X_i - \overline{X})^2}{N-1}}; \qquad (1)$$

where X_i - the value of each level of formation of the value-motivational component, $\underline{X}$ – the average value of the levels of formation of value-motivational components, and N - is the number of observations (in this situation, the number of students in each group).

2. Criterion χ^2 is calculated according to the formula:

$$\chi^2 = N \cdot [\sum_{j=1}^{m} \left(\sum_{i=1}^{n} \frac{x_{ij}^2}{Q_i \cdot R_j} \right) - 1], \qquad (2)$$

where N - is the total number of students, participating in the forming stage of the pedagogical experiment, m - the number of possible values of the first feature, n - the number of possible values of the second feature;
x_{ij} - number of combinations of i value of the first feature with j value of the second feature;
Qi - the total number of observations of i value of the first feature;
Ri - the total number of observations of j value of the second feature.

Critical values, as a rule, are presented on different significance levels. Error probability, related to deviation or refutation of the null hypothesis, is called significance level. Thus, the probability of significance of differences regardless of their accidental nature is called the significance level. Significance level (marked as α), with the value 0,05 is used in pedagogical studies, denoting that error probability cannot exceed 5%. The study uses this significance level.

3. The reliability of the selected methods was checked with Cronbach's alpha. It characterises the internal consistency of test tasks and is calculated according to the formula:

$$\frac{N}{N-1}\left(\frac{\sigma_x^2 - \sum_{i=1}^{N} \sigma_{Y_i}^2}{\sigma_x^2}\right), \qquad (3)$$

where σ_x^2 – dispersion of the grade of the whole test;
$\sigma_{Y_i}^2$ – element i dispersion.

Ethical criteria

Principles of academic honesty and respect for an individual lie in the basis of this study. The study has an exclusively scientific nature and excludes discreditation. The main criteria for the selection of the instruments and methods were checked for credibility, reliability, verification of the received results, and professionalism. They gave informed consent to their personal data processing and publication of study results. Each participant of the study was conferred a code, to assure that it is unbiased and objective.

Results

The results of the conducted study show that the motivational tendency - strive to for success prevailed in most participants, while the motive of failure prevention prevailed in a minor part (Table 3). This was found using cumulative grades, received according to standard methodology.

Table 3.
The level of formation of motivation to professional training of students of experimental and control groups on the ascertaining stage (in percentage)

Groups/levels	Strive to success, %	Failure prevention, %
Experimental	57	43
Control	58	42

Source: Developed by the authors on the basis of the study results

It is necessary to note that parameter values are very similar in the table 4. This allows at the ascertaining stage both in the experimental and control groups to ascertain the homogeneity of the initial conditions, which guarantees the validity and transparency of the experiment.

Table 4.
The level of formation of the value-motivational component in experimental and control groups on the ascertaining stage (in percentage)

Groups/levels	High, %	Average, %	Low, %
Experimental	67	33	Not found
Control	60	40	

Source: Developed by the authors on the basis of the study results

The standard deviation (C) for each group was defined to ensure the objectivity and reliability of the received results. Such deviation indicates the level of deviation of each parameter from the average value. Determination of standard deviation is important for further results interpretation and determination of the level of data variability. In this study, (C) indicates the level of value distribution in relation to the average value. In the case of the experimental group, it is equal to 20,083, which indicates the large variability in results. On the other side, the (C) value for the control group amounts to 14,142, which indicates lower variability in the value-motivational component of the professional identity.

Table 3 demonstrates that students did not have low values of the level of formation of value-motivational components of professional identity. This means that students in both groups were equally interested in education, and only the experiment can demonstrate the efficiency of educational programs.

The ordinal scale was developed to analyse the results of the measurement of the knowledge level. For this, three levels of knowledge were determined (L=3): satisfactory (the number of solved tasks is less or

equal to 12), good (the number of solver tasks is more than 12, but less or equal to 15), and high (the number of solved tasks is significantly higher than 15). After this, the results were aggregated into selected frequency levels. Data in Fig. 1 demonstrate, that before the beginning of the experiment, the control group had 34% of participants, who received a grade, which corresponded to a certain range: m_1=34, which means that 34% of students of the control group before the beginning of the experiment demonstrated a sufficient level of this competence formation), m_2 =56, m_3 =8. Fig. 1 demonstrates the division of participants into experimental and control groups according to their knowledge level.

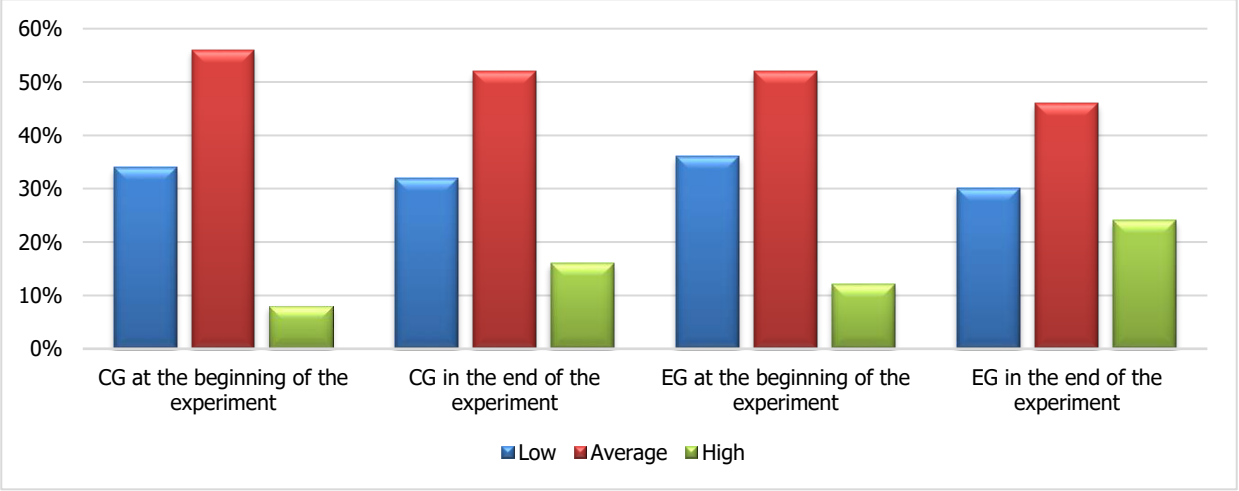

Figure 1. Results of measurement of the level of knowledge in control and experimental groups before and after the experiment.
Source: Developed by the authors on the basis of the study results.

According to the diagram, the low level of knowledge has reduced in the experimental group after the introduction of new conditions. On the other side, the high level has increased. The parameters of the control group have significantly changed. After the end of the experiment, the average number of correctly solved tasks for the experimental and control groups was determined to evaluate study results in quantity. Thus, experiment results showed that students of the experimental group correctly performed final tests for 2,66 more than those of the control group, and in general, the number of correctly performed tasks in the experimental group was lower for 1,76.

The table of critical values shows a critical value χ^2 for the significance level of 0,05, and the value L=3 is equal to 7,82. Calculated L=3, thus, there were three levels of knowledge: satisfactory, good, and excellent. Thus, L–1 = 2. From the table of critical values of criterion 2 for the significance level of α=0,05, we receive L–1=2: χ2 0,05 = 5,99. Calculation results showed that all empirical values of criterion 2 are lower than the critical value except for the result χ^2_{EMP} = 6,10 for comparison of experimental and control groups after the end of the experiment. Table 5 presents these values.

Table 5.
Empirical values of χ^2 criterion

	CG before the beginning of the experiment	EG before the beginning of the experiment	CG after the end of the experiment	EG after the end of the experiment
CG before the beginning of the experiment	0	0,4	0,13	4,64
EG before the beginning of the experiment	0,4	0	0,04	5,99
CG after the end of the experiment	0,13	0,04	0	6,10
EG after the end of the experiment	4,64	5,99	6,10	0

Source: Developed by the authors on the basis of the study results.

Based on the data presented in Table 4, it is possible to conclude that the characteristics of all compared samples, except for control and experimental groups after the end of the experiment, are equal to the significance level of 0,05. As $\chi^2_{ЕМП} = 6,10 > 5,99 = \chi^2$ 0,05, 'the reliability of differences of characteristics of experimental and control groups after the end of the experiment is 95%'. Thus, the states of the control and experimental groups are similar at the beginning of the experiment and differ in the end.

Ensuring the validity of the study is an important part, besides the use of the above-presented mathematical methods for the analysis of the study results. We understand validity as the correctness and appropriateness of the methods and results of the study for use in particular conditions. Content, constructive, and criteria validity are different. Content validity defines the level to which the content of the task technique corresponds to real activity, in which they are measured. This means that students see a clear relation between the content of the procedure of evaluation of features peculiarities and the formed plan of discipline studying, provided by the detailed commentaries, which are based on psychological diagnostics techniques.

Discussion

According to Korolko and Pereghinets (2023), and Sagan (2023), engagement in the process and enhancement of internal motivation of students is the basic purpose of gamification, that is achieved due to natural satisfaction and absence of forcing. Therefore, using game mechanisms, gaming elements and the formation of gaming thinking, it is possible to achieve engagement and create educational environments, forming new experiences and new methods of problem-solving.

In general, gamification creates and maintains interest, and increases loyalty, efficiency, and resultativeness of the users and/or consumers. But Murillo-Zamorano, López-Sánchez, López-Rey and Bueno-Muñoz (2023) note that it works in short-term perspective or at high level of engagement in the process without gamification, and even if it allows receiving the necessary result at the beginning, the activity rapidly decreases soon, and the element of external forcing becomes self-obvious. In other words, extremely high expectations are related to the notion of gamification as an innovative and very effective approach, which is not proven in general.

According to Oliveira et al. (2023) and Goi (2023), the disadvantages of this technology are related to its marketing strategy, due to which it provides for manipulation and forcing, which rather demotivates than motivates to continue the activity. The use of gamification of different types of processes at some stage

causes overuse and fatigue from the game, which requires either expansion of the use of gaming elements or objection to the game and activity transition to another qualitative level. This leads to the reduction of motivation to activity, but the strengthening of the gaming component of the process cannot last endlessly, and the transition of the activity from gaming form to non-gaming form causes frustration.

Klock, Gasparini, Pimenta and Hamari (2020) and Camacho-Sánchez, Manzano-León, Rodríguez-Ferrer, Serna and Lavega-Burgués (2023) believe that gamification should be considered as the instrument for enhancing educational process efficiency. It is necessary to know how to use this instrument, to be competitive in the world market. Therefore, the methodology of gamification of educational disciplines, which would include the development of gamification and integral game educational components, is needed. Such a combination is based on the experience of the use of integral games in domestic educational practice.

The influence of the methodology introduction has both positive and negative features. Based on the results of the conducted study, the use of the methodology of gamification of educational disciplines improves students' engagement in the educational process and enhances interest in the theme or discipline (Zhukova et al., 2023). On the other side, its application can lead to negative consequences described in the first section (Afifi et al., 2022). In particular, demotivation can develop in case of excessive use of external motivational elements, such as motivation with grades and badges, which reduce internal students' motivation.

The study has found both theoretical and practical conclusions, which significantly contributed to the understanding of the level of formation of the value-motivational part of the professional identity of future translators in the ascertaining stage. The theoretical conclusions of the study demonstrated important relations between the levels of the value component and factors, affecting its formation in students, who learn to translate. The main elements, influencing the development of this identity part, were defined by the analysis of the comparison of data of experimental and control groups. The practical results include the development of particular methods and methods that can be used in the educational process for effective development of the value element. The received information can be used for the development of new products and methods oriented on the optimisation of the process of formation of the professional identity of translators.

Several methodological limitations, which should be considered in the received results' interpretation, were found. First, it is necessary to underline that the study was conducted with the engagement of a limited sample of students of a certain higher educational institution, which can limit the generalisation of the received results and the universality of their use in other educational contexts. Second, it is important to pay attention to the fact that the study was long-term, and the length of student's interaction with the gamified educational environment was limited. Such a factor can influence the stability and length of gamification effects, therefore, received results should be considered as intermediate and perceived within the context of the selected time limit.

Conclusions

Relevance. The study and analysis of the possibilities of gamification within the context of distance education enable considering this approach as a powerful tool for the enhancement of the educational process. The indicated results confirm the importance of improvement of online education and the provision of students with effective means for self-development. *Conclusions on the received results.* It is possible to note that in distance education, gamification of the educational process becomes a perspective and effective approach oriented on the enhancement of students' motivation and activity. Gamification stimulates students and contributes to their active and goal-oriented engagement in the educational process. When considering sources of bias, it is important to consider the diversity of the student population

and their personal characteristics to avoid generalizations that may not apply to all groups. *Implication.* The received results may be used in the sphere of higher education and distance learning. The introduction of gamification elements into the educational process enables optimisation of the approaches to education and improving education quality. This will be, firstly, important for the lecturers and managers of educational institutions, as well as for the developers of pedagogical software and online platforms. It is recommended that when developing educational programs, consider the possibility of implementing such gamification elements as quizzes, success ratings, and virtualization of educational material as a variation component of the curriculum. *Further studies perspectives.* Further studies can be dedicated to the search and testing of the new gamification strategies and elements, specially adapted to the needs of specific discipline areas or groups of students. It is important to conduct research on the effectiveness of gamification in different contexts, such as subject areas or age groups of respondents. It should be investigated whether these factors influence the effectiveness of introducing gamification elements. This will allow a better understanding of which methods are most effective in specific situations and how they can be optimized to improve the learning process.

Bibliographic References

Afifi, S., Santoso, H. B., & Hasani, L. M. (2022). Investigating students' online self-regulated learning skills and their e-learning experience in a prophetic communication course. *Information Systems Engineering*, *27*(3), 387-397. https://doi.org/10.18280/isi.270304

Alahmari, M., Jdaitawi, M. T., Rasheed, A., Abduljawad, R., Hussein, E., Alzahrani, M., & Awad, N. (2023). Trends and gaps in empirical research on gamification in science education: A systematic review of the literature. *Contemporary Educational Technology*, *15*(3). https://doi.org/10.30935/cedtech/13177

Camacho-Sánchez, R., Manzano-León, A., Rodríguez-Ferrer, J. M., Serna, J., & Lavega-Burgués, P. (2023). Game-based learning and gamification in physical education: A systematic review. *Education Sciences*, *13*(2), 183. https://doi.org/10.3390/educsci13020183

Chizhikova, I. (2023). Development of the educational autonomy of students in the conditions of gamification of the educational process in ZVO. *Education. Innovation. Practice*, *11*(2), 54-59. https://doi.org/10.31110/2616-650X-vol11i2-008

Christopoulos, A., & Mystakidis, S. (2023). Gamification in Education. *Encyclopedia*, *3*(4), 1223-1243. https://doi.org/10.3390/encyclopedia3040089

Diachenko, I., Kalishchuk, S., Zhylin, M., Kyyko, A., & Volkova, Y. (2022). Color education: A study on methods of influence on memory. *Heliyon*, *8*(11), e11607. https://doi.org/10.1016/j.heliyon.2022.e11607

Duggal, K., Gupta, L. R., & Singh, P. (2021). Gamification and machine learning inspired approach for classroom engagement and learning. *Mathematical Problems in Engineering*, *2021*, 9922775. https://doi.org/10.1155/2021/9922775

Folomieieva, N., Pelekh, V., Haidamashko, I., Sivak, N., & Koriakin, O. (2024). Gamification in the educational process of higher education institutions. *Amazonia Investiga*, *13*(73), 331-343. https://doi.org/10.34069/AI/2024.73.01.28

Goi, C. L. (2023). Gamification in business education: Visualising bibliometric networks analysis. *Journal of Education for Business*, *98*(5), 229-241. https://doi.org/10.1080/08832323.2022.2129553

Klock, A. C. T., Gasparini, I., Pimenta, M. S., & Hamari, J. (2020). Tailored gamification: A review of literature. *International Journal of Human-Computer Studies*, *144*, 102495. https://doi.org/10.1016/j.ijhcs.2020.102495

Korolko, A. Z., & Pereghinets, O. (2023). The use of gamification tools in out-of-school history education. *Youth and the Market*, *2*(210), 98-104. https://doi.org/10.24919/2308-4634.2023.273961

Kryshtanovych, M., Kryshtanovych, S., Stepanenko, L., Brodiuk, Y., & Fast, A. (2021). Methodological approach to determining the main factors for the development of creative thinking in students of creative professions. *Creativity Studies*, *14*(2), 391-404. https://doi.org/10.3846/cs.2021.14806

Kryshtanovych, S., Bilyk, V., Matvienko, O., Stepanenko, L., & Tsvietkova, H. (2022). Influence of psychological conditions on the level of creative imagination. *Creativity Studies*, *15*(2), 406-419. https://doi.org/10.3846/cs.2022.15196

Kurbonova, G. (2023). Principles of gamification of the educational process. *Academic Integrity and Lifelong Learning (France)*. 110-112. Retrieved from https://www.openconference.us/index.php/academic/issue/view/14

Lampropoulos, G. (2024). Virtual reality and gamification in education: a systematic review. *Educational technology research and development*, *72*(2), 1-95. https://doi.org/10.1007/s11423-024-10351-3

Mehed, K. M. (2020). Gamification of learning as an innovative means of implementing the competence approach in higher education institutions. *Bulletin of the Chernihiv Collegium National University named after T. G. Shevchenko. Series: Pedagogical Sciences*, *7*(163), 19-22. https://epub.chnpu.edu.ua/jspui/handle/123456789/7134

Ministry of Education and Science of Ukraine. (2023). *On instructional and methodical recommendations for teaching subjects/integrated courses in institutions of general secondary education in the 2023/2024 academic year* (letter dated September 12, 2023 № 1/13749-23). Retrieved from: https://ru.osvita.ua/legislation/Ser_osv/89974/

Mohammed, A. M. S., & Hirai, Y. (2021). Utilising urban gamification for sustainable crime prevention in public spaces: A citizen participation model for designing against vandalism. *International Journal of Sustainable Development and Planning*, *16*(1), 25-38. https://doi.org/10.18280/ijsdp.160103

Montiel-Ruiz, F. J., Sánchez-Vera, M. D. M., & Solano-Fernández, I. M. (2023). Social networks and gamification in physical education: A case study. *Contemporary Educational Technology*, *15*(1). Retrieved from https://eric.ed.gov/?id=EJ1377187

Murillo-Zamorano, L. R., López-Sánchez, J. Á., López-Rey, M. J., & Bueno-Muñoz, C. (2023). Gamification in higher education: The ECOn+ star battles. *Computers & Education*, *194*, 104699. https://doi.org/10.1016/j.compedu.2022.104699

Nonthamand, N., & Suaklay, N. (2021). Self-regulation students' online learning behavior in general education courses of university of Phayao. *International Journal of Emerging Technologies in Learning (IJET), 16*(14), 269-278. https://doi.org/10.3991/ijet.v16i14.19897

Oliveira, W., Hamari, J., Shi, L., Toda, A. M., Rodrigues, L., Palomino, P. T., & Isotani, S. (2023). Tailored gamification in education: A literature review and future agenda. *Education and Information Technologies*, *28*(1), 373-406. https://doi.org/10.1007/s10639-022-11122-4

Pereyaslavska, S., & Smagina, O. (2019). Gamification as a modern direction of national education. *Open Educational E-Environment of the Modern University*, 250-260. https://doi.org/10.28925/2414-0325.2019s24

Sadovets, O., Martynyuk, O., Orlovska, O., Lysak, H., Korol, S., & Zembytska, M. (2022). Gamification in the informal learning space of higher education (in the context of the digital transformation of education). *Postmodern Openings*, *13*(1), 330-350. https://doi.org/10.18662/po/13.1/399

Sagan, O. V. (2022). Gamification as a modern educational trend. *Collection of Scientific Works "Pedagogical Sciences", 100*, 12-18. https://doi.org/10.32999/ksu2413-1865/2022-100-2

Samodumska, O., Zarishniak, I., Tarasenko, H., Buchatska, S., Budas, I., & Tregubenko, I. (2022). Gamification in non-formal adult educational practices. *Romanian Magazine for Multidimensional Education*, *14*(2), 156-176. https://doi.org/10.18662/rrem/14.2/573

Trischuk, O., Figol, N., & Volyk, N. (2020). Effectiveness of using gamification as a method of attracting attention in electronic media. *In Innovative scientific research: European development trends and the regional perspective*. Riga: Baltija Publishing. https://doi.org/10.30525/978-9934-588-38-9-52

Vasylenko, A. V., & Vasenko, O. V. (2023). Gamification in the educational process of the university. Online Conference. Retrieved from http://www.konferenciaonline.org.ua/ua/article/id-1345/

Yaroshenko, O., Kokorina, L., Shymanovych, I., Naumovska, N., Shchaslyva, N., & Serdiuk, N. (2022). The modern principles of gamification in the teaching of English as a foreign language. *Romanian Magazine for Multidimensional Education*, *14*(1Sup1), 437-452. https://doi.org/10.18662/rrem/14.1Sup1/560

Zhukova, O., Mandragelia, V., Alieksieienko, T., Semenenko, A., & Skibina, E. (2023). Digital Technologies for Introducing Gamification into the Education System in the Context of the Development of Industry 4.0. *Information Systems Engineering*, *28*(1), 141-147. https://doi.org/10.18280/isi.280114

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.13
Cómo citar:
Popovych, O., Yakovenko, V., Mylian, Z., Hrab, O., & Yushchik, L. (2024). Preparation of future preschool teachers for interaction with children in a natural environment. *Revista Eduweb*, 18(2), 183-196. https://doi.org/10.46502/issn.1856-7576/2024.18.02.13

Preparation of future preschool teachers for interaction with children in a natural environment

Preparación de futuros profesores de preescolar para la interacción con los niños en un entorno natural

Oksana Popovych
https://orcid.org/0000-0002-0321-048X
Mukachevo State University, Mukachevo, Ukraine.
Vita Yakovenko
https://orcid.org/0000-0003-3826-037X
Municipal Establishment «Kharkiv Humanitarian Pedagogical Academy» of Kharkiv Regional Council Kharkiv, Ukraine.
Zhanna Mylian
https://orcid.org/0009-0002-6182-898X
State Institution of higher education «Uzhhorod National University», Uzhhorod, Ukraine.
Olha Hrab
https://orcid.org/0000-0002-5970-1579
Mukachevo State University, Mukachevo, Ukraine.
Lydmila Yushchik
https://orcid.org/0009-0002-5619-2235
Mukachevo State University, Mukachevo, Ukraine.

Recibido: 21/03/24
Aceptado: 21/06/24

Abstract

The purpose of the study was to determine the level of formation of professional competencies and components of the readiness of future preschool teachers for interaction with children of early and preschool age in a natural environment. The methods used in the research are: Identifying the teacher's abilities for self-development (I. Nikishyna), the technique for diagnosing reflexivity (A. Karpov, V. Ponomareva), Research of the level of empathic tendencies (I. Yusupov), Methods of assessing cognitive potential in education (M. Shevardin). For statistical processing of the results, descriptive analysis, dispersion analysis, and correlation analysis were used. It was found that future preschool teachers have a high level of readiness for interaction with children of early and preschool age in a natural environment. They have developed empathy, self-development abilities, cognitive potentials, and reflexivity. Professional competencies are also developed at a high level. A positive correlation was established between the components of readiness for interaction with children in a natural environment and professional competencies. The obtained research results support the expansion of educational programs for future preschool teachers by including the development of such qualities as empathy, reflexivity, a desire for self-development, and cognitive potential in the list of necessary competencies.

Keywords: Competence, professional training, empathy, reflexivity, cognitive potential, education standard.

Resumen

El propósito del estudio fue determinar el nivel de formación de competencias profesionales y componentes de la preparación de los futuros docentes de preescolar para la interacción con niños de edad temprana y preescolar en un entorno natural. Los métodos utilizados en la investigación son: identificación de las habilidades del docente para el autodesarrollo (I. Nikishyna), la técnica para diagnosticar la reflexividad (A. Karpov, V. Ponomareva), investigación del nivel de tendencias empáticas (I. Yusupov), Métodos de evaluación del potencial cognitivo en educación (M. Shevardin). Para el procesamiento estadístico de los resultados se utilizó análisis descriptivo, análisis de dispersión y análisis de correlación. Se encontró que los futuros maestros de preescolar tienen un alto nivel de preparación para interactuar con niños de edad temprana y preescolar en un entorno natural. Han desarrollado empatía, habilidades de autodesarrollo, potenciales cognitivos y reflexividad. Las competencias profesionales también se desarrollan a un alto nivel. Se estableció una correlación positiva entre los componentes de la preparación para la interacción con los niños en un entorno natural y las competencias profesionales. Los resultados de la investigación obtenidos apoyan la ampliación de los programas educativos para futuros maestros de preescolar al incluir el desarrollo de cualidades como la empatía, la reflexividad, el deseo de autodesarrollo y el potencial cognitivo en la lista de competencias necesarias.

Palabras clave: Competencia, formación profesional, empatía, reflexividad, potencial cognitivo, nivel educativo.

Introduction

Transformation processes in the modern higher education system involve a radical restructuring of the system for specialist training. The focus is on active adaptation to the European standards system, expanding students' independence in studying professional disciplines and implementing new methods of control and assessment (Kompirović et al., 2023). These changes also apply to preschool education, as future preschool teachers are the primary link in a child's education and development. The professional competence of future preschool teachers is an important priority of higher education in the field of pedagogy (Czepil, 2021). Pedagogical training, being an important part of the professional training of early childhood education specialists, is a significant means of enhancing the qualifications of future teachers (Liu & Zhang, 2023). The quality of preschool education directly affects the professional competence and professional development of future teachers (Zhanga & Wub, 2022).

Within the framework of the updated Higher Education Standard for the specialization 012 "Preschool Education" (second (master's) level of higher education) in Ukraine, the directions for the training of future teachers are expanding to carry out professional activities in various areas (Zdanevych et al., 2020). The Standard defines the main competencies that specialists in preschool education should possess. Among these competencies, the ecological and natural development of children and interaction in the natural environment are particularly important. These competencies correspond to the main results of educational work with preschoolers, as indicated in the Basic Component of Preschool Education in Ukraine (LIGA 360, 2021).

The interaction with the natural environment gives a child the opportunity to understand the essence of the surrounding environment, acquire skills for appropriate behavior, and form their values towards the natural world and animals (Masnan et al., 2021). The development of key competencies in children plays a crucial role in preparing them for life in the surrounding environment and fostering their ability to interact with it (Gyoreva, 2022).

Preschool education today highlights the value of outdoor play as a priority for children (Smedsrud et al., 2024). Future preschool teachers must be equipped to integrate nature-oriented learning components, skills, and values into their teaching practices (Masnan et al., 2021). The professionalism of preschool teachers plays a crucial role in the development of young children (Tatalović-Vorkapić & Vesna, 2015).

Preschool teachers' support for outdoor play is influenced by their understanding of what the natural environment offers (Mortensen & Barnett, 2015). Different types of environments afford different learning opportunities. However, preschool teachers, especially those working in early childhood education, often have a limited understanding of the educational potential of natural environments (Levine Brown et al., 2022). Therefore, a full awareness of the benefits of children's interaction with nature is a prerequisite for implementing supportive learning in playful settings. This demonstrates that the quality preparation of future preschool teachers ensures the holistic development of preschool children through their interactions with the natural environment.

The main structural unit of the training of preschool teachers is the formation of competencies laid down in the Standard of Higher Preschool Education (Verkhovna Rada of Ukraine, 2010). Professional competence implies that future preschool teachers possess professional skills at a high level, which ensures their competitiveness as specialists (Salaam, 2023). The full formation of general and special professional competencies will contribute to the effective preparation of future preschool teachers for interaction with children of early and preschool age in the natural environment.

The purpose of the study is to determine the level of readiness of future preschool teachers for interaction with children of early and preschool age in the natural environment and the formation of their basic competencies. Based on the goal, the hypothesis was put forward: there is a direct relationship between the components of readiness for professional activity and professional competencies for working in the natural environment among future preschool teachers.

Based on the purpose and hypothesis, the following research tasks were set:

- To diagnose the components of future preschool teachers' readiness for professional activity;
- To identify the formation of general and special competencies of future preschool teachers;
- To compare gender characteristics of future preschool teachers' readiness for professional activity;
- To identify the relationship between the components of readiness for professional activity and professional competencies for working in the natural environment.

Literature Review

Competence is a professional readiness to solve professional tasks, and the professional competence of a preschool teacher is a set of theoretical and practical aspects of preparation for professional activity (Czepil, 2021). In the National Qualification Framework, competence is defined as a training outcome. The essence lies in the extent to which a graduate of a higher educational institution is able to demonstrate the acquired knowledge and skills after completing the training. According to the National Classifier of Ukraine DK 003:2010 "Classifier of Occupations" (Verkhovna Rada of Ukraine, 2010), the profession of a preschool teacher has the code 2332 and the full name "Preschool teacher". The professional competence of future preschool teachers of early and preschool children is a characteristic of the ability to perform professional activities based on acquired knowledge, skills, and abilities. Among them, the main ones are respect and love for children, empathy, reflection, and positive communication (Tokatligil et al., 2022). The professional competence of preschool teachers is an important and effective component of the educational process (Kaļķe et al., 2022).

The Preschool Education Standard (Verkhovna Rada of Ukraine, 2010) outlines 11 professional competencies that describe the abilities, knowledge, and skills that a preschool teacher must possess. The Standard distinguishes between general and special competencies. General competencies are those abilities and knowledge that enable preschool teachers to fully develop children of early and preschool age. Special competencies of a future preschool teacher specify his or her knowledge, skills, and abilities to work with children in a specific area. In our case, the special abilities of future preschool teachers pertain

to their readiness to interact with the natural environment. They include the ability to form initial ideas about the natural environment in children of early and preschool age, the ability to develop skills of environmentally safe behavior, aesthetic attitude to the environment, and the ability to create and implement new ideas in classes with children.

Using different forms, methods, and tools for working with children, preschool teachers form in them a conscious attitude towards the natural environment and a sense of aesthetic delight (Mortensen & Barnett, 2015). It has been proven that children who spend time in the natural environment are well aware of the environment, and have a positive environmental attitude and connection with nature (Smedsrud et al., 2024). At the same time, this knowledge relies on the quality of training provided to preschool teachers, and with a sufficient level of knowledge and skills, these teachers can effectively apply suitable methods and forms of work in their professional activities (Narea et al., 2022).

It is especially important to highlight the influence of the personal qualities of preschool teachers on the development of children in the natural environment. Preschool teachers who demonstrate empathy and reflection, which allow them to emotionally and sensually reflect reality, promote the development of a positive attitude towards the natural environment and aesthetic feelings in children (Levine Brown et al., 2022).

The ability of preschool teachers to organize active recreation in the natural environment deserves special attention. The combination of professional knowledge and personal cognitive potential ensures an increase in physical activity and improves motor skills in children (Humphries et al., 2018). This provides advantages in the development of self-esteem, self-efficacy, resilience, and cognitive productivity (Gyoreva, 2022).

Scientists have proven that the natural environment contributes to the improvement of cognitive outcomes, such as play, learning, and creativity (Kompirović et al. 2023). This is especially important in early childhood, as it promotes the development of attention, punctuality, concentration, and various types of play activities (Seaman & Giles, 2021). Overall, it has been shown that children's exposure to the natural environment is beneficial for their well-being and development (Nilfyr et al., 2021). These advantages of the natural environment in the development of children of early and preschool age prove their relevance and the need for training qualified preschool teachers who would contribute to expanding opportunities in this field of educational and developmental work.

Methods

Research procedure

The research was conducted from October 2023 to March 2024 and consisted of 4 stages. The first stage of the research involved a theoretical and methodological analysis of the scientific literature on the research topic. The second stage included the selection and structuring of the competencies of future preschool teachers, as well as the selection of diagnostic methods. The third stage involved testing students to identify the corresponding competencies. The fourth stage included the analysis and interpretation of the obtained results, substantiation of conclusions, and prospects for further research.

Sample Formation

The study involved 280 students who are pursuing a second (master's) level of education in the specialty of 012 "Preschool education" on a full-time basis aged 21 to 25 years. Among them, 186 are female and 94 are male students.

The sample was formed based on the Department of Preschool and Special Education of the Pedagogical Faculty of Mukachevo State University (43 students), the Communal Institution "Kharkiv Humanitarian-Pedagogical Academy" of the Kharkiv Regional Council (65 students), the Faculty of Preschool and Special Education and History, the Department of Theory and Methods of Preschool Education (Kharkiv city) (72 students), the Department of General Pedagogy and Pedagogy of Higher Education of the Faculty of Social Sciences of the State Higher Educational Institution "Uzhhorod National University" (55 students), and the Department of Preschool Pedagogy, Primary Education, and Educational Management of Mukachevo State University (45 students).

Methods

According to the Higher Education Standard for the 012 "Preschool Education" specialization, we have identified general and specific competencies of future preschool teachers that reflect their readiness to interact with children of early and preschool age in a natural environment as follows:

1) General: the ability to provide psychological and pedagogical guidance in the personal development of a child; possess skills and abilities in analysis, forecasting, planning, and organizing the educational process; analyze and compare the results of pedagogical influence on the individual development of a preschool child in different types of activities; apply modern didactic technologies and methodologies in professional activities.
2) Special: the ability to develop in children of early and preschool age initial concepts about the natural environment; the ability to develop in children of early and preschool age skills of environmentally safe behavior; the ability to develop in children of early and preschool age an aesthetic and respectful attitude towards the environment; the ability to generate new ideas for implementing them in activities with children in the conditions of the natural environment.

Competencies were assessed based on the learning outcomes according to the following criteria: 1 point - competency not developed, 2 points - low level of development, 3 - partial development, and 4 - full development.

Structural analysis of various types of readiness of future preschool teachers for professional activities allowed us to distinguish three levels of readiness for interaction with children of early and preschool age in the natural environment.

1) The first and personal level reflects the ability for self-development. The "Identifying the teacher's abilities for self-development" method (I.V. Nikishina) is used to study this level. The method aims to study the abilities of future preschool teachers for continuous self-development during their professional training.
2) The second emotional level includes the study of the reflexivity of future preschool teachers and their empathy. The technique for diagnosing reflexivity (A. V. Karpov, V. V. Ponomareva) is chosen to study reflexivity. Preschool teacher's reflexivity is the ability to go beyond one's "self," to contemplate, study, and analyze something by comparing the image of one's "self" with events. Empathy reflects the ability to emotionally respond to the emotional state of others, fostering compassion. Preschool teachers with high empathy can instill respect for nature, and animals, compassion, and kindness in children. Empathy was studied using the method of researching the level of empathic tendencies ("Research of the level of empathic tendencies" (I. Yusupov)). The test identified three levels of empathy: low, medium, and high.
3) The cognitive level of readiness to interact with children of early and preschool age in a natural environment is presented by the Method of assessing cognitive potential in education (Shevardin M.K). The goal of the test is to determine the ability to acquire new knowledge and actively apply it in practice.

Statistical Methods

Frequency analysis, descriptive statistics, Pearson correlation analysis, and one-way analysis of variance (Anova) were used.

Research Ethics Criteria

The ethics of the research were ensured by the voluntary consent of the respondents to participate in the diagnosis. Before testing, students were informed about the purpose and objectives of the study and the confidentiality of the results was guaranteed.

Results and Discussion

The results showed that future preschool teachers have a high level of self-development ability (Figure 1), which expresses students' desire to acquire new knowledge and skills, expand their practical experience, and improve personal qualities.

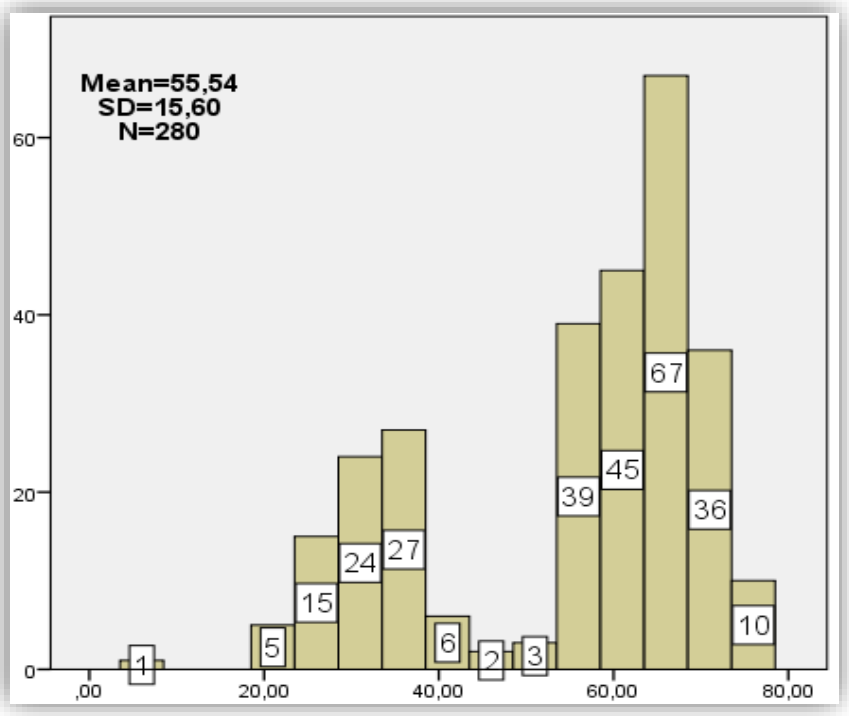

Figure 1. Frequency distribution of indicators of future preschool teachers' self-development ability.

It was found that future preschool teachers have a quite high level of cognitive potential (Figure 2). This indicates that students have developed thinking processes that contribute to better knowledge acquisition. Such potential is the basis for self-development, acquiring new knowledge, and using the experience already gained.

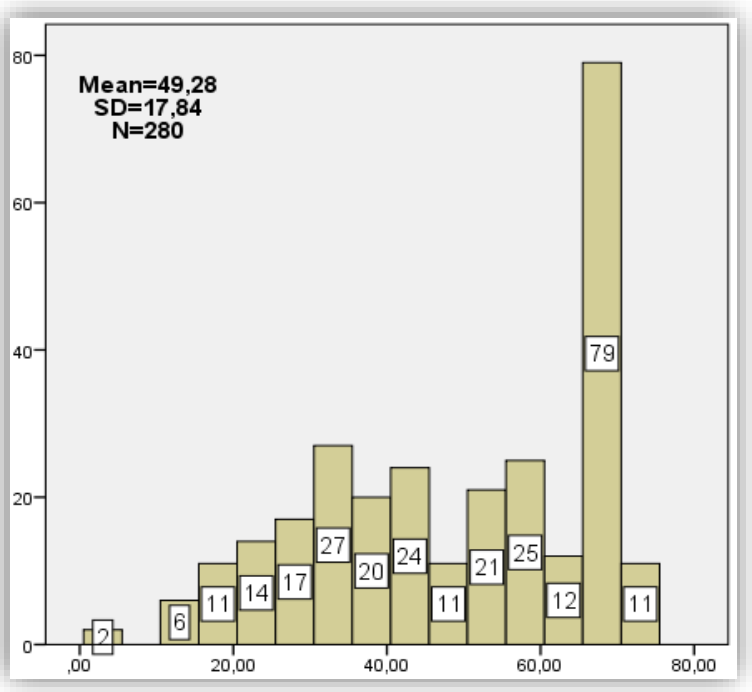

Figure 2. Frequency distribution of indicators of future preschool teachers' cognitive potential.

It has been found that students have a high level of empathy (Figure 3). Empathy is one of the key traits of future preschool teachers because it is required for building trusting relationships with children while emotional attunement provides feedback and encourages children to actively cooperate.

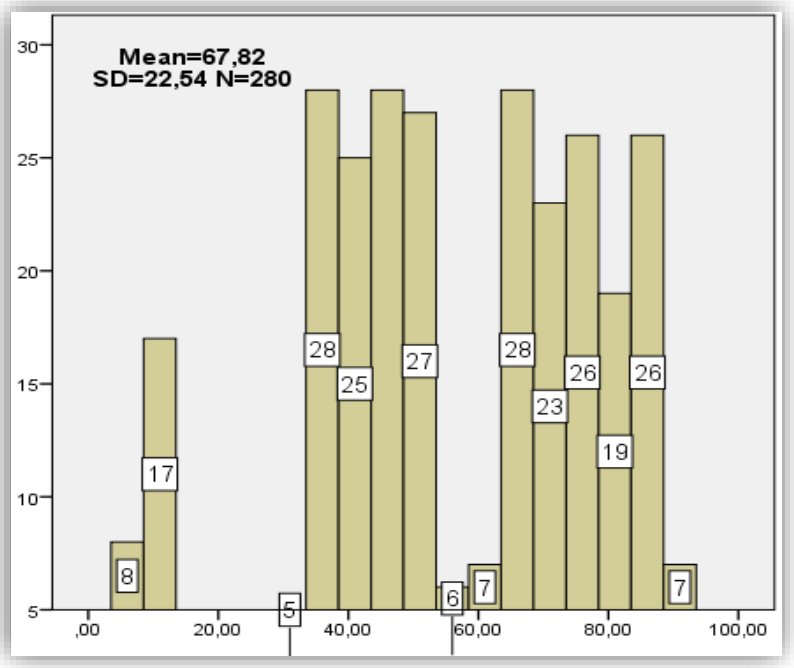

Figure 3. Frequency analysis of indicators of empathy in future preschool teachers.

The study of reflexivity in future preschool teachers showed a high level of expression of all three parameters (Figure 4). The reflexivity of future preschool teachers fosters self-assessment, and adjustment of activities, and at the same time, it also allows them to be highly attuned to even the subtlest shifts in children's behavior. Accordingly, reflexivity allows for regulating the educational process taking into account all the personal characteristics of early and preschool-age children.

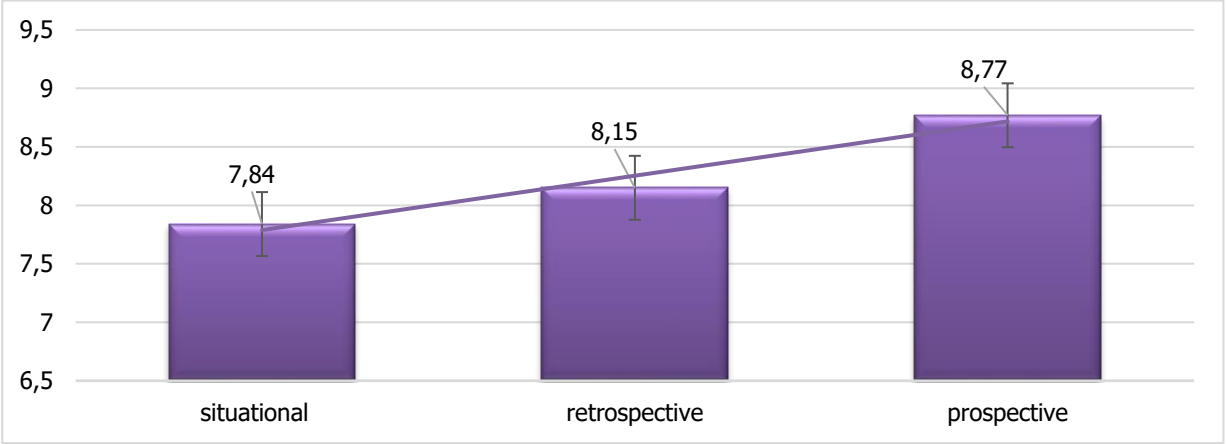

Figure 4. Average values of parameters of reflexivity in future preschool teachers.

Our analysis of the gender aspect of the identified components of readiness of future preschool teachers to interact with children of early and preschool age in a natural environment has revealed no statistically significant differences. This indicates the equal formation of readiness among male and female students (Table 1).

Table 1.
Indicators of components of readiness of future preschool teachers for professional activity (N=280)

Gender		Aptitude for self-development	Cognitive potential	Empathy	Reflexivity		
					Situation-based	Retrospective	Prospective
male	Mean	53,29	47,61	66,48	7,24	8,11	8,38
	SD	14,83	16,73	20,85	1,29	1,19	1,27
	N	94	94	94	94	94	94
female	Mean	54,85	49,55	67,02	7,33	7,95	8,16
	SD	15,01	15,84	20,81	1,17	1,02	1,22
	N	186	186	186	186	186	186
F		1,781	0,247	0,739	1,112	0,947	1,257
Total	Mean	55,54	49,28	67,82	7,84	8,15	8,77
	SD	15,60	17,84	22,54	1,16	1,23	1,35
	N	280	280	280	280	280	280

According to the table data, the average values for all investigated parameters correspond to a high level of formation both separately in the group of female and male students, and in the sample as a whole. This indicates that future preschool teachers have a high ability for self-development, the ability to acquire and use knowledge, developed empathic abilities, and formed reflexivity. These parameters do not depend on gender. Thus, these components of readiness for interaction with children of early and preschool age in a natural environment are a condition for effective professional activity.

It has been established that future preschool teachers have a high level of developed professional competencies that contribute to the interaction with children of early and preschool age in a natural environment (Table 2).

Table 2.
Indicators of professional competencies of future preschool teachers (N=280)

Professional competencies	not formed	low formation	partial formation	fully formed	σ
ability to provide psychological and pedagogical guidance for the personal development of a child	2%	8%	20%	70%	0,712
ability to possess skills and competencies in analyzing, forecasting, planning, and organizing the educational process	1%	6%	9%	84%	0,487
ability to analyze and compare the results of pedagogical influence on the individual development of preschool children in various types of activities	0	7%	13%	80%	0,628
ability to apply modern didactic technologies and methodologies in professional activities	3%	16%	21%	60%	0,547
ability to form in children of early and preschool age basic concepts of the natural environment	0	4%	11%	85%	0,688
ability to cultivate in children of early and preschool age skills of environmentally safe behavior	0	6%	14%	80%	0,763
ability to foster in children of early and preschool age an aesthetic attitude toward the environment	0	0	8%	92%	0,679
ability to generate new ideas for implementing them in activities with children in natural environment conditions	0	4%	8%	88%	0,534

According to the data obtained, the largest share of variance is represented by competencies such as the ability to provide psychological and pedagogical guidance in the individual development of a child; analyze and compare the results of pedagogical influence on the individual development of a child in various activities; the ability to form in children primary ideas about the natural environment, and to cultivate in them an aesthetic attitude towards the environment and environmentally friendly behavior.

These results indicate that these competencies are the most pronounced in students and that they collectively form the level of professional training.

Correlation analysis revealed direct relationships between the components of readiness for interaction with children of early and preschool age in a natural environment and the necessary professional competencies (Table 3).

Table 3.

Correlation analysis of the relationship between components of professional preparation of future preschool teachers for the interaction with children in the natural environment and necessary professional competencies (N=280)

Professional competencies	Aptitude for self-development	Cognitive potential	Empathy	Reflexivity		
				Situational	Retrospective	Prospective
ability to provide psychological and pedagogical guidance for the personal development of a child	0,491**	0,765**	0,314**	0,681**	0,730**	0,412**
ability to possess skills and competencies in analysis, forecasting, planning, and organizing the educational process	0,771**	0,526**	0,240**	0,575**	0,541**	0,711**
ability to analyze and compare the results of pedagogical influence on the personal development of preschool children in various types of activities	0,548**	0,720**	0,301**	0,815**	0,497**	0,529**
ability to apply modern didactic technologies and methodologies in professional activities	0,401**	0,839**	0,332**	0,648**	0,601**	0,697**
ability to form in children of early and preschool age basic concepts of the natural environment	0,451**	0,640**	0,339**	0,545**	0,410**	0,760**
ability to cultivate in children of early and preschool age skills of environmentally safe behavior	0,469**	0,468**	0,328**	0,577**	0,650**	0,610**
ability to foster in children of early and preschool age an aesthetic attitude towards the environment	0,326**	0,438**	0,758**	0,498**	0,482**	0,514**
ability to generate new ideas for implementing them in activities with children in natural environment conditions	0,736**	0,791**	0,258**	0,639**	0,673**	0,745**
*Note: * - p≤0,05, ** - p≤0,01*						

According to the table data, positive correlation links have been found between all components of readiness of future preschool teachers for interaction with children of early and preschool age in a natural environment and necessary professional competencies. The highest coefficients are observed between the ability to provide psychological and pedagogical guidance in the individual development of a child and cognitive potential and retrospective reflexivity. Between the ability to possess skills and abilities of analysis, forecasting, planning, and organizing the educational process, and the ability for self-development, and prospective reflexivity. Between the ability to analyze and compare the results of pedagogical influence on

the individual development of a preschool-age child in various activities and cognitive development and situational reflexivity. Between the ability to apply modern didactic technologies and methods in professional activities and cognitive potential. Between the ability to form in children of early and preschool age primary ideas about the natural environment and prospective reflexivity. Between the ability to cultivate in children of early and preschool age an aesthetic attitude towards the environment and empathy. Between the ability to generate new ideas for implementing them in activities with children in natural environment conditions and self-development, cognitive potential, and prospective reflexivity. The obtained relationships indicate that the identified competencies are inseparable from such components of readiness for professional activity as self-development, cognitive potential, empathy, and reflexivity. The higher the readiness indicators, the higher the indicators of professional competencies.

Our findings indicate that students, future preschool teachers, have high indicators of self-development, cognitive potential, empathy, and reflexivity. This demonstrates their high level of professional training. They have developed both general and specific competencies that allow them to effectively interact with children of early and preschool age in natural environment conditions. Additionally, a direct relationship was found between components of professional preparation and professional competencies, proving their interdependence.

Similar results have been found in other studies. It has been established, for example, that the professional competence of a preschool teacher is a prerequisite for the quality of their pedagogical work (Duraku et al., 2022). Furthermore, professional competence affects the learning and learning outcomes of children (Kaļķe et al., 2022). The high level of natural science knowledge of future preschool teachers ensures children's excellent knowledge of the natural environment (Masnan et al., 2021). It has been found that the completion of training for future preschool teachers positively correlates with a significant increase in their level of knowledge and skills, as well as an increase in the level of self-development (Duraku et al., 2022). These results demonstrate the benefits of professional training and development of future preschool teachers, which in turn improves the effectiveness of early education and the natural development of children (Abril-López et al., 2021).

For instilling humane attitudes toward nature in children of early and preschool age, it is important to cultivate humane feelings and positive experiences of interacting with nature. Only preschool teachers with high levels of empathy and reflexivity are capable of developing such qualities in children (Fushtei & Sarancha, 2023). One of the key competencies of future preschool teachers is their professionalism combined with knowledge and skills (Blewitt et al., 2020). In Ukraine, unlike in European countries, the preparation of future preschool teachers is based on the formation of key professional competencies combined with basic knowledge, values orientations, and motives of pedagogical activity (Zdanevych et al., 2020).

However, some scholars emphasize the gap between theory and practice in the preparation of future preschool teachers, which complicates the process of forming the relevant competencies for interacting with children in the natural environment (Zhanga & Wub, 2022). It is noted that the use of special methods in the training of future preschool teachers contributes to the improvement of their professional skills and competencies (Krasovska et al., 2020).

The professional competence of future preschool teachers determines the level of educational and research preparation of preschool children in interacting with the natural environment (Tokatligil et al., 2022). Therefore, effective teaching methods should be implemented from the first year of study to promote the development of professional competencies of early childhood education students (Weatherby-Fell et al., 2019). To improve the quality of future preschool teachers' training, it is necessary to create more opportunities for their learning using effective resources (Khandaker, 2021).

Thus, the updated higher education standard for the specialty 012 Preschool Education is oriented towards the formation of general and specific competencies of future preschool teachers, including readiness for interaction with children of early and preschool age in the natural environment.

Conclusions

The study revealed that future preschool teachers demonstrate a high level of readiness for professional activity with children of early and preschool age in the natural environment. Developed aspirations for self-improvement, cognitive potential, empathy, and reflexivity in the interaction with general and special professional competencies contribute to the full development of children of early and preschool age, their acquisition of relevant knowledge about the natural environment, aesthetic attitude towards it, and environmentally safe behavior. Such results are useful from several perspectives. Firstly, the identified components of professional training for future preschool teachers make it possible to include their development in educational programs, which will contribute to the development of their key competencies. Secondly, the identified connection between cognitive, emotional, and personal components of readiness for professional activity and competencies proves their imminent development. This is useful for the students themselves, who must direct their efforts towards self-improvement, constant development of skills, and expanding experience to achieve efficiency in their work. Thirdly, the identified high level of training of future preschool teachers increases their chances of employment, makes them competitive professionals, and expands professional opportunities in interacting with children of early and preschool age in the natural environment.

Limitations of the study include the influence of individual characteristics of future preschool teachers on the level of their readiness. Motivation for professional choice, academic achievements, and personality traits may limit the adequacy of the results obtained. Therefore, studying these aspects may be a prospect for further research.

Additionally, it is advisable to conduct a study in the future to examine the correspondence of general and special competencies of students with the aspects of development of preschool children prescribed in the Basic Component of preschool education.

Bibliographic References

Abril-López, D., Morón-Monge, H., Morón-Monge, M. C., & López Carrillo, M. D. (2021). The learning to learn competence in early childhood preservice teachers: An outdoor and e/m-learning experience in the museum. *Future Internet*, *13*(2), 25. https://doi.org/10.3390/fi13020025

Blewitt, C., O'Connor, A., Morris, H., Mousa, A., Bergmeier, H., Nolan, A., Jackson, K., Barrett H., and Skouteris, H. (2020). Do curriculum-based social and emotional learning programs in early childhood education and care strengthen teacher outcomes? A systematic literature review. *International Journal of Environmental Research and Public Health, 17*(3), 1049. https://doi.org/10.3390/ijerph17031049

Czepil, M. (2021). Professional competence of preschool teachers in the works of Ukrainian scholars. *Annales Universitatis Mariae Curie-Skłodowska. Section J, Paedagogia-Psychologia*, *34*(1), 25-34.

Duraku, H. Z., Blakaj, V., Likaj, E., Boci, L., & Shtylla, H. (2022). Professional training improves early education teachers' knowledge, skills, motivation, and self-efficacy. *Frontiers in Education*, *7*, 1-11. https://doi.org/10.3389/feduc.2022.980254

Fushtei, O., & Sarancha, I. (2023). Formation of environmental culture in preschool children. *Personality and Environmental Issues*, *4*(2), 21-25. https://doi.org/10.31652/2786-6033-2023-2(4)-21-25

Gyoreva, R. (2022). Applying the competency approach to quality management of early childhood education and care. *Scientific Collection «InterConf+»*, *24*(121), 50-59. https://doi.org/10.51582/interconf.19-20.08.2022.006

Humphries, M.L., Williams, B.V., & May, T. (2018). Early childhood teachers' perspectives on social-emotional competence and learning in urban classrooms. *Journal of Applied School Psychology, 34*(2), 157-179. https://doi.org/10.1080/15377903.2018.1425790

Ivaniuk, H. I., Antypin, Y., Venhlovska, O., Kuzemko, L., & Savchenko, Y. (2023). Practices of psychological and pedagogical support of future teachers' personal and professional development in the conditions of distance learning. *Amazonia Investiga*, *12*(67), 250-264. https://doi.org/10.34069/AI/2023.67.07.23

Kaļķe, B., Baranova, S., & Aboltina, L. (2022). Self-assessment of the professional competence of preschool teaching student. *Acta Paedagogica Vilnensia*, *48*, 116-128. http://dx.doi.org/10.15388/ActPaed.2022.48.7

Khandaker, R. (2021). Professional training: Crucial need to enhance the efficacy of preschool teachers in the context of Bangladesh. *Open Access Library Journal*, *8*, 1-23. https://doi.org/10.4236/oalib.1107880

Kompirović, T., Popović, D., Radojević, T., & Biševac, A. (2023). Preschool teachers' professional training in the field of inclusive education in the North of Kosovo and Metohija. *International Journal of Cognitive Research in Science, Engineering and Education*, *11*(1), 37-50. https://doi.org/10.23947/2334-8496-2023-11-1-37-50

Krasovska, O., Miskova, N., & Veremchuk, A. (2020). Professional training of future preschool teachers in the field of artistic and aesthetic education by means of contextual learning technologies. *Behavioral Sciences*, *4*, 10(2), 50. https://doi.org/10.3390/bs10020050.

Levine Brown, E., Vesely, C. K., Mehta, S., & Stark, K. (2022). Preschool teachers' emotional acting and school-based interactions. *Early Child Education Journal, 51*(4), 615-626. https://doi.org/10.1007/s10643-022-01326-1

LIGA 360 (2021). *Basic Component of Preschool Education (State Standard of Preschool Education).* (2021). Order No. 33 dated January 12, 2021. Retrieved from https://ips.ligazakon.net/document/MUS34727

Liu, M., & Zhang, M. (2023). Current situation and training strategies of preschool students' skills in the Internet era. *Applied Mathematics and Nonlinear Sciences*, *9*(1). http://dx.doi.org/10.2478/amns.2023.2.00188

Masnan, A. H., Manja, S., Zain, A., Shafawati, F., Mohd, T., Wan, J., & Wan, A. (2021). Preschool nature education module for preschool teachers activities. *International Journal of Academic Research in Progressive Education and Development*, *10(2)*, 1-12. http://dx.doi.org/10.6007/IJARPED/v10-i2/9684

Mortensen, J. A., & Barnett, M. A. (2015). Teacher–child interactions in infant/toddler childcare and socioemotional development. *Early Education and Development, 26*, 209-229. https://doi.org/10.1080/10409289.2015.985878

Narea, M., Treviño, E., Caqueo-Urízar, A., Miranda, C., & Gutiérrez-Rioseco, J. (2022). Understanding the relationship between preschool teachers' well-being, interaction quality and students' well-being. *Child Indicators Research*, *15*(2), 533-551. https://doi.org/10.1007/s12187-021-09876-3

Nilfyr, K., Aspelin, J., & Lantz-Andersson, A. (2021). Teacher–child interaction in a goal-oriented preschool context: A micro-analytical study. *Education Sciences*, *11*, 692. https://doi.org/10.3390/educsci11110692

Salaam, M. A. (2023). *Perspectives on Preschool Education and Care.* IntechOpen. http://dx.doi.org/10.5772/intechopen.111745

Seaman, H., & Giles, P. (2021). Supporting children's social and emotional well-being in the early years: An exploration of practitioners' perceptions. *Early Child Development and Care, 191*(6), 861-875. doi: https://doi.org/10.1080/03004430.2019.1649668

Smedsrud, T. M., Kleppe, R., Lenes, R., & Moser, Th. (2024). Early childhood teachers' support of children's play in nature-based outdoor spaces: A systematic review. *Education Sciences*, *14*(1), 13. https://doi.org/10.3390/educsci14010013

Tatalović, V. S., & Vesna, K. (2015). How students of preschool education perceive their play competences – An analysis of their involvement in children's play. *Center for Educational Policy Studies Journal*, *5(1)*, 112-130. http://dx.doi.org/10.26529/cepsj.162

Tokatligil, Y. S., Saliyeva, A. Z., & Zhumabekova, F. N. (2022). Psychological aspect of the training process of preschool education students. *Quality & Quantity*, *56*, 2613-2625 https://doi.org/10.1007/s11135-021-01240-5

Verkhovna Rada of Ukraine (2010). *Order of the State Committee of Ukraine for Technical Regulation and Consumer Policy No. 327 dated 28.07.2010*. Retrieved from https://zakon.rada.gov.ua/rada/show/va327609-10#Text

Weatherby-Fell, N., Duchesne, S., & Neilsen-Hewett, C. (2019). Preparing and supporting early childhood pre-service teachers in their professional journey. *The Australian Educational Researcher*, *46*, 621-637. http://dx.doi.org/10.1007/s13384-019-00340-4

Zdanevych, L. V., Kruty, K., Tsehelnyk, T., Pisotska, L., & Kazakova, N. (2020). The formation of key competences in the training process of preschool education specialists (Experience of the United Kingdom, Germany, Ukraine). *International Journal of Higher Education*, *9*(7). https://doi.org/10.5430/ijhe.v9n7p196

Zhanga, L., & Wu, H. (2022). Research on training mode of practical ability of preschool education based on functional theory. In *International Conference on Humanities and Education (ICHE 2022)* (pp. 104-110). Wuhan. https://webofproceedings.org/proceedings_series/ESSP/ICHE%202022/E14.pdf

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.14
Cómo citar:
Romanyuk, S., Karaman, O., Onyshkiv, Z., Vasylyk, M., & Strohanova, H. (2024). The use of multimedia technologies in the development of the methodological competence of future teachers. *Revista Eduweb*, 18(2), 197-208. https://doi.org/10.46502/issn.1856-7576/2024.18.02.14

The use of multimedia technologies in the development of the methodological competence of future teachers

El uso de tecnologías multimedia en el desarrollo de la competencia metodológica de los futuros docentes

Svitlana Romanyuk
https://orcid.org/0000-0002-9905-8880
Department of Pedagogy and Methodology of Primary Education, Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine.
Olga Karaman
https://orcid.org/0000-0002-5662-4395
Department of Ukrainian Language, Borys Grinchenko Kyiv Metropolitan University, Kyiv, Ukraine.
Zinovii Onyshkiv
https://orcid.org/0000-0002-4851-070X
Department of Pedagogics and Methodology of Junior, Ternopil Volodymyr Hnatiuk National Pedagogical University, Ternopil, Ukraine.
Maryna Vasylyk
https://orcid.org/0000-0002-0515-9251
Department of Foreign Languages, Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine.
Hanna Strohanova
https://orcid.org/0000-0003-2900-3152
Department of Methods of Teaching Ukrainian Language and Literature, Dragomanov Ukrainian State University, Andrii Malyshko, Kyiv, Ukraine.

Recibido: 12/03/24
Aceptado: 05/06/24

Abstract

The main objective of this study was to determine the effectiveness of the use of multimedia technologies in building the methodological competence of future teachers. To achieve this, a mixed methodology was used that combined the application of standardized tests, direct observation, in-depth interviews, evaluation by experts and a training experiment. The main findings of the study reveal that the systematic use of multimedia technologies in the training of future teachers constitutes an effective factor for the development of their methodological competence. A significant impact was observed on the cognitive and motivational components of said competence. The multimedia training system implemented was based on the principles of methodological training and demonstrated a high potential to be integrated into pedagogy educational programs and continuing training courses for teachers.

Keywords: competence approach, educational field, future teachers, multimedia technologies, professional training.

Resumen

El presente estudio tuvo como objetivo principal determinar la efectividad del uso de tecnologías multimedia en la construcción de la competencia metodológica de futuros docentes. Para ello, se empleó una metodología mixta que combinó la aplicación de pruebas estandarizadas, observación directa, entrevistas a profundidad, evaluación por expertos y un experimento formativo. Los hallazgos principales del estudio revelan que el uso sistemático de tecnologías multimedia en la formación de futuros docentes constituye un factor eficaz para el desarrollo de su competencia metodológica. Se observó un impacto significativo en los componentes cognitivo y motivacional de dicha competencia. El sistema de formación multimedia implementado se basó en los principios de la formación metodológica y demostró un alto potencial para ser integrado en programas educativos de pedagogía y cursos de formación continua para docents.

Palabras clave: ámbito educativo, enfoque por competencias, formación profesional, futuros docentes, tecnologías multimedia.

Introduction

Multimedia tools are part of an integrated strategy for ensuring the quality of modern education (Abdulrahaman et al., 2020). Their implementation is a mandatory element of the transformation of the general educational paradigm in modern society (Wallner & Wagner, 2016). The use of modern technologies has significant psychological advantages in learning (Saini & Baba, 2024), which helps to make the educational process more personality-oriented (Deineko, Sotnik & Lyashenko, 2022). Multimedia tools have especially proven their effectiveness in crisis periods of social life, in particular, during the COVID-19 pandemic (Haleem et al., 2022) and full-scale war (Horbatiuk & Polishchuk, 2023). The positive impact of the studied technologies on the effectiveness of higher education is proven (Riznyk, 2021). The implementation of multimedia technologies in higher education makes it possible to quickly respond to the demands of the information society, stimulate self-learning, develop creative abilities, communication skills, optimize research activities, and establish an information culture (Bhat, Naidu & Singh, 2018; Shunkov et al., 2022).

The problem of using multimedia technologies to train future teachers is insufficiently studied. The use of multimedia technologies in training future art teachers has been researched in some aspects (Davydova, 2017). In particular, this study examines the possibilities of enhancing visibility, creating a professionally oriented learning environment and updating feedback using multimedia tools. The effectiveness of multimedia technologies in visualisation and ensuring quality communication has also been studied in training future English teachers (Rohulska, 2018). The specifics of using multimedia presentations in the training of primary school teachers have been identified (Filatova & Drobina, 2021).

At the same time, the impact of multimedia technologies on building the methodological competence of future teachers remains poorly studied. The problem's significance is exacerbated by the exceptional relevance of methodological training in education (Chernenko, 2021). Therefore, the study of multimedia resources as a factor in building the methodological competence of future teachers has theoretical and practical relevance for the pedagogical field.

The aim of the article is to determine the effectiveness of using multimedia technologies for building the methodological competence of future teachers.

The research objectives:

1) analyse the possibilities and principles of using multimedia technologies in higher education;
2) determine the criteria and indicators of the level of methodological competence of future teachers;
3) determine the effectiveness of the use of multimedia resources for developing the ability to interpret texts in students of different years of study critically.

Literature Review

General understanding of multimedia technologies

Multimedia resources are the results of computer technologies manifested in a wide range of products: presentations, animations, multimedia galleries, game applications, video and audio files, e-books, online lessons, virtual and augmented reality (Sayidova & Do'sanova, 2022; Srivani & Hariharasudan, 2020). The main feature of these tools is the targeting of information to different areas of the brain, which activates visual, auditory and kinesthetic sensations with the help of information technologies (Alobaid, 2020). This is achieved through the comprehensive integration of text, audio, and video signals (Guan, Song & Li, 2018). The effectiveness of the use of these products is related to the awareness of their importance and learning the algorithm of use (Tang, Zainal & Li, 2023).

The use of multimedia technologies in education

The integration of multimedia technologies into the educational process optimizes communication between teachers, parents and students, as well as to ensure the flexibility of the educational process (Anderson & Rivera Vargas, 2020). Their methodologically justified use actualizes creative abilities, develop critical thinking and the ability to solve universal problems (Alzubi, 2023). There is also a positive effect on the students' motivation, which corresponds to the principles of human-computer integration in the context of Education 4.0 (Dhivya, Hariharasudan & Nawaz, 2023). The researchers have recorded intensive stimulation of cognitive interest in multimedia learning (Akinoso, 2020). Multimedia games satisfy the need for new experiences, allow to overcome tension and optimize the environment for the achievement of pedagogical goals (Kartika et al., 2019). An individual learning experience that meets the students' needs and motivations determines the creation of the cooperation and teamwork environment that ensures proper intercultural communication (Gajek et al., 2022). Multimedia technologies determine immersion in the educational process of technology, which contributes to the acquisition of not only educational, but also relevant skills and abilities for socialization (Oliveira & Saraiva, 2023). Informatization and computerization of higher education should take into account the potential impact on the students' academic performance and discipline and be based on methodological developments in view of sociocultural conditions (Chugh et al., 2023).

The use of multimedia technologies in higher education

The effective implementation of multimedia technologies in higher education is ensured by such components as teacher competence, teaching methods, information and communication technologies (ICTs), and the technological infrastructure of the institution (Mayer, 2020; Miranda et al., 2021). In this context, a particularly positive point is the role of technology in optimizing the students' individual learning trajectory (Qureshi et al., 2021). The integration of multimedia technologies in higher education should be based on the appropriate training of teachers (Pastore, Manuti & Scardigno, 2019), which involves the ability to adapt traditional teaching methods to the current information environment (Aydın & Uştuk, 2020). This ensures the orientation of the educational process towards students' practical abilities and skills in accordance with the current and the near future requirements (Matsumoto-Royo & Ramírez-Montoya, 2021). An important task is the purposeful, systematic work of the administration of HEIs in this direction (Adlet et al., 2022). The problem of using multimedia technologies in the professional training of future specialists is of particular relevance. The implementation of video materials is effective for this process

(Noetel et al., 2021). Professional training in the context of the use of multimedia resources involves the implementation of preparatory, main and supporting stages, which is reflected in theoretical, practical, and control training blocks (Kashuba, Asauliuk & Diachenko, 2019). Multimedia presentations, interactive whiteboards, and electronic textbooks have proven effective in training future teachers (Filatova & Drobina, 2021). Multimedia technologies in the process of education of future teachers activate feedback, increase creativity, and ensure better assimilation of educational material (Rohulska, 2018).

So, the theoretical literature review shows that the problem of using multimedia technologies in the educational process is represented by a fairly large number of works. The study of their implementation in higher education is relevant. Such research focuses on multimedia technologies as visualisation tools in the training of specialists. However, researchers mainly focus on the problems of enhancing students' knowledge in the context of an interactive environment. At the same time, research into the possibilities of multimedia resources for building the methodological competence of future teachers is not deep enough. The analysed theoretical literature does not identify clear links between implementing multimedia technologies and forming professional competence and self-awareness of a pedagogical specialist. Abstract theoretical schemes often do not find specific use in practical areas of higher education. The proposed study allows us to identify causal trends in the technological support of professional training and professional development of students in the pedagogical field.

Methods and materials

The study was conducted in the period from September 2023 to February 2024 with the following *stages*:

Research planning – development of an algorithm for carrying out the research. At this stage, the theoretical literature of the issue under research was analysed. The general features of the use of multimedia technologies in professional training in the context of higher education were determined. The structure of methodological competence of future teachers was been determined separately (Chornous, 2020; Patyk et al., 2022). It includes the following components: motivational (professional motives), cognitive (knowledge about the implementation of teaching methods), activity (specific abilities and skills of methodological training), reflective (introspection of one's own teaching). The research hypothesis is advanced — a theoretically and methodologically justified system of using multimedia technologies in the educational process of future teachers is an effective factor in building their methodological competence. The organizational aspects are also defined at the research planning stage: research bases, samples, tools, specifics of data collection and analysis.

The empirical stage included the primary diagnostic test, experimental influence, and repeated diagnostic test. The data on the influence of multimedia technologies on the methodological training of future teachers were collected. The standard academic scheme of a formative experiment was implemented. This stage was implemented in the context of the natural science paradigm.

The data processing and interpretation stage included quantitative and qualitative analysis of the obtained data. Trends in each component of the methodological competence of future teachers were analysed. Thorough statistical and interpretive methods were used in order to obtain reliable results. At this stage, the data of the first and second diagnostic tests were compared for the control group (CG) and the experimental group (EG).

Instruments

Such tests as The Level of Satisfaction with the Profession and Self-Assessment of the Level of Ontogenetic Reflection were used. These methods were used to determine the dynamics of the motivational and

reflective component of methodological competence. We were guided by the reasoning that the general development of reflection will determine the level of professional self-analysis. Specialized tests were also used to diagnose knowledge about the implementation of the teaching methodology for a specific subject, which reflected indicators of the cognitive component of methodological competence.

Observation was used to determine the level of formation of the activity component. This method will be implemented in the process of students' educational practice, when there was an opportunity to check the peculiarities of conducting an educational session. We focused on the following criteria in the monitoring process — academic knowledge of the subject, compliance of the model's activities with the structure of the lesson, the implementation of communication with children, the level of use of teaching methods in class. The level of the activity component was determined based on the observation of these criteria. The validity and reliability of the selected diagnostic tools is confirmed by an independent expert evaluation.

Expert evaluation was also used to clarify the data. Teachers with more than 20 years of experience were involved as experts. These individuals did not directly participate in the formative experiment, but conducted independent diagnostics. The experts had to evaluate two criteria of methodical preparation: academic didactic and psychological. The academic didactic criterion reflected the knowledge of the academic subject and the methodological foundations of teaching the educational material. The psychological component showed the level of mastery of communication techniques with students and the ability to take into account their individual and age characteristics in the educational process. The assessment was carried out on a 10-point scale.

A pedagogical formative experiment is the main method of our research, which enabled testing our hypothesis. The independent variable of the experiment is a methodologically justified system of using multimedia technologies during classes. The dependent variable of the experiment is the methodological competence of future teachers. The experiment involved an experimental sample (the presence of an independent variable) and a control sample (the absence of an independent variable). The method is realized in the paradigm of a natural experiment.

Sampling

The sample was formed on the basis of the following educational institutions: Yuriy Fedkovych Chernivtsi National University, Borys Grinchenko Kyiv Metropolitan University, Ternopil Volodymyr Hnatiuk National Pedagogical University, Vasyl Stefanyk Precarpathian National University, Dragomanov Ukrainian State University. The study involved the students of the 3rd-4th year majoring in Secondary Education, specialized in Philology. The samples were formed on the basis of academic groups of students of the respective majors. The entire territory of Ukraine were covered by selecting the subjects from different universities, which will increase the representativeness of the study. The naturalness of the research conditions was preserved as much as possible due to work with selected academic groups. The experimental sample included 94 people, the control sample included 92 people (a total of 186 people). The samples are significantly dominated by female students (174 persons – 94.09%), which reflects the gender specifics of this major. A total of 11 young men (5.91%) participated in the study. The average age of the subjects is 19–21 years.

Data collection

The research and diagnostics were carried out by the authors of the article. The experimental influence provided for the systematic use of multimedia technologies within the educational components of the respective majors. In the CG, training took place in similar subjects, but without an extensive involvement of multimedia technologies. The experimental influence was carried out in accordance with a number of principles of methodical training, which should be analysed in more detail:

- the principle of motivational provision of the educational process - the implementation of information technologies contributed to the intensification of educational activities through the demonstration of video files and presentations;
- the principle of value orientation – substantiation in the educational process of the importance of acquired competences;
- the principle of vital expediency and effectiveness of knowledge — the use of multimedia technologies helped to activate the connection between theory and practice;
- the principle of intensification of cognitive activity is implemented through the constant use of the problem-based method, which is enhanced by the possibilities of multimedia technologies;
- the principle of directing education towards harmonious development;
- the principle of cooperation and mutual support - support for constant feedback regarding the nature and results of training;
- the principle of personal activity - ensuring the constant implementation of educational and cognitive activities in the learning process;
- the principle of individualization of the educational process is implemented through the differentiation of tasks according to the level of difficulty for students;
- the principle of organic unity of a person, speech and the learning process is reflected in the ability of multimedia technologies to activate various sensory systems.

The experimental programme actively used the capabilities of Web 2.0 technologies. The total time share of their use within the class is 60-70%. At the same time, it is worth noting that the training sessions took place in direct interaction. The experimental effect was implemented within four months.

The data analysis was carried out due to the quantitative and qualitative comparison of the results of primary and secondary diagnostics of the control and experimental groups. The proportional shares and indicators of the average value was calculated. The Student's t-test was calculated using the SPSS software package.

Results

The analysis of the obtained data of the primary diagnostics demonstrates the maximum initial similarity of both research samples. The indicators in the context of comparing the trends of the CG and EG are presented in Table 1.

Table 1.
Dynamics of indicators of the components of methodological competence of future teachers under the influence of multimedia technologies

Components of professional competence	Development levels	Number of respondents							
		CG				EG			
		Before the experiment		After the experiment		Before the experiment		After the experiment	
		%	Q-ty	%	Q-ty	%	Q-ty	%	Q-ty
Motivational	Low	54.35	50	48.91	45	51.06	48	2.13	2
	Medium	42.39	39	43.48	40	43.62	41	92.55	87
	High	3.26	3	7.61	7	5.32	5	5.32	5
Cognitive	Low	6.52	6	4.35	4	6.38	6	4.26	4
	Medium	65.22	60	63.04	58	65.96	62	54.26	51
	High	28.26	26	32.61	30	27.66	26	41.48	39
Activity	Low	10.87	10	3.26	3	12.77	12	4.26	4
	Medium	76.09	70	53.26	49	71.28	67	60.64	57

	High	13.04	12	43.48	40	15.95	15	35.1	33
Reflective	Low	36.96	34	34.78	32	31.91	30	31.91	30
	Medium	61.96	57	61.96	57	63.83	60	63.83	60
	High	1.08	1	3.26	3	4.26	4	4.26	4

Author's development

In both samples, a low level of professional motivation prevails at the beginning of the study. Such indicators were found in more than half of the subjects. Very few students with a high level of the component were found — 8 people in the total sample. Average values of the motivational component of methodological competence were recorded in approximately 40%. Re-diagnostics showed an insignificant change in results in the CG. At the same time, in the experimental group there is a very significant shift of students with a medium level of the component - by 48.93%. Accordingly, low indicators of the motivational component of methodological competence have significantly decreased. Comparing the results of both samples gives reason to talk about the significance of the use of multimedia technologies in this component. We can state that the use of audio and video files on the subject of educational courses stimulated the students' cognitive interest. In our opinion, the activation of students' motivation occurs through the systematic stimulation of sensory systems and the actualisation of problematic teaching of material. However, multimedia technologies lack the resources to target high levels of motivation, as they only average the levels studied.

The trends of the cognitive component are analysed below. The vast majority of respondents (more than 60%) have medium indicators of this component of methodological competence. A third of future teachers were diagnosed with high indicators of the component. The smallest percentage of respondents shows low professional motivation. In the CG, no significant dynamics of the component was observed after the end of the experiment. At the same time, the number of studied students with high indicators of methodological knowledge in the pedagogical field increased by 13.82% in the EG. In general, the results indicate a moderate impact of multimedia technologies on the acquisition of theoretical knowledge by future teachers. In this context, we are talking about enhancing visibility possibilities in the multimedia environment to form a holistic view of the methods of teaching future teachers. The visual and auditory components of learning material are stimulated, which correlates with the formation of relevant abstract theoretical schemes.

The trends of the activity component are the following. Medium levels of the abilities and skills of methodical training of the studied students were found in more than 70% of the sample. Low and high values of this component of methodological competence were distributed almost equally. A significant positive shift in the activity component was recorded in both groups. After the experiment, the percentage of people with a high level of methodical skills in the control group increased by 30.44%. In the experimental group, this indicator is 19.15%. That is, positive changes in this component do not depend on the organized influence of multimedia technologies. That is, the formation of specific professional skills is more effective in implementing direct pedagogical situations. Using multimedia technologies creates an imitation effect of practical training, which hinders the productive learning of algorithms of teachers' methodological actions.

The trends of the reflective component are analysed below. Medium levels dominate. Low values were found in a third of the respondents. The results did not change significantly after conducting the formative experiment. Therefore, the use of multimedia technologies does not have a significant impact on the reflective component of methodological competence. Traditional vocational education is not focused on systemic changes in the professional identity of future teachers. This requires a shift in the strategic approach to teacher education. Since multimedia technologies are an auxiliary tool, they cannot change the overall education paradigm.

A corresponding diagram was created for clarity of demonstration of the results of expert evaluation during the experiment (Figure 1). In the figure, the order of diagnostic procedures is indicated by a number: 1 – primary diagnostics; 2 – re-diagnostics.

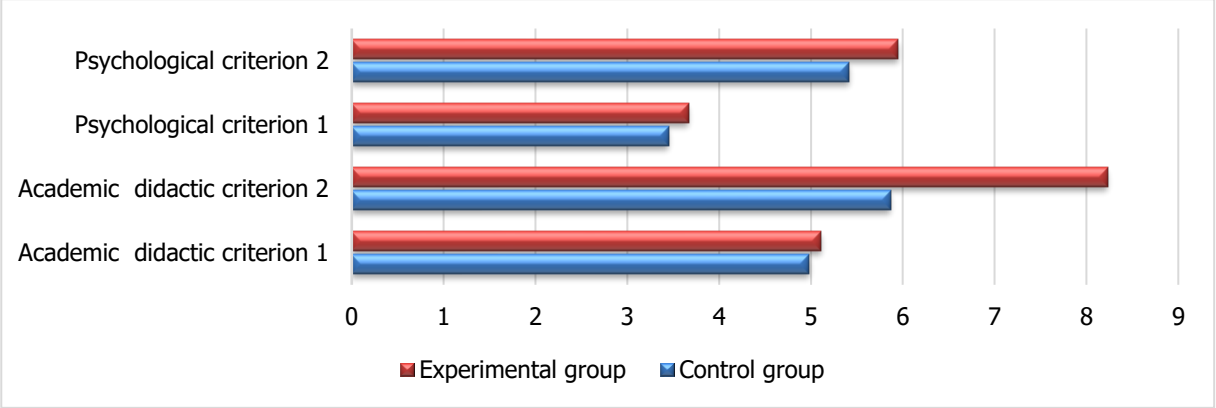

Figure 1. Indicators of criteria for methodical competence of future teachers (primary diagnostics and re-diagnostics)
Author's development

The chart demonstrates changes in the academic didactic and psychological criteria of methodological competence. Arithmetic means are taken as a basis. The predominance of medium values for the academic didactic component was revealed. More pronounced changes in this criterion are recorded in the EG. According to the psychological criterion of methodical competence, a predominance of below-medium indicators was found. In both groups, moderate positive dynamics are observed as a result of the experimental program using multimedia technologies. The psyche of the studied students is more sensitive to multimedia tools, which can be explained in this situation by the systemic activation of sensory systems as the initial link in the process of acquiring professional competencies.

Table 2.
The value of Student's t-test according to the components of methodological competence of future teachers

Components of professional competence	Student's t-test	
	Control group	Experimental group
Motivational	1.738	4.009**
Cognitive	1.395	2.330*
Activity	3.198**	3.543**
Reflective	1.391	1.006

Author's development

The Student's t-test for dependent samples was used to confirm the previous conclusions. The obtained coefficient for the motivational component in the CG indicates the absence of significant changes (t=1.738). At the same time, statistically significant differences were found in the EG at the p=0.01 level (t=4.009). The cognitive component in the CG has not changed significantly (t=1.395), but has significant shifts in the EG (t=2.330, p=0.05). The obtained coefficients of the Student's t-test for the activity component of methodological competence indicate significant shifts in both groups (t=3.198, p=0.01; t=3.543, p=0.01). According to the trends of the reflective component, no significant differences were recorded (t=1.391; t=1.006). The obtained results of the statistical analysis confirm the results of the previous descriptive analysis.

Analysis of the qualitative characteristics of the conducted formative experiment shows a number of trends revealed in the process of observations. Setting up a problem situation and stimulating cognitive interest were more effective as a result of the activation of complex perceptions of information through the use of multimedia technologies. The use of multimedia presentations combining a video series, pictures, and text blocks (verbal logical schemes) is more pedagogically justified than text presentations. The presence of a verbal component stimulates theoretical thinking, and a visual component causes positive emotional experiences. In the context of practical training, the use of multimedia needs further optimization towards interactivity. Difficulties in orienting the pedagogical education system to real interaction are observed. The development potential of multimedia technologies is revealed through the stimulation of positive emotions in the process of solving problems. Compared to traditional education, computer technologies create more opportunities for the individualization of educational theoretical training due to the use of game elements. At the same time, teachers need to ensure that the emotional component of game-based multimedia methods does not interfere with the performance of professional training tasks. It should be noted that the current study's results were more representative, using more reliable research methods. This determines the need for further development of tools for diagnosing the components of methodological competence, which involves preliminary testing of such tools.

Discussion

The research confirmed the hypothesis that a theoretically and methodically justified system of using multimedia technologies in the educational process of future teachers is an effective factor in building of their methodological competence. In particular, the impact of multimedia tools on the development of the motivational and cognitive component of the studied competence is quite significant. At the same time, no significant changes were recorded in the CG. We can assume that traditional education is more inert in terms of the development of professional competencies. At the same time, multimedia technologies provide the necessary additional stimulus for students' cognitive interest and work on themselves. The connection between the motivational and cognitive components of the methodological competence of future teachers is also obvious.

The formation of methodological abilities and skills does not significantly depend on the use of multimedia technologies, as it is more determined by the regular implementation of a system of practical actions. It may also be related to the active period of practical training of the surveyed students. Reflection does not change significantly in the educational process. In general, we confirm the conclusions of other researchers about the effectiveness of the implementation of multimedia technologies in higher education (Riznyk, 2021). These tools create favourable psychological conditions in the educational process (Saini & Baba, 2024). It should be noted that the main stages of the implementation of information technologies are preserved in the formative influence: preparatory, main, control (Kashuba et al., 2019).

We agree with the opinions about the positive impact of video materials for professional training of future specialists (Noetel et al., 2021). Multimedia presentations and interactive whiteboards demonstrated their effectiveness in the development of methodological competence (Filatova & Drobina, 2021). One of the leading factors of the positive role of multimedia technologies in educational training is their systemic impact on various sensory systems (Alobaid, 2020). It is promising to improve the used pedagogical tool when designing an environment based on the Education 4.0 principles (Dhivya et al., 2023). According to the results of our research, we can state the importance of modern technologies for the individualization of education (Kartika et al., 2019). In the future, similar pedagogical systems should more actively involve the possibilities of virtual reality and artificial intelligence to increase the immersive effect (Oliveira & (Saraiva, 2023). It is also worth to train teachers in the use of multimedia technologies in the educational process (Pastore et al., 2019).

Limitations

The research was conducted with students studying to become Philology teachers. The obtained results will be more fair for the specified group of future specialists.

Conclusions

Methodical training of future teachers is one of the key factors in their professional development. In this context, the role of modern information tools for optimizing the professional training of students of pedagogical majors has not been sufficiently studied. As a result of the study, the hypothesis that a theoretically and methodically justified system of using multimedia technologies in the educational process of future teachers is an effective factor in the development of their methodical competence was confirmed. The primary diagnostics revealed the dominance of medium indicators of the methodological competencies. The significant impact of multimedia tools on the motivational and cognitive component was revealed. At the same time, significant changes in these components are not observed in the CG. The activity and reflective components of methodological competence does not depend on the use of multimedia technologies. The multimedia training system was used in accordance with the principles of methodological training of future specialists. Multimedia technologies help to stimulate cognitive interest and more productive acquisition of professional knowledge of methodological competence. This is due to the systematic activation of students' sensory systems. At the same time, the formation of the ability to self-analysis, self-development, and practical skills of methodological competence in multimedia technologies is not observed. The study's results are limited by the composition of the sample and the methodological tools used. The practical significance of the study is the possibility of changing the content and methodology of educational programmes of pedagogical majors. It is necessary to consider the possibility of increasing the efficiency of multimedia technologies to form the activity and reflective components. The solution to this issue lies, in particular, in the integration of artificial intelligence and virtual reality technologies into the technological rationale of higher education. The results can also be used in advanced training courses for teachers of HEIs. The research prospects may be the verification of the basic hypothesis on a wider range of students. In particular, future teachers of natural and social sciences may be involved.

Bibliographic References

Abdulrahaman, M. D., Faruk, N., Oloyede, A. A., Surajudeen-Bakinde, N. T., Olawoyin, L. A., Mejabi, O. V., Imam-Fulani, Y. O., Fahm, A. O., & Azeez, A. L. (2020). Multimedia tools in the teaching and learning processes: A systematic review. *Heliyon,* 6, e05312. https://doi.org/10.1016/j.heliyon.2020.e05312

Adlet, K., Zhanagul, S., Tolkin, Y., Fadeyeva, O., Nazymgul, A., & Kadir, N. (2022). Interactive educational technologies as a factor in the development of the subjectivity of university students. *World Journal on Educational Technology: Current Issues*, *14*(3), 533-543. https://doi.org/10.18844/wjet.v14i3.7269

Akinoso, O. (2020). Effect of the use of multimedia on students' performance in secondary school mathematics. *Global Media Journal*, 16(30), 1-8. Retrieved from https://www.researchgate.net/publication/341741472

Alobaid, A. (2020). Smart multimedia learning of ICT: Role and impact on language learners' writing fluency – YouTube online English learning resources as an example. *Smart Learning Environments*, *7*(1), 24. https://doi.org/10.1186/s40561-020-00134-7

Alzubi, A. (2023). The role of multimedia tools in Hashemite Kingdom of Jordan education classroom teaching in the digital era. *European Journal of Interactive Multimedia and Education*, *4*(2), e02303. https://doi.org/10.30935/ejimed/13378

Anderson, T., & Rivera Vargas, P. (2020). A critical look at educational technology from a distance education perspective. *Digital Education Review*, *37*, 208-229. https://doi.org/10.1344/der.2020.37.208-229

Aydın, S., & Uştuk, Ö. (2020). A descriptive study on foreign language teaching anxiety. *International Online Journal of Education and Teaching*, *7*(3), 860-878. Retrieved from https://iojet.org/index.php/IOJET/article/view/846

Bhat, A. Z., Naidu, V. R., & Singh, B. (2018). Multimedia cloud for higher education establishments: A reflection. *Advances in Intelligent Systems and Computing, 841*, 691-698. https://doi.org/10.1007/978-981-13-2285-3_81

Chernenko, H. M. (2021). Formation of subject-methodical competence in future teachers of primary education institutions. *Collection of Scientific Works "Pedagogical Sciences", 91*, 129-134. https://doi.org/10.32999/ksu2413-1865/2021-94-18

Chornous, V. (2020). The main criteria and indicators of the formation of professional competence of students of pedagogical specialties. *Current Issues of the Humanities*, *31*(4), 232-237. https://doi.org/10.24919/2308-4863.4/31.214390

Chovriy, S., Pelekh, V., Rogoza, V., Zorochkina, T., & Zdir, D. (2024). Organization of a STEM-oriented environment in higher education institutions. *Amazonia Investiga, 13*(76), 333-347. https://doi.org/10.34069/AI/2024.76.04.27

Chugh, R., Turnbull, D., Cowling, M. A., Vanderburg, R., & Vanderburg, M. A. (2023). Implementing educational technology in Higher Education Institutions: A review of technologies, stakeholder perceptions, frameworks and metrics. *Education and Information Technologies*, *28*, 16403-16429. https://doi.org/10.1007/s10639-023-11846-x

Davydova, S. (2017). The use of multimedia technologies in the training of fine arts teachers. *Information Technology and Management*, *132*, 67-77. Retrieved from https://www.researchgate.net/publication/329520251

Deineko, Z., Sotnik, S., & Lyashenko, V. (2022). Multimedia systems in education. *International Journal of Academic Information Systems Research (IJAISR), 6*(7), 23-28.

Dhivya, D. S., Hariharasudan, A., & Nawaz, N. (2023). Unleashing potential: Multimedia learning and Education 4.0 in learning professional English communication. *Cogent Social Sciences*, *9*(2). https://doi.org/10.1080/23311886.2023.2248751

Filatova, L., & Drobina, A. (2021). The use of multimedia technologies in the training of future primary school teachers. *Acta Paedagogica Volynienses*, *3*, 157-165. https://doi.org/10.32782/apv/2021.3.23

Gajek, A., Fabiano, B., Laurent, A., & Jensen, N. (2022). Process safety education of future employee 4.0 in industry 4.0. *Journal of Loss Prevention in the Process Industries*, *75*, 104691. https://doi.org/10.1016/j.jlp.2021.104691

Guan, N., Song, J., & Li, D. (2018). On the advantages of computer multimedia-aided English teaching. *Procedia Computer Science*, *131*, 727-732. https://doi.org/10.1016/j.procs.2018.04.317

Haleem A., Javaid M., Asim Qadri, M., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers, 3,* 275-285. https://doi.org/10.1016/j.susoc.2022.05.004

Horbatiuk, O., & Polishchuk, S. (2023). Features of the functioning of higher education institutions during the war: face-to-face and distance forms of education, their key advantages and disadvantages. *Modern Information Technologies and Innovation Methodologies of Education in Professional Training Methodology Theory Experience Problems*, *66*, 5-13. https://doi.org/10.31652/2412-1142-2022-66-5-13

Kartika, Y., Wahyuni, R., Sinaga, B., & Rajagukguk, J. (2019). Improving math creative thinking ability by using math adventure educational game as an interactive media. *In Journal of Physics: Conference Series, 1179*(1), 012078. https://doi.org/10.1088/1742-6596/1179/1/012078

Kashuba, V. O., Asauliuk, I. O., & Diachenko, A. (2019). Increasing the effectiveness of professional and applied physical training of students based on the use of multimedia technologies. *Scientific Journal of the National Pedagogical University named after M. P. Drahomanov. Series 15: Scientific and*

Pedagogical Problems of Physical Culture (Physical Culture and Sport): Collection of Scientific Papers, *1*(107), 25-29. Retrieved from http://enpuir.npu.edu.ua/handle/123456789/26359

Matsumoto-Royo, K., & Ramírez-Montoya, M. S. (2021). Core practices in practice-based teacher education: A systematic literature review of its teaching and assessment process. *Studies in Educational Evaluation*, *70*, 101047. https://doi.org/10.1016/j.stueduc.2021.101047

Mayer, R. E. (2020). *Multimedia learning* (3rd ed.). Cambridge: Cambridge University Press. Retrieved from https://assets.cambridge.org/97811071/87504/frontmatter/9781107187504_frontmatter.pdf

Miranda, J., Navarrete, C., Noguez, J., Molina-Espinosa, J. M., Ramírez-Montoya, M. S., Navarro-Tuch, S. A., Bustamante-Bello, M. R., Rosas-Fernández, J. B., & Molina, A. (2021). The core components of education 4.0 in higher education: Three case studies in engineering education. *Computers and Electrical Engineering*, *93*, 1-13. https://doi.org/10.1016/j.compeleceng.2021.107278

Noetel, M., Griffith, S., Delaney, O., Sanders, T., Parker, P., del Pozo Cruz, B., & Lonsdale, C. (2021). Video improves learning in higher education: A systematic review. *Review of Educational Research*, *91*(2), 204-236. https://doi.org/10.3102/0034654321990713

Oliveira, S. R. M., & Saraiva, M. A. (2023). Leader skills interpreted in the lens of education 4.0. *Procedia Computer Science*, *217*, 1296-1304. https://doi.org/10.1016/j.procs.2022.12.327

Pastore, S., Manuti, A., & Scardigno, A. F. (2019). Formative assessment and teaching practice: The point of view of Italian teachers. *European Journal of Teacher Education*, *42*(3), 359-374. https://doi.org/10.1080/02619768.2019.1604668

Patyk, R., Benyakh, N., Yakymova, O., Yefimova, A., & Danylyuk, S. (2022). The use of information technology in the educational process during martial law. *Revista de la Universidad del Zulia*, *38*, 696-713. http://dx.doi.org/10.46925//rdluz.38.38

Qureshi, M. I., Khan, N., Raza, H., Imran, A., & Ismail, F. (2021). Digital technologies in Education 4.0. Does it enhance the effectiveness of learning? A systematic literature review. *International Journal of Interactive Mobile Technologies (iJim)*, *15*(4), 31-47. https://doi.org/10.3991/IJIM.V15I04.20291

Riznyk, N. (2021). Use of multimedia technologies during distance learning in higher education institutions. *University Economic Bulletin*, *50*, 12-17. https://doi.org/10.31470/2306-546X-2021-50-12-17

Rohulska, O. (2018). The expediency of using multimedia technologies in the training of future teachers of foreign languages. *Youth and the Market, 12*(167), 82-87. https://doi.org/10.24919/2308-4634.2018.155508

Saini, G., & Baba, M. M. (2024). Psychological expedient of multimedia in blended learning and metamemory satisfaction. *The Learning Organization*, *31*(1), 68-87. https://doi.org/10.1108/TLO-11-2022-0130

Sayidova, D., & Do`sanova, M. (2022). Use of multimedia in education. *Conference Zone*, 165-167. Retrieved from https://conferencezone.org/index.php/cz/article/view/479

Shunkov, V., Shevtsova, O., Koval, V., Grygorenko, T., Yefymenko, L., Smolianko, Y., & Kuchai, O. (2022). Prospective directions of using multimedia technologies in the training of future specialists. *IJCSNS International Journal of Computer Science and Network Security, 22*(6), 739-746.

Srivani, V., & Hariharasudan, A. (2020). Modern techniques of English language learning using Education 4.0. *International Journal of Recent Technology and Engineering*, *8*(4S4), 73-76. https://doi.org/10.35940/ijrte.d1027.1284s419

Tang, X., Zainal, S. R. B. M., & Li, Q. (2023). Multimedia use and its impact on the effectiveness of educators: A technology acceptance model perspective. *Humanities and Social Sciences Communications*, *10*, 923. https://doi.org/10.1057/s41599-023-02458-4

Wallner, T., & Wagner, G. (2016). Academic Education 4.0. *International Conference on Education and New Developments,* 155-159. Retrieved from https://www.researchgate.net/publication/304115292

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.15
Cómo citar:
Kharytonova, T., Hryhorieva, K., Kanivets, L., Platonova, Y., & Karpinska, N. (2024). Peculiarities of teaching disciplines on environmental and legal topics during the martial law in Ukraine. *Revista Eduweb*, 18(2), 209-221. https://doi.org/10.46502/issn.1856-7576/2024.18.02.15

Peculiarities of teaching disciplines on environmental and legal topics during the martial law in Ukraine

Peculiaridades de la enseñanza de disciplinas sobre temas ambientales y legales durante la ley marcial en Ucrania

Tetiana Kharytonova
https://orcid.org/0000-0002-7998-5089
Odesa Law Academy National University, Fontanskaya road, Odesa, Ukraine.
Khrystyna Hryhorieva
https://orcid.org/0000-0001-7659-2178
Odesa Law Academy National University, Fontanskaya road, Odesa, Ukraine.
Lyudmyla Kanivets
https://orcid.org/0000-0002-8866-4527
Odesa Law Academy National University, Fontanskaya road, Odesa, Ukraine.
Yevheniia Platonova
https://orcid.org/0000-0002-5688-7857
Odesa Law Academy National University, Fontanskaya road, Odesa, Ukraine.
Nataliia Karpinska
https://orcid.org/0000-0001-9658-3623
Pomeranian Higher School, Poland.

Recibido: 03/04/24
Aceptado: 01/06/24

Abstract

The article investigates the problems and prospects of teaching environmental legal disciplines under the conditions of martial law in Ukraine. The purpose of the study is to examine the problems and prospects of teaching environmental legal disciplines under the conditions of martial law in Ukraine. Research methodology includes such methods as analysis method, comparative method, forecasting method, and logical methods. Various approaches to the teaching of the above-mentioned disciplines in the conditions of martial law were analyzed, and the degree of importance and interest in them was determined, which allows us to state that all legal relations that make up the relevant subject of each of the studied legal disciplines were negatively, and sometimes critically, affected in the conditions of martial law. Since February 24, 2022 (since the introduction of martial law on the territory of Ukraine), most of the specified legal relations have been significantly limited, and sometimes even blocked (for example, land and agrarian ones). The existing situation required a quick reorientation in the teaching of relevant legal disciplines. Conclusions are made regarding the development prospects of each discipline.

Keywords: agrarian law, alternative energy law, environmental law, natural resource law, land law.

Resumen

El artículo investiga los problemas y perspectivas de la enseñanza de disciplinas jurídicas ambientales bajo las condiciones de la ley marcial en Ucrania. El objetivo del estudio es examinar los problemas y perspectivas de la enseñanza de disciplinas jurídicas ambientales bajo las condiciones de la ley marcial en Ucrania. La metodología de investigación incluye métodos como el método de análisis, el método comparativo, el método de pronóstico y los métodos lógicos. Se analizaron diversos enfoques de la enseñanza de las disciplinas mencionadas en las condiciones de la ley marcial y se determinó el grado de importancia e interés en las mismas, lo que permite afirmar que todas las relaciones jurídicas que conforman la materia relevante de cada una de Las disciplinas jurídicas estudiadas se vieron afectadas negativamente, y a veces de manera crítica, en las condiciones de la ley marcial. Desde el 24 de febrero de 2022 (desde la introducción de la ley marcial en el territorio de Ucrania), la mayoría de las relaciones legales especificadas se han limitado significativamente y, a veces, incluso se han bloqueado (por ejemplo, las relacionadas con la tierra y las agrarias). La situación existente requería una rápida reorientación en la enseñanza de las disciplinas jurídicas pertinentes. Se extraen conclusiones sobre las perspectivas de desarrollo de cada disciplina.

Palabras clave: derecho agrario, derecho de energías alternativas, derecho ambiental, derecho de recursos naturales, derecho de tierras.

Introduction

The threats require the development of new legal solutions and practical steps aimed at ensuring the functioning of land, agrarian, ecological, natural resource, energy legal relations, and legal relations in the field of alternative energy. The military aggression is a negative factor affecting all important areas of life and health of the population of Ukraine. Thus, we are already seeing the terrible consequences of the negative impact on water bodies, including the Black Sea ecosystem, which is a consequence of oil pollution, organic pollution due to the destruction of the wastewater treatment system, and noise pollution that injures marine fauna. Military actions lead to the destruction of forests, pollution of air, soil, and land, disturbance of landscapes of territories and objects of the nature reserve fund, the condition of which is critical, and destruction of objects of flora and fauna. The risks of emergencies of critical infrastructure facilities and increased nuclear danger, etc., are increasing. Food security, as a state in which the population has physical and economic access to a sufficient amount of safe food, which is an integral component of Ukraine's national security, is also under great threat. All these problems are related to the future life not only of the population of Ukraine but also, without exaggeration, of the whole world.

The introduction of martial law in Ukraine, in accordance with the decree of the President of Ukraine, dated February 24, 2022, No. 64/2022, in connection with the military aggression of the Russian Federation (Law 2102-IX, 2022; Resolution 480, 2022) fundamentally changed the procedure for the implementation of the above-mentioned legal relations in our country, which undoubtedly affects the relevant industries as well.

In view of this, the purpose of the study is to clarify the problematic issues and prospects of teaching environmental legal disciplines in the conditions of martial law in Ukraine.

The object of the study is to the problems and prospects of studying environmental legal disciplines under the conditions of martial law in Ukraine.

The tasks of the research are:

1. Analysis of land, agrarian, ecological, natural resource, energy legal relations, and legal relations in the

field of alternative energy under martial law and their influence on the possibility of teaching environmental legal disciplines under martial law in Ukraine.
2. Analysis of the current state of teaching environmental legal disciplines under martial law in Ukraine, identifying the main problems faced by teachers and students during the study of these disciplines during martial law, and studying the impact of martial law on the effectiveness and accessibility of the educational process in the field of environmental law.
3. Development of proposals for improving the methods of teaching environmental legal disciplines, increasing the interest of students and teachers in this educational process.

The teaching of environmental legal disciplines is critically important in wartime, as the training of specialists in environmental law contributes to the solution of numerous challenges related to the restoration and protection of the environment. Improving teaching methods and supporting the educational process will help ensure the training of competent specialists who will be able to work effectively in the conditions of post-war reconstruction of Ukraine. Among the problems is that the instability of the Internet connection makes it difficult to conduct classes; lack of access to educational materials and technical equipment reduces the effectiveness of the educational process. Teachers and students experience constant stress and anxiety due to hostilities, which negatively affects concentration and motivation. Many students and teachers are forced to move, which creates additional challenges for the organization of the educational process.

Theoretical Framework or Literature Review

To study the problematic issues and perspectives of teaching environmental legal disciplines under martial law in Ukraine, the works of the following scholars were studied:

In his work, Ilkiv (2023) analyzed the problems of implementing individual organizational and legal forms of environmental security under martial law and the prospects for their improvement. Therefore, to ensure the recovery of Ukraine in the context of socio-economic planning, which considers the climate goals of the European Union, it is necessary to create a mechanism that contributes to the reduction of greenhouse gas emissions and adaptation to climate change.

The research of Zarzhytskyi (2012) investigated the relevance of problems related to the legal support of Ukraine's environmental policy, including methodological and legal measures, the genesis and mechanisms of this policy, the priority directions of the state's environmental activities, and the legal regulation of environmental quality as a strategic aspect of Ukraine's environmental policy. Legal forms and methods of ensuring the quality of the environment were also studied.

Moreover, Zhadan (2023) noted that ensuring the rational use of natural resources is of great importance in the implementation of regional environmental policy. This involves the creation of an interdisciplinary scientific and practical institute, which has economic and ecological components in its composition. For a long time, it was believed that the rational use of resources means their economic profitability in the field of nature management. However, in research and policy, the understanding of this concept can vary depending on the context and approach.

To add, Kirin (2023) analyzed the problems of urban environmental law. The industrial paradigm of development has led to the depletion of natural resources, the destruction of ecosystems, and the disruption of natural balance. Rejection of the main negative aspects of this model caused a creative search by world leaders and scientists, which led to the formulation and consolidation of the concept of sustainable development in UN documents.

What is more, Kostytskyi (2003) analyzed the theoretical provisions regarding the ecology of the transition

period. Pavlov & Pavlova (2023) considered the problems of rational use of the socio-economic, ecological, and energy potential of Ukraine and its regions in the conditions of martial law. Futher, Pyokhov, Pyokhova, & Shevchuk (2018) considered the environmental crisis in Ukraine in the context of ensuring the implementation of state environmental policy.

Kolomoiets, Galitsina, Sharaia, Kachuriner, & Danylenko (2021) claim that agriculture is a crucial sector of the economy that requires ongoing legislative enhancement. Its significance stems from supplying the population with food and delivering raw materials for industry.

Additionally, Semernya, Lyubynskyi, Fedorchuk, Rudnytska, & Semernya (2022) investigated environmental security under martial law. Analyzing the results of polls about ecological danger in Ukraine among ordinary citizens, it can be noted that the population understands the whole tragedy of the complex situation and experiences the psychological consequences of war caused by the intervention of an aggressor country that is an enemy of our sovereignty.

Problems of environmental safety law, 2016, are considered in the book of Krasnova & Kirina (2016). The agrarian and land law of Ukraine through the modern paradigm and development prospects is analyzed in the work of Hetman & Kurman (2012). Shemshuchenko (2023) investigated the organizational and legal problems of ecological security of Ukraine under martial law.

Finally, Yakovyshyn & Tkach (2022) noted that the training of specialists of any profile should meet the needs of the time and solve the urgent challenges of today. The boundaries of the educational programs of the 101 "Ecology" specialty, considering their focus, make it possible to make changes to the educational components to ensure the ecological safety of urban areas affected by military activity.

Methodology

Researching the problems and prospects of teaching environmental legal disciplines under the conditions of martial law in Ukraine can use various research methods to obtain objective information and conclusions.

With the help of the analysis method, problematic issues from the review and analysis of scientific works, articles, books, and legislative acts related to environmental legislation, education, and war in Ukraine were investigated. Analysis of the problems and prospects of teaching legal disciplines related to environmental issues in the conditions of martial law in Ukraine requires a structured approach to understanding the impact of the ongoing conflict on education. This involves identifying key challenges, assessing current teaching practices and making suggestions for improvement to improve the learning process and maintain educational standards.

In particular, a comprehensive analysis of the existing literature was carried out regarding: the impact of martial law on educational systems; previous cases of educational adaptation in conflict zones, best practices of distance and crisis education, as well as the current state of legal and environmental education in Ukraine. By systematically identifying problems, evaluating current practices, and studying innovative solutions, the goal is to increase the sustainability and effectiveness of environmental and legal education in conflict situations.

Logical methods of research may contribute to the understanding of the problems and prospects of teaching environmental legal disciplines in the conditions of martial law in Ukraine. In particular, the main terms and concepts related to the problem of teaching environmental legal disciplines in wartime are defined. The teaching of legal disciplines on environmental and legal issues under martial law in Ukraine faces unique challenges and opportunities. Logical methods of research can provide a structured framework

for analyzing these issues and identifying viable solutions. Example:

Research Compilation: Collect studies on remote education during conflicts, impacts of war on student performance, and case studies on environmental law education.

Critical Appraisal: Assess the methodologies and conclusions of these studies for reliability and applicability. Synthesis: Create a summary of key findings and identify best practices and gaps in the current research. By applying these logical methods of research, a thorough and structured analysis of the problems and prospects of teaching legal disciplines on environmental and legal issues under martial law in Ukraine can be conducted. This approach will help in identifying the specific challenges faced, evaluating the effectiveness of current strategies, and proposing well-founded recommendations for improvement.

The forecasting method has become a useful method for determining the possible prospects of teaching environmental legal disciplines in the conditions of martial law in Ukraine and identifying possible problems that may arise in the future. The study of historical data and trends in the teaching of environmental legal disciplines under the conditions of martial law in Ukraine made it possible to identify certain patterns and predict possible future changes. The use of the forecasting method made it possible to gain a deeper understanding of the possible prospects and problems of teaching environmental legal disciplines under the conditions of martial law in Ukraine and to prepare appropriate strategies for overcoming challenges.

The application of the comparative research method can help in understanding the problems and prospects of teaching environmental legal disciplines in the conditions of martial law in Ukraine. This include:

Literature review: Academic papers, reports, and articles on education in conflict zones.

Field reports: Documentation from NGOs, international organizations, and local authorities.

Identifying similarities and differences: Compare how each case addresses the challenges of teaching legal disciplines during conflict.

Assessing effectiveness: Evaluate the effectiveness of different strategies and adaptations.

Contextual adaptation: Consider the specific cultural, economic, and political contexts that influence education in each case.

In particular, thanks to this method, a comparative analysis of the methods of teaching environmental legal disciplines in martial law conditions was carried out, which contributed to the identification of effective approaches and strategies. The achievements and results of the teaching of environmental legal disciplines were evaluated, which made it possible to draw conclusions about which approaches are the most successful and implemented. The comparative method provided an opportunity to gain a unique insight into what approaches might be most effective under martial law conditions in Ukraine and what challenges might be unique to this context. The comparative research method provides a comprehensive framework for analyzing the problems and prospects of teaching legal disciplines on environmental and legal issues under martial law in Ukraine. By comparing with other conflict-affected regions and historical contexts, valuable lessons and best practices can be identified and adapted to enhance the resilience and effectiveness of Ukrainian legal education during these challenging times.

Results and Discussion

The methodology of teaching environmental legal disciplines should involve the use of several basic ideas.

First, it is the use of an integrated approach. This is because any researched direction can have several branches and constituent parts (take as an example the energy system, which has electricity, thermal energy, fuel, and transport energy, and its components are coal, oil and gas, nuclear, hydropower, and alternative energy). Each of the branches has its objective characteristics, but at the same time demonstrates a close relationship with other parts. The improvement of the legislation should consider both the need to unify the legal foundations of the functioning of a certain area and the need to specialize in legal regulation.

Secondly, the development of the conceptual basis for the reform of legislation should consider such a necessary condition as the minimization of the amount of public funds spent. Thirdly, a feature of the disciplines of the ecological direction is the need to take into account the natural potential of Ukraine, since most of the studied directions use natural resources or are natural resource activities.

Fourth, for the development of a well-founded conceptual improvement of legislation in this direction, it is strategically important to permanently use the method of greening, which consists of considering ecological requirements and the need to protect the natural environment when developing any legal mechanism.

Thus, despite the challenges of today, which the war dictates to our country, there are all prerequisites for the continuation of pre-war reforms and the creation of new urgent norms, which are necessary for the development of relations, the research of which is oriented to the legal disciplines of the environmental direction.

For this purpose, it is proposed to consider land, agrarian, environmental, natural resource, energy legal relations, and legal relations in the field of alternative energy under martial law in separate blocks within the framework of the legal disciplines that cover them.

Land Law

The war also posed new challenges to the legislators regarding and ensuring the implementation of land rights during martial law. So, starting from 24.02.2022, the work of the online resource – Public Cadastral Map was stopped. In addition, it was forbidden to carry out any operations related to the sale of land plots, and the possibility of receiving some services was limited (in particular, viewing information about a land plot, obtaining information from the State Land Cadastre), which relates to the implementation of cyber-attacks on relevant resources. the holder of which is the state. In addition, some territories of Ukraine became temporarily occupied, so there was a need to legally regulate the status of such lands and land plots.

The impetus for the possible partial de conservation of land legal relations was the adoption by the Cabinet of Ministers of Ukraine of Resolution No. 480 dated 19.04.2022, according to which the sale/purchase of immovable property and the execution of relevant alienation agreements with certain features were allowed (Resolution 480, 2022). But only on 05/07/2022 the Cabinet of Ministers of Ukraine adopted Resolution No. 564 (2022), which was finally brought into line with the requirements of the legislation. Since notaries must obtain information from the state land cadastre to certify agreements with land plots, and before the adoption of the beforementioned Resolution, as already noted above, this service was impossible.

Another important step in the regulation of land relations in conditions of war was the adoption the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the Features of Regulation of Land Relations in Conditions of Martial Law" (Law 2247-IX, 2022). This legislative act simplified the leasing of state and communal land plots for the placement of production facilities of enterprises displaced (evacuated) from the war zone, critical infrastructure facilities, and placement of facilities for the temporary

stay of internally displaced persons.

The Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the Restoration of the System of Registration of Land Lease Rights for Agricultural Purposes and Improvement of Land Protection Legislation" (Law 2698-IX, 2022) the procedure for conducting land auctions (trading) was restored for the purpose of transferring land plots for use.

During the first half of 2023, several laws were also adopted, among which the most comprehensive regarding land legal relations is the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine on Improving the Legal Regulation of Performing Notarial and Registration Acts When Acquiring Rights to Land Plots" (Law 3065-IX, 2023), which regulates and clarifies many issues regarding the acquisition of rights to land agricultural land.

After the end of martial law, many issues will be devoted to the restoration of lands and the elimination of their clogging and pollution. There will also be many questions regarding the return of land plots to their owners and compensation for damages caused by military actions.

Agrarian Law

The first thing that suffers in a state that is forced to conduct military operations is the food security of its population. Currently, there is an urgent question regarding the formation of such legislation, which can preserve the achieved level of agricultural production and protect the population of Ukraine and the world from hunger. This is extremely relevant if we remember that Ukraine's contribution to the world food market is equivalent to feeding about 400 million people, not considering the country's population.

In accordance with Goal 2 of the National Report "Sustainable Development Goals: Ukraine" (Ministry of Economic Development and Trade of Ukraine, 2017) "Overcoming hunger, development of agriculture", the said report states that "the agro-industrial complex of Ukraine is currently the leading link of the national economy, which largely determines socio-economic development, forming 14% of gross value added and more than 40% of the country's exports. Currently, the agricultural sector is almost the only locomotive of the Ukrainian economy. Almost 90% of the food needs of the country's population (within their purchasing power) are met by domestic products. The main problems of the development of the agrarian sector of the economy are as follows:

1) reduction in the number of the population living in rural areas, in general, and employed in agricultural production;
2) low level of labor productivity caused by worn-out production facilities, use of outdated technologies, insufficiently developed rural infrastructure;
3) the instability of the competitive positions of domestic agricultural products on foreign markets due to the incompleteness of the processes of adaptation to European requirements regarding the quality and safety of food products, because of which the share of exports of food industry products is less than the share of exports of agricultural raw materials;
4) lack of motivation among agricultural producers to comply with agro-ecological requirements;
5) lack of information of a significant part of agricultural producers about market conditions and business conditions in the industry;
6) incompleteness of land reform" (Ministry of Economic Development and Trade of Ukraine, 2017).

To resolve the main pool of problems that arose because of the introduction of martial law in the field of agrarian relations, the Verkhovna Rada adopted the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the Creation of Conditions for Ensuring Food Security in the Conditions of Martial Law". which changed the procedure for regulating land and agrarian legal relations in conditions of full-

scale war (Law 2145-IX, 2022).

Thus, following this Law:

1) the term of validity of all types of land use, the term of which expired during the period of martial law, has been automatically extended;
2) it is allowed to transfer land plots for commercial agricultural production for rent without conducting land auctions;
3) land lease contracts are concluded only in electronic form and are not subject to registration under the procedure established by law, instead, such contracts must be registered in special books, the form of which is approved by the competent authorities;
4) it is allowed to sublease leased plots of land for agricultural production for sowing.

For the most part, the corresponding law was aimed at ensuring the 2022 seed company. The Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the Restoration of the System of Registration of Land Lease Rights for Agricultural Purposes and Improvement of Land Protection Legislation" (Law 2698-IX, 2022) also regulated a temporary legal mechanism for registration of lease rights to agricultural land plots without entering information about the specified right into the State Land Cadastre and the State Register of Property Rights on immovable property with the registration of the specified rights by district military administrations in the relevant Registration Books.

Of course, the new realities of the existence of Ukraine require a qualitative update of the current legislation to revise the existing ones and create new effective mechanisms for the formation of food security.

Environmental Law

One of the biggest damages inflicted by the aggressor state on environmental legal relations is because military actions have a devastating effect on natural ecosystems. Military actions on the territory of the state led to an increase in greenhouse gas emissions, which further deepened the global climate crisis.

The state and society faced an urgent task of developing an effective system for protecting the environment and man as part of it. There is a need to update environmental legislation adapted to the conditions of martial law, work on theoretical improvements and development, implement specific practical steps to overcome the negative environmental consequences of war, preserve and restore affected ecosystems, ensure environmental safety, and protect the environmental rights and interests of citizens.

Therefore, the legislator should direct legal measures to:

1) development of a compensation mechanism that will guarantee full compensation for environmental damage caused to the environment because of hostilities;
2) updating several legal acts by expanding the list of real and potential threats to environmental security in Ukraine and strategic directions of state environmental policy, taking into account actions on the territory of the state of martial law, in particular the Strategy of Environmental Security and Adaptation to Climate Change for the period until 2030, approved by the order of the Cabinet of Ministers of Ukraine of October 20, 2021 No. 1363-r and the Law of Ukraine "On the Basic Principles (Strategy) of the State Environmental Policy of Ukraine for the Period Until 2030" (Law 2697-VIII, 2019).
3) improvement of the organizational and legal mechanism of environmental management following the requirements of wartime (increasing the effectiveness of the system of environmental monitoring, environmental control, etc.);
4) determination of the peculiarities of the legal regime for the use of natural resources and ecosystems,

considering the action on the territory of the state of martial law;
5) reproduction of individual natural resources, revival of natural complexes (in particular, territories and objects of the nature reserve fund), damaged because of military actions;
6) determination of the peculiarities of the implementation of environmental rights in conditions of war and increasing the effectiveness of their protection.

Natural Resource Law

Domestic natural resource legislation is not adapted to the regulation of relations of use and protection of natural resources in the conditions of war and post-war reconstruction – the current normative and legal regulation is not able to effectively ensure counteraction to the rapid depletion of natural resources and create effective mechanisms for their recovery. That is why there is an urgent need to develop a systemic vision for improving natural resource legislation from the standpoint of meeting modern needs because most natural resources are exhaustible – it is much easier to lose them irretrievably than to restore them. For example, the development of some strategies of the European Union and Ukraine, cause certain fears, because they can create prerequisites for a sharp exacerbation of the above-mentioned problems. We are talking about the implementation of the prepared hydrogen strategies of the EU and Ukraine. According to them, Ukraine is considered as a territory for deploying a significant volume of hydrogen production for EU needs. This perspective contains not only attractive opportunities but also serious risks. They are concentrated in the natural resource component, namely in the use of freshwater resources, which are currently in a rather difficult ecological state. Awareness of the vulnerability of our state due to military, economic, environmental, and demographic crises, as well as a clear focus on national interests, should become safeguards that will prevent future hydrogen legislation from conserving Ukraine's raw material status and negatively affecting the state's environmental security.

Energy law

Ukraine's energy security deteriorated critically during the war due to the damage to a large part of the country's energy infrastructure. The restoration of the country's energy system in the post-war period will require proper, adapted regulatory regulation that would consider the latest objective circumstances and challenges. Since the current energy legislation of Ukraine is currently not adapted to such needs, it turned out to be ineffective both during and after the war (Kharytonova, & Grigoryeva, 2021). Currently, there is an urgent need to reform domestic energy legislation, considering the impact of wartime conditions.

Legal science is currently on the path of studying individual components of energy law and legislation, where the following components are distinguished:

1) legislation on the general regulation of energy relations (regulations on the electricity market, energy efficiency, energy conservation);
2) oil and gas legislation;
3) atomic (nuclear) legislation;
4) coal legislation;
5) legislation in the field of alternative energy (Kharytonova, & Grigoryeva, 2023).

In modern conditions in Ukraine, the normal rate of differentiation of energy legislation is additionally accelerated by several systemic factors: European integration substantive restructuring of legislation, and adaptation of energy legislation to the conditions of a constant threat to energy security during military operations.

In Ukraine, the adoption of various energy strategies and programs has become an indispensable attribute of rulemaking. However, there are quite significant flaws in this: firstly, the replacement of the necessary

regulatory support by software rulemaking; secondly, the visibility of rule-making activity (most often created for foreign partners: the adoption of a program or strategy does not require special efforts, does not require resources, no responsibility arises for its non-fulfillment, but at the same time there is an opportunity to report positively on the fulfillment of international obligations, etc.).

Modern legislation, which was written under the circumstances of peacetime, turned out to be poorly adapted to the operation of the energy system in the conditions of military operations. Only at the end of 2022, because of military actions on the territory of Ukraine, a third of power plants were destroyed, and more than 40% of consumers remained without electricity. Fuel prices are steadily rising, and thermal fuel resources are limited. At the same time, the analysis of rule-making activity demonstrates that the acute social problem of energy security has not been solved systematically at the moment, because energy legislation during the wartime period was changed only point by point (for example, through the adoption of the laws of Ukraine Law 2479-IX (2022), Law 2956-IX (2023), Law 3141-IX (2023), etc.). The systemic energy crisis can be solved only by systemic restructuring of legislation.

However, it should be noted the emergence of the tendency of the transition of Ukrainian legislation from the paradigm of energy saving to the newest paradigm of energy efficiency, which is aimed at regulating relations aimed at strengthening energy security, reducing energy poverty, sustainable economic development, preserving primary energy resources and reducing greenhouse gas emissions.

Alternative Energy Law

The dynamics of the development of national and international legislation and the constantly growing requirements for the need to reduce Ukraine's energy dependence led to the rapid development of alternative energy. Alternative energy sources can include solar and wind energy, geothermal and hydrothermal, aerothermal, wave and tidal energy, hydropower, biomass energy, gas from organic waste, gas from sewage treatment plants, biogas, as well as secondary energy resources: blast furnaces and coke gases, methane gas, degassing of coal deposits, transformation of waste energy potential of technological processes.

From the analysis of land, agrarian, environmental, natural resource, energy legal relations, and legal relations in the field of alternative energy under martial law, it can be seen that their development and further fate are very different. Thus, for land and agrarian legal relations, prospects are returning for the continuation of those reforms that were initiated before the war. Too progressive legislation will create an inadequate regulatory environment, which reduces the effectiveness of public influence on such relations.

Therefore, the solution to this systemic problem should consist of determining:

a) temporal adequacy, that is, establishing the real timeliness of the adoption of certain norms; forecasting the degree of realism of their implementation within the specified time frame; avoiding the sudden appearance of new rules for the functioning of the industry; the guarantee of the stipulated terms (for example, the terms of receiving one or another state support);
b) factual adequacy, i.e. analysis of the actual state of social relations for their readiness, the presence of problematic aspects, possible consequences of the implementation of certain legal mechanisms;
c) formal and legal adequacy, i.e. choosing the least traumatic way of implementing a normative decision.

Conclusions

As a result of the study, the following conclusions were made:

The development of environmental legal disciplines is complicated by the combined effect of several main legal problems of a systemic nature, namely: a) imbalance of differentiation and systematization in the development of legislation in the relevant field; b) deformed software; c) unpreparedness of legislation for regulation in crisis conditions; d) transformation of the legal model of state support; e) application of the "political freezing" method; e) conservation of Ukraine's raw material status; g) observance of adequate rates of legislative development and transition. Solving these problems requires a systematic approach, considering many factors and circumstances, which requires high-quality scientific support for the process of rulemaking.

At the current stage, the teaching of environmental legal disciplines should be based on a crisis approach, which involves determining ways to improve land, agrarian, environmental, natural resource, and energy (including alternative energy) legislation of Ukraine through the prism of the functioning of the legal system in the conditions of military operations and further post-war restoration of the state. The proposed crisis approach is new for domestic science since previous studies of legal disciplines of the environmental direction were guided by other approaches, in particular: environmental (ensuring greening, reducing the negative impact on the environment, etc.); climatic (for example, decarbonization of the energy sector); integration (legislation reform under the influence of international European integration obligations), etc. In addition, there is an urgent need in the teaching of environmental legal disciplines to apply the crisis testing method, which will involve checking each proposed regulatory decision for efficiency and effectiveness in the event of force majeure (crisis) situations. This method will make it possible to implement a general crisis approach to the implementation of certain norms, as well as to substantiate the expediency of certain rule-making steps in the conditions of military actions and post-war reconstruction. The third important component in the teaching of environmental legal disciplines is the development of the latest methods of priority stress resistance, which will involve the teaching of environmental legal disciplines based on the use of the crisis testing method and the identification on this basis of the most effective and efficient legal mechanisms that are able to ensure the harmonious functioning of the outlined relations as in peacetime, as well as in crisis situations of anthropogenic, technogenic and natural nature.

Considering the perspective of the development of the studied legal relations and the solution of legal problems related to this issue, it can be noted that there are currently prerequisites for the continuation of pre-war reforms and the creation of new norms necessary for the restoration of our country. Teaching environmental legal disciplines in modern conditions and challenges requires consideration of many factors and should be aimed at: 1) defining a certain approach; 2) application of the most suitable methods; 3) developing and creating the latest methods.

As for further scientific research, we consider it necessary to investigate the international experience of teaching environmental legal disciplines under martial law.

Bibliographic References

Decree 64/202. On the introduction of martial law in Ukraine. *President of Ukraine*, 2022. Retrieved from https://zakon.rada.gov.ua/laws/show/64/2022#Text

Hetman, A.P., & Kurman, T.V. (2012). *Agrarian and land law of Ukraine: modern paradigm and development prospects*. Kharkiv: Yurait. Retrieved from: https://dspace.nlu.edu.ua/bitstream/123456789/19500/1/AZPU-mon-2022.pdf

Ilkiv, N. (2023). Problems of implementation of separate organizational and legal forms of ensuring environmental safety in the conditions of martial law and prospects for their improvement. *Scientific Bulletin of the Lviv State University of Internal Affairs, 2*, 27-48. Retrieved from http://journals.lvduvs.lviv.ua/index.php/law/article/view/574

Kharytonova, T.E., & Grigoryeva, K.A. (2021). Energy component of the Ukrainian Green Deal: an analysis of the legal prerequisites. *Legal Scientific Electronic Journal, 2*, 149-154. Retrieved from http://www.lsej.org.ua/2_2021/37.pdf

Kharytonova, T.E., & Grigoryeva, K.A. (2023). *Alternative energy: ways of legislative stimulation*. Lutsk: Vezha-Druk. Retrieved from https://nddkr.ukrintei.ua/view/ok/105aeb2d3740dbe54c8e1ad9873ba3a2

Kirin, R.S. (2023). *Actual problems of urban environmental law*. Kyiv, Dnipro: Zhurfond. Retrieved from https://doi.org/10.35668/978-617-14-0043-6

Kolomoiets, T., Galitsina, N., Sharaia, A., Kachuriner, V., & Danylenko, O. (2021). International experience of public-private partnership in agriculture. *Amazonia Investiga, 10*(41), 160-168. https://doi.org/10.34069/AI/2021.41.05.16

Kostytskyi, V.V. (2003). *Ecology of the transition period: law, state, economy (Economic and legal mechanism of environmental protection in Ukraine)*. Kyiv: IZP and PZ.

Krasnova, M.V., & Kirina, R.S. (2016). *Problems of environmental safety law academic*. Dnipro: NSU. (In Ukranian)

Law 2102-IX. On the approval of the Decree of the President of Ukraine "On the introduction of martial law in Ukraine". *The Verkhovna Rada of Ukraine*, 2022. Retrieved from https://zakon.rada.gov.ua/laws/show/2102-20#Text

Law 2145-IX. On amendments to some legislative acts of Ukraine regarding the creation of conditions for ensuring food security under martial law. *The Verkhovna Rada of Ukraine*, 2022. Retrieved from https://zakon.rada.gov.ua/laws/show/2145-20#Text

Law 2247-IX. On the introduction of changes to some legislative acts of Ukraine regarding the peculiarities of the regulation of land relations under martial law. *The Verkhovna Rada of Ukraine*, 2022. Retrieved from http://surl.li/drscu

Law 2479-IX. On the peculiarities of regulating relations in the natural gas market and the field of heat supply during actions of martial law and further restoration of their functioning. *The Verkhovna Rada of Ukraine*, 2022. Retrieved from https://zakon.rada.gov.ua/laws/show/2479-20#Text

Law 2697-VIII. On the Basic Principles (Strategy) of the State Environmental Policy of Ukraine for the Period Until 2030". *The Verkhovna Rada of Ukraine*, 2019. Retrieved from https://zakon.rada.gov.ua/laws/show/2697-19#Text

Law 2698-IX. On the introduction of changes to some legislative acts of Ukraine regarding the restoration of the system of registration of lease rights for agricultural land plots and improvement of the legislation on land protection. *The Verkhovna Rada of Ukraine*, 2022. Retrieved from https://zakon.rada.gov.ua/laws/show/2698-IX#Text

Law 2956-IX. On some issues of the use of vehicles equipped with electric engines and amendments to some laws of Ukraine regarding overcoming fuel dependence and development of electric charging infrastructure and electric vehicles. *The Verkhovna Rada of Ukraine*, 2023. Retrieved from https://zakon.rada.gov.ua/laws/show/2956-20#Text

Law 3065-IX. On the introduction of changes to some legislative acts of Ukraine regarding the improvement of the legal regulation of notarial and registration actions when acquiring rights to land plots. *The Verkhovna Rada of Ukraine*, 2023. Retrieved from https://zakon.rada.gov.ua/laws/show/3065-20

Law 3141-IX. On Amendments to Certain Laws of Ukraine on Prevention of Abuse in Wholesale Energy Markets. *The Verkhovna Rada of Ukraine*, 2023. Retrieved from https://zakon.rada.gov.ua/laws/show/3141-20#Text

Ministry of Economic Development and Trade of Ukraine. (2017). *National report "Sustainable Development Goals: Ukraine"*. Retrieved from https://www.undp.org/sites/g/files/zskgke326/files/migration/ua/SDGs_NationalReportEN_Web.pdf

Order 1363-r. Strategy of Environmental Security and Adaptation to Climate Change for the period until 2030. *Cabinet of Ministers of Ukraine*, 2021. Retrieved from https://zakon.rada.gov.ua/laws/show/1363-2021-%D1%80#Text

Pavlov, K., & Pavlova, O. (2023). *Problems of the rational use of the socio-economic, ecological and energy potential of Ukraine and its regions in the conditions of martial law*. Ivano-Frankivsk: Lutsk. Retrieved from https://acortar.link/CD1rjX

Pyokhov, V.M., Pyokhova, S.V., & Shevchuk, V.V. (2018). Environmental crisis in Ukraine: specific issues of regulatory and legal support for the implementation of state environmental policy. *Problems of environmental legislation, 2,* 51-55. Retrieved from http://www.sulj.oduvs.od.ua/archive/2018/2/16.pdf

Resolution 480. On making changes to some resolutions of the Cabinet of Ministers of Ukraine regarding the activities of notaries and the functioning of unified and state registers, the holder of which is the Ministry of Justice, in the conditions of martial law. *Cabinet of Ministers of Ukraine*, 2022. Retrieved from https://zakon.rada.gov.ua/laws/show/480-2022-%D0%BF#Text

Resolution No. 564. Some issues of maintaining and functioning of the State Land Cadastre under martial law. *Cabinet of Ministers of Ukraine*, 2022. Retrieved from https://zakon.rada.gov.ua/laws/show/564-2022-%D0%BF#Text

Semernya, O.M., Lyubynskyi, O.I., Fedorchuk, I.V., Rudnytska, Zh.O., & Semernya, A.O. (2022). Environmental security under martial law. *Environmental sciences, 2*, 62-66. Retrieved from http://ecoj.dea.kiev.ua/archives/2022/2/11.pdf

Shemshuchenko, Yu.S. (2023). Organizational and legal problems of environmental security of Ukraine under martial law. *Journal of the Kyiv University of Law, 2*, 9-12. Retrieved from https://chasprava.com.ua/index.php/journal/article/view/844/785

Teremetskyi, V., Boiko, V., Malyshev, O., Seleznova, O., & Kelbia, S. (2023). Electronic judiciary in Ukraine: Problems of implementation and possible solutions. *Amazonia Investiga*, *12*(68), 33-42. https://doi.org/10.34069/AI/2023.68.08.3

Yakovyshyn, T.F., & Tkach, N.O. (2022). Involvement of current problems of ecological security of Ukraine in the conditions of martial law to the subject of profile disciplines of specialty 101 "Ecology". Edited by. M. V. Savytskyi, I. P. Mamchych. *Education in the conditions of war: realities, challenges and ways to overcome it: materials of the II Forum of the academic community*. Dnipro: DVNOZ "PDABA", pp. 99. Retrieved from https://pgasa.dp.ua/wp-content/uploads/2022/09/Zbirnyk-materialiv-II-Forumu-akademichnoyi-spilnoty-OSVITA-V-UMOVAH-VIJNY.pdf

Zarzhytskyi, O.S. (2012). *Actual problems of legal support of environmental policy of Ukraine (theoretical aspects).* Dnipro: National Mining University. Retrieved from https://core.ac.uk/download/pdf/48401788.pdf

Zhadan, E. V. (2023). *National environmental policy as a component of sustainable development strategy: normative and legal aspect*. Lviv - Toruń: Meat-Pres.

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.16
Cómo citar:
Chagovets, A., Myskova, N., Kovrei, D., Bobyrieva, O., & Yokob, A. (2024). Effectiveness of Training in Building the Professional Image of Future Preschool Teachers. *Revista Eduweb*, 18(2), 222-237. https://doi.org/10.46502/issn.1856-7576/2024.18.02.16

Effectiveness of Training in Building the Professional Image of Future Preschool Teachers

Efectividad de la formación en la construcción de la imagen profesional de los futuros docentes de preescolar

Alla Chagovets
https://orcid.org/0000-0003-0680-3165
Department of Theory and Methods of Preschool Education, Municipal Establishment «Kharkiv Humanitarian Pedagogical Academy» of Kharkiv Regional Council, Kharkiv, Ukraine.
Nataliia Myskova
https://orcid.org/0000-0001-7832-4409
Department of Pre-school Pedagogy, Psychology and Professional Methods, Khmelnytskyi Humanitarian-Pedagogical Academy, Khmelnytskyi, Ukraine.
Dora Kovrei
https://orcid.org/0000-0003-4745-4977
Department of Pedagogy, Psychology, Primary and Preschool Education and Management of Educational Institutions, Ferenc Rakoczi II Transcarpathian Hungarian College of Higher Education, Berehovo, Ukraine.
Olena Bobyrieva
https://orcid.org/0000-0002-1757-0494
Department of Pedagogy of Preschool, Primary Education and Educational Management, Mukachevo State University, Mukachevo, Ukraine.
Andreia Yokob
https://orcid.org/0009-0008-6378-7089
Department of Pedagogy, Psychology, Primary and Preschool Education and Management of Educational Institutions, Ferenc Rakoczi II Transcarpathian Hungarian College of Higher Education, Berehovo, Ukraine.

Recibido: 04/04/24
Aceptado: 12/06/24

Abstract

The aim of the study is to empirically verify the effectiveness of training in building the professional image of future preschool teachers. The research employs the following methods: diagnostics, qualitative and quantitative analysis, comparative analysis, testing, fulfilling tasks and resolving situations, completing creative professional assignments. A comparative analysis of the data on the level of the professional image of future preschool teachers with bachelor and master qualification levels was carried out. A professional image building programme was developed and tested within the scope of the study. It consists of ten training classes. The study found an increase in the level of the professional image of future preschool teachers by an average of 26.7%. The highest indicators of the professional image of future preschool

teachers were recorded for the motivational and value component (75% of respondents), the medium — for the practical and activity component (65%), and the lowest — for the prognostic and reflexive component (60%). The use of training is effective for building the professional image of future preschool teachers in the process of their professional training.

Keywords: educational institution, preschool teacher, professional training, student, training technologies.

Resumen

El objetivo del estudio es comprobar empíricamente la eficacia de la formación en la construcción de la imagen profesional de los futuros docentes de preescolar. La investigación utiliza los siguientes métodos: diagnóstico, análisis cualitativo y cuantitativo, análisis comparativo, pruebas, cumplimiento de tareas y resolución de situaciones, realización de tareas profesionales creativas. Se realizó un análisis comparativo de los datos sobre el nivel de imagen profesional de los futuros docentes de preescolar con niveles de titulación de licenciatura y maestría. Se desarrolló y probó un programa de creación de imágenes profesional dentro del alcance del estudio. Consta de diez clases de formación. El estudio encontró un aumento en el nivel de la imagen profesional de los futuros maestros de preescolar en una media del 26,7%. Los indicadores más altos de la imagen profesional de los futuros maestros de preescolar se registraron en el componente motivacional y valorativo (75% de los encuestados), los medios en el componente práctico y de actividad (65%) y los más bajos en el componente pronóstico y reflexivo. (60%). El uso de la formación es eficaz para la construcción de la imagen profesional de los futuros docentes de preescolar en el proceso de su formación profesional.

Palabras clave: estudiante, formación professional, institución educative, profesora de preescolar, tecnologías de formación.

Introduction

The role of the teacher's image is increasing in view of current educational transformations and destructive challenges. The teacher is the organizer of the optimal educational and cognitive environment for students, for their harmonious development. Such an environment should be created and maintained at all educational levels. Such an environment begins to be formed in preschool. A teacher's ability to organize an educational environment appropriate to the children's age characteristics, interests, and requests is an indicator of his/her professional image. Today, a teacher who knows how to make a child interested, find an approach to him/her, develop and implement an optimal programme for his/her individual harmonious development takes leading image positions. This especially applies to preschool education. In preschool, there are many children with different indicators of development, different manifestations of behavioural reactions, with different requests. The system of private preschool institutions is also actively developing in Ukraine. So, the demand for teachers with a high level of professional image is growing. The image of a preschool educational institution on the market of educational service providers (both private and public) depends on the teacher's professional image. It should, however, be stated that higher education institutions (HEIs) engaged in the training of preschool teachers do not provide future teachers with a sufficient amount of knowledge, skills, and abilities necessary for occupying and maintaining high image positions in the professional environment. Moreover, constant changes are taking place in the educational sphere, which require preschool teachers to constantly study, update and improve their existing knowledge, abilities, skills, and experience. Therefore, experimental implementation of training technologies is used for building the professional image of future teachers in higher pedagogical education institutions. The training contributes to building future preschool teacher's ability to establish image positions in the professional environment. However, there is a lack of thorough empirical research that would study the impact of training technologies on the development of the professional image of teachers in general and preschool teachers in particular. Therefore, we decided to conduct an experimental testing and evaluate

the effectiveness of the training in building the professional image of future preschool teachers.

The aim of the research is to empirically verify the effectiveness of the training in building the professional image of future preschool teachers.

The research objectives include:

- studying the level of the professional image of future preschool teachers;
- development of a programme for building the professional image of future preschool teachers by means of training;
- experimental testing of the programme for building the professional image of future preschool teachers by means of training;
- drawing conclusions and outlining prospects for building the professional image of future preschool teachers by means of training.

Research hypothesis: training methods contribute to improving the professional image of future preschool teachers.

Literature Review

The studies on the problem of building the teacher's professional image emphasize the spontaneity of its development during training in HEIs. The researchers interpret the professional image as a status and role characteristic of an individual that unites a specialist's external and internal personal and professional qualities, as well as competencies, which is aimed at the formation of public perception of the social and professional role that an individual constructs (Kurok & Tkachenko, 2020). The teacher's professional image is also defined as the perception of his/her personality by others, an image that embodies harmony and balance between the teacher's spiritual and moral image and his/her appearance (Karimova, 2022). The motivational and value, gnostic, personal and reflective, as well as practical and operating components are distinguished in the structure of the teachers' professional image (Kurok & Tkachenko, 2020).

The researchers also single out destructive influences on the teachers' professional image. This is the excessive enthusiasm of the pedagogical community for the commercialization of its activities through the provision of a system of paid services, in which material reward comes to the fore, not the quality of education (Samoylenko et al., 2020). Other destructive influences on the teacher's professional image include the high regulation of his/her activity, the presence of the teacher's figure on the professional continuum between subordination and autonomy (La Velle, 2023). At the same time, the development of the preschool teacher's professional image is positively influenced by the provision of additional opportunities for learning and improving one's professional competencies (Barenthien et al., 2020).

Important correlates of a teacher's professional image are the recognition of the student as the highest value in the education system, the teachers' ability to empathize with their students and motivate them to acquire knowledge, the ability to competently teach this knowledge independently in the process of communicating with students, and the teacher's cultural level (Antoniuk et al., 2021).

In the context of building the image of a modern teacher, the opinion about the importance of teacher's professional self-development, the use of various traditional and innovative methodical forms of promoting the professional development of a teacher and preschool teacher is of particular importance. They include both formal and informal methods of professional development of the preschool teacher. At the same time, the opinion about the lack of motivation of modern teachers for professional self-development caused by insufficient financial support, an unstable working environment, and overwork (Maksimović et al., 2021),

is being urged. Other equally important correlates of a teacher's professional image are his/her cognitive, social, and academic competence (Erkaboeva & Musaeva, 2022), a professional identity as a means of self-understanding of a teacher as a professional (Meyer et al., 2023).

The teacher's professional image is associated with such features as: professional flexibility, the ability to generate original ideas, creativity Makhkamovna (2023), digital competence (Garzón Artacho et al., 2020), improvement of the teacher's professional profile within the framework of education throughout life (Melnyk et al., 2021). The opinion about the importance of combining formal and informal learning (Formosa, 2019) is essential, which has a positive effect on the preschool teacher's professional image. The teacher's motivational component is no less important (Gogh & Kovari, 2018), which ensures his/her desire for continuous learning. For example, continuous professional learning is an important condition for the formation and maintenance of the educator's image positions. At the same time, the teacher must be aware of the importance of learning throughout the entire professional career (Talmage et al., 2018), have clear intentions to learn throughout life (Mbagwu et al., 2020).

Training of preschool teachers to build their professional image should involve the creation of such an educational environment that will make it possible to overcome the gaps between learning at the workplace and professional education, to reconcile the trajectories of the current acquisition of knowledge in the educational institution and future learning at the workplace (Nottingham, 2019), a complex relationship between adult learning and vocational education (Hodge et al., 2020). A preschool teacher who cares about his/her professional image should be in a continuous and unlimited personal self-development based on rapid digital progress (Poplavskyi & Bondar, 2021). The forms of continuous professional development and obtaining new qualifications should be implemented for this purpose (Poplavskyi & Bondar, 2021). Such forms can be represented by combining non-formal and informal learning in modern educational systems (Kanwar et al., 2019). Moreover, the students' need for additional education is actualized in all spheres (Broiakovskyi et al., 2020). The importance of lifelong learning is cultivated on the basis of rapprochement and understanding of representatives of different generations (Lyu et al., 2020).

Professional image can be clearly associated with the development of professional mobility, building an individual educational and professional trajectory (Kravchenko et al., 2021), the continuous improvement of the qualifications of specialists in the conditions of sustainable development of education and science (Sydorenko et al., 2020). The preschool teacher's professional image has a positive effect on the achievement of creative self-realization (Mushynska, 2018), on the formation of spiritual and moral behaviour, and the development of the emotional and motivational sphere (Yekimov et al., 2020). A creative educational environment of professional self-development makes it is possible to build a professional image of a modern preschool teacher (Bashkireva et al., 2021).

The researchers are unanimous about the fact that building of a professional image falls on the period of training of future preschool teachers in HEIs. Therefore, after completing vocational education, preschool teachers should have a professional image formed at least on a conditional level (Dudchak, 2020). Scientific works specify the conditions and methods of building the teachers' professional image (Kurok & Tkachenko, 2020). Training is one of the methods that contributes to building the professional image of preschool teachers and combines the features of formal and informal education. It is considered as a means of developing the professional and creative potential of preschool teachers, developing such concepts related to professional image as: promoting professional development, forming positive self-awareness, increasing the level of pedagogical culture (Hevko & Bytsiv, 2019). Domestic researchers positively evaluate the role of training in promoting the pedagogical creativity of future preschool teachers and in preparing them for professional activities in general (Havryliuk et al., 2023).

Today, training methods are actively introduced into the system of professional development of specialists of different professions. But the issue of using training as a means of forming the professional image of a

preschool teacher is poorly studied. There are no empirically proven effective practices of using training as a means of building the professional image of a preschool teacher in the course of his/her professional training at a HEI. Therefore, in view of the episodic studies on building the professional image of a preschool teacher, as well as the poorly studied issue of using training method in building image positions of a modern preschool teacher, we decided to empirically test the impact of training on building the professional image of a preschool teacher.

Methods

Research design

Empirical testing included the following stages: preparatory, summative, formative, and final. The preparatory stage involved sampling, choosing research methods, as well as determining its aim and objectives. At the summative stage of the research, the level of professional image of future preschool teachers was studied. An experimental testing of the programme for building the professional image of future preschool teachers by means of training was developed and carried out at the formative stage of the research. The final stage provided for the interpretation of the research results and drawing conclusions. The experimental study was initiated by the academic communities of Ukrainian HEIs. The study was conducted during 2023-2024: preparatory stage — August 2023, summative stage — September 2023, formative stage — October 2023 - January 2024, final stage — February 2024.

Sampling

The study involved a total of 150 future preschool teachers. They are holders of Bachelor's and Master's qualification levels: 80 bachelors and 70 masters. Motives for the selection of students of different qualification levels are dictated by the need to identify their levels of professional image upon completion of professional training. The respondents are 21-23 years old.

The motives for forming the research sample were:

1) completion of professional training at the appropriate qualification level;
2) readiness of students to perform professional functions in a real educational environment;
3) students' understanding of the essence and significance of professional image.

Methods

The research employed the following methods: diagnostics of the level of the professional image of future preschool teacher, qualitative and quantitative analysis of the obtained data, comparative analysis.

Three components of the analysed phenomenon were distinguished in order to diagnose the level of the professional image of future preschool teachers: motivational and value, practical and activity, prognostic and reflexive (Table 1).

Table 1.
The structure of the professional image of future preschool teachers

Components	Component description
Motivational and value	the level of an understanding of the importance of the professional image in the preschool teacher's career, clearly defined preschool teacher's aspirations to build and confirm the professional image positions
Practical and activity	the high level of practical skills necessary to deepen and maintain one's professional image, a clear awareness of the dependence of the professional image on professional competence, professional skills, and the ability to learn throughout the professional career of a preschool teacher
Prognostic and reflexive	the development of the ability to critically analyse and evaluate the current level of the professional image and awareness of the need to improve the professional image of a preschool teacher

Source: developed by the author

The teaching staff used testing, solving situational tasks, professionally oriented creative tasks in order to determine the level of a professional image for each of the components.

The test assignments covered the essence, structure and meaning of the professional image of the future preschool teacher. The situational tasks offered to the students involved the application of practical skills aimed at finding ways to improve one's professional image. Professionally-oriented creative tasks involved the students' use of their existing professional image to achieve success in professional communications.

All of them were developed by the teaching staff. The following levels were used to determine the level of the professional image of future preschool teachers: high, medium, low (Table 2).

Table 2.
Levels of the professional image of future preschool teachers

Levels	Level description
High	The future preschool teacher understands the importance of professional image in his/her professional career, strives to achieve and confirm his/her professional image positions, has a high level of skills necessary to improve and maintain his/her professional image, understands the dependence of professional image on professional competence, professional skill, ability to study during the professional career of a preschool teacher, and shows readiness to improve his/her professional image, has the skills of critical analysis and assessment of the current level of professional image
Medium	The future preschool teacher understands the importance of professional image in his/her professional career, strives to achieve and confirm his/her professional image positions, has certain skills necessary to improve and maintain his/her professional image, understands the dependence of professional image on professional competence, professional skill, ability to learn during the professional career of a preschool teacher, occasionally demonstrates the ability to critically analyse and assess the current level of professional image
Low	The future preschool teacher partially understands the importance of professional image in his/her professional career, but does not show a desire to achieve and confirm his/her professional image positions, has certain skills necessary to improve and maintain his/her professional image, does not understand the dependence of professional image on professional competence, professional skills, the ability to learn during the professional career of a preschool teacher, does not have the ability to critically analyse and assess the current level of professional image

The formative stage of the research involves developing and testing a programme for building the professional image of future preschool teachers. Table 3 presents the content of the programme.

Table 3.
Programme for building the professional image of future preschool teachers

Session number	Topic of the training session	The aim of the training session	Target audiences of the training session
1	Why does the future preschool teacher need a professional image?	Formation of a conscious attitude to the professional image of a preschool teacher	Future preschool teachers, teaching staff of HEIs
2	What is included in my professional image?	The formation of an understanding of the components of the professional image of a preschool teacher, the ability to self-assess the professional image	Future preschool teachers, teaching staff of HEIs
3	Building a professional image: components, criteria, advantages	Development of an individual programme for building the professional image of a preschool teacher	Future preschool teachers, practicing preschool teachers
4	Changing the professional image: methods, ways, results	Adjustment of the individual programme of building the professional image of a preschool teacher	Future preschool teachers, teaching staff of HEIs, researchers, methodologists of preschool education institutions
5	Start, restart and transformation of the preschool teacher's professional image	Formation of image flexibility of a preschool teacher, taking into account current educational transformations and destructive challenges	Future preschool teachers, researchers, methodologists and heads of preschool education institutions
6	Professional image and target audiences of a preschool teacher	Awareness of the leading influence of the target audiences with whom he works (children, parents, colleagues, the administration of the educational institution, specialists of other profiles, representatives of education management bodies) on the preschool teacher's professional image	Future preschool teachers, practicing preschool teachers, methodologists and heads of preschool education institutions, representatives of parent communities and public organizations
7	The professional image of a preschool teacher: how to respond to the challenges of modern education	The formation of a conscious understanding of the positive and at the same time destructive effect of various factors of the educational and professional environment on the preschool teacher's professional image, the formation of adaptation skills to the action of factors that have a corrective effect on the preschool teacher's professional image	Future preschool teachers, practicing preschool teachers, methodologists and heads of preschool education institutions, teaching staff of HEIs
8	How a modern preschool teacher can maintain image positions	Development of skills necessary for correcting and improving the current level of the preschool teacher's professional image, awareness of the difference between the current and optimal level of the preschool teacher's professional image and determination of ways to achieve the optimal level of the preschool teacher's professional image	Future preschool teachers, practicing preschool teachers, methodologists and heads of preschool education institutions
9	How to use your professional image in employment	Confirmation of understanding of the clear relationship between the level of the preschool teacher's professional image (current, achieved,	Future preschool teachers, practicing preschool teachers, methodologists and heads of preschool

		optimal) and its impact on the results of employment and consolidation in the profession	education institutions, teaching staff of HEIs
10	How a developed professional image works	Development of skills to optimally use the advantages of professional image	Future preschool teachers, practicing preschool teachers, methodologists and heads of preschool education institutions, teaching staff of HEIs

The primary data were processed using Excel spreadsheet. Statistical processing of the research results was carried out using Spearman's rank correlation coefficient. Cronbach's alpha was used to determine the reliability of the author's questionnaire (Cronbach's alpha — 0.8).

Ethical criteria. The study involved obtaining consent from all its participants. All respondents of the study gave consent to participate in it. The study involved direct intervention in the educational process through the introduction of training sessions in the professional training of future preschool teachers. All adjustments to the educational process have been agreed with the administration and teaching staff of the HEI.

Results

Testing of future preschool teachers was conducted at the summative and formative stages of the research. Tables 4, 5 summarized the results of testing all respondents at the summative stage of the research in percentage for each component of the preschool teacher's professional image.

Table 4.
The levels of the professional image of future preschool teachers (bachelor qualification level) at the summative stage of the research (%)

Components of professional image	**Development levels**		
	High	Medium	Low
Motivational and value	40	50	10
Practical and activity	20	40	40
Prognostic and reflexive	20	30	50
Mean	26.6	40	33.3

Source: developed by the author

Table 4 shows that at the formative stage of the research respondents with medium and low levels of professional image for each of the components prevail. Among future bachelor preschool teachers, the most developed professional image is based on the motivational and value component, and the least — on the practical and activity, as well as prognostic and reflexive one. Future bachelor preschool teachers understand the importance of professional image in the professional career of a preschool teacher, strive to achieve and establish professional image positions. But the obstacles in their aspirations are the absence or insufficient level of the skills necessary for building a professional image, for carrying out a critical analysis and assessment of the current level of the professional image and awareness of the need for the growth of the preschool teacher's professional image.

Table 5.
The levels of the preschool teachers' professional image (master's degree) at the summative stage of the research (%)

Components of professional image	**Development levels**		
	High	Medium	Low
Motivational and value	70	30	0
Practical and activity	50	40	10
Prognostic and reflexive	40	30	30
Mean	53.3	33.3	13.3

Source: developed by the author

Table 5 shows that persons with high and medium levels of professional image prevail among the future master preschool teachers for each of its components. The most developed professional image is based on the motivational and value component, and the least — on the prognostic and reflexive one. Future master preschool teachers understand the importance of professional image in their professional career, strive to achieve and establish professional image positions, and have the necessary skills for this purpose. At the same time, it is difficult for them to critically analyse and evaluate the current level of professional image.

The comparative data shown in Figure 1 give grounds to state that among the future master preschool teachers, the indicators of professional image are higher compared to bachelor students.

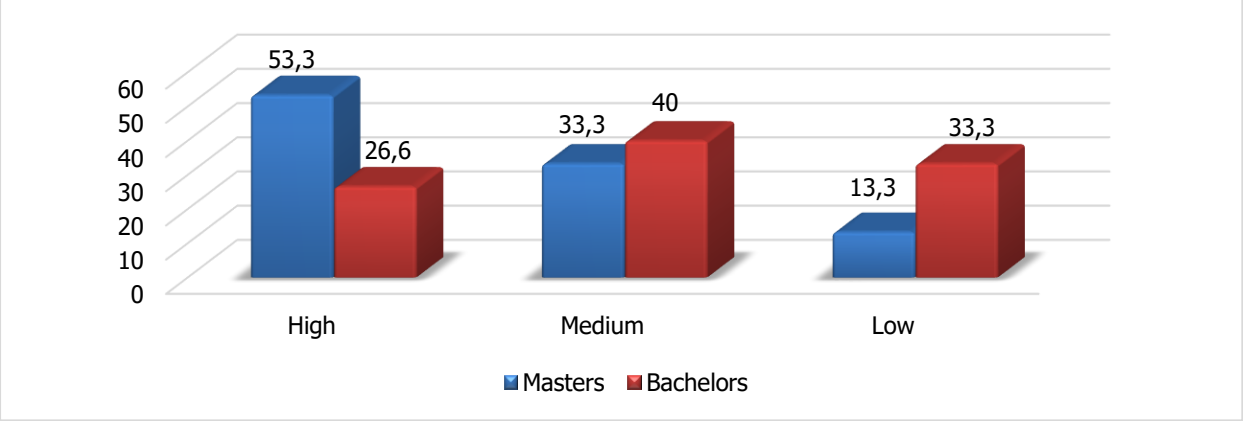

Figure 1. Comparative analysis of the level of the professional image of future preschool teachers (masters and bachelors) at the summative stage of the research, %
Source: developed by the author

At the formative stage of the research, a programme for building the professional image of future preschool teachers was developed and implemented by means of training. The aim of the programme is to adjust the current level of the professional image of future preschool teachers. This programme consists of a series of training sessions aimed at building/correcting the professional image of future preschool teachers.

The experimental testing of the programme was followed by a re-diagnosis of the levels of the professional image of future preschool teachers. Tables 6, 7 provide the data on the level of the professional image of future preschool teachers at the formative stage of the study.

Table 6.
Levels of the professional image of future preschool teachers (bachelor qualification level) at the formative stage of the research (%)

Components of professional image	Development levels		
	High	Medium	Low
Motivational and value	60	40	0
Practical and activity	50	40	10
Prognostic and reflexive	50	40	10
Mean	53.3	40	6.7

Source: developed by the author

Table 6 shows that at the formative stage of the research, respondents with high and medium levels of professional image prevail among future bachelor preschool teachers. Among future bachelor preschool teachers, the most developed professional image is based on the motivational and value component, and the least — on the practical and activity, as well as prognostic and reflexive one.

This gives grounds for asserting that future bachelor preschool teachers understand the importance of professional image in a professional career, strive to build and maintain professional image positions. At the same time, they do not have a sufficient level of the necessary skills to build a professional image. Future bachelor preschool teachers have difficulties in carrying out a critical analysis and assessment of the current level of professional image and awareness of the need to improve the professional image of a preschool teacher.

Table 7.
The levels of the professional image of future preschool teachers (master's qualification level) at the formative stage of the research (%)

Components of professional image	Development levels		
	High	Medium	Low
Motivational and value	90	10	0
Practical and activity	80	20	0
Prognostic and reflexive	70	30	0
Mean	80	20	0

Source: developed by the author

The data in Table 7 demonstrate that the vast majority of future master's preschool teachers at the formative stage of the study have a high level of professional image. Among the future master's preschool teachers, the professional image is most shaped by the motivational and value component, and the least – by the prognostic and reflexive one. Such data give grounds for asserting that future master's preschool teachers understand the importance of professional image in their professional career, strive to form and establish professional image positions, and have the necessary skills for this purpose. The main difficulty for master's preschool teachers is the ability to critically analyse and evaluate the current level of professional image.

Figure 2 gives grounds to state that there are 26.7% more persons with a high level of professional image among the future master's preschool teachers at the formative stage of the study compared to students with the bachelor qualification level. There were no respondents with a low level of manifestation of the analysed indicator among master's.

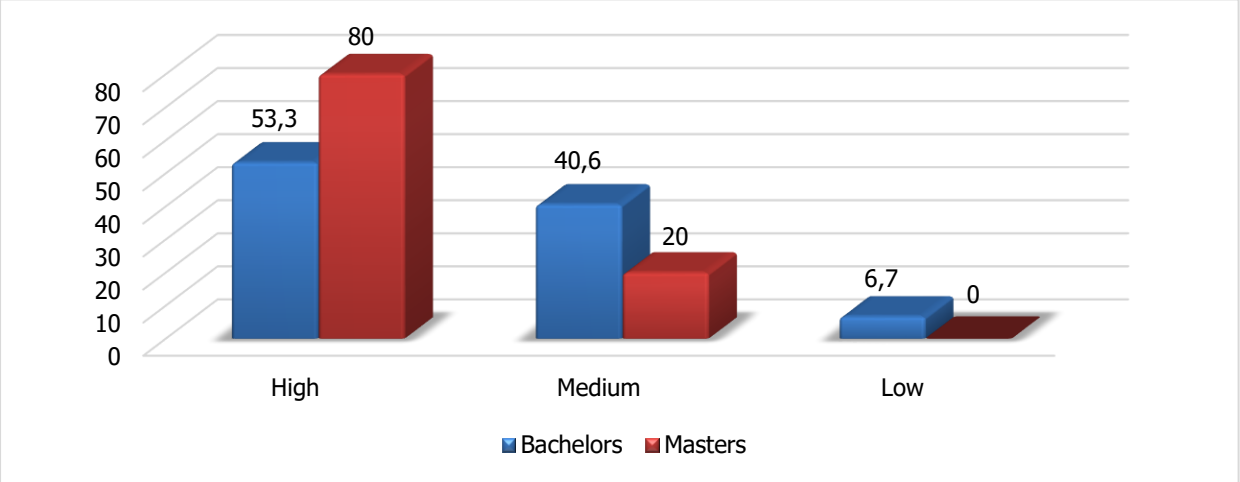

Figure 2. Comparative analysis of the levels of the professional image of future preschool teachers (master's and bachelor degrees) at the formative stage of the study, %
Source: developed by the author

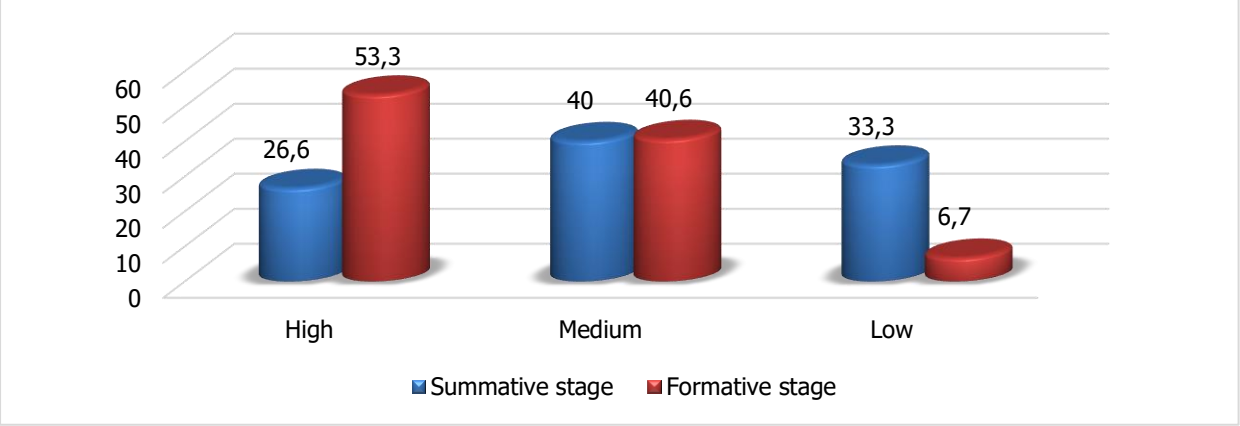

Figure 3. Comparative analysis of the level of the professional image of future bachelor preschool teachers at the summative and formative stages of the research, %
Source: developed by the author

Figure 3 shows that an increased number of future bachelor preschool teachers with a high level of professional image (by 26.7%), a proportional decrease of students with a low level of the analysed indicator (by 26.7%) was recorded at the formative stage of the study.

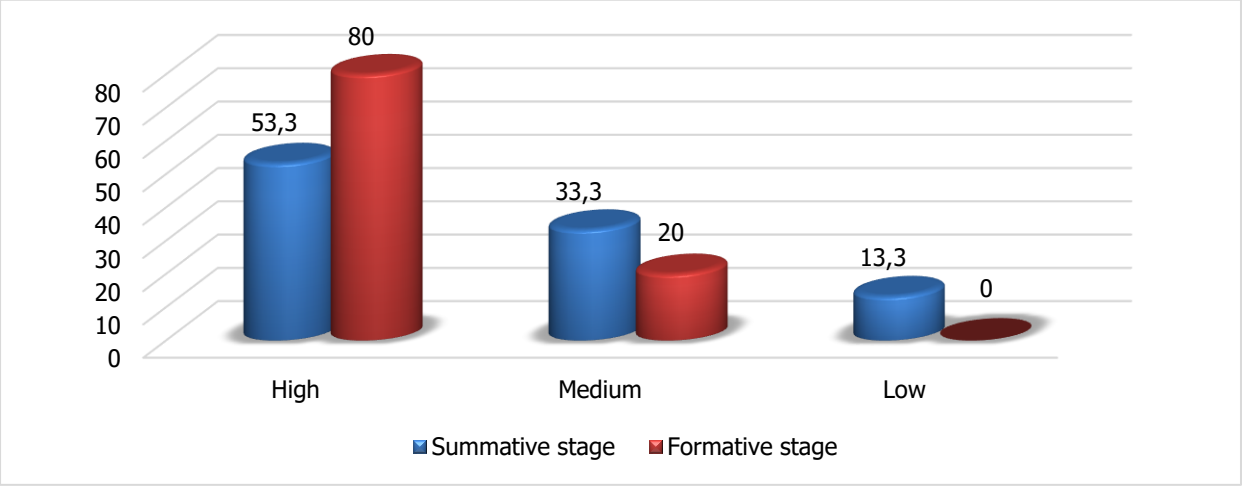

Figure 4. Comparative analysis of the level of the professional image of future master's preschool teachers at the summative and formative stages of the research, %
Source: developed by the author

Figure 4 gives grounds to summarize that there was an increase in the number of respondents with a high level of professional image among future master's preschool teachers (by 26.7%) at the formative stage of the research, compared to the summative one. At the formative stage of the research, there were no respondents with a low level of professional image. The number of master's with a medium level of professional image is insignificant (20% of the total number of respondents).

Discussion

The studies related to our study emphasize the importance of building the professional image of teachers of different majors (Karimova, 2022; Kurok & Tkachenko, 2020). The authors of empirical studies state the positive impact of training methods on the quality of professional training of preschool teachers (Havryliuk et al., 2023; Hevko & Bytsiv, 2019). In the context of our research, the approach to distinguishing the components of the professional image, in particular, such as: motivational and value, gnostic, personal and reflexive, as well as practical and operating (Kurok & Tkachenko, 2020) is also worth noting. The components of the analysed phenomenon are also distinguished within the concept of our research, which include motivational and value, practical and activity, prognostic and reflexive. In addition to the components, we distinguished the levels of each of the above-mentioned components: high, medium, and low levels.

Summarizing the results of our research, we can fully agree with the positive and negative effects on the professional image of preschool teachers identified by other researchers. Among the positive effects, the improvement in professional competence, professional self-development should be noted (Barenthien et al., 2020). And the main negative influence on the professional image of a preschool teacher is the excessive enthusiasm of the pedagogical community for the commercialization of its activities (Samoylenko et al., 2020).

The studies which are different from the our research consider the pedagogical conditions for building the teacher's professional image, which include ensuring the readiness of the teaching staff of HEIs to implement the ideas of image science, creating an algorithm for building the professional image of future teachers, introducing the category of professional image into individual educational trajectory of a future teacher, the integration of formal education or activities with informal ones on an innovative basis, the use of quasi-professional activities as a means of achieving success (Kurok & Tkachenko, 2020). We do not

single out such pedagogical conditions, but we offer an effective methodical form aimed at building the professional image of future preschool teachers. These are training sessions as part of the professional training of bachelors and masters.

Our research is characterized by a systematic approach to diagnosing the current level of the professional image of future preschool teachers and creating conditions for achieving an optimal level of professional image.

Our study is important due to the possibility of solving different points of view existing in the scientific and pedagogical communities of higher education institutions regarding the expediency of using training classes to form the professional image of future preschool teachers during their professional training in a HEI. Training sessions are more often used in the system of postgraduate education of teachers in the course of short-term and long-term improvement of their qualifications. We propose the integration of the system of training sessions for building the professional image of future preschool teachers into the professional education of students of pedagogical majors in HEIs.

Limitations

The main limitations of the study are its focus on students studying to become future preschool teachers. But the problem of building a professional image is relevant for all teachers without exception.

Recommendations

The main recommendations are to expand the research sample by covering teachers of different profiles. Further testing of the proposed programme of professional image building by means of training in the professional education of teachers of other profiles will also be of significant importance.

Conclusions

The research raises an urgent problem of building the professional image of future preschool teachers in the course of their professional education. The main attention is focused on diagnosing the current and achieved levels of the professional image of future preschool teachers according to motivational and value, practical and activity, prognostic and reflexive components. The research established that the professional image of future preschool teachers is most formed in the motivational and value component, and the least – in the prognostic and reflexive component. This indicates that future preschool teachers understand the importance of professional image in their professional career, strive to build and maintain professional image positions, have the necessary skills for this, while being characterized by difficulties in carrying out a critical analysis and assessment of the current level of professional image and awareness the need to improve the professional image of a preschool teacher.

The study offers a system of training sessions for building the professional image of future preschool teachers. The topics of the training sessions include the formation of a conscious attitude to the professional image of a preschool teacher, understanding and adjusting its components, drawing up an individual programme for its development, awareness of the leading influence of target audiences on the professional image of a preschool teacher, the development of skills necessary for correcting and improving the current level of the professional image of a preschool teacher, understanding the impact of professional image on the results of employment and consolidation in the profession, development of skills for optimal use of the advantages of the professional image of preschool teachers.

The results of the study show that the use of training sessions has a positive effect on the professional image of future preschool teachers. This is evidenced by the increased number of bachelors and masters with a high level of professional image at the formative stage of research compared to the summative stage.

The obtained results of the research can be used in the educational process of professional training of future preschool teachers, in the system of postgraduate education of preschool teachers.

The experimental testing of the proposed programme of training sessions on the professional image for professional and postgraduate education of teachers of other majors is promising.

Bibliographic References

Antoniuk, V. Z., Alendar, N. I., Bartkiv, O. S., Honcharuk, O. V., & Durmanenko, O. L. (2021). Axiological aspect of professional training of future pedagogues. *Revista Geintec-Gestao Inovacao e Tecnologias, 11*(4), 2481-2492. Retrieved from http://revistageintec.net/old/wp-content/uploads/2022/03/2296.pdf

Barenthien, J., Oppermann, E., Anders, Y., & Steffensky, M. (2020). Preschool teachers' learning opportunities in their initial teacher education and in-service professional development–do they have an influence on preschool teachers' science-specific professional knowledge and motivation? *International Journal of Science Education*, *42*(5), 744-763. https://doi.org/10.1080/09500693.2020.1727586

Bashkireva, T., Bashkireva, A., Morozov, A., Kuraev, A., & Nebrodovskaya-Mazur, E. (2021). Problems of Professional self-development among undergraduates in the digital space, identified during the COVID-19 Pandemic. *SHS Web of Conferences, 93*, 01018. https://doi.org/10.1051/shsconf/20219301018

Broiakovskyi, O. V., Ilchuk, V. V., Mas, N. M., Kapinus, O. S., & Okaievych, A. V. (2020). The Implementation of the principles of lifelong learning as the basis of quality specialize education. *International Journal of Higher Education*, *9*(7), 12-23. https://doi.org/10.5430/ijhe.v9n7p12

Dudchak, H. (2020). The formation of a pedagogical image in future teachers of the NUS. *Problems of Modern Teacher Training*, *2*(22), 56-63. https://doi.org/10.31499/2307-4914.2(22).2020.219400

Erkaboeva, N. S., & Musaeva, D. A. K. (2022). Factors of developing the professional competence of a teacher of a special education institution. *Open Access Repository*, *8*(12), 109-111. Retrieved from https://oarepo.org/index.php/oa/article/download/1054/1049

Formosa, M. (2019). Active aging through lifelong learning: the university of the third age. In: Formosa, M. (eds) *The university of the third age and active aging*. International Perspectives on Aging, Vol. 23. Springer, Cham. https://doi.org/10.1007/978-3-030-21515-6_1

Garzón Artacho, E., Martínez, T. S., Ortega Martin, J. L., Marin Marin, J. A., & Gomez Garcia, G. (2020). Teacher training in lifelong learning — The importance of digital competence in the encouragement of teaching innovation. *Sustainability*, *12*(7), 2852. Retrieved from https://www.mdpi.com/2071-1050/12/7/2852/pdf

Gogh, E., & Kovari, A. (2018). Metacognition and Lifelong Learning: A survey of secondary school students. In *2018 9th IEEE International Conference on Cognitive Infocommunications (CogInfoCom)* (pp. 000271-000276). IEEE. https://doi.org/10.1109/CogInfoCom.2018.8639961

Havryliuk, S. M., Melnykova, O. M., & Kushnir, M.V. (2023). *Modern trends in training future teachers of preschool education for professional activity: Theoretical aspect*. Uman: Visavy. Retrieved from https://dspace.udpu.edu.ua/handle/123456789/15682

Hevko, O., & Bytsiv, M. (2019). Peculiarities of shaping the professional and creative capabilities of the next generation. *Young People and the Market*, *11*, 83-87. Retrieved from https://acortar.link/7FXvxQ

Hodge, S., Holford, J., Milana, M., Waller, R., & Webb, S. (2020). Adult education, vocational education and economic policy: Theory illuminates understanding. *International Journal of Lifelong Education*, *39*(2), 133-138. https://doi.org/10.1080/02601370.2020.1747791

Kanwar, A., Balasubramanian, K., & Carr, A. (2019). Changing the TVET paradigm: New models for lifelong learning. *International Journal of Training Research*, *17,* 54-68. https://doi.org/10.1080/14480220.2019.1629722

Karimova, M. (2022). The image of a psychologist and teacher in modern education. *International Journal of Social Science & Interdisciplinary Research*, *11*(09), 272-274. Retrieved from http://gejournal.net/index.php/IJSSIR/article/view/1280

Kravchenko, L., Bilyk, N., Onipko, V., Plachynda, T., & Zavitrenko, A. (2021). Professional mobility of the manager of a secondary education institution as the basis of his or her self-development. *Romanian Magazine for Multidimensional Education*, *13*(1), 417-430. https://doi.org/10.18662/rrem/13.1/379

Kurok, V., & Tkachenko, N. (2020). Future English teachers' professional image forming. *Postmodern Openings*, *11*(3), 95-114. https://doi.org/10.18662/po/11.3/201

La Velle, L. (2023). The teacher educator: Pedagogue, researcher, role model, administrator, traveller, counsellor, collaborator, technologist, academic, thinker compliance or autonomy? *Journal of Education for Teaching*, *49*(1), 1-4. https://doi.org/10.1080/02607476.2023.2172664

Lyu, K., Xu, Y., Cheng, H., & Li, J. (2020). The implementation and effectiveness of intergenerational learning during the COVID-19 pandemic: Evidence from China. *International Review of Education*, *66*, 833-855. https://doi.org/10.1007/s11159-020-09877-4

Makhkamovna, I. A. (2023). Pedagogical fundamentals of the teacher's creative approach to the educational process. *BioGecko*, *12*(03), 509-5100. Retrieved from http://www.biogecko.co.nz/admin/uploads/4_5787255087449509765.pdf

Maksimović, J., Zajić, J., & Dimitrijević, M. (2021). Professional development of teachers in the context of modern education. In *Proceedings of the 7th International Scientific Eraz Conference: Knowledge Based Sustainable Development*, Belgrade. https://doi.org/10.31410/ERAZ.2021.263

Mbagwu, F. O., Chukwuedo, S. O., & Ogbuanya, T. C. (2020). Promoting lifelong learning propensity and intentions for vocational training among adult and vocational educational undergraduates. *Vocations and Learning*, *13*(3), 419-437. https://doi.org/10.1007/s12186-020-09245-1

Melnyk, N., Maksymchuk, B., Gurevych, R., Kalenskyi, A., Dovbnya, S., Groshovenko, O., & Filonenko, L. (2021). The establishment and development of professional training for preschool teachers in Western European countries. *Romanian Magazine for Multidimensional Education, 13*(1), 208-233. Retrieved from https://lumenpublishing.com/journals/index.php/rrem/article/download/2590/2969

Meyer, D., Doll, J., & Kaiser, G. (2023). Professional identity of pre-service teachers: Actual and designated identity profiles and their relationship to teacher education programs. *Frontiers in Education, 8,* 1134848. https://doi.org/10.3389/feduc.2023.1134848

Mushynska, N. (2018). Means of future economists' professional self-development in the educational process of foreign language studying. *Economics Ecology Socium*, *2*(3), 45-56.

Nottingham, P. (2019). Acknowledging lifelong learning principles within work-based studies: A continuing legacy for the degree apprenticeship. *Widening Participation and Lifelong Learning*, *21*(1), 29-45. https://doi.org/10.5456/WPLL.21.1.29

Poplavskyi, M., & Bondar, I. (2021). Application of information technologies for lifelong learning. *International Journal of Computer Science and Network Security*, *21*(6), 304-311. https://doi.org/10.22937/IJCSNS.2021.21.6.39

Samoylenko, N. B., Zharko, L. N., & Georgiadi, A. A. (2020). Teacher's professional image: Reimagining the future. *SHS Web of Conferences, 87*, 00063.. https://doi.org/10.1051/shsconf/20208700063

Sovhira, S., Dushechkina, N., Balokha, A., Borysenko, N., & Ieresko, O. (2023). Ecologization of education in the innovative space of higher education. *Amazonia Investiga*, *12*(67), 115-126. https://doi.org/10.34069/AI/2023.67.07.11

Sydorenko, V. V., Yermolenko, A. B., Lukiianchuk, A. M., Denysova, A. V., & Kharagirlo, V. Ye. (2020). Platform "Profosvita" as innovative educational and digital environment for specialists' professional development. *Educação & Formação*, *5*(3), 1-17.

Talmage, C. A., Hansen, R. J., Knopf, R. C., & Thaxton, S. P. (2018). Directions for 21st century lifelong learning institutes: Elucidating questions from osher lifelong learning institute studies. *Alberta Journal of Educational Research*, *64*(2), 109-125. https://doi.org/10.11575/ajer.v64i2.56548

Yekimov, S., Getmanets, G., Miroshnik, L., Sosnina, T., Havrylenko, A., Vasylieva, N., Zymivets, N., & Bondarenko, Z. (2020). Some problems of humanitarian training of future specialists in pedagogical specialties using interactive technologies. *Journal of Physics: Conference Series, 1691*(1), 012221. https://doi.org/10.1088/1742-6596/1691/1/012221

DOI: https://doi.org/10.46502/issn.1856-7576/2024.18.02.17
Cómo citar:
Shcherbii, N., Vorobets, O., Mytsan, D., Korpalo, O., & Kuravska, N. (2024). The debate on the nature of verbal nouns in Slavic languages: nominal or verbal? *Revista Eduweb*, 18(2), 238-250. https://doi.org/10.46502/issn.1856-7576/2024.18.02.17

The debate on the nature of verbal nouns in Slavic languages: nominal or verbal?

El debate sobre la naturaleza de los sustantivos verbales en las lenguas eslavas: ¿nominales o verbales?

Nataliia Shcherbii
https://orcid.org/0000-0002-1431-9595
Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine.
Oleksii Vorobets
https://orcid.org/0000-0002-3530-2581
Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine.
Dariia Mytsan
https://orcid.org/0000-0002-1430-7121
Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine.
Oksana Korpalo
https://orcid.org/0000-0001-7356-442X
Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine.
Nataliia Kuravska
https://orcid.org/0000-0002-3069-9241
Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine.

Recibido: 17/04/24
Aceptado: 09/06/24

Abstract

The article defines the status of verbal nouns in Slavic linguistics, focusing in particular on the diverse terminological apparatus in each of the Slavic languages and determining its verbal or nominal nature. The verbal nature of such constructions is analyzed based on the following features: regular and systemic nature of formation; retained aspectual correlation; constructions with the agent in the instrumental case, which are characteristic of the passive voice; retained reflexive formants; expressed uncountable actions, which makes it impossible to use a plural form; expressed categories of transitivity/intransitivity and nullified categories of tense, mood, and person. It is emphasized that the productivity of the usage of these forms in Slavic languages depends on the nominal (Russian, Polish) or verbal (Ukrainian, Slovak) nature of the language. The article also analyzes the usage of reflexive verbal nouns in modern texts.

Keywords: Category of aspect, nominal nature, reflexive formant, Slavic languages, verbal nature, verbal nouns.

Resumen

El artículo define el estatus de los sustantivos verbales en la lingüística eslava, centrándose en particular en el diverso aparato terminológico de cada una de las lenguas eslavas y determinando su naturaleza verbal o nominal. La naturaleza verbal de tales construcciones se analiza basándose en los siguientes rasgos: naturaleza regular y sistémica de la formación; correlación aspectual conservada; construcciones con el agente en el caso instrumental, que son características de la voz pasiva; formantes reflexivos conservados; acciones incontables expresadas, lo que imposibilita el uso de una forma plural; categorías expresadas de transitividad/intransitividad y categorías anuladas de tiempo, modo y persona. Se subraya que la productividad del uso de estas formas en las lenguas eslavas depende de la naturaleza nominal (ruso, polaco) o verbal (ucraniano, eslovaco) de la lengua. El artículo también analiza el uso de sustantivos verbales reflexivos en textos modernos.

Palabras clave: Categoría de aspecto, naturaleza nominal, formante reflexivo, lenguas eslavas, naturaleza verbal, sustantivos verbales.

Introduction

One of the most popular areas of modern linguistic research is the study of intercategorical relations, especially in the context of several languages. Verbal nouns belong to the hybrid parts of speech that combine categories that are typical for different classes of words, such as mood, tense, reflexivity, case, and number.

Under the term "hybrid verb forms" we partially qualify adjectives, adverbs, verbal nouns, forms with -no, -to and infinitives. This principle of analysis has not been tested to date, since the first time these forms were described in a single work on their joint interpretation, using material from various Slavic languages. Genetically, hybrid forms of the verb tend to be nouns. These forms have gone through a long way of verbalization – acquiring verbal properties, consolidating the semantics of action. In Slavic linguistics, these forms are to some extent related to each other by origin, common procedural meaning, and grammatical features.

From the point of view of grammatical meaning, the infinitive is close to verbal nouns, only the latter is subject to declension, while the former remains unchanged, thus being the so-called "fossilized case form of former verbal nouns" (Espersen, 1958, p. 159).

According to the semantic criterion, the above-described verb forms are characterized by a processual meaning that describes features related to changeability/invariability over time.

According to the word-formation criterion, hybrid verb forms are united by a procedural meaning that covers such conceptual features of other categories (subject, property) that are derived from the names of certain processes. Hybrid verb forms retain the suffixes and prefixes of the stem of the formative verb, which serve as formal indicators of the belonging of the formative verb to a certain grammatical type, and thus preserve the verb category, which, through the meanings of imperfection and completion, conveys the nature of the process, i.e. its integrity/integrity, limit/unlimited, effectiveness/ineffectiveness, completeness/incompleteness, continuity/immediacy, repeatability/uniformity.

The consideration of the verbal noun as a hybrid form of the verb with the semantic and grammatical approach will allow to prove its intercategory partitive status in Slavic languages.

The article identifies the status of verbal nouns in the context of Slavic linguistics, with the primary focus on the analysis of the terminological apparatus in the aspect of Slavic language formations. The theoretical

and methodological foundation, in the form of the work of scientists in an extended time frame, allowed us to determine the verbal or nominal nature of the terminological apparatus. The definition of the verbal nature of linguistic constructions is given in the concepts of aspectual correlation, the nature of formation, the state of preservation of reflexive formants, the expressed uncountability of action, the categorical nature of time, mood, and person. After that, the analysis of the use of deverbal reflexive nouns in modern texts is given. The article proves that the productivity of the use of the studied forms in Slavic language formations is determined by the nominal or verbal nature of the language, with the first case being typical for Russian and Polish, and the second - for Ukrainian and Slovak.

Theoretical background

In the West Slavic linguistics, verbal nouns have been the subject matter in the works of the following linguists: M. Jelínek, H. Křížková, P. Karlík, J. Furdík, K. Buzássyová, F. Trávníček, J. Gebauer, B. Havránek, J. Puzynina, H. Safarewiczowa, A. Skopliev, in Eastern Slavic –N. Kostusiak, O. Kurylo, H. Kutnia, O. Petryk, K. Ponomarenko, O. Pchelintseva, N. Szczerbij, and more.

The term "hybrid verb-adjective forms" is usually associated with V. Vinogradov's grammatical concept of adjectives that combine features of completely opposite parts of speech – verbal and noun (Vinogradov, 2001).

The theoretical basis of the terminological theory of representation of process concepts is O. Peshkovsky's concept of mixed parts of speech, which consists in the formation of morphological structures that combine categories characteristic of different classes of words, such as mood, tense, reflexivity, case, number, and gender.

Mixed parts of speech are united, on the one hand, not only by their common origin and procedural meaning, but, on the other hand, by the category of the Slavic type, which primarily belongs to the verb, which creates preconditions for the inclusion of hybrid forms in the system of verbal functioning (Peshkovsky, 1938; Kostusiak, 2018). At the same time, mixed parts of speech are not characterized by the categories of person and mode of action, which opposes them to the personal forms, respectively, they are inflectional categories that have the ability to independently express the predicate, i.e. to describe something, some opinion or one's view on what is being discussed (Szober, 1969, p. 139).

However, it didn't result in their unified explanation or part-of-speech status, which necessitates a comprehensive study of the intercategorical relations of verbal nouns in Slavic languages, in particular against the background of the hybridity of this category as it combines features of diametrically opposite parts of speech.

Research objective, methodology

The objective and goals of the study consist in defining the concept of a verbal noun in Slavic linguistics, characterizing and comparing the structural and semantic features of verbal nouns in Slavic languages, and determining their verbal or nominal nature.

Methods. The specificity of the object and the tasks set have led to the complex use of methods used in modern linguistics and involving the interpretation of linguistic phenomena from a systemic linguistic perspective. In analyzing the theoretical foundations of the study, linguistic observation, description and the method of philological analysis were used. The comparative method made it possible to analyze verbal nouns as hybrid forms of the verb in Slavic languages, in which they have different means of expression. In order to classify different types of linguistic facts for the expression of word-formation, morphological,

semantic and syntactic features of verbal nouns in the system of Slavic languages, the typological method was used. The transformation analysis has identified semantic and syntactic similarities and differences between linguistic objects by establishing common and distinctive features as a result of their transformations. The component approach was used to study the semantic structure of the word, in particular, analytical forms. Quantitative analysis was conducted to determine the degree of typological productivity of structural and semantic units of analysis. The empirical method was useful in updating, correcting and supplementing certain linguistic provisions, in particular, in distinguishing the concept of hybrid verb forms.

The illustrative material was taken from literary texts using the method of continuous sampling from the national corpora of the Ukrainian (KUM) and Polish (NKJP) languages, as well as from the Internet to analyze modern colloquial variants.

Results and Discussion

This section presents the information obtained in a clear way, specifying the main findings from the interpretation of the data in light of the theoretical references or the literature review. This section seeks to fulfill the objective of the investigation/ Presenta la información obtenida de manera clara, especificando los hallazgos principales a partir de la interpretación de los datos a la luz de los referentes teóricos o la revisión de literatura. Este apartado busca dar cumplimiento al objetivo de la investigación. / Apresenta la información obtenida de manera clara, especificando los hallazgos principales a partir da interpretación de los datos à la luz de los referencias teóricos ou la revisión de literatura. Este apartado busca dar cumprimento ao objetivo de la investigación.

Analysis and discussion

Verbal nouns are notable for their complex nature, as they are considered a mixed, hybrid phenomenon due to the debatable part-of-speech status and intercategorical nature.

In Slavic linguistics, there is no clear terminology for verbal nouns. Ukrainian linguists traditionally call these forms *віддієслівні іменники* (Vykhovanets & Horodenska, 2004; Vakulenko, 2010; Kutnia, 2018; Kostusiak, 2018; Petryk, 2008; Piletskyi, 2002). O. Kurylo used the term *речівник* (Kurylo, 2008, p. 77).

The following terms are used in Polish: *odsłownik*, referring to these forms as verbal (Saloni, 2007), *rzeczownik odsłowny*, including these words in the verb paradigm (Mędak, 2004), *forma rzeczownikowa czasownika*; W. Doroszewski classifies the following forms as nouns (WSJP). Other Slavic languages use the following terms: ces. *deverbální substantivum*, slv. *izglagolski samostalnik*, bel. *аддзеяслоўныя назоўнікі*, bul. *отглаголни съществителни*) or "action noun" (lat. *nomina actionis*, rus. *имя действия*, slk. *dejové menâ*).

Up to the end of the 20th century, the classical Czech linguistics predominantly included the action nouns ending with *-ni / -ti* into the verb paradigm (Tomíček, 1858; Gebaue, 1904, Bartoš, 1901, Čenský, 1888; Trávníček, 1951; Havránek & Jedlička, 1981) as an impersonal form of the verb alongside infinitives, participles, and adjectives. Since the mid-twentieth century, this concept has been criticized (Dokulil, 1982; Jelínek, 1968; Křížková, 1959; Kopečný, 1958), because verbal nouns represent a word-formation category close to inflection due to their virtually unlimited productivity, which makes a verbal noun a full-fledged noun (Dokulil, 1982, p. 16), which has become a conventional leading concept in Czech linguistics in the twenty-first century. Among verb forms, they occupy the most peripheral position.

Alongside this, in West Slavic linguistics, we find the narrower term "verbal noun" to denote only nominalized verbs ending with **-nje/-tje* as a special subclass of nomina actionis, in particular: ces.

podstatné jméno slovesné / verbální substantivum, slk. *slovesné podstatné meno or dejové mená / verbálne substantívum*, sorb. *werbalny substantiw / słowjesny wěcownik* (in grammar books that are written in German – das Verbalsubstantiv, which denotes actional verb-derived constituents with the *- ni, - ti* formant, which has inflectional features of a noun and expresses the categories of gender, number, and case, but is also regularly derived from verb stems, inheriting the categories of aspect and reflexivity (*dotýkání se - dotknutí se, rozcházení se - rozejiti se*) (Just, 1914; Skopliev, 2018, p. 259).

J. Puzynina, the author of a comprehensive monograph on verbal nouns, follows other West Slavic linguists (Buzássyová, 1982; Furdík, 1967; Křížková, 1959; Karlík, 2004) and distinguishes two types of verbal nouns: 1) categorical substantivum verbale (*-anie, -enie, -cie, -ęcie*), which are close to the verb in terms of formal and semantic characteristics; 2) non-categorical substantivum deverbale, which are formed using various suffixes and are close to the noun (Puzynina, 1969, pp. 28-33).

In South Slavic languages, two types are also distinguished, particularly in Serbian, glagolske imenice and deverbative imenice, but regular forms are created only from verbs of the perfective aspect. Accordingly, the glagolske imenice type is interpreted as verbal form, and the deverbative imenice type covers non-categorical nouns formed from imperfective verbs that lose their semantic connection with the verb and acquire thing-denoting meanings (Klajn, 1998; Marič, 2010; Gradinarova, 1999).

In East Slavic languages, there is no division into categorical and non-categorical types: all such forms are considered as verbal nouns, which is the result of a word-formation approach to the consideration of this linguistic phenomenon, although the scope of verbal semantics in the lexemes varies (Pchelintseva, 2016). I. Vykhovanets and K. Horodenska consider the word-forming noun category of grammatical denotation of a thing within the noun, which is based on the transformation of nominalization. In this category, the researchers include predicative nouns (mostly verbal and adjectival), which nullify the original verbal categories and acquire grammatical categories of a noun (Vykhovanets & Horodenska, 2004, pp. 101-102).

For instance, following Z. Saloni and J. Puzynina, A. Skopliev separately distinguishes Czech categorical verbal formations ending with *-ni / -ti*, which are formally and semantically similar to the verb, and calls them verbal nouns (Skopliev, 2018).

J. Popel grants the verbal noun the status of a separate part of speech of a "hybrid type" (Popela, 1962, p. 136). We support the opinion of O. Peshkovskyi and J. Popel (Popela 1962) and identify hybrid verb forms that combine categories that are typical for different classes of words, such as mood, tense, reflexivity, case, and number (Szczerbij, 2022). Among them, we distinguish a verbal noun that is positioned in the ranges of both a noun and a verb.

Regarding a verb and a verbal noun, there is a long process of identifying similarities and differences in formal grammar, particularly in terms of semantics.

There are two types of nouns that are formed in terms of meaning (Doroszewski, 1963, p. 284): 1) predicative nouns like *słuchanie, mycie* and 2) subjectival nouns like *podanie*'written request, document, statement', *nakrycie*'table setting', *okrycie*'coat', *zamknięcie*'lock, padlock'. Similar opinions are expressed by Ukrainian linguists regarding subjectival nouns. Indeed, I. Vykhovanets and K. Horodenska argue that the acquisition of syntactic and morphological features of a new part of speech for the original word is sometimes followed by a semantic shift – partial or complete semantic convergence with another part of speech to which the word has syntactically and morphologically shifted. Thus, the verbal morphologized nominalization can have several degrees of transposition: syntactic, morphological, and semantic – which is why there is a large number of types of verbal nouns (denoting action, process, or state). The nouns formed as a result of verbal morphological nominalization have a common lexical semantics with the original

verbs, but different part-of-speech grammatical categories and formal-syntactic and semantic-syntactic functions. (Vykhovanets & Horodenska, 2004, pp. 115-116). M. Dokulil also distinguishes verbal nouns resulted from transposition as a special type of derivation, which consists in the formation of a linguistic unit that is identical in lexical content to the original one, but with grammatical features of another part of speech (Dokulil, 1982, pp. 259-260).

The verbal nature of such formations is confirmed by various features, in particular:

1) **Regular and systemic formation.** They are formed using a limited set of suffixes with a clear distribution that is determined by the structural characteristics of the original.

According to O. Pchelintseva's calculations, the Polish verbal noun can be formed from (almost) every verb and retains the categories of case and reflexivity; the Ukrainian noun can be formed from every fourth verb and retains most of the case indicators; the Russian noun is formed only from every sixth verb and loses case forms and reflexivity, cf: rus.: *повторение*; ukr.: *повторення і повторювання*; pol.: *powtorzenie i powtorzenie się / powtarzanie / powtarzanie się* (Pchelintseva, 2019, p. 34).

In Ukrainian, the following word-forming suffixes are used to form verbal nouns: *-нн(я)* (other options: *-енн(я), -інн(я), -тт(я);* they do not belong to verb forms but are distinguished as a special type of noun. They express only neuter gender and have unified case inflections.

Notably, in Polish, categorical verbal nouns (substantivum verbale) are formed from passive participles ending with *-any, -eny, -ty, -ęty* using the formants *-anie, -enie, -cie, -ęcie*. They are characterized by process-denoting meaning and the ability to retain suffixes and prefixes of the original verb, which act as formal indicators of belonging to a certain aspect. Their productivity does not stop, as evidenced by the formation of completely new verbal nouns from borrowings to denote modern information processes, such as: *esemesowanie, googlanie, facebookowanie, istalowanie, nagrywanie, pobieranie, blogowanie, instagramowanie, polubienie*. In Polish, due to the development of computer technology, the number of corresponding terms and derivatives with this meaning has increased in recent years, e.g.: *W dziedzinie produktów elektronicznych dominowało* ***oprogramowanie*** *oraz dzwonki do telefonów, znacznie wyprzedzając m.in. pliki muzyczne oraz ebooki. Natomiast wśród usług najczęściej znaleźć można było hosting,* ***projektowanie i pozycjonowanie*** *stron, porady i wywoływanie zdjęć* (Dziennik Internautów). About 200 verbs are exceptions to the formation of verbal nouns with *-nie, -cie* in Polish (Pchelintseva, 2016, p. 160), but in colloquial speech and in the Corpora, forms of these verbs are actively used; however, they're not recorded in dictionaries.

In Czech, verbal nouns are not formed from modal verbs, linking verbs, marked repetitive verbs such as *chodivát* (to go often, more than once), as well as from verbs with the meaning "to belong to something", as well as from verbs to say, to take place, to happen, and more (Skopliev, 2018, p. 19).

According to linguists, a significant number of verbal nouns came to Eastern Slavic languages from Old Bulgarian, where the *-ние* model was highly productive, e.g.: *създание, отвръщение, съпасение, освяштение, искоушение* (Pychkhadze, 2011). In the nineteenth century, during the Bulgarian Revival and the formation of the literary Bulgarian language, a reverse process occurred: not only words but also entire word-formation models were borrowed from Russian into Bulgarian, including the very Bulgarian model of *-ние*, which had Old Bulgarian origin. As a result of this process of model return, many words ending with *-ние* appeared in the Bulgarian language, which initially functioned in parallel with the vernacular Bulgarian forms ending with -не (*съставление – съставяне*). These two types of verbal nouns even have the same plural form (*фінальния*), e.g.: *събрание – събрания, събиране – събирания*, although in colloquial speech, verbal nouns ending with *-не* can form the plural with the suffix *-та* (after *-не-): ядене – яденета* 'eating', 'meals'. Over time, many of these forms diverged in their meanings: in

modern Bulgarian, nouns ending with *-ние* mostly acquired the meaning of a generalized result or a whole situation, or developed subject meanings, but nouns ending with *-не* denote a processual action and are semantically close to the verb (Andrejčin, 1978; Gradinarova, 1999; Pchelintseva & Volodarska, 2021).

In general, Bulgarian linguists agree that nouns ending with *-не* have a distinct verbal nature (Stoyanov, 1964, p. 408; Andrejčin, 1978, p. 364; Pърvev, 1993, pp. 384-385). In contrast, nouns ending with *-ние* are irregular and semantically unpredictable.

The regularity of usage and systematic formation of verbal nouns depends on the nominal or verbal nature of the language. The Swedish linguist A. Lombard argued that nominal nature has been ingrained in the European way of thinking since the end of the nineteenth century, as a result of which we no longer only speak but also think with the help of noun phrases (Lombard, 1930).

The usage of noun phrases makes the text more precise, in particular, it shows a tendency to linguistic economy by condensing sentences, because noun phrases are shorter than their synonymous subordinate verb phrases, and a concise text is easier to read, understand, and memorize (Wierzbicka, 1962, p. 195; Bajerowa, 1980, p. 59).

Noun phrases have become widespread in Ukrainian under the influence of Russian, in which it has a deep historical tradition. The main syntactic difference between Ukrainian and Russian is the verbal nature of Ukrainian and the nominal nature of Russian (Nepyivoda, 1997). Nominal nature is also typical for other Slavic languages, including Polish, in which the share of noun phrases is constantly growing (Wierzbicka, 1962). This feature is also emphasized by Diana Wieczorek, who argues that Poles perceive the world in a more 'object-centered' way, while Ukrainians have an organic ability to see life in dynamics, movement, and convey it with a verb, the so-called 'verbalization' (Wieczorek, 1994, pp. 58-59).

Czech scientific writing is also typically object-centered, but to a lesser extent (Viková, 1976), and an even lower degree is typical for Slovak verbal nouns, which, like Ukrainian, were formed based on the vernacular (Selihei, 2014, p. 38).

2) **Retained aspectual correlation.** Verbal nouns inherit the grammatical category of aspect, which conveys the nature of the process, namely: integral / non-integral, effective / ineffective, starting / completed, repetitive / singular, limited / unlimited, continuous / instantaneous, and more (Ginzburg, 2012; Horpynych, 2004). Verbal nouns are characterized by their inability to be a formative unit for new words (which brings them closer to the inflected form).

Regarding modern Ukrainian, linguists have different opinions. For instance, some believe that the category of aspect in subjectival nouns is largely neutralized and deprived of the status of a grammatical category (Ponomarenko, 2008, p. 79). Others point out that the research has shown that the semantic structure of subjectival nouns resulting from the process of transposition retains not only the lexical meaning of the base verb, but also the grammatical aspect along with the acquisition of new categorical meanings (Yarmolenko, 2001, p. 83). Still others note that as a result of the morphological transition of a verb into a noun, the latter retains the category of aspect in a slightly modified form (Vykhovanets & Horodenska, 2004, p. 116). All of this complicates the practical usage of verbal nouns in professional texts, leading to the fact that authors choose one of the two related nouns ending with *-ння, -ття,* regardless of which verb (imperfect or perfective) it is formed from, most often the shorter one, and use it to denote "both completed and unfinished actions," while "the second one becomes superfluous, because it duplicates the semantics of the first one" (Piletskyi, 2002, p. 217), and is gradually falling out of usage (Ginzburg, 2011, p. 31).

The verbal nouns ending with *-ння, -ття* usually describe an action in its continuity, where verbal nouns correspond to imperfect continuous verbs; they can also denote the name of a short action, the name of an action as a result of a process, and the name of a thing, a place, where they correspond to perfective verbs or imperfective continuous verbs (Kurylo, 2008, p. 77).

In Polish, verbal nouns are mostly formed from both aspectual verb pairs, for example: *robienie – zrobienie, mycie – umycie, picie – wypicie, bicie – podbicie, pisanie – napisanie, malowanie – wymalowanie, otwieranie – otwarcie*.

In Russian, verbal nouns do not retain verbal aspect opposition in a systemic fashion: *изучать* 'to be learning' (imperf.) → *изучение* 'learning' ← *изучить* 'to have learnt' (perf.); they are formed only from every 6th verb, have an unpredictable semantic result, and cases *like чтение – прочтение* 'reading' make up no more than 10% of the entire corpus of deverbatives; such pairs usually contain only reflexes of the verbal category of aspect (Pchelintseva & Volodarska, 2021, p. 20; Peshkovsky, 1938). The reason for this is the historical development of the category of aspect in Russian, the loss of a range of verbal nouns that correlated with the perfective, certain restrictions on the formation of such forms from verbs with quantitative and temporal limits, as well as restrictions on nominalization and the disappearance of a vivid aspectual differentiation of derived verbal nouns. Aspectual indicators have been practically lost in Russian, since the surviving pairs of verbal nouns show a small degree of aspectual semantics. Accordingly, in the spoken language, those verbal nouns that do not show any kind of aspectual characteristics are used more frequently.

In Czech, verbal nouns with the suffixes *-nie (-ní) / -tie (-cie), -ti* (honění 'hunting') are regularly formed from both aspectual forms of the verb and consistently retain formal indicators and aspectual semantics, having a high degree of semantic predictability (Karlík, 2004). Aspectual correlation also remains consistent in Polish (Puzynina, 1969; Jędrzejko, 1993). Therefore, the East, South, and West Slavic languages at the systemic level demonstrate different degrees of preservation of verbal aspectuality.

In Bulgarian, verbal nouns, or as they are also called Bulgarian gerunds, are regularly formed only from imperfective verbs using *-nje (-ne)* (Šipka, 2000). From perfective verbs, such nouns are formed irregularly, and the grammatical and lexical semantics of such formations are rather unpredictable (Pchelintseva & Volodarska, 2021).

3) **Formation of constructions with an agent in the instrumental case, which is typical for the passive voice.** Verbal nouns can be paraphrases of sentences with predicates in both the active and passive voice. However, it is worth noting that a passive voice sentence is a result of a transformation of an active voice sentence without changing its meaning. This opinion is shared by the supporters of transformational-generative grammar, in particular J. Kuryłowicz (Kuryłowicz, 1977).

Verbal nouns in the diachronic aspect are transformations of the passive voice, as evidenced not only by the morphological structure of the verbal action noun, the base for which is a passive participle, but also by the similar form of the agent in both constructions, e.g.: *Słoiki, starannie myte przez aseptyczną ciotkę Mirosławę, ujawniały swe sekrety* (Jacek Dehnel); *Byłaś zbyt miła dla niego - powiedziałem, wycierając* ***myte przez*** *Renię naczynia* (Mariusz Ziomecki) – passive voice constructions used with a noun in the accusative case and a preposition przez*. Do snujących się dźwięków dołączył brzęk talerzy i sztućców, niesionych do* ***mycia przez*** *Lidkę* (Robert Urbański; Jacek Kondracki) – construction with a verbal noun of action with an agent in the accusative case and a preposition *przez*.

However, in Ukrainian, a construction with a verbal noun of action is used with an agent in the instrumental case, which is typical for passive constructions or participles, respectively: *Мокрі, липкі від поту люди зринали і не могли зринути з сонного очманіння, борсалися в тяжкій атмосфері, як на дні моря,*

наснаженій тухлим смородом, надміром вуглекисню, терпкими випарами давно не ***митого милом*** *тіла…* (Sofiia Andrukhovych) – participial phrase. *Після* ***миття шампунем*** *машина набуде свого натурального кольору, тобто білого* (Viktor Savchenko) – construction with verbal nouns.

4) **Retained reflexive formants.** Among the Slavic languages, modern Polish is distinguished by the preservation of the reflexive formant się with verbal nouns of the categorical type. In the East and South Slavic languages, such forms are impossible. In Czech and Slovak, this tendency is also preserved, but to a lesser extent, e.g: slk. *rozbiehať sa* (to run off) – *rozbehnúť sa* (to have run off) → *rozbiehanie sa – rozbehnutie sa* (a run-off); ces. *dočasně zakrývat – zakrýt* (to temporarily close – to close) → *dočasné zakrývání – zakrytí* (temporary closure). As for related East Slavic forms, this interpretation is hardly applicable or even impossible, cf: ukr. *закривання – закриття* (closing – closure), but *витирання* (wiping) – ?; rus. *разбегание (*ся)* (run-off, to run off) – ? A similar situation is observed in the South Slavic languages (Skopliev, 2018, pp. 259-260). According to F. Trávníček, J. Gebauer, B. Havránek, reflexivity in Czech verbal nouns is peripheral and optional, and dictionaries may not record reflexive forms of verbal nouns at all, as they are intended for practical usage (Gebauer, 1904, p. 402; Havránek & Jedlička, 1981, p. 268), e.g.: *A pak přišlo učení se fotografie — malířství — umění* (Jaroslav Němec). The reflexive clitic is retained with verbal nouns where its absence may cause ambiguity or confusion (Havránek & Jedlička, 1981, p. 268; Trávníček, 1951, pp. 1405-1406). Slovak occupies an intermediate position in terms of voice-based differentiation, in particular, the reflexive voice (Atsarkyna, 1993, pp. 141-146; Baláž, 1954, pp. 16-17).

H. Safarewiczowa also notes (Safarewiczowa, 1954, p. 332), that in Polish and Czech, unlike in Ukrainian and Russian, the reflexive pronoun is not merged with the verb, but functions freely in the sentence, although it is characterized by the phenomenon of desemantization as a pronoun: *Zmuszają do* ***obejrzenia się****, nawet do podążenia się za kobietą, które ich* używa (Janusz Leon Wiśniewski).

5) **Denoting uncountable actions, which indicates the impossibility of using the plural form.** The category of number of verbal nouns is closely related to the category of aspect. One of the features of verbal nouns is the lack of plurality and the impossibility of using them with cardinal numerals, since the singular form accordingly denotes 'uncountable' actions, abstractness, and indefiniteness.

The usage of the plural form leads to nominalization of the lexical meaning, specification and, accordingly, loss of the actional semantics. For instance, in the following examples *Na razie o masowych odejściach z policji nie ma mowy* (Gazeta Krakowska); *Ani umierający, ani ten, kto mu towarzyszy, nawet jeśli asystował przy stu odejściach* (Krystyna Kofta) the verbal noun highlighted in bold denotes individual acts of action, understood as specific, calculable events. In the second sentence, the seme of nominality is reinforced by the usage of a cardinal numeral with it. *A jakież człowiek może mieć w państwowym sklepie życzenia, na państwowej posadzie i w ogóle, żeby tak powiedzieć, gdy również i życzenia są upaństwowione* (Wiesław Myśliwski) – the highlighted verbal noun has a nominal meaning.

Accordingly, we distinguish two types of verbal nouns: predicative nouns, which are used only in the singular and follow the aspectual semantics, and subjectival nouns, which, accordingly, lose their actionality and can be used in the plural; they are divided into several semantic subtypes: transformable; usable in plural; terms; mode of action; state; situations-actions, etc. In addition, several functions of the plural of verbal nouns can be distinguished, which is the subject of further research.

6) **Category of transitivity/intransitivity.** Verbal nouns are characterized by the verbal category of transitivity, which is expressed by the functional similarity of a noun in the accusative case by a transitive verb and a noun in the genitive case by verbal nouns motivated by transitive verbs: *malować obraz – malowanie obrazu, obserwować ptaki – obserwowanie ptaków.*

When a transitive verb is replaced by a corresponding verbal noun, the genitive case with the meaning of object by action nouns motivated by the transitive verb is a regular transformation of the accusative case with the meaning of direct object.

Some Polish verbs require only a verbal noun as an object, for example: *przerywać (badania), kontynuować (protest), rozpocząć (strajk), zmusić (do ustępstw), umożliwić (obserwację), odmówić (pójścia), zaplanować (kupno)*. Their Ukrainian equivalents are often paired with the infinitive: *Oni kontynuowali protest – Вони продовжували протестувати; Konieczność zmusza nas do ustępstw – Необхідність змушує нас поступитися; On zaplanował kupno nowego samochodu – Він запланував купити новий автомобіль*.

A number of Polish verbs can be used with an object in both infinitive and verbal noun forms, e.g.: *Kończyć tłumaczyć opowiadanie* або *Kończyć tłumaczenie opowiadania*; *Wolę chodzić piechotą* або *Wolę chodzenie piechotą*; *Pragniemy wyzwolić się z tego* або *Pragniemy wyzwolenia się z tego*; *Zdecydowałam się urządzić wycieczkę* або *Zdecydowałam się na urządzenie wycieczki; Pozwoliła zwiedzić okolice* або *Pozwoliła na zwiedzenie okolic*.

Polish verbal nouns in the role of modifier may require a verbal noun, but not an infinitive, as in Ukrainian, cf: *próba zrobienia (czegoś) – спроба зробити (щось); zezwolenie na wykorzystanie (czegoś) – дозвіл використати щось; przeszkadzanie w robieniu (czegoś) – перешкоджання робити щось; propozycja wygłoszenia (czegoś) – пропозиція виголосити (щось); możliwość zbadania (czegoś) – можливість дослідити (щось); szansa przetrwania – шанс витримати (вистояти, протриматися, вижити)* (Kravchuk, 2015, pp. 76-77).

7) **In verbal nouns, a number of verbal categories are nullified, in particular the categories of tense, mood, and person, since verbal nouns themselves do not have morphological means to convey information about the time of the action, i.e. they do not possess the semantics of interval.** This information is clear from the context and is expressed with the help of various elements. Constructions with verbal nouns most often indicate relative tenses. The temporal interpretation of verbal nouns depends on the semantics of the verbs from which these verbal nouns are derived. For instance, we distinguish the following tense values: present – imperfective verbal nouns; absolute present / past – imperfective verbal nouns; preceding or preceding / past – imperfective verbal nouns; sequence – imperfective and perfective verbal nouns. In the domain of expressing the category of tense, we observe neutralization, which unites relative and absolute tenses in verbal nouns as lexical units.

The formation of verbal nouns is largely regulated by the syntactic position, in particular by moving the "verb to the topic position in the information structure and formally to the syntactic position of the subject, whereby the formative verbs can have different person-tense and person-mood forms, which does not imply the presence of person-tense or person-mood features in derivatives. The tense, mood and person features are not represented at all in the formal structure of nouns with object-centered dynamic meaning.

Conclusions

Verbal nouns are complex hybrid formations that border on two parts of speech and combine categories characteristic of different word classes. They are formed with the help of a limited set of suffixes with a clear distribution. In Polish, they are characterized by a more systemic and regular formation, unlike in Ukrainian. The verbal nature of such formations is evidenced by the category of valence and transitivity / intransitivity inherited from the base, which at the level of syntagmatics affects their combinability and becomes a differentiating feature for distinguishing the components of the semantic paradigm of a polysemous verbal noun. The category of voice, in particular, reflexivity, is a feature of Polish that manifests

itself in the preservation of the reflexive formant with verbal nouns and the expression of various meanings. The categories of gender and number depend on the semantic meaning of verbal nouns and determine their verbal or nominal nature.

Bibliographic References

Andrejčin, L. (1978). *Basic Bulgar grammar*. Sofia: Science and Art. (In Bulgaria)

Atsarkyna, T. A. (1993). Ways of expressing return meanings in verbal nouns in West Slavic languages. *Studies on the verb in Slavic languages: Typology and confrontation.* Ed. by A. Bartoszewicz and J. Pietruchina. (pp. 141-146). Warsaw. (in Polish)

Bajerowa, I. (1980). *The influence of technology on the evolution of the Polish language*. National Institute of Ossoliński family. https://www.konin-pbp.sowa.pl/index.php?KatID=0&typ=record&001=KON+00210076727

Baláž, G. (1954). Abstract deverbs in Russian, Slovak and Czech. *Soviet linguistics*, *4*(1), 12-21. (in Czech).

Bartoš, F. (1901). *New handbook of correct Czech*. Telči: By Emil Šolec, bookseller. https://acortar.link/vayb4Y

Buzássyová, K. (1982). Names of events and names of properties in the transpositional and nominative function. *Linguistic journal*, *33*(1), 21-35. https://www.juls.savba.sk/ediela/jc/1982/1/JC_1982_1_LQ.pdf

Čenský, F. (1888). *Brief practical grammar of the Bohemian language for Germans: with special consideration of military terminology in the examples used*. *3, verbesserte Auflage*. Prag: Verlag von Kober. (in Czech).

Dokulil, M. (1982). On the issue of word-species conversions and transitions, especially transposition. *Word and Ceremony*, *43*(4), 257-271. (in Czech)

Doroszewski, W. (1963). *Basics of Polish grammar*. (1th ed.). Warsaw: State Scientific Publishing House. (in Polish)

Furdík, J. (1967). On vide and binding in verbal nouns. *Slovak language, 32*(2), 65-74. (in Slovak)

Gebauer, J. (1904). Handbook of the Czech language for teachers and private study. (2nd ed.). Prague. *Czech Graphic Society "Unie".* (in Czech)

Gradinarova, A. (1999). *Semantics of Russian and Bulgarian Deverbal Nouns*. Sofia: Eurasia Academic Publishers, 142 p. (in Bulgarian).

Havránek, B., & Jedlička, A. (1981). *Czech lexicon. (4th ed.).* Prague. (in Czech)

Ginzburg, M. (2011). The species opposition of verb nouns to the designation of objective processes in Slavic languages. *Ukrainian language*, *2,* 30-43. http://tc.terminology.lp.edu.ua/TK_Work/hinzburg_2011_Ukrainska_mova_N2_vydove_protystavlenn'a_.pdf

Ginzburg, M. (2012). Linguistic basis of the theory of presentation of process concepts in the Ukrainian language. *Ukrainian Scientific Terminology*, *4,* 29-39. http://tc.terminology.lp.edu.ua/TK_Work/hinzburh_2012_UNT_N4_proces_pon'ann'a_.pdf

Horpynych, V. (2004). *Monograph of the Ukrainian language*. Kyiv: Academy. ISBN: 966-580-179-1

Jędrzejko, E. (1993). *Nominalizations in the system and texts of the modern Polish language*. Katowice: University of Szląsk. (in Polish)

Jelínek, M. (1968). Functions and development of syntactic condensers in Slavic languages. *Questions of Slavic syntax. II, Proceedings of the symposium "Structural types of Slavic sentences and their development".* Bauer, Ja. (Ed.). (1st ed.). (pp. 389-395). Brno: J. E. Purkyně University. (in Slovak)

Just, M. (1914). About word-making in Serbšćinje. *Časopis Maćica Serbskeje, 67*(1), 59-79. (In Poland)

Espersen, O. (1958). *Philosophy of grammar*. Publishing house foreign literature. (in English)

Karlík, P. (2004). Microsyntax of Czech deverbal names. *Proceedings of the Faculty of Philosophy of the University of Brno, 53* (A52), 71-81. (in Czech)

Klajn, I. (1998). Grammatical and lexicographical status of glagolitic imenica from a non-smoking glagol. *Scientific meeting of Slavists in the Days of the Wolf*, *27*(2), 149-158. (in Czech)
Kopečný, F. (1958). *Basics of Czech composition.* Praha: State Pedagogical Publishing House. https://acortar.link/AE2Mj2
Kostusiak, N. (2018). Categorical features of verbal nouns. *Linguistic studies: collection of scientific papers, 35*, 39-47. https://doi.org/10.31558/1815-3070.2018.35.3
Kravchuk, A. M. (2015). *Polish: grammar with exercises. Textbook for higher educational institutions*. Kyiv. ISBN: 9786175981108
Křížková, H. (1959). On the problem of verbal nouns in Russian in comparison with English. *Russian language*, *9*(5), 195-203. (in Czech)
Kurylo, O. (2008). *Attention to modern literary language*. (2nd ed.). Kyiv: Solomiya Pavlichkos publishing house "Osnovi". ISBN: 966-500-134-5
Kuryłowicz, J. (1977). *Problems of Indo-Europaean linguistics. Wrocław.* (in French)
Kutnia, H. V. (2018). Verbal nouns as secondary predicates of process: structural-semantical, word-forming and grammatical features. *Visnyk of the Lviv University. Series Philology, 68,* 77-87. https://doi.org/10.30970/vpl.2018.68.8909
Lombard, A. (1930). *Nominal constructions in French modem*. Uppsala. https://acortar.link/BVVsKx
Marič, B. (2010). *Syntactic derivation in the modern Russian language in comparison with Serbian.* Unpublished Pfd dissertation. University of Belgrade. (in Serbian)
Mędak, S. (2004). *Dictionary of conjugation forms of Polish verbs.* Kraków. (in Polish)
Nepyivoda, N. F. (1997). *The language of scientific and technical literature*. Kyiv: Funktsion. -stylist, aspect. International Finance Agency LLC.
Piletskyi, V. (2002). Names of objectified actions in scientific and technical terminology. *Bulletin of the Lviv Polytechnic National University*. *Series "Problems of Ukrainian Terminology", 453*, 215-221. https://acortar.link/yCrnm7
Petryk, O. (2008). Verbal nouns of objective action: structural and morphological aspect. *Literature and culture of Polissya, 43*, 144-151. http://nbuv.gov.ua/UJRN/Ltkp_2008_43_22
Peshkovsky, A. M. (1938). *Russian syntax in scientific coverage: textbook*. 6th ed. Moscow: Uchpedgiz. (in Russian)
Ponomarenko, K. (2008). Deverbative in the semantic-syntactic structure of the sentence. *Donetsk Bulletin of the Scientific Society named after T. Shevchenko*, *22*, 73-87. https://acortar.link/sdTU3z
Pchelintseva, O. (2016). *From the verb to the name: aspectuality in Russian, Ukrainian, and Polish deistviia names.* Sankt-Peterburh. ISBN: 5020396125, 9785020396128
Pchelintseva, O. (2019). Functional and grammatical peculiarities of Ukrainian verbal nouns with the meaning of action comparing to other Slavic languages*. Terminological Bulletin*, *5*, 33-40. https://doi.org/10.37919/2221-8807-2019-5-4
Pchelintseva O., & Volodarska, T. (2021). Bulgarian verbal action noun against the background of other Slavic languages*. LANGUAGE: Codification·Competence·Communication*, *2*(5), 18-29. https://er.chdtu.edu.ua/bitstream/ChSTU/4013/1/18-29_Pchelintseva_Volodarska.pdf
Pychkhadze, A. A. (2011). *Translation activity in pre-Mongol Rus: Linguistic aspect.* Moscow: Manuscript monuments of Ancient Rus. https://cir.nii.ac.jp/crid/1130282272751755392
Popela, J. (1962). To word types in Czech. *Slavica Pragensia, IV,* 129-137. (in Czech)
Pървев, Kh. (1993). *Slightly glocal forms*. A Grammar of the Contemporary Bulgarian Language. (pp. 372–386). Sofyia: Publishing House of the Bulgarian Academy of Sciences. (in Bulgarian)
Puzynina, J. (1969). *Names of activities in contemporary Polish (word formation, semantics, syntax)*. Warsaw: National Scientific Publishing House, Dissertations of the University of Warsaw. https://acortar.link/mY2vJI
Safarewiczowa, H. (1954). "Reflexive" nouns in Polish. *Polish language, XXXIV*(5), 332-348. (in Polish)
Saloni, Z. (2007). *Polish verbs. Variety*. Dictionary. Warsaw: Common Knowledge. ISBN: 8321413722, 9788321413723

Selihei, P. (2014). Substantivity versus verbality: in search of the golden Mean. *Linguistics,* 4, 36-55. https://movoznavstvo.org.ua/component/attachments/download/296.html

Šipka, D. (2000). The status of the verb nominative. *Collection of MS for Philology and Linguistics. Novi Sad*, *XLIII*, 641–645. (in Czech)

Skopliev, A. (2018). Verb or noun? (from the history of the study of the linguistic status of the Czech verbal noun). *Scientific notes of V. I. Vernadsky Taurida National University. Series: "Philology. Journalism"*, *29*(68), 17-25. http://nbuv.gov.ua/UJRN/UZTNU_filol_2018_29%2868%29_4_6

Stoyanov, S. (1964). *Grammar of the Bulgar language. Phonetics and morphology.* Sofia: Science and art. https://books.google.com.ua/books/about/Gramatika_na_bulgarskiya_knizhoven_ezik.html?id=vEKXQwAACAAJ&redir_esc=y

Szczerbij, N. (2022). Hybrid verb forms in Polish and Ukrainian. *Language Guide*, *1*, 147-163. https://doi.org/10.33896/PorJ.2022.1.8

Szober, S. (1969). *Grammar of the Polish language*. Warsaw: State Publishing House Scientific.

Tomíček, J. S. (1858). *Czech Language: the first (theoretical) part.* (5th ed.). Praha: By Bedřich Tempský, 231 p. (in Czech)

Trávníček, F. (1951). *Grammar of written Czech: in 2 parts.* (3th ed.). Praha: Slavonic publishing house, II, 617-1497. https://acortar.link/Zhlula

Vakulenko, M. (2010). Problems of using verbal nouns in the Ukrainian scientific language. *Studia Linguistica: a collection of scientific papers for the 80th anniversary of the professor's birthday Nikitinoi Fionilly*, 4, 353-359. Ed. I. O. Holubovska. K.: VPTs "Kyivskyi universytet". https://acortar.link/l9rV3u

Vykhovanets, I., & Horodenska K. (2004). *Theoretical morphology of the Ukrainian language.* Kyiv: Academic grammar of the Ukrainian language. ISBN: 966-7671-60-7

Viková, V. (1976). Characteristics of vocabulary of professional style from the quantitative point of view. *Word and Ceremony*, *37*(4), 318-328. (in Slovak)

Vinogradov, V. (2001). *Russian language (Grammar teaching about the word): Training manual*. (4th ed.). Moscow: Russian language. https://library.navoiy-uni.uz/files/русский_язык_грамматическое_учение_о_слове_by_виктор_владимирович.pdf

Vusyk, H., Pavlyk, N., Lipych, V., Alieksieieva, L., & Hlazova, S. (2022). The word-forming motivation for lexical innovations in the cognitive space (based on ukrainian- and english-speaking sources). *Amazonia Investiga*, *11*(52), 232-239. https://doi.org/10.34069/AI/2022.52.04.25

Wieczorek D. (1994). *Ukrainian Perfect -no, -to versus the Polish Perfect*. Wrocław. (in Polish)

Wierzbicka, A. (1962). Hypotax and nominal constructions in the development of the Polish language. *Literary Memoir, 53*(1), 195-216. (in Polish)

Yarmolenko, H. A. (2001). The category of the meaning of the species in the semantic structure 'nomina agentis'. *Proceedings. Series: Philological sciencesm*, *31*, 83-85.

ONLINE ISSN: 2665-0223
PRINT ISSN: 1856-7576