

Practices with proven effectiveness in training of students in the design of an inclusive digital environment

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Abstract—In pedagogical science, higher education, and the activities of a teacher, a contradiction between the aggravation of the problem of implementing the conditions of an accessible environment in the field of education and the need for special training of students competent in designing an inclusive digital environment, and the opportunities that are not fully realized by the organizations of higher and supplementary education in training of such specialists should be resolved. In connection with the social, economic, and pedagogical significance of the identified problem, we determined the research topic “Practices with Proven Effectiveness in Training of Students in the Design of an Inclusive Digital Environment”. The paper discusses the main approaches to the design of an inclusive digital environment and presents research data on the existing level of competence of lecturers of higher educational institutions.

Keywords—*inclusive competency, inclusive education, inclusive digital environment, design, training of students.*

I. INTRODUCTION

Statement of the problem in general terms and its relationship with important scientific and practical tasks. Today inclusive education is rightfully considered to be one of the main priorities of the state social policy of Russia, implemented to varying degrees at all levels of education. However, its introduction into the system of vocational and higher education is somewhat complicated, since it requires significant transformations of a methodological and technical nature when students with special educational needs are included in the educational process. The Federal Law *On Education in the Russian Federation* indicates the education of students with disabilities together with other students and defines it as inclusive, that is, capable of providing equal access to education for all students, taking into account the diversity of special educational needs and individual opportunities [20].

Currently, the total number of students studying in

vocational educational organizations in Chelyabinsk Region is 66.5 thousand people, 2% of which are people with disabilities, for the training of which a differentiated network of specialized educational organizations is completely preserved. In accordance with Article 7 of the Law of Chelyabinsk Region *On Education in the Chelyabinsk Region*, children with disabilities are entitled to use the computer, telecommunication, and specialized equipment, software provided them for distance education upon completion of their studies in basic general education programs of primary general education, basic general education, and secondary general education [10]. However, a pilot study has shown that only 3% of vocational educational organizations are ready to use educational technologies for training of people with disabilities.

An analysis of recent studies and publications that examined aspects of this problem and on which the author substantiates; highlighting previously unresolved parts of a common problem.

Research hypothesis. Taking into account that the nature of training actualizes a change (growth) in the level of competence of university students, we assume that the effectiveness of students’ training in the design of an inclusive digital environment will be ensured if there is developed holistic pedagogical concept, which includes: a) scientific understanding of the training of the university students in the design of an inclusive digital environment; b) disclosure of its content and specific features; c) the definition of technologies and means of training of university students in the design of an inclusive digital environment.

II. RESEARCH METHODOLOGY

In accordance with the logic of the study, the following methods were used:

- theoretical: analysis of regulatory documents; historical and pedagogical analysis to identify the features of inclusive education in the history of domestic and foreign education; a conceptual and terminological analysis of the literature was used to explicate the terminological field of the problem; a systematic approach has become the basis for a holistic consideration of the problem of implementing inclusive education; modelling was used to build a model of the teacher's inclusive competence and present its result;

- experimental: generalization of effective domestic and foreign experience in the implementation of inclusive education; organization of an experiment for testing a complex of interconnected and interdependent components; organization of an experimental verification of the effectiveness of the selected complex of structural components; questioning, observation, testing, self-esteem, rating, expert evaluations; statistical methods of data processing and testing hypotheses put forward.

Experimental base of research: Federal State Budgetary Institution of Higher Education "Chelyabinsk State University". In total, 256 students (including 24 students with disabilities) and 202 lecturers took part in the study.

The theoretical and methodological basis of the study was scientific work, reflecting the diversity of views on education management in general (V.I. Zvereva, B.S. Lazarev, A.Ya. Nain, G.N. Serikov, V.P. Simonov, P.I. Tretyakov, R.Kh. Shakurov, and others), the foundations of a systematic approach to education management (T.A. Ilyina, Yu.A. Konarzhevsky, F.F. Korolev, N.V. Kuzmina, V.M. Lizinsky, M.M. Potashnik, G.N. Serikov, P.I. Tretyakov, and others). Among domestic psychological and pedagogical studies, the ideas of foreign and domestic scientists on the problems of philosophy, the history of education, pedagogy, and psychology (L.Yu. Belenkova, S.I. Hessen, M.A. Galaguzova, A.N. Dzhurinsky, H.S. Zamsky, J. Kyrgesaar, L.N. Litvin, N.N. Malofeev, L.F. Obukhova, E.G. Osovsky, B.P. Puzanov, F.A. Fradkin, T.F. Yarkina, M. Einskou); integrated education for children with disabilities (S.V. Alekhina, A.G. Asmolov, D.Z. Akhmetova, G. Banch, L.S. Vygotsky, S.A. Zykov, T.S. Zykova, N.A. Kargapoltseva, V.P. Kashchenko, S.N. Kryukov, E.I. Leongard, N.S. Morova, N.M. Nazarova, Z.G. Nigmatov, M.S. Pevzner, F.L. Ratner, G.Ya. Troshin, U.V. Ulenkova, T.Hellbrügge, N.D. Shmatko, L.M. Shipitsina, A.Yu. Yusupova, E.R. Yarskaya-Smirnova); socialization of personality (P. Bourdieu, E. Durheim, D.V. Zaitsev); humanistic pedagogy (Sh.A. Amonashvili, R.A. Valeeva, E.A. Yamburg) are of the greatest interest.

III. RESULTS

Exploring approaches to organizing training for children with disabilities, almost all researchers, despite some methodological differences in approaches to organizing inclusive education, agree that inclusive education involves ensuring the availability of quality education and joint learning for all as a result of creating an educational space, which meets the different needs of all children. And, it is clear that the child and his/her various educational needs are at the center of inclusive education.

Inclusion is a way of common life between ordinary people and people with disabilities, which is supported and developed by society and its subsystems, including educational institutions, and with respect to which, all members of society have the right to freely choose forms of

participation in all social processes, at all levels of education, at work, in the implementation of various social roles and functions.

In our study, the current concept of inclusive education will be considered as follows: inclusive education is a focused process of organizing students to master the knowledge, skills, and competencies, providing equal access to education for all students, taking into account the diversity of special educational needs and motivating students to get lifelong learning.

The identification of theoretical and pedagogical prerequisites confirming the reliability and conceptuality of the structural and genetic model of the process under study by the author made it possible to systematize the terminological field of the problem, determine the basic (pedagogical design, inclusive digital environment) and basic (designing an inclusive digital environment, preparing university students for the design of inclusive digital environment) categories, as well as clarifying concepts (inclusive competence, differentiated design and pedagogical tasks, etc.). Pedagogical design is a technology for creating educational products that are implemented in a digital environment, which ensures the feasibility, didactic effectiveness, and consideration of the educational needs of the subjects of the educational process (including people with disabilities). In the context of the study, it will be correct to define an inclusive digital environment as a single space that integrates educational products and computer-telecommunication interaction technologies, which mediates the formation of synergetic competencies for effective educational professionals, including those with special educational needs (including people with disabilities) activities and social self-realization in the information society. Designing an inclusive digital environment is a set of management procedures for selecting the content of high-quality educational content, determining the structure and means of presenting educational products in the information and educational environment, accessible to the subjects of the educational process, including those with special educational needs (including people with disabilities). The training of university students for the design of an inclusive digital environment is defined by us as the focused activity of the subjects of the educational process, ensuring the acquisition of knowledge, skills, and competencies by university students to create an inclusive information and educational environment with specified properties. Inclusive competence, considered as the result of the process under study, is an integrative ability to perform professional and pedagogical functions in an inclusive society, including creating an inclusive digital environment and providing special conditions that compensate for the invalids and people with disabilities.

Experimental work was carried out in vivo in several stages. The ascertaining stage of the experimental work made it possible to determine the current level of inclusive competence, the quality of training university students for the design of an inclusive digital environment. At the formative stage of the experimental work, a conceptual model was introduced into the educational process and pedagogical conditions were differentially implemented. In accordance with the tasks of the forming stage of the experimental work, four groups of subjects were organized: control (CG) and 3 experimental (EG), approximately equal in terms of inclusive competency and in terms of preparation for the design of an inclusive digital environment. In EG-1, a substantial block of pedagogical conditions was implemented.

In EG-2, a process-technological unit was implemented. In EG-3, a set of pedagogical conditions was implemented, including both substantive and process-technological units. In the CG, special measures to prepare for the design of an inclusive digital environment were not introduced. Processing, quantitative and qualitative analysis, interpretation and presentation of the results of experimental work were carried out at a generalizing stage.

We tested the effectiveness of the proposed markers of the educator's inclusive competency using the ϕ^* -criterion, the Pearson's χ^2 -criterion. In order to identify differences in the distribution of levels of inclusive competence in the CG, EG-1, EG-2, and EG-3 at the ascertaining and control stages using the Pearson's χ^2 -test, statistically significant differences were revealed in each group, including the CG. Consequently, the educational process provides significant changes in the formation of inclusive competence of students; however, the experimental impact has a greater statistically significant effect, which is confirmed by the observed values of Pearson's χ^2 -criterion (when comparing the CG at the ascertaining and CG at the control stage $\chi^2_{\text{obs. KG}} = 22.86$; similar to $\chi^2_{\text{obs. EG-3}} = 58.12$; χ^2 approx. EG-2 = 34.02; χ^2 approx. EG-1 = 31.87). In order to confirm the results, the ϕ^* -criterion, the Fisher angular transformation, was used, according to which the recorded observed value at the control stage of the experiment between EG-2 and KG is 4.891, between EG-2 and KG is 2.549, between EG-1 and KG is 2.384 (the critical value at a significance level of P is 0.05 = 1.64, and at P it is 0.01 = 2.31). The observed value is higher than critical, which indicates the presence of statistically significant changes in the level of students' inclusive competence in EG-1, EG-2, and EG-3 compared with the CG with the established insignificant difference between the groups at the ascertaining stage of the experiment [13].

IV. DISCUSSION

The relevance of this study is determined by evolutionary trends in education associated with the need to prepare university students for the design of an inclusive digital environment; the undeveloped conceptual foundations of training of university students for the design of an inclusive digital environment, reflecting the dialectical unity of the theoretical and technological aspects of this process; insufficient development of the methodological and technological apparatus for training of university students to design an inclusive digital environment; the need to create an infrastructure for training of university students to design a digital environment.

The effectiveness of training of university students for the design of an inclusive digital environment is ensured by the development of a holistic pedagogical concept, which includes: a) scientific understanding of the training of university students in the design of an inclusive digital environment (the intentional aspect); b) disclosure of its content and specific features (structural aspect); c) determination of technologies and means for training of university students in the design of an inclusive digital environment (procedural aspect).

The structural aspect reveals the instrumental foundations for training of university students in the design of an inclusive digital environment: a set of patterns, principles, and functions (information, design, communicative, interactive, and organizational). Determinant patterns determine the principles of inclusive education (personal educational and professional

trajectory; facilitation). The principles of higher education pedagogy (continuity; taking into account students' vitagenic experience) are based on attributive laws. Productive laws are concretized in the principles of pedagogical design (the actualization of the potential of information technology; balance and dynamism).

Verification of the concept during the experiment revealed statistically significant changes in the experimental groups compared with the control: higher ones in EG-3, in which preparation was carried out against a background of a complex of conditions, and lower—in EG-1, EG-2, in which respectively substantive and process-technological conditions. The results confirm the validity of the hypothesis.

V. CONCLUSIONS

Thus, we believe that the prospects and success of building students' competence in the design of an inclusive digital environment as a factor that ensures the realization of the individual's actual needs in lifelong learning and the quality of inclusive higher education determine:

1. The integration of andragogical (general scientific level), competence-based (specific scientific level), and modular (methodological and technological level) approaches that make up the methodological regulation of the formation of inclusive competence of lecturers of educational institutions of vocational education.

2. The structural and functional model of the formation of inclusive competence of lecturers of educational organizations, providing for successful use in a dynamically developing vocational education, which includes targeted, methodological, substantive, procedural, functional, and effective blocks.

3. A set of organizational and pedagogical conditions that takes into account the purpose and content of professional activities of educators, the prescription of an inclusive society and the regulatory framework of modern educational activities, the possibilities of andragogical, competency-based, and modular approaches. We include substantive ones (updating the content of programs for continuing professional development of academic staff; cluster-concentric structuring of courses and modules for advanced training of academic staff), and process-technological (introduction of interactive teaching methods into the continuous process of professional development of teachers; the use of distance educational technologies in the continuous process of continuing education of teachers).

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