REVIEW

Review of the foreign scientific advisor, Shenol Dost, on the dissertation work of Gulzhamal Ussainova entitled «**Instructional design in the system of professional training of future teachers of mathematics in the conditions of digitalization of education**», submitted for the degree of Doctor of Philosophy (PhD) in the educational program 8D01501 – «Mathematics».

Introduction

The dissertation research of Ussainova Gulzhamal is a relevant work in the field of pedagogical education. In the dissertation work, a doctoral student is required to work in higher education institutions. The dissertation is well written and provides a thorough analysis of the research topic within the framework of instructional design in the system of professional training of future mathematics teachers under the conditions of digitalization of education.

The dissertation research of **Ussainova Gulzhamal** is a relevant and significant work in the field of pedagogical education. In her dissertation, the doctoral student investigates the scientific and methodological foundations for organizing the system of professional training of future mathematics teachers in higher education institutions under the conditions of digital education through instructional design. The dissertation is well written and presents a thorough and comprehensive analysis of the research topic.

Relevance of the study:

Currently, in the training of future specialists in higher education institutions, there is a need to improve the content, structure, and overall orientation of education in accordance with the demands of the time. Therefore, the main goal of modern higher education is to train qualified specialists who are competitive in the labor market, have developed competence, can organize their own activities, have their own vision, are focused on effective work, are able to adapt to the changes taking place, are flexible, and quickly adapt, are able to express their ideas freely and think creatively. In particular, the Law states that the activities of the education system should be aimed at improving the teaching process, introducing modern educational technologies, and forming the professional competencies of students. These requirements make it urgent to form a scientifically based system of professional training of future mathematics teachers in the context of digital education, including the effective use of pedagogical design. In this regard, adapting pedagogical design to the context of digital education in the system of professional training of future mathematics teachers, substantiating it theoretically and proving its effectiveness in practice, is consistent with the strategic directions of the state educational policy and meets the requirements of the modern education system.

Analysis of the compliance of scientific results with the requirements for a doctoral dissertation

The dissertation entitled "Instructional Design in the System of Professional Training of Future Mathematics Teachers under the Conditions of Digitalization of Education" presents the scientific and methodological foundations for organizing this process.

The scientific results of the dissertation work are proven by their theoretical validity, the consistency of the scientific methods used, and the statistical processing of the experimental results obtained. The theoretical, empirical, and statistical methods used in the research ensure the reliability and accuracy of the scientific results. In addition, the research

results were presented and discussed by the scientific community at scientific and methodological seminars and international scientific and practical conferences.

In general, the novelty, theoretical validity, practical significance and scientific substantiation of the scientific results presented in the dissertation work fully comply with the basic requirements for doctoral dissertations. The research results contain scientific and methodological recommendations for the effective organization of instructional design in the system of professional training of future mathematics teachers under the conditions of digitalization of education and can be used in educational practice.

Research object: The process of professional training of future mathematics teachers in the system of higher pedagogical education.

Description of the independence of the author's point of view

The degree of innovation of the scientific results and the formulated research findings is characterized by their scientific and theoretical substantiation, consistency with the research framework, the effectiveness of the methods and approaches used in teaching, the systematic planning of the experimental work, and the consistency of the quantitative and qualitative indicators.

Deficiencies in the content and format of the dissertation

There are no comments regarding the content and formalization of the dissertation. The structural components of the dissertation (title page, table of contents, normative references, titles and abbreviations, introduction, main part, conclusion, list of references and appendices) are correctly executed. The volume of the dissertation meets the established requirements. The identified shortcomings in the content of the work were eliminated by the doctoral student, together with the domestic scientific advisor, during the editorial revision phase.

Validity of research results

The novelty, validity and reliability of the results, conclusions and recommendations formulated in the dissertation are justified due to the theoretical, empirical and statistical methods used in the dissertation research. The relevance and validity of the work are clearly demonstrated.

In accordance with the goals and objectives of the research work, the following results were obtained:

- the scientific and pedagogical role of pedagogical design in the professional training system of future mathematics teachers in the context of digital education is justified;
- an original theoretical and methodological model of pedagogical design aimed at improving the professional training of future mathematics teachers has been developed;
- methodological mechanisms for implementing pedagogical design that ensure the systematic integration of digital and artificial intelligence tools into the professional training process of future mathematics teachers have been substantiated;
- The results of the experiment on the effectiveness of the proposed pedagogical design model showed an increase in the level of professional training of future mathematics teachers in terms of quantitative and qualitative indicators.

The validity and reliability of the research results are ensured by the theoretical substantiation of the research methods system, as well as by the use of statistical methods in processing the obtained experimental data and their presentation at scientific and methodological seminars and international scientific and practical conferences of Kyzylorda University "Bolashak".

Compliance with the requirements of the Committee for Quality Assurance in Science and Higher Education of the Ministry of Science and Higher Education of the Republic of Kazakhstan.

The doctoral student analyzed numerous sources and scientific works of domestic and foreign scientists on the topic of research.

The results of the dissertation research meet the basic requirements of higher education institutions and provide for effective methods of organizing instructional design in the professional training system of future mathematics teachers in the context of digital education.

Conclusion

It can be concluded that the dissertation is a completed work and demonstrates a sufficient level of theoretical preparation of the doctoral student, his ability to formulate problems and find ways to solve them.

The dissertation used clear statements and maintained stylistic neutrality.

An objective interpretation of the results of the research work is supported by a list of publications that reveal the basic scientific principles proposed by the author.

The theoretical foundations and conclusions of the dissertation research were presented at methodological seminars of the Higher School of Natural Sciences, and at scientific and practical conferences of various levels.

Taking into account the relevance of the topic under consideration, the novelty of the problem under study, and the practical significance of the work on the topic "Instructional Design in the System of Professional Training of Future Mathematics Teachers in the Context of Digital Education", I consider it appropriate to recommend it for defense before the Dissertation Council for the degree of Doctor of Philosophy (PhD) in the educational program 8D01501- "Mathematics".

Reviewer:

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