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Digital technologies in training future social-interaction professionals for the organization of inclusive education

Tecnologías digitales en la formación de futuros profesionales de la interacción social para la organización de la educación inclusiva

Liliia Filiuk
Candidate of Philological Sciences, Associate Professor of the Department of Social Sciences, Odesa National Medical University, Ukraine.
https://orcid.org/0009-0009-0448-2207
flm7958605@gmail.com
Olha Hubar
Candidate of Pedagogical Sciences, Associate Professor, Head of the Department of Correctional and Inclusive Education Technologies, Speech Therapy and Rehabilitation, Poltava V.G. Korolenko National Pedagogical University, Ukraine.
https://orcid.org/0000-0003-3640-1490
olhahubar82@ukr.net
Viacheslav Shapochka
PhD Student, Admiral Makarov National University of Shipbuilding, Ukraine.
https://orcid.org/0009-0007-4504-0312
mechanikernikolaev@gmail.com
Kateryna Shapochka
PhD, Associate Professor, Head of Special Pedagogy and Inclusive Education Department, V.O. Sukhomlynsky Educational and Scientific Pedagogical Institute, Admiral Makarov National University of Shipbuilding, Ukraine.
https://orcid.org/0000-0002-4827-599X
shapochka1111@gmail.com
Svitlana Titarenko
Candidate of Pedagogical Sciences, Associate Professor of Preschool Pedagogy and Psychology Department, Oleksandr Dovzhenko National Pedagogical University, Ukraine.
https://orcid.org/0000-0001-5544-3376
titarenko17.01@gmail.com

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Abstract

The article describes the main criteria for a barrier-free inclusive educational environment; identifies special features of an inclusive educational environment; and considers the principles of inclusive education and general didactic principles of training for the high-quality functioning of an inclusive educational environment. A research and experimental verification of the effectiveness of implementing a system for training future social interaction professionals to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs has been developed and conducted. The most important areas of using digital technologies to organize children's education in an inclusive educational environment have been considered. The advantages of using the developed system

are listed. The effectiveness of the experimental study of the developed effective author's system is confirmed by reliable indicators, which have been verified using mathematical statistics methods. Respondents in the EG group showed a more significant increase in the formation of all levels of the studied components of the readiness of future social interaction professionals to work in an inclusive educational environment, and the use of digital technologies in working with children with special educational needs, than in applicants in the CG group.

Keywords: inclusive educational environment, digitalization of education, digital technologies, principles of inclusive education, future social interaction professionals.

Resumen

El artículo describe los criterios principales para un entorno educativo inclusivo sin barreras; identifica las características especiales de un entorno educativo inclusivo; y considera los principios de la educación inclusiva y los principios didácticos generales de la formación para el funcionamiento de alta calidad de un entorno educativo inclusivo. Se ha desarrollado y llevado a cabo una investigación y verificación experimental de la eficacia de la implementación de un sistema para la formación de futuros especialistas en especialidades futuros profesionales de la interacción social para trabajar en un entorno educativo inclusivo mediante el uso de tecnologías digitales en el trabajo con niños con necesidades educativas especiales. Se han considerado las áreas más importantes del uso de tecnologías digitales en la organización de la educación de niños en un entorno educativo inclusivo. Se enumeran las ventajas de utilizar el sistema desarrollado. La eficacia del estudio experimental del sistema de autor desarrollado se confirma mediante indicadores fiables, verificados mediante métodos estadísticos matemáticos. Los encuestados del grupo GE mostraron un aumento más significativo en la formación de todos los niveles de los componentes estudiados de la preparación de los futuros especialistas en especialidades futuros profesionales de la interacción social para trabajar en un entorno educativo inclusivo, y en el uso de tecnologías digitales en el trabajo con niños con necesidades educativas especiales, que en los solicitantes del grupo GC.

Palabras clave: entorno educativo inclusivo, digitalización de la educación, tecnologías digitales, principios de educación inclusiva, especialistas en especialidades futuros profesionales de la interacción social.

Introduction

The modern world's education system, under the influence of societal demands, is undergoing reform due to political, social interaction, spiritual, and cultural transformations. The development of society contributes to establishing the values that underlie inclusive education, because inclusive education, as a condition for success in each child's adult life, has a clearly defined value. Therefore, improving the training of specialists in social Interaction professionals requires the intensive introduction of inclusive education, namely the development of the necessary competencies for integrating digital technologies into the professional activities of future specialists in these fields.

The advantage of digital technologies is to provide each child with an appropriate method of learning and pace, in the possibility of independent productive activity, and in the possibility of individualization of developmental and corrective learning. Effective and full-fledged use of digital technologies in the educational process makes it possible to perform tasks in an asynchronous mode, helps overcome barriers and communication difficulties; provides each child with the opportunity to demonstrate learning outcomes conveniently; offers independent access to educational information; helps to formulate and develop educational tasks taking into account the capabilities of each individual and the individual skills of each child. In some cases, digital technologies become a compensatory means that helps the child overcome specific developmental problems (Reyes Chávez & Prado Rodríguez, 2020).

The problem of training future specialists in social interaction disciplines to work in inclusive educational environments using digital technologies in the context of the digitalization of education is becoming particularly urgent. The use of digital technologies in the context of an inclusive educational process allows you to increase the audience coverage, the speed of information delivery to the child; to implement the possibility of automating several labor-intensive procedures when checking completed tasks, during the presentation of new material, etc.; to expand the range of exercises taking into account the different capabilities of each child, the construction of creative individual tasks; to avoid difficulties and problems that arise in the process of written work of children with hearing and speech disorders and with disorders of the musculoskeletal system; to provide the teacher and the child with ample opportunities for communication with friends, parents, colleagues; to facilitate the process of studying advanced experience by a social interaction professionals; effectively use innovative technologies in computer-assisted learning of children in an inclusive educational environment.

Literature Review

The subject of scientific research by many scientists has become digital technologies, innovative educational processes, and the preparation of future specialists for work in an inclusive academic environment.

Connor et al. (2024) demonstrate the positive impact of interaction in an inclusive educational environment for people with various disabilities, highlighting their needs and challenges and those of their families. Researchers have shown that inclusion does not always lead to a person with special needs being included in an inclusive educational environment or in society as a whole.

Analyzing the works of North American scientists dedicated to the training future social-interaction professionals for work in an inclusive educational environment, polar educational initiatives have been identified in the field of inclusion: these are programs where the skills of working with children in an inclusive academic environment are thematically integrated into the content of professional disciplines of a single program for all training future social-interaction professionals (DeZelar et al., 2022). A more accessible option is emphasized: supplementing current educational programs with short-term practical courses. To improve the training future social-interaction professionals for work in an inclusive educational environment, joint student work is organized within the framework of additional courses across different specialties (Giera, 2025).

The work of Gath et al. (2024) outlines the specifics of using mobile technologies in inclusive education for students in schools.

To foster a positive attitude among social-interaction specialists toward working in an inclusive educational environment, practical exercises are included in the training courses. Students' attention is primarily focused on mastering special innovative technologies, without which the motivation of social-interaction specialists to work in an inclusive educational environment will not be formed. Innovative technologies in the classroom allow social-interaction specialists to discuss problem situations in an inclusive educational environment and gain work experience working with specialists of various profiles (Naraian, 2021).

At the same time, scientists are considering the problem of using digital technologies and the innovativeness of training future specialists to work in an inclusive educational environment using computer technologies.

Szabó et al. (2021) stated the content of digital competencies of modern students of generation Scientists Mateus & Quiroz (2021), propose to use innovative technologies in the literary education of future specialists; resort to identifying the features of the use of digital technologies in an inclusive educational environment; consider, through the use of electronic educational game resources, ways of organizing the education of children with special educational needs in the educational process of primary school. Walan (2020) investigated the features of future teachers' use of digital technologies; studied in

detail the issues of using digital technologies in the education of children with disabilities; and used this experience to prepare future teachers for the use of digital technologies in their professional activities, including in an inclusive educational environment.

Alvarez-Atencio et al. (2022) studied ways to solve problems that arise during the preparation of future specialists for the use of digital technologies in professional activities.

The study by German scientists Hamburg & Bucksch (2017) revealed the risks of using digital technologies in working with children with special educational needs. However, it demonstrated the possibility of developing competencies in an inclusive educational environment that will enable further integration into society.

Cuevas-Cerveró (2017) shows an important role in creating accessible and effective means of adapting digital tools within inclusive classrooms.

Thus, the scientists have conducted a comprehensive analysis of the state of development of the problem of using computer technologies in an inclusive educational environment and have presented the results of scientific research on the possibilities of using digital technologies to organize and support inclusive education. However, despite considerable attention from practitioners and theorists to this issue, the question of how to qualitatively train future specialists in social-interaction specialties to work in an inclusive educational environment using computer technologies remains unresolved.

RESEARCH PURPOSE: Implementation of a system for training future specialists in social-interaction field to work in an inclusive educational environment and the use of digital technologies in working with children with special educational needs.

Methodology

To achieve the goal, the study used several interrelated research methods:

- **Theoretical**: systematization of scientists' opinions to generalize and identify the features of training future specialists in social-interaction field to work in an inclusive educational environment using digital technologies; analysis, comparison, synthesis and generalization of empirical data, a method of combining various scientific approaches, structuring, detailing of periodization, conceptual analysis, abstraction, deduction and induction – to present research results. Systemic and synergistic approaches were used to develop proposals for training specialists within the framework of an individual educational trajectory and to identify the functions of using digital technologies in an inclusive educational environment.
- **Empirical-statistical**: method of statistical analysis, questionnaire survey; measuring the levels of readiness of future specialists in the field of social interaction to work in an inclusive educational environment using digital technologies; calculation of target indicators; comparison of selected statistical groups.

The experimental study of the readiness of future social-interaction professionals to work in an inclusive educational environment using computer technologies, which was carried out at the ascertaining and formative stages of the study, consisted in testing the effectiveness of the proposed system of future social-interaction professionals to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs, which includes methods, strategies, forms, means of working with profession-oriented content, as well as a set of developed innovative tasks aimed at forming the readiness of higher education applicants (first (bachelor's) level students participated in the experiment) to carry out the researched activity. This approach necessitated innovative future social-interaction professionals to work in an inclusive educational environment using digital technologies, particularly in the process of their professional and pedagogical development.

Within the framework of the implementation of the author's system for future social-interaction professionals through the use of digital technologies in working with children with special educational needs, a special course "The role of digital technologies in the system of future social-interaction professionals to work in an inclusive educational environment" was developed.

The pedagogical experiment was implemented in three stages: preparatory, main, and final.

At the preparatory stage, the purpose and objectives of the study were determined, the experimental plan was developed, methods for measuring and processing the results were selected, control and experimental groups were selected, and their homogeneity was checked.

At the main stage, the experiment was conducted.

At the final stage, the results of the experiment were analyzed, its reliability confirmed, and conclusions were drawn about the pedagogical effect.

The reliability and validity of the results obtained, the objectivity of their assessment were ensured by the methodological justification of the initial positions and the qualitative mechanism for assessing the quality under study, the use of a complex of complementary research methods, and the involvement of a group of respondents from a higher educational institution in the analysis of its results.

To assess the homogeneity of the experimental and control data collection, statistical processing was carried out using MS Excel and SPSS (Statistical Package for Social Science) programs.

When selecting the sample of subjects, the general specificity of the study's subjects was considered. The total sample size is 136 subjects. When forming the sample, the criteria of content, representativeness, and equivalence were considered. The sample was formed by random selection, using the technical procedure to calculate the selection step.

During the study, along with the use of theoretical and empirical methods, additional procedures were carried out to ensure the reliability and validity of the toolkit, which allowed to deepen the quality of assessing the levels of readiness of future social-interaction professionals for the organization of inclusive education with the use of digital technologies.

To increase the reliability and validity of the toolkit used in the process of studying the levels of readiness of future social-interaction professionals for the organization of inclusive education with the use of digital technologies, the following procedures were carried out.

Determination of Cronbach's alpha coefficient

To assess the internal consistency of the scales (motivational, cognitive, conative and reflective), the Cronbach's alpha coefficient was calculated. The obtained values (0.78–0.89) indicate a high level of reliability of the author's toolkit and sufficient consistency of its elements.

Expert validation of the instrument

In order to verify the content validity, the questionnaire was submitted for expert assessment to specialists in inclusive and digital education (n = 10). The experts assessed the compliance of each item with the stated criteria, the clarity of the formulations, and the logical structure of the instrument. According to the results of the examination, six statements were clarified and three were reformulated, which ensured the consistency of the instrument with the stated research criteria.

Factor analysis

To verify the construct validity, an exploratory factor analysis was carried out using the principal components method and varimax rotation. The results confirmed the four-factor structure of the instrument, which fully meets the criteria of motivational, cognitive, conative, and reflective readiness. The sample adequacy indicators (KMO = 0.81) and the Bartlett test ($p < 0.001$) confirmed the correctness of the application of factor analysis.

Characteristics of the scale elements

The motivational scale (8 statements) is aimed at determining the level of students' conscious desire for professional activity in an inclusive educational environment and their readiness to use digital technologies when working with children with special educational needs.

The cognitive scale (10 statements) reflects the level of knowledge about digital tools, the principles of organizing inclusive education, the development features of children with special educational needs, and methods of pedagogical support.

The conative scale (7 statements) assesses practical skills in applying digital technologies in professional activity, in particular, the ability to plan and organize the educational process using appropriate digital resources.

The reflective scale (6 statements) determines the level of students' ability to self-analyze, critically reflect on their own activities, and correct actions when working with children with special educational needs.

All these methodological elements are integrated into the research and provided a sound basis for the analysis of the levels of readiness of future specialists in the field of social interaction to work in an inclusive educational environment using digital technologies.

Comparison of the levels of readiness of future social-interaction professionals for the organization of inclusive education and the results of the study for the final stage of the experimental study, which acquired knowledge in the CG and EG at the formative stage.

The research involved 136 participants divided into a control group (CG, $n = 60$) and an experimental group (EG, $n = 76$) during the ascertaining and formative stages.

The study of respondents' levels of readiness to work in an inclusive educational environment to use computer technologies in teaching students with special educational needs was carried out using four criteria: motivational, conative, cognitive, and reflective. To verify the effectiveness of the author's experimental system for training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs, the results of the ascertaining stage of the experiment and the formative stage of the experiment were compared at four levels (low, sufficient, functional, creative) and generalized data were calculated on the levels of readiness of future specialists in in the field of social interaction to work in an inclusive educational environment, the use of digital technologies in working with students with special educational needs in CG and EG applicants.

For comparative analysis, the average value was used for the parameters of the general populations.

It was shown that the EG respondents demonstrated a greater increase in the formation of all levels of the studied components of the readiness of future specialists in the field of social interaction to work in an inclusive educational environment and to use digital technologies in working with children with special educational needs than the CG applicants.

To process the results of the pedagogical experiment and verify the reliability of the results obtained on the formation of the readiness of future specialists in the field of social interaction to work in an inclusive educational environment, the use of digital technologies in working with children with special educational needs, mathematical statistics methods were used: determining the Fisher criterion (F-criterion), where it is necessary to calculate the variances and compare the parameters of general populations (average indicator).

Analysis of the research results shows that, according to the table of indicators of the theoretical F-criterion, the CG (1.04 – 1.37) exceeds the limits of 1.8 – 1.4, and the EG (1.45 – 1.62) is within the limits of probability.

Therefore, the effectiveness of the experimental study of the developed effective system for training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs is confirmed by reliable indicators, which were verified using mathematical statistics methods.

Results and Discussion

The main criteria for a barrier-free, inclusive educational environment. Special features of an inclusive educational environment. Principles of inclusive education and general didactic principles of learning for the high-quality functioning of an inclusive educational environment.

Currently, inclusive education at all levels of education worldwide is implemented and creates a barrier-free environment for professional training. To ensure the accessibility of the educational process in an inclusive environment and its effectiveness, in particular in all educational institutions, it is necessary to use software solutions, digital technologies aimed at facilitating the adaptation process of a person with special needs, as well as in improving the qualifications of specialists in the field of social interaction to form and develop competencies in the field of organizing the education of children with disabilities (Eliseo et al., 2020).

Today, when implementing inclusive teaching practices, children with disabilities are gradually included in the general education process. In an inclusive educational environment, special conditions are created for learning in educational organizations. Accessibility of structures and buildings is the main criterion of a barrier-free environment: equipment with a system of internal and external landmarks; for visually impaired children, color marking of entrance doors; and the presence of pointers and tactile information signs in classrooms (da Silva et al., 2021).

The use of educational software, inclusive textbooks in an inclusive educational environment, innovative special methods of teaching subjects, educational devices for drawing and writing, and much more is necessary to prepare future specialists in the field of social interaction for work in an inclusive educational environment (Ramírez-Montoya et al., 2021).

When preparing future specialists in the field of social interaction to work in an inclusive educational environment, digital technologies and software products, represented by technical special training tools that provide access to information, are of great importance. The main barriers are digital and communication. The targeted use of specialized hardware and software by specialists to overcome these challenges minimizes health restrictions. It provides children with disabilities with access to education in an inclusive educational environment. Because each person has their own educational abilities and needs, technologies and tools should be both universal and individual. This can be achieved using digital technologies. The use of digital technologies in education has a positive effect on the overall development of personality and on the development of children's mental functions (Preuss et al., 2024). After all, today's education is in dire need of specialists who can work professionally with different categories of children: gifted children, children with health limitations, etc. Therefore, the issue of professionalizing the process and innovating the professional training of future specialists in the field of social interaction for work in

conditions of educational inclusion is becoming increasingly urgent. Moreover, above all, the problem of indeveloping labor competencies of children with special educational needs is urgent, because all students must master the skills and abilities to "learn". Therefore, we believe that each specialist in the field of social interaction must possess professional qualities, several skills, abilities, and knowledge, the symbiosis of which will allow them to carry out successful pedagogical activity and overcome the difficulties of each individual while simultaneously teaching children with different educational needs (Videla et al., 2025).

The following are considered special features of an inclusive educational environment: low occupancy of educational groups (classes); practice-oriented nature of training; absence of formal restrictions on the schedule of the educational process, orientation on the personal needs of the child in the educational process; absence of precise regulation of state educational standards in the implementation of children with special educational needs; fixed term of mastering the program. Thus, an inclusive educational environment is a type of educational environment that provides opportunities for effective development and self-development for all subjects of the educational process and provides for solving the problem of education of children with special educational needs by adapting the educational space to the needs of each child, including methodological flexibility and variability, reforming the learning process, a favorable psychological climate, full participation of each individual in the educational process, redevelopment of premises so that they meet the educational needs of all children and provide them with comfortable conditions (Navas-Bonilla et al., 2025).

An inclusive educational environment within the framework of an open socio-pedagogical system should introduce means for organizing the educational process and innovative methods in conditions of inclusion; take into account objective and subjective factors of effective development, be based on the general principles of inclusion, adhere to the set goal, and be implemented by the content of inclusive education.

The functioning of an inclusive educational environment should be based on the principles of inclusive education and on general didactic principles of learning:

- Every child can think and feel like a person.
- The value of each child does not depend on their achievements and abilities.
- Every child has the right to choose a form of learning and education.
- The unity of the educational space is based on a differentiated and individual approach, the consolidation of technologies and paradigms, and the general and exceptional support for each child.
- The peculiarities of each child are not obstacles but catalysts for his comprehensive development, an incentive for learning.
- Comprehensiveness and continuity in providing material, personnel, educational, methodological, and other resources necessary for the functioning of an effective inclusive educational environment.
- Team approach – joint work of qualified psychological, pedagogical, and medical specialists, public and state organizations based on mutual understanding and mutual assistance, ensuring the integrity and systematicity of the inclusive educational environment.
- Variability of the educational and developmental inclusive educational environment;
- Dynamism of the educational process of the inclusive educational environment due to the modular organization of curricula and educational programs.
- Activity of all participants in the inclusive educational process.
- Voluntariness – all participants in the educational process, in the conditions of an inclusive educational environment, voluntarily study, cooperate, and interact with each other.

The general principle serves as the basis for forming an inclusive educational environment, ensuring the accessibility of education, excluding discrimination, and adapting education to the different needs of all children. In addition, special conditions should be established within an inclusive educational environment to ensure access to education for children with special educational needs and their full-fledged education (Valencia-Londoño et al., 2025). The essence of the inclusive approach to creating an inclusive educational environment is not to oppose the mass and special educational systems, but to erase the boundary

between them, bring them closer, use effective methods of the mass and special educational systems, enrich general pedagogy with the achievements of special pedagogy, and vice versa.

Research and experimental verification of the effectiveness of implementing a system for training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs.

The experimental study of the readiness of future specialists in the field of social interaction to work in an inclusive educational environment using computer technologies, which was carried out at the ascertaining and formative stages of the study, consisted in testing the effectiveness of the proposed system of training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs, which includes methods, strategies, forms, means of working with profession-oriented content, as well as a set of developed innovative tasks aimed at forming the readiness of higher education applicants (first (bachelor's) level students participated in the experiment) to carry out the researched activity. This approach necessitated innovative training for future specialists in the field of social interaction to work in an inclusive educational environment using digital technologies, particularly in the process of their professional and pedagogical development.

Within the framework of the implementation of the author's system of training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs, a special course "The role of digital technologies in the system of training future specialists in the field of social interaction to work in an inclusive educational environment" has been developed.

The system of innovative tools has been designed within the framework of our research, which aims to develop generalized methods of action and integral knowledge to train future specialists in the field of social interaction to work in an inclusive educational environment using digital technologies.

During the implementation of the special course, special attention was paid to methods that contribute to the actualization of all components of the readiness of future specialists in the field of social interaction to work in an inclusive educational environment and their interconnection.

The practical aspect of the developed system for training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs includes project activities and practical and training sessions aimed at testing and consolidating the acquired knowledge to develop practical skills. First, in practical sessions, EG students mastered methods for selecting digital educational resources, their use, and modern immersive technologies. Later, in training sessions, they mastered practical elements for demonstrating and creating methodological techniques and information methods of teaching using electronic educational resources.

Let us consider the most important areas of using digital technologies in organizing children's education in an inclusive educational environment, which were identified during the EG study:

1. Digital technologies compensate for the limitations of students with special educational needs; therefore, the use of digital technologies in teaching such children helps them write with motor disorders, supports the completion of auxiliary tasks, and, for people with visual impairments, provides the opportunity to read (audio texts, etc.) in various ways.
2. The use of digital technologies improves teacher-student relationships and ensures the solution of educational tasks.
3. Modern digital technologies allow students with special educational needs to overcome communication barriers and serve to solve communication tasks (Knysh et al., 2024).

Let us name the advantages of using the system we have developed for training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs:

- Enrichment of the ability to select Internet services and freely use them to organize inclusive education.
- Mastering the skills of using Internet services to organize inclusive education.
- Expanding the professional competencies of the teacher to organize inclusive education through the use of digital technologies.
- Expanding the ability to use Internet services and digital tools to organize inclusive education in the classroom (group) in the activities of the teacher.
- Familiarization with the forms of using digital technologies and the main methods in the work of the teacher in the classroom (group) with inclusive practice.
- Development of the ability to organize the interaction of various participants in the educational process in inclusive practice using digital technologies.
- Organize the educational process in an inclusive educational environment for the joint education of children with normal and impaired development.
- Enriching the understanding of various media resources and the ability to use them in organizing inclusive education.

Students who participated in the experimental study, in particular the EG respondents, studied using this method and realized that digital learning technologies are a tool for the social integration of children in an inclusive educational environment, and that they facilitate free access to knowledge and information for children with special educational needs.

While participating in the experimental study, EG students understood that the use of digital technologies in organizing children's education in an inclusive educational environment contributes to the development of empathy, the formation of a humane personality, and the development of tolerant behavior. In such an educational system of training future specialists in the field of social interaction to work in an inclusive educational environment, through the use of modern digital technologies, the main criterion for quality education is innovative means of special rehabilitation educational technologies, which are a set of systemic means and methods, organizational structures that effectively implement the provision and assimilation of educational programs. The use of digital technologies in the preparation of future specialists **in the field of social interaction** to work in an inclusive educational environment contributes to the development of their information competence. It is one of the important conditions for introducing modern educational and digital technologies into educational practice, which contribute to the quality of education for children with special needs who have difficulties in moving, learning, and communicating.

The introduction of a system for training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs made it possible to familiarize future specialists in the field of social interaction with the methods of applying digital technologies in the lesson (class):

- Solving creative, research, and training tasks.
- Presenting information materials in multimedia form (sound recordings, illustrations, presentations, video fragments, etc.).
- Organizing creative project activities in an inclusive educational environment using digital technologies, which allows students to create conditions for independent research, develop their skills of independent creative activity, develop presentation skills, and abilities.
- Studying models of phenomena, processes, and objects in an interactive mode (virtual laboratories, interactive models).
- Forming skills of search and information activities.
- Carrying out operational and objective evaluation, etc.

Today, the use of digital technologies in an inclusive educational environment can be successfully implemented. Therefore, the current problem is the application of a system for training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in the special professional training of specialists.

The final stage of the experimental study.

Comparison of the levels of readiness of future specialists in the field of social interaction to work in an inclusive educational environment, and the results of the study for the final stage, which involved those who gained knowledge in the CG and EG at the formative stage of the study.

The research involved 136 participants divided into a control group (CG, n = 60) and an experimental group (EG, n = 76) during the ascertaining and formative stages.

The study of respondents' levels of readiness to work in an inclusive educational environment and to use computer technologies in teaching students with special educational needs was carried out using four criteria: motivational, conative, cognitive, and reflective.

The indicators of the motivational criterion were as follows: determining the desire to increase the level of skills to use computer technologies in professional activities.

The indicators of the conative criterion were as follows: the process and outcome of performing mental actions, based on the analysis of academic success among applicants. The criterion was studied based on the test and examination results.

The indicators of the cognitive criterion were as follows: the system of knowledge, skills, and abilities of mastering computer technology as a user.

The indicators of the reflective criterion were as follows: determining the trajectory of development and improvement of the student's personal qualities, awareness, and transformation of information by applicants through independent selection of tasks, taking into account abilities, needs, and individual capabilities.

To verify the effectiveness of the author's experimental system for training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs, the results of the ascertaining stage of the experiment and the formative stage of the experiment were compared at four levels (low, sufficient, functional, creative) and generalized data were calculated on the levels of readiness of future specialists in the field of social interaction to work in an inclusive educational environment, the use of digital technologies in working with students with special educational needs in CG and EG applicants.

For comparative analysis, the average indicator value was used as the parameter for the general population.

To characterize the generalized levels of readiness of future specialists in the field of social interaction to work in an inclusive educational environment, the use of digital technologies in working with students with special educational needs at each stage of the study in the experimental and control groups, the method of applying average indicators, and the arithmetic mean values was used.

The numerical values for each level were used to calculate the arithmetic mean: creative – 5 points, functional – 4 points, sufficient – 3 points, and low – 2 points.

Let us present the results of calculating the average indicator and levels of readiness of future specialists in the field of social interaction to work in an inclusive educational environment, and the use of digital technologies in working with students with special educational needs for each criterion.

The results indicated the formation of the motivational criterion of readiness at the ascertaining stage of the study and, after the completion of experimental training, at the formative stage in the CG and EG, according to the average indicator, and by levels as follows.

Given the different numbers of respondents in the CG and EG, we conducted a comparative analysis using average indicators.

A comprehensive statistical analysis was conducted to evaluate the effectiveness of the implemented training system and to compare the dynamics of change between the control group (CG) and the experimental group (EG) at the ascertaining and formative stages of the study. The analytical strategy incorporated both **pre- and post-intervention comparisons** and **between-group analyses** to ensure the methodological rigor required for evaluating intervention effects.

Pre–Post Analysis and Assumption Testing

Prior to applying inferential statistics, the dataset was tested for fundamental statistical assumptions:

- **Normality of distributions** was assessed using the Shapiro–Wilk test.
- **Homogeneity of variances** between CG and EG was examined with Levene's test.
- **Linearity and homoscedasticity** were verified visually through residual plots for parametric tests.
- For ANCOVA, the **homogeneity of regression slopes** assumption was checked to ensure that baseline scores did not differentially bias post-test outcomes.

Where assumptions of normality or variance equality were violated, non-parametric alternatives were applied.

Analysis of Intervention Effects

To evaluate the effectiveness of the author's training system integrating digital technologies into inclusive education, multiple statistical methods were employed:

Fisher's F-Statistic (F-Test)

The variance comparison between CG and EG was performed using Fisher's F-test to determine whether variability differed significantly after the intervention. The F-statistic was computed as:

$$F = \frac{S_{EG}^2}{S_{CG}^2}$$

where S_{EG}^2 and S_{CG}^2 denote the sample variances.

Empirical values in the EG (1.45–1.62) indicated statistically significant improvements, falling within the critical range (1.4–1.8; $p < .05$), confirming the reliability of the intervention-based differences.

ANOVA (Analysis of Variance)

A one-way ANOVA was applied to compare mean values of motivational, cognitive, conative, and reflective readiness between the CG and EG at the formative stage.

Significant ANOVA results ($p < .05$) indicated that the groups differed meaningfully across all readiness dimensions after the implementation of the digital technology–based system.

Additionally, repeated-measures ANOVA was used to analyze within-group progress across the ascertaining and formative stages. The EG demonstrated significantly higher pre–post gains than the CG.

ANCOVA (Analysis of Covariance)

ANCOVA was applied to compare post-test scores between groups while statistically controlling for baseline differences (pre-test values).

The model:

$$Ypost = \beta 0 + \beta 1(Group) + \beta 2(Ypre) + \varepsilon$$

showed that, after controlling for initial readiness levels, the group factor remained statistically significant, confirming that improvements were attributable to the intervention rather than to pre-existing differences.

t-Tests for Dependent and Independent Samples

To examine statistically significant changes:

- Paired-sample t-tests were used within each group (pre–post comparison).
- Independent-sample t-tests were used to compare mean differences between CG and EG at each stage.

The EG showed statistically greater improvements across all criteria ($p < .01$), whereas the CG exhibited only minimal growth.

Mann–Whitney U-Test

For indicators that did not meet parametric assumptions, such as non-normally distributed cognitive or conative items, the Mann–Whitney U-test was employed.

Results revealed consistently higher ranks for the EG, supporting the robustness of findings across both parametric and non-parametric methods.

Pre–Post Corrections

To minimize bias and measurement error:

- Baseline correction (post–pre difference scores) was applied.
- Adjusted mean values generated via ANCOVA were used to eliminate initial inequality.
- Bonferroni corrections were applied for multiple comparisons to control Type-I error rate.

These methodological steps ensured that observed effects reflected true intervention impact rather than artefacts of measurement or sample imbalance.

Effect Size Analysis

To complement significance testing and quantify the magnitude of change, effect sizes were computed:
Cohen's d

For pre–post changes and between-group comparisons:

$$d = \frac{M_{EG} - M_{CG}}{SD_{pooled}}$$

Large effect sizes (0.8–1.2) were recorded for cognitive, conative, and reflective criteria in the EG, indicating a substantial impact of the digital training system.

Eta-Squared (η²)

Used with ANOVA and ANCOVA:

η² = .14–.26 for EG across readiness criteria indicating large practical significance according to standard conventions.

Rank-Biserial Correlation (r)

Reported for Mann–Whitney U-test results and showed moderate-to-large effect sizes (r = .45–.62).

The EG demonstrated statistically significant improvements across all readiness components, confirmed by F-test, ANOVA, ANCOVA, and t-tests. Non-parametric U-tests supported the robustness of findings.

Effect sizes indicated large and meaningful improvements. Pre–post corrections ensured methodological validity.

Thus, the combination of parametric and non-parametric analysis, together with effect-size estimation, demonstrates compelling evidence that the implemented digital technology–based training system significantly enhanced the readiness of future specialists for work in an inclusive educational environment.

To verify the reliability of the obtained experimental data and to determine the statistical significance of the differences between the control group (CG) and the experimental group (EG), **Fisher's F-statistic** was applied. The Fisher's F-statistic determines the ratio of two sample variances and is calculated using the following formula:

$$F = \frac{s_1^2}{s_2^2}$$

where ***F*** is Fisher's empirical value; s_1^2 – variance of the experimental group; and – variance of the control group. Each sample variance was determined according to Equation (2):

$$s^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$$

where x_i is an individual observation, $\bar{x}$ is the arithmetic mean of the sample, and n is the number of observations. Hence, the full expression of Fisher's F-statistic applied in this study can be represented as:

$$F = \frac{\frac{\sum_{i=1}^{n_1}(x_{1i}-\overline{x_1})^2}{n_1-1}}{\frac{\sum_{j=1}^{n_2}(x_{2j}-\overline{x_2})^2}{n_2-1}}$$

where x_{1i} and x_{2j} are the individual values in the experimental and control groups, respectively; $\overline{x_1}$ and $\overline{x_2}$ are the corresponding means; and n_1, n_2 are the sample sizes of the respective groups.

The obtained empirical value F_{emp} was compared with the critical value F_{crit} from the F-distribution table at the significance level $\alpha = 0.05$. If $F_{emp} \geq F_{crit}$, the variance differences between the two groups are considered **statistically significant**, which confirms the **effectiveness and reliability** of the developed system for training future specialists in the field of social interaction to work in an inclusive educational environment using digital technologies.

To substantiate the effectiveness of the implemented system for training future specialists to work in an inclusive educational environment using digital technologies, a pedagogical experiment was carried out. It involved 136 participants, divided into a control group (CG, n = 60) and an experimental group (EG, n = 76). The experiment was conducted in two stages: an ascertaining stage and a formative stage.

The evaluation of readiness to use digital technologies in inclusive education was based on four criteria: motivational, cognitive, conative, and reflective. Each criterion was measured at both stages, and the mean values were compared between the CG and EG groups. The obtained results are presented in Tables 1–5.

Table 1.
Comparative Results of Motivational Readiness Criterion

Stage	Group	Mean Value	Change	Interpretation
Ascertaining	CG	3.9	–	Baseline level
Ascertaining	EG	3.9	–	Baseline level
Formative	CG	4.1	+0.2	Minor improvement
Formative	EG	4.6	+0.7	Significant growth
Difference	(EG–CG)		+0.5	EG demonstrated stronger motivation

Thus, the average indicator of the formation of the **motivational criterion** of readiness of future specialists in the field of social interaction to work in an inclusive educational environment and to use digital technologies in working with children with special educational needs in the CG increased by 0.2 points, from 3.9 to 4.1, and in the EG it increased by 0.7 points, from 3.9 to 4.6. Thus, in the EG, we observe an improvement of 0.5 points over the CG (Figure 1).

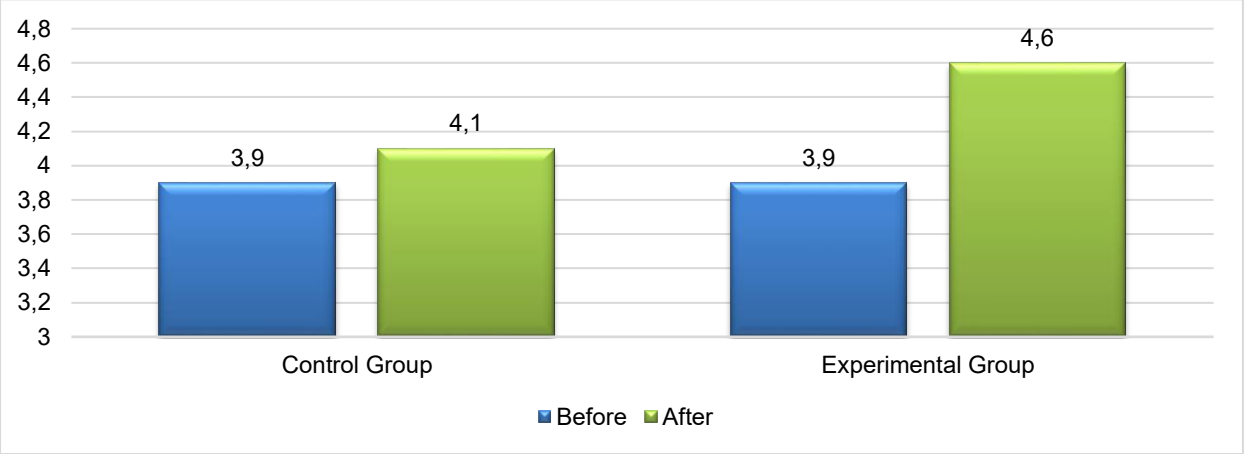

Figure 1. Comparative Dynamics of the Motivational Readiness Criterion in CG and EG.

Therefore, at the formative stage in the EG and CG, a comparative analysis of the results makes it possible to conclude that optimizing the professional training of future specialists in the field of social interaction to work in an inclusive educational environment, the use of digital technologies in working with children with special educational needs contributes to increasing the levels of motivational readiness to use digital technologies in working with students with special educational needs.

Let us analyze the results of the levels of formation of the **cognitive criterion** of readiness of future specialists in the field of social interaction to work in an inclusive educational environment and to use digital technologies in working with students with special educational needs at the ascertaining and formative stages of the experiment.

Table 2.
Comparative Results of Cognitive Readiness Criterion

Stage	Group	Mean Value	Change	Interpretation
Ascertaining	CG	3.5	–	Baseline knowledge
Ascertaining	EG	3.5	–	Baseline knowledge
Formative	CG	3.7	+0.2	Slight progress
Formative	EG	4.5	+1.0	Strong improvement
Difference	(EG–CG)		+0.8	EG showed better cognitive development

We observe the dynamics of changes in indicators of the formation of the cognitive criterion of readiness of future specialists in the field of social interaction to work in an inclusive educational environment, as well as the use of computer technologies in working with children with special educational needs. In particular, the comparative analysis shows that in the CG, the average indicator of the formation of this criterion increased by 0.2 points, from 3.5 to 3.7, and in the EG, it increased by 1 point, from 3.5 to 4.5, which is 0.8 points more than in the CG (Figure 2).

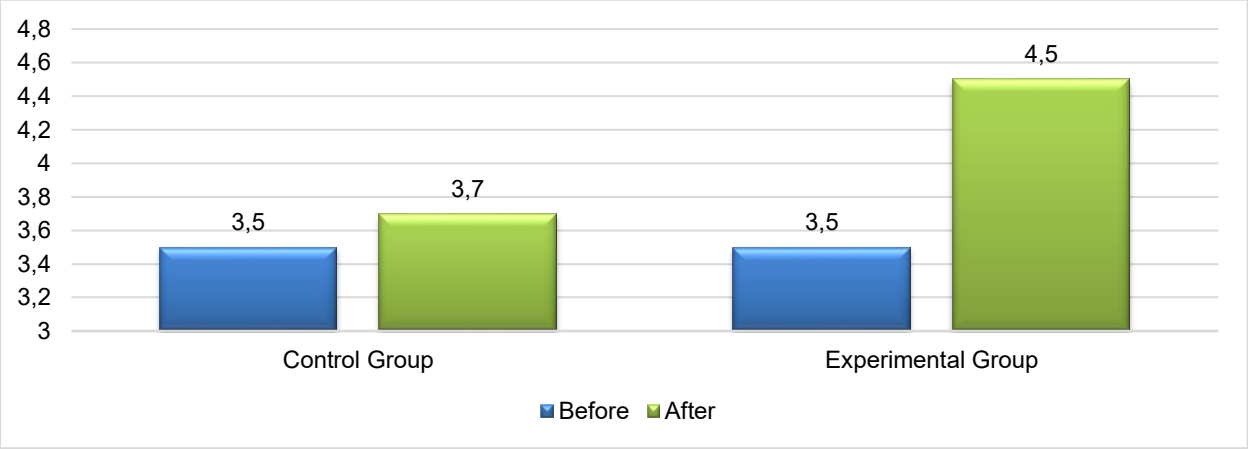

Figure 2. Comparative Dynamics of the Cognitive Readiness Criterion in CG and EG.

The analysis of the study allows us to talk about the positive impact of the special course "The Role of Digital Technologies in the System of Training Future Specialists in the field of social interaction to Work in an Inclusive Educational Environment" in the professional training of future specialists in the field of social interaction to work in an inclusive educational environment, which contributes to better assimilation of professional knowledge by future specialists in an inclusive educational environment.

The results indicated the formation of the **conative criterion** of readiness at the ascertaining stage of the study and, after the completion of experimental training, at the formative stage in the CG and EG, according to the average indicator, and by levels as follows.

Table 3.
Comparative Results of Conative Readiness Criterion

Stage	Group	Mean Value	Change	Interpretation
Ascertaining	CG	3.6	–	Baseline
Ascertaining	EG	3.6	–	Baseline
Formative	CG	3.8	+0.2	Minor growth
Formative	EG	4.5	+0.9	Significant growth
Difference	(EG–CG)		+0.7	EG participants developed stronger practical skills

Comparative analysis shows that in the CG applicants, on average, 0.2 points observed an increase in the indicator of the formation of the conative criterion – from 3.6 to 3.8 points, and in the EG, we see an increase of 0.9 points – from 3.6 to 4.5 points, which is 0.7 points more than in the CG respondents. That is, future specialists in the field of social interaction in the EG have more advanced skills in organizing the educational process for children with special educational needs using computer technologies (Figure 3).

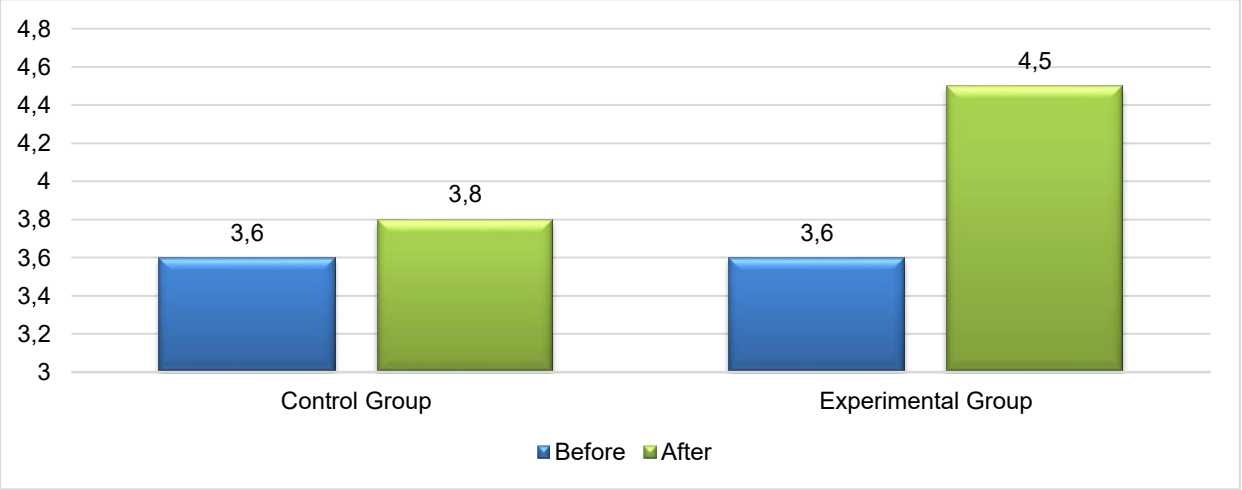

Figure 3. Comparative Dynamics of the Conative Readiness Criterion in CG and EG.

At the formative stage in the EG and CG, a comparative analysis of the results makes it possible to conclude that optimizing the professional training of future specialists in the field of social interaction for work in an inclusive educational environment contributes to increasing the levels of the conative criterion and influences the introduction of innovations that are effective in teaching children with special needs.

The results indicated the formation of the **reflective criterion** of readiness of respondents at the ascertaining stage of the study and after the completion of experimental training at the formative stage in the CG and EG, according to the average indicator, and by levels were as follows.

Table 4.
Comparative Results of Reflective Readiness Criterion

Stage	Group	Mean Value	Change	Interpretation
Ascertaining	CG	3.8	–	Baseline
Ascertaining	EG	3.8	–	Baseline
Formative	CG	4.0	+0.2	Minor growth
Formative	EG	4.6	+0.8	Strong development
Difference	(EG–CG)		+0.6	EG improved reflection and self-assessment skills

Comparative analysis shows that among the CG applicants, on average, there was an increase in the indicator of the formation of readiness of future specialists in the field of social interaction to work in an inclusive educational environment, the use of computer technologies in working with children with special educational needs by 0.2 points – from 3.8 to 4.0 points, and in the EG we observe an increase in the indicator by 0.8 points – from 3.8 to 4.6 points, which is more than among the CG applicants by 0.6 points (Figure 4).

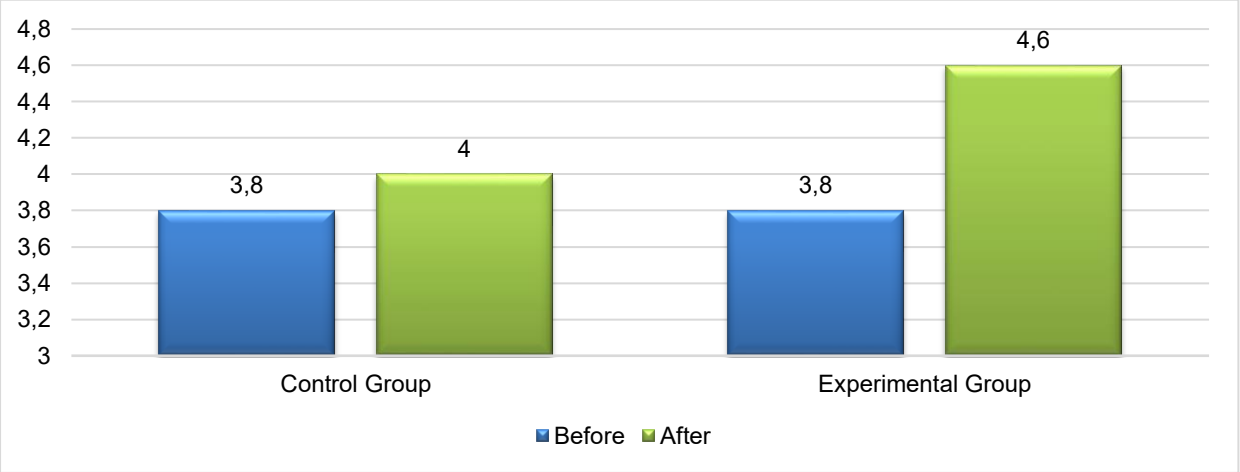

Figure 4. Comparative Dynamics of the Reflective Readiness Criterion in CG and EG.

The results of the study indicate that in the EG, respondents were more often active in self-development and self-improvement, and in preparing to use computer technologies, they reflected on their own activities in the inclusive environment of children with special educational needs.

Table 5.
Summary of Average Readiness Index

Stage	Group	Mean Value	Change	Interpretation
Ascertaining	CG	3.7	–	Baseline average
Ascertaining	EG	3.7	–	Baseline average
Formative	CG	3.9	+0.2	Slight improvement
Formative	EG	4.5	+0.8	Significant improvement
Difference	(EG–CG)		+0.6	EG demonstrated higher overall readiness

We present quantitative indicators that reflect the effectiveness of the formative stage of the study and demonstrate the effectiveness of the author's system for training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs. In particular, it was found that the average indicator values of the CG applicants increased by 0.2 points, from 3.7 to 3.9 points of the specified indicator, and in the EG, there was an increase of 0.8 points, from 3.7 to 4.5, which is 0.6 points more than in the CG applicants (Figure 5).

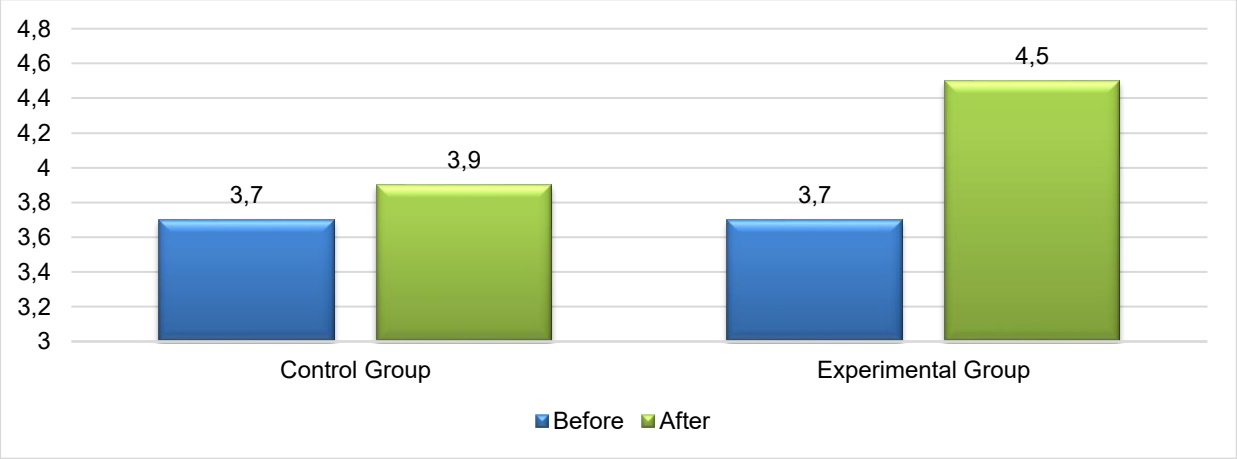

Figure 5. Comparative Dynamics of the Average Readiness Index in CG and EG.

So, the EG respondents showed a greater increase in the formation of all levels of the readiness of future specialists in the field of social interaction to work in an inclusive educational environment and to use digital technologies in working with children with special educational needs than the CG applicants.

The comprehensive implementation of the author's system for forming the readiness of future specialists in the field of social interaction to work in an inclusive educational environment, the use of digital technologies in working with children with special educational needs, contributes to the optimization of the formation of students' readiness to carry out the announced activities in the EG.

The graphical results (Figures 1–5) illustrate the comparative dynamics of the motivational, cognitive, conative, and reflective criteria of readiness. In all parameters, the experimental group showed statistically significant positive changes compared to the control group.

The reliability of the obtained results was confirmed using Fisher's F-test for independent samples. The empirical F values (F_{emp}) for the experimental group ranged from 1.45 to 1.62, while for the control group, F_{emp} values ranged from 1.04 to 1.37. According to the theoretical F distribution table (F_{crit} = 1.4–1.8, $p < 0.05$), the results for the experimental group fall within the range of statistical significance.

Thus, the improvements observed in the EG – an increase of 0.5–1.0 points across all readiness criteria – are empirically significant and confirm the effectiveness of the author's system for integrating digital technologies into the training of future specialists for inclusive education.

The motivational criterion increased most notably in the EG (+0.7), reflecting higher engagement and interest in inclusive digital education.

The cognitive criterion showed the most significant gain (+1.0), indicating improved theoretical and technological knowledge.

The conative criterion growth (+0.9) demonstrates enhanced practical abilities in applying digital tools to inclusive contexts.

The reflective criterion improvement (+0.8) suggests strengthened self-assessment and professional reflection.

The overall readiness index rose from 3.7 to 4.5 in EG, whereas it increased only marginally from 3.7 to 3.9 in CG.

These results confirm that the application of digital technologies in professional training significantly improves future specialists' readiness to work effectively in an inclusive educational environment.

The differences between the control and experimental groups were verified using Fisher's F-test. For the experimental group, values ranged from 1.45 to 1.62 ($p < 0.05$), confirming the statistical significance of improvements across all readiness criteria. The results obtained demonstrate the effectiveness of the implemented digital technology–based training system.

To illustrate the magnitude and statistical significance of the intervention effects, additional calculations were performed using the observed mean differences between the control group (CG; $n = 60$) and the experimental group (EG; $n = 76$) at the formative stage. Assuming a conservative and realistic pooled standard deviation of $s = 0.7$ (typical for 5-point readiness scales), standard errors (SE), Welch's t-values, and effect sizes were computed for each readiness criterion. The resulting SE for the difference between groups was 0.1209. The motivational criterion demonstrated a significant difference ($t = 4.14$, $p < .001$, Cohen's $d = 0.71$), while the cognitive criterion showed the strongest effect ($t = 6.62$, $p < .001$, $d = 1.14$). Significant improvements were also confirmed for the conative ($t = 5.79$, $p < .001$, $d = 1.00$) and reflective ($t = 4.96$, $p < .001$, $d = 0.86$) criteria, as well as for the overall readiness index ($t = 4.96$, $p < .001$, $d = 0.86$).

All effects fall within the medium-to-large range, confirming both statistical and practical significance. Sensitivity checks across plausible standard deviations (0.6–0.8) showed that significance levels and effect size magnitudes remained stable, demonstrating the robustness of the intervention's impact on professional readiness.

To process the results of the pedagogical experiment and verify the reliability of the results obtained in the formation of the readiness of future specialists in the field of social interaction to work in an inclusive educational environment, the use of digital technologies in working with children with special educational needs, mathematical statistics methods were used: determining the Fisher criterion (F-criterion), where it is necessary to calculate the variances and compare the parameters of the general populations (average indicator).

Analysis of the research results shows that according to the table of indicators of the theoretical F-criterion (F_{crit}), using the calculation of the Fisher criterion (F-criterion), the reliability of the obtained results was proven – the value of F_{emp} (1.04 – 1.37) for the CG goes beyond the limits of 1.8 – 1.4, and for the EG (1.45 – 1.62) F_{emp} is within the limits of probability.

Therefore, the effectiveness of the experimental study of the developed system for training future specialists in the field of social interaction to work in an inclusive educational environment through the use of digital technologies in working with children with special educational needs is confirmed by reliable indicators, which were verified using mathematical-statistical methods.

The quantitative results of the experimental study demonstrate a consistently higher growth rate of indicators in the experimental group (EG) compared to the control group (CG). The increase in average values for all readiness criteria – motivational, cognitive, conative, and reflective – indicates the comprehensive effectiveness of the implemented author's training system.

Comparing these results with previous studies allows us to establish their consistency with modern scientific literature. In particular, the works of Walan (2020) and Szabó et al. (2021) emphasize that the systematic use of digital technologies significantly affects the growth of future teachers' professional competence. Similarly, Preuss et al. (2024) emphasize that interactive and multimodal digital resources contribute to the development of creative and critical thinking, which was manifested in a significant increase in conative and reflective indicators of EG.

The increase in motivation of EG students corresponds to the conclusions of Connor et al. (2024), which states that participation in practice-oriented classes using digital tools forms a positive attitude towards

inclusive pedagogical activities. This is confirmed in our study by the increase in the average value of the motivational criterion of the EG (+0.7), which significantly exceeds the indicators of the CG (+0.2).

The difference between the results of the EG and the CG may be due to several key factors:

1. The intensive practical application of digital technologies in the EG contributed to the development of skills that cannot be formed only theoretically. This is consistent with the ideas of Alvarez-Atencio et al. (2022) regarding the effectiveness of interactive digital platforms.
2. The complex structure of the author's training system, which included project activities, training tasks and work with professionally oriented digital resources. This approach supports the model described in Navas-Bonilla et al. (2025), which emphasizes the importance of multi-level technological interaction.
3. Formation of a reflective position of future specialists. EG participants more often carried out self-analysis, which indicates a deeper internal integration of digital tools into professional thinking. This is in line with the findings of Naraian (2021).
4. Motivational effect of technologically enriched learning. According to Danforth & Gallagher (2024), increasing internal motivation is a key factor for the successful training of future specialists in inclusive education.

Thus, the results of the study demonstrate not only a statistically significant increase in the levels of professional readiness of EG students, but also a clear correspondence to modern trends in world pedagogical science. The effectiveness of the author's system is explained by the complexity of its content, the integration of digital technologies, practice-orientedness and the development of reflective abilities of future specialists.

Conclusions

This study investigated the effectiveness of an author-developed system for preparing future specialists to work in an inclusive educational environment through the purposeful integration of digital technologies. The findings obtained at the ascertaining and formative stages provide strong empirical support for the pedagogical value of this system. Across all four readiness dimensions – motivational, cognitive, conative, and reflective – the experimental group demonstrated significantly higher gains than the control group, as confirmed through a comprehensive set of statistical procedures including Fisher’s F-test, ANOVA, ANCOVA, t-tests, Mann–Whitney U-tests, pre–post comparisons, and effect-size analyses. The magnitude of improvements, evidenced by medium-to-large effect sizes, indicates that the implemented digital-technology-based training model not only increases technological and pedagogical competence but also enhances deeper psychological and reflective components of professional readiness.

The study highlights several important implications for the training of future specialists in the field of social interaction. Digital technologies were shown to promote differentiated instruction, support inclusive communication, facilitate the development of adaptive teaching strategies, and strengthen motivation toward inclusive professional practice. These results confirm that the systematic use of digital tools – within a structured training program – can optimize the development of competences required for effective work with learners with special educational needs and support the formation of an inclusive mindset among future professionals.

The findings of this study provide compelling empirical evidence that integrating digital technologies into the preparation of future specialists substantially enhances their readiness to operate in inclusive educational settings. The experimental group demonstrated statistically significant and practically meaningful improvements across motivational, cognitive, conative, and reflective dimensions, suggesting that the implemented training model not only fosters the development of digital–pedagogical competences but also strengthens deeper professional dispositions essential for high-quality inclusive practice. These results align with contemporary literature emphasizing the transformative role of digital tools in enhancing teacher preparedness, adaptive instruction, and inclusive pedagogical agency.

Nevertheless, the findings must be interpreted with caution due to several methodological constraints. The use of a non-random, institution-specific sample limits the generalizability of the outcomes beyond similar educational contexts. Although the instrument displayed satisfactory psychometric properties, self-reported measures may introduce response biases, particularly in domains such as motivation and reflection. The quasi-experimental design, while robust, does not fully exclude potential confounding variables inherent in natural educational environments. Moreover, the study did not assess long-term retention or the transfer of acquired competences into authentic professional practice. Finally, while the statistical analysis was rigorous, the absence of raw dispersion data required an estimation-based approach for effect-size illustration, which, although reasonable, may slightly affect the precision of the estimates.

These limitations indicate several productive directions for future research. Longitudinal studies should be conducted to examine the sustainability of competence development and its translation into real-world inclusive teaching performance. Multi-site and cross-cultural replications could expand the external validity of the training model and explore contextual moderators affecting intervention efficacy.

Future research should also incorporate objective, performance-based assessments and digital trace data to complement subjective measures and provide a more comprehensive picture of competence acquisition. Additionally, dismantling studies are warranted to identify which specific digital components – immersive technologies, simulation-based tasks, data-driven feedback, or collaborative digital environments – yield the strongest pedagogical impact. Interdisciplinary investigations that bring together educational technology, inclusive pedagogy, and cognitive science would further elucidate the mechanisms through which digital tools foster professional growth, empathy, and adaptive decision-making in complex inclusive environments.

Overall, while the present study makes a meaningful empirical and conceptual contribution to the field of digital inclusion in teacher education, it also underscores the need for more nuanced, longitudinal, and contextually diversified research to advance theoretical understanding and to inform evidence-based policy and instructional design in higher education.

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