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Experimental Work on Competence Building of a University Teacher in Inclusive Education by Means of Digital Technology

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The article presents the results of experimental work on the formation of the competence of university teachers in inclusive education by means of information technology in additional professional education. Information technology is implemented on the basis of the unity of two components: information and technology. The didactic digital complex acts as an information component, the technological component provides the personification of the educational process, the use of a set of forms and methods of training for intensifying the process of additional professional education using information and communication technologies, creating conditions for the formation of pedagogical communities for the exchange of experience and interactive solving of the professional tasks 353 teachers from 6 educational universities were recruited for this study. The effectiveness of the study was confirmed by the method of mathematical statistics (Pearson's criterion).

Keywords: competence of a university teacher in inclusive education; additional professional education; information technology support; didactic digital complex.

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Экспериментальная работа по формированию компетентности преподавателя вуза в инклюзивном образовании средствами информационно-технологического обеспечения

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В статье представлены результаты экспериментальной работы по формированию компетентности преподавателей вуза в инклюзивном образовании средствами информационно-технологического обеспечения в системе дополнительного профессионального образования. Информационно-технологическое обеспечение реализуется на основе единства двух составляющих: информационной и технологической. В качестве информационной составляющей выступает дидактический электронный комплекс, технологическая составляющая предусматривает персонификацию образовательного процесса, применение совокупности форм и методов обучения, ориентированных на интенсификацию процесса дополнительного профессионального образования средствами информационно-коммуникационных технологий, создание условий для формирования сетевых педагогических сообществ для обмена опытом и решения профессиональных задач в процессе коммуникации и взаимодействия. В исследовании приняли участие 353 преподавателя из 6 образовательных организаций высшего образования. Эффективность исследования подтверждена методом математической статистики (критерий x^2 — критерий Пирсона).

Ключевые слова: компетентность преподавателя вуза в инклюзивном образовании; дополнительное профессиональное образование; информационно-технологическое обеспечение; дидактический электронный комплекс.

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Introduction

The current development stage of Russian society is characterized by the rise of an inclusive approach in higher education. The challenges of modern society determine the need for academic staff training to implement professional activity in inclusive education. In this regard, the development of managerial technologies in additional professional education, aimed at the competence building of academic staff in inclusive education, is of particular importance.

Currently, the modern trend in education is the mobilization of information and communication technology (ICT) resources, aimed at the development of educational distance learning technologies. An important role in education is played by massive open online courses, interactive services, Wiki technologies, Web 2.0 social services, electronic teaching and learning materials, electronic didactic complexes, information and communication environments, etc. [3; 7]

ICT, when mobilizing teaching creativity, contribute to the development and implementation of academic innovations aimed at intensifying the educational process at various levels, including the system of additional professional education.

The analysis of the authors' works (N.Yu. Sorokina, T.G. Lukovenko, O.Yu. Muller, O.A. Denisova, O.L. Lekhanova and others.) allows us to state that, despite various theoretical and practical models and aspects of inclusive teacher training, the competence building issues in additional education by means of ICT are considered insufficiently [2; 4; 8; 9].

The analysis of various models and practices of using ICT in the educational process allowed us to deduce the potential and feasibility of using the theory of information technology support in the educational process (ITS), presented in the works of A.V. Nikitina, A.S. Rodionov, etc., according to which ITS is considered as "a didactic system that represents an integral unity of functionally and structurally related information and technological components" [5; 6].

The didactic electronic complex (DEC) is considered as an information component of additional professional education, and the technological element is implemented through the information technology of training.

DEC is considered as "a didactic interactive system created on the basis of information technology tools, represented by a structured set of information and content elements that provide and sustain the educational process in the context of full and necessary information. Information technology training is a didactic process carried out using a set of information technology software, ensuring optimal educational content perception and assimilation, as well as the interaction between the subjects of the educational process in order to achieve academic results" [1].

Hypothesis and Research Objective.

We assumed that the educational process in additional professional education aimed at training university teachers for the implementation of inclusive education would be more effective if ITS were used.

The research objective was to evaluate the effectiveness of competence building in university teachers in inclusive education by means of ITS in additional professional education.

Methods

Competence Assessment of the Academic Staff in Inclusive Education

To assess the competence of a university educator working in inclusive education, the following assessment tools were used: a questionnaire developed by us "Competency Self-Assessment for Academic Staff in Inclusive Education", tests, project tasks; the "Professional activity incentive" method (K. Zamfir's method modified by A.A. Rean). The questionnaire is presented by four ten-point scales, including statements on inclusive education issues, which allow us to assess the level of competence components identified by us (val-

ue and motivational, cognitive, activity, reflexive). The competence of academic staff in inclusive education was assessed at four levels: critical, beginner, intermediate, advanced. To establish statistically significant differences in the results obtained in the experimental group compared with the control group, the x^2 criterion was used — the Pearson criterion.

The Procedure for Competence Building of University Teachers in Inclusive Education

The competence building of university teachers in inclusive education was carried out with the use of DEC.

DEC, which is an integral part of ITS, is an information and communication environment, implemented on the basis of software product integration, social services Web 2.0 and the Moodle virtual learning environment. The developed didactic complex comprises entry and final diagnostics on competence level of a university educator in inclusive education, as well as its components.

Based on the results of the entry diagnostics, depending on the degree of the university teachers' competence components in inclusive education, students' individual academic paths were generated in DEC. The personification of the educational process was carried out through the introduction of software solutions and the developed implementation plan (Fig. 1).

The convenience of generating an individual academic path was ensured by differentiating educational content into micro units (subtopics) within modules/topics that are interrelated with the specific criteria and competence indicators of a university teacher in inclusive education, as well as the theory presentation of the basic and advanced level, supplementary resources on the topics, practice activities, the testing and assessment resources of basic and advanced levels.

DEC, along with the traditional formats of content presentation, is represented with various educational resources (online databases of regulatory documents in inclusive education, documentaries about the achievements of people with disabilities, video guides on the use of special technical devices, mind maps, collections of teachers' works, Internet resources on inclusive education, a replenishable bank of cases, document templates, webinars on inclusive education implementation, etc.).

The learning technology is represented by a set of active forms and methods (discussion, brainstorming, debate, the case method, the project method, the peer assessment method, the problem presentation method, the swot-analysis method). Practice was organized on the use of modern web-tools that provide students with group and team communication, network project activities.

To gain high-quality empirical content, provide practice-oriented content, share experiences among students in the educational process, DEC provides the opportunity to replenish a bank of students' works by accumulating practice on cloud platforms and including cross-references to the collection of students' works in the structure of DEC.

In order to take into account the experience and specifics of the trainees' professional activities, their professional experience in inclusive education, the formation of micro groups was carried out according to the following parameters: the amount and level of knowledge formed, skills, abilities, region, university, professional activity.

Sampling

The study involved 353 teachers of 6 educational institutions of higher education. Sample 1 (experimental group) included 187 teachers, the second sample (control group) included 166 teachers. At the ascertaining stage, the samples were balanced and did not differ significantly in the pre-experimental level of teachers' competence in inclusive education (x^2emp.=1.3< x^2cr.=7.8 with a significance level of p=0.05 and degrees of freedom equal to 3).

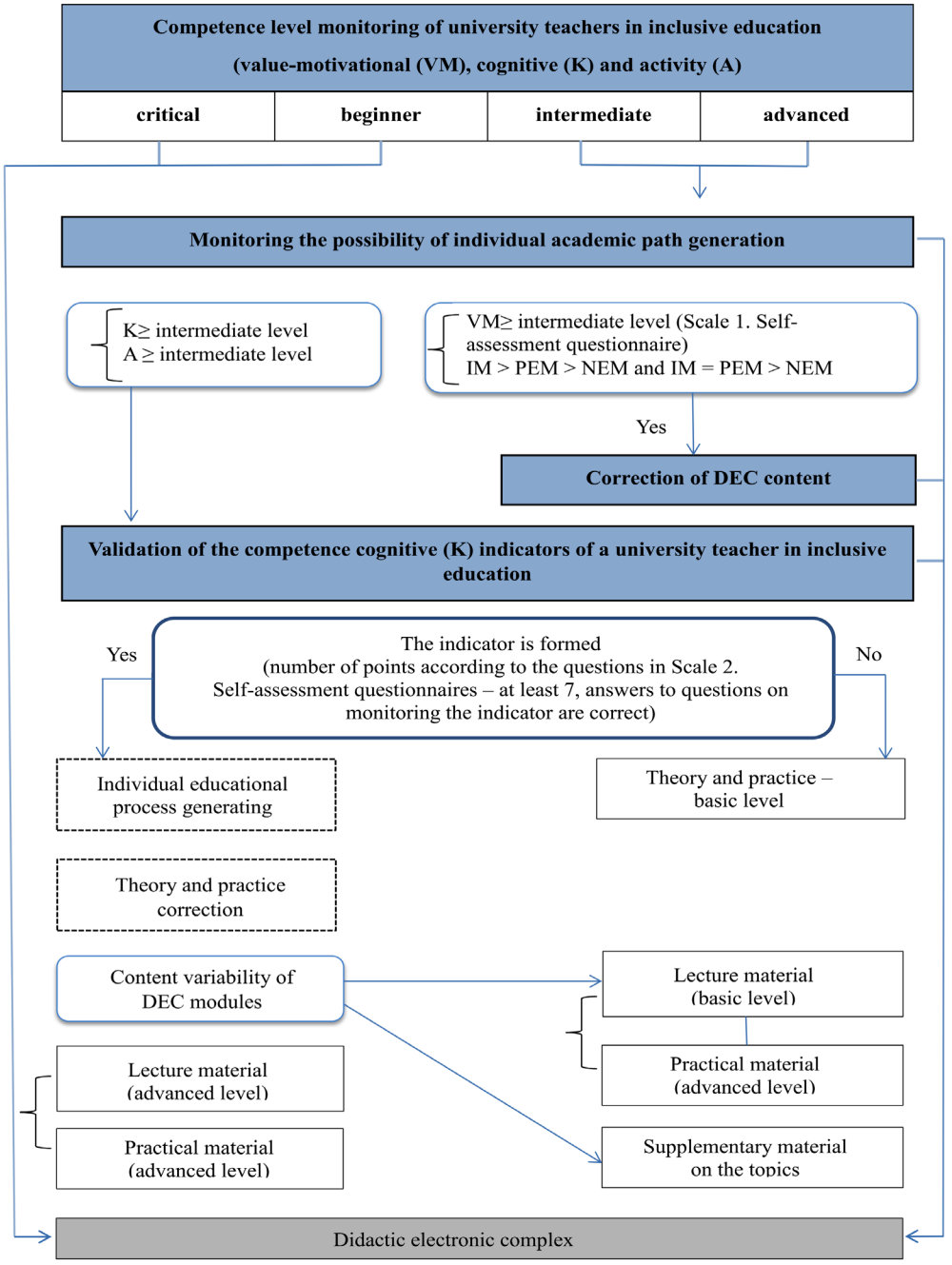

Fig. 1. Implementation plan of the individual academic path generating in DEC

Experimental Work

Experimental work was carried out in 2020—2021. At the ascertaining stage of the experiment, the selection of subjects was carried out. At the formative stage, the teachers of the experimental group were trained according to the developed additional professional educational program of advanced training implemented with the use of DEC. The teachers in the control group were trained in traditional academic learning conditions using distance learning technologies (an online course containing a single-level lecture and practice material that does not involve an individual academic path, providing mainly the independent work of students). The labor intensity of the professional development programs for the experimental and control groups was 72 hours. The number of classes in the experimental group: 24 hours of lectures, 42 hours of cooperative practical work in the DEC, 6 hours of final assessment, in the control group: 24 hours of lectures, 16 hours of practical work, 28 hours of independent work, 4 hours of final assessment. The duration of the training program was 3 weeks. At the control stage of the experiment, the results of the experimental work were analyzed, statistically significant differences in the results obtained in the experimental group compared with the control group were checked according to the Pearson criterion.

Results and their Discussion

According to the training results of the experimental and control groups, changes in the level of development of teachers' competence in inclusive education were diagnosed. A comparison of empirical data presented as a percentage of the number of teachers with critical, beginner, intermediate and advanced levels of competence components in inclusive education in the experimental and control groups at the entry and final diagnostics of the relative total number of teachers in groups is presented in Figures 2—5.

According to the dynamics of the value and motivational component, the following results were obtained: as the training result, the number of teachers in the experimental group at the intermediate and advanced levels of value and motivational component increased by 28.9% and 23%, in the control group — by 9% and 5.4 %, respectively. The number of teachers at the critical and beginner levels in the control group decreased by 10.8% and 3.7%. In the experimental group, the decrease occurred by 24.1% and 27.8%, respectively (Fig. 2).

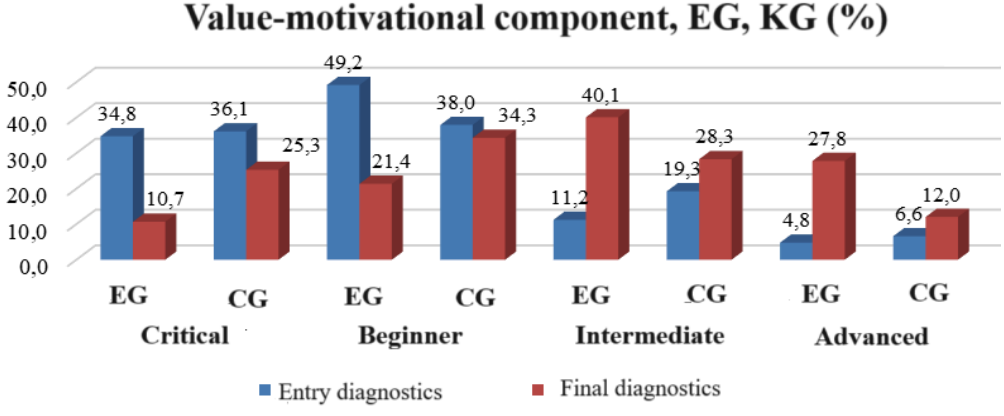

Fig. 2. Value and motivational dynamics

According to the cognitive component dynamics, the following results were obtained: the number of teachers in the experimental group at the intermediate level increased by 27.9% and 43.9% at the final diagnostics, the number of teachers at the advanced level increases by 24.6% and 29.9%. In the control group, the increase at the intermediate and advanced levels is 18.6% and 11.5%, respectively (Fig. 3).

According to the activity component dynamics, significant changes were obtained: the number of teachers in the experimental group at the intermediate and advanced levels increased to 43.8% (> 3.3 times) and 29.4% (> 7.9 times), respectively, compared to the starting data. In the control group, the number of teachers at the intermediate and advanced levels was 32.5% (> 2 times) and 14.5% (> 3 times), respectively (Fig. 4).

According to the reflexive component, the number of teachers in the experimental group

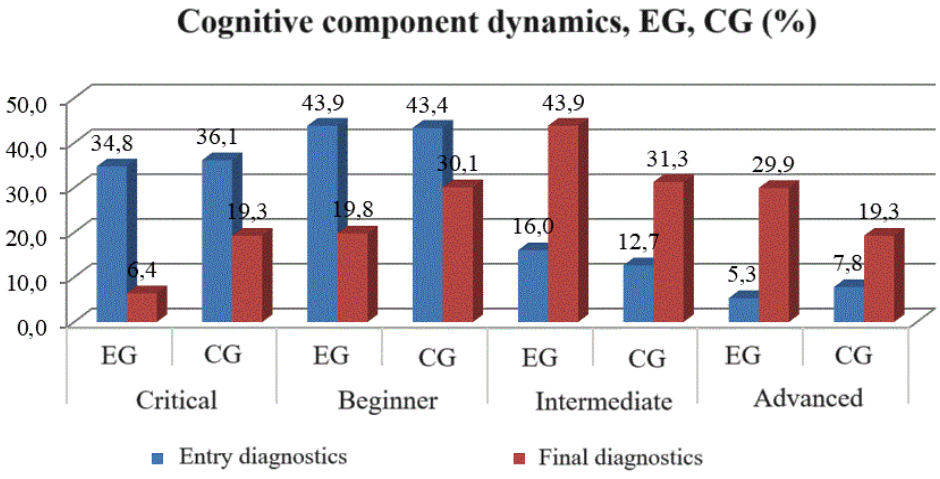

Fig. 3. Cognitive component dynamics

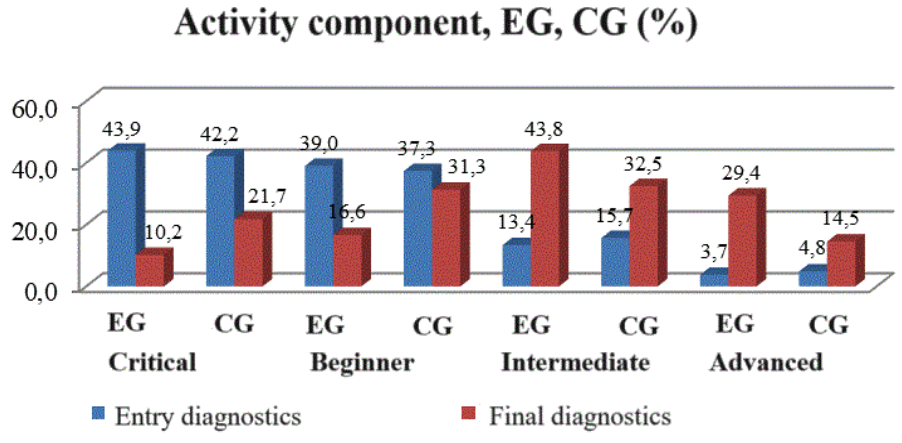

Fig. 4. Activity component dynamics

at the critical level decreased by 29.4%, at the beginner level — by 28.8%, at the intermediate level increased by 28.4%, at the advanced level — by 29.9%. In the control group, the number of teachers at the critical level decreased by 13.9%, at the beginner level — by 13.3%, at the intermediate level increased by 15.7%, at the advanced level — by 11.5% (Fig. 5).

At the ascertaining stage of the experiment, the primary empirical data allow us to state the dominance of the critical and beginner levels of university teachers' competence in inclusive education in both the experimental and control groups. According to the results of the formative experiment, positive dynamics are observed in both groups. However, the experimental group is dominated by the number of teachers at the intermediate and advanced levels in all competence components in inclusive education, in the control group — at the intermediate and beginner levels.

To establish statistically significant differences in the obtained results in the experimental group compared to the control group, χ^2 — Pearson 's criterion was used. While monitoring the differences in the experimental and control groups, the following empirical values were obtained: for the value and communication component — x^2emp.=30,3; for the cognitive component — x^2emp.=23,1; for the activity component — x^2emp.=27,3; for the reflexive component —x^2emp.=33,2; The obtained empirical values x^2 emp. are significantly higher than the critical value x^2cr. = 7.8. at a significance level of p = 0.05 and the degrees of freedom equal to 3, which indicates a more significant increase in university teachers' competence in inclusive education in the experimental group than in the control group.

Conclusions

The results of the experimental work allow us to conclude that the use of ITS in additional professional education aimed at academic staff's competence building in inclusive education in the experimental group contributes to progress in the acquiring of knowledge, the consolidation and application in professional and academic activity in inclusive education for each component and it confirms the hypothesis.

The use of the theory of the didactic unity of the content (DEC) and the procedural side

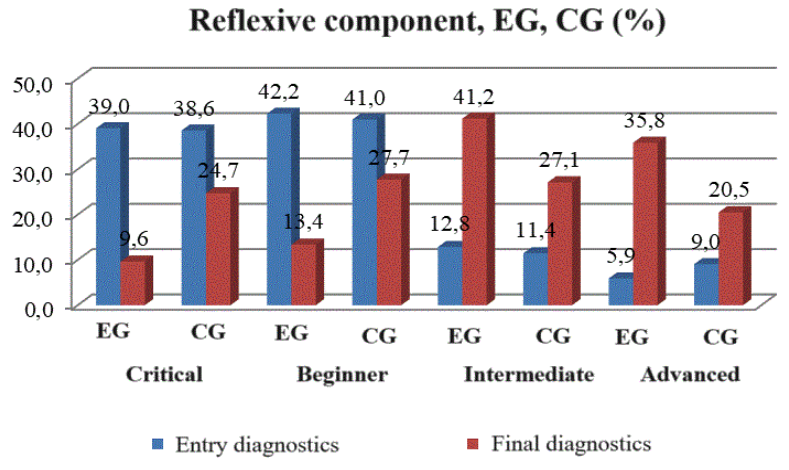

Fig. 5. Reflexive component dynamics

(information technology) in additional professional education allows to achieve the effect of rapid inclusion of the participants in educational and cognitive activity by providing access to necessary information resources in the context of full and adequate provision of information, preparation of didactic materials, educational process personification taking into account the needs and experience of the professional activity of students, the development of academic network communities for exchanging experience and solving professional tasks during communication and interaction.

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