

## PROFESSIONAL TEACHING METHODOLOGY OF "INFORMATION" SCIENCE ON THE BASIS OF INTERDISCIPLINARY INTEGRATION TRAINING

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### Abstract

In the study, the following general scientific methods were used: logical-historical method, pedagogical observation, analysis, synthesis, systematisation and generalisation, methods of pedagogical experiment, methods of mathematical statistics. The authors propose criteria and indicators of the readiness of future informatics teachers to develop electronic educational resources, as well as levels to identify the readiness of future informatics teachers to create electronic educational resources. In the paper, the authors share the results of an experiment to determine the suitability of their proposed methodology, describe the ways of forming the skills of future teachers to develop EER.

**Keywords:** learning process, informatisation of education, structure, aptitude of future teachers, criteria, indicators.

### Introduction

New challenges require comprehensive training of computer sciences teachers for new digital technologies. Information and communication technologies lead to a new level of learning with the use of electronic educational resources. There are great opportunities for the qualitative assimilation of subjects through the use of EER (Cheung, 2019). Many teacher functions are transferred to electronic educational resources. EER becomes the main source of learning, the organiser of student's learning activities, monitors student's performance and growth dynamics. The problem of creating and using electronic educational resources in the educational process is considered in the studies of E.V. Artykbaeva (2010), N. Grijalva-Borja et al. (2020), J.Zh. Karbozova (2017), G.O. Kasymalieva and E.S. Seitalieva (2016), Sh.Kh. Kurmanalina (2002), etc. The works of N. Grijalva-Borja et al. (2020) and others (Grinshkun et al., 2011; Huang et al., 2020; Nipa et al., 2020) discuss the issues of technology for creating electronic publications at different educational levels. Researcher Zh.Zh. Karbozova (2017) studied the issues of preparing future teachers for the development of EER, but she emphasized the definition of pedagogical conditions for the design of EER, the search for features of competences that reflect the design process of EER. The works of I.V. Morozova (2014) investigate the issue of the methodology for the development of universal educational actions in the process of

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constructing EER within the framework of the formation of general cultural competences of future computer sciences teachers.

The purpose of the study is to develop a methodology for preparing future informatics teachers to create electronic educational resources and introduce it into the process of teaching in higher education institutions. Achievement of this goal implies the implementation of the following tasks: to develop indicators of the readiness of future teachers to develop an ESM; to conduct an experimental study to determine the suitability of the proposed methodology.

## Methods

Research materials, books, publications, theses, and electronic resources served as materials for research on the issue of preparing future computer sciences teachers for the creation of EER. In this study, the process of forming the aptitude of future teachers to develop and use electronic educational resources in the educational process is designated as the object of study, while the process of developing a methodology for the formation of the said aptitude of future computer sciences teachers to develop electronic educational resources constituted the subject of research. In the study, the following general scientific methods were used: logical-historical method, pedagogical observation, analysis, synthesis, systematisation and generalisation, methods of pedagogical experiment, methods of mathematical statistics.

In the 2016/17 academic year, before the experiment, conversations were held with students and teachers who took part in the experiment, they were explained the goals and objectives of the experiment. Prior to the experiment, preliminary diagnostics of the aptitude of future computer sciences teachers to compile EER was performed with the use of questions, practical works, and surveys. Diagnostics showed that the aptitude of the experimental and control groups at large is low, the starting aptitude of the groups is identical. According to the proposed methodology, the formation of aptitude was performed according to the selected components: motivationally purposeful, informative, activity, and evaluative-reflective. To form *the motivationally purposeful component* of training future teachers, the following work was performed.

To form *the informative component* of the training of future computer sciences teachers in the development of EER, a discussion was held on the content of the course “Development of Electronic Educational Resources”. Future teachers were explained the knowledge and skills that future teachers should have, as well as the experience with skills during the study of this course. The reasoning was provided that the future computer sciences teacher, as a result of studying this course, must know the role, purpose, types, and structures of the EER in computer sciences; EER development requirements. Teachers must be capable of using information and communication technologies to create EER, use the software and capabilities of the Internet to

design the structural blocks of EER, analyse existing EERs and evaluate their quality. All this should lead them to mastering the experience of creating an EER in computer sciences, analysis, and examination of existing EER. Modern forms and teaching methods were applied in the implementation of *the technological component*. To study the course, an electronic textbook was created with the use of SunRav BookEditor package. Students analysed the capabilities of existing EER in computer sciences that are posted at the educational portals of universities and the websites of educational centres. Students learned how to create presentation packages for organising training sessions: training presentations, interactive posters, exercise machines, and computer tests. To design fragments of audio and video materials, students solved examples with the use of Adobe Primer Pro and 3D Studio MAX programs. Thanks to such technical support, students received an excellent opportunity to demonstrate their presentations, conduct trainings and seminars (Bodnar, 2021).

## Results

In the study of the essence of EER, the investigation of their structure is of the greatest interest. It is useful to know what components do electronic educational resources comprise and how many elements are offered by researchers. For this, the works of V.V. Grinshkun (2011), G.V. Ivshin, A. Abuloum et al. (2019) and others were analysed. Analysis showed that researchers offer various components and in this they proceed from their subject matter. Russian researcher G.V. Ivshina (2008) identifies the following components of an electronic educational resource:

- A. Didactic component (material content, interactive teaching methods and techniques, multimedia tools).
- B. Information technology component (information and communication technology to represent the content of the EER).
- C. Regulatory component (compliance with regulatory documents, the requirements of the educational process, state standard).

Specialists in the development and use of electronic learning tools W. Huang (2020) propose two components of EER (Allred and Murphy, 2019; Shterenberg et al., 2015):

1. The content part includes a curriculum, structured study texts, illustrative materials, literature, a glossary, complementary materials, guidelines for studying the course and organising independent work (Kaldybaev, 2007).
2. The technological part includes the provision of support for practical and laboratory classes, evaluation of learning outcomes, reference material for teachers and students.

As is evident from the analysis of the work, the researchers offer a different number of constituent components of the EER. The authors believe that the proposed blocks should be filled with the corresponding elements proposed in the works of G.V. Ivshina (2008) and M.S.



Nikabadi and A. Sepehrnia (2019). This, in authors` opinion, ensures the completeness and quality of the presentation of materials. Furthermore, it should be noted that technological components and information tools should appear in all EER units.

The methodology is defined as a kind of ready-made “recipe”, algorithm, the procedure for carrying out any targeted actions. With regard to education, in this case, the methodology is characterised as a description of specific techniques, methods, means of pedagogical activity in individual educational processes. Therefore, the methodology of preparing future computer sciences teachers to create electronic educational resources, on the one hand, provides an algorithm, techniques, and methods of activity that computer science teachers should have. With regard to the education system, training constitutes part of the learning and education process. Training can also be understood in a broad meaning – as the process of obtaining a profession, a specialty that covers the entire training cycle (Osmond-Johnson and Campbell, 2018). Preparation is also understood in the narrow meaning, this is the process of the student completing assignments in various subjects in the form of homework. This may be a review, or preparation for the next classes, etc.

The study developed indicators of the willingness of future teachers to develop EER. Indicators of the formation of theoretical knowledge are knowledge of the purpose and effectiveness of EER, the capabilities of software for creating EER, knowledge of the content of the subject on which EER is created. Experience indicators may include: the ability to analyse the structures of existing EERs, the ability to work with software for creating EERs, and the experience of creating a pedagogical situation for creating EERs. The following indicators may motivate future teachers to develop EER: desire and aspiration to create EER, awareness of the necessity of creating EER, awareness of the new role of teachers in the development of EER. Determination of the criteria and readiness indicators of future computer sciences teachers allowed to determine their levels of readiness for the development of electronic educational resources (Aizstrauts et al., 2013).

*Low level* is typical for future teachers who have little knowledge of the purpose and effectiveness of EER; poor understanding of software capabilities for creating EER; they have no desire to create an EER; they are insufficiently motivated to design EER; they are insufficiently able to offer the right program for the development of EER; insufficient insight into the role of teachers in developing EER. *Average level* of aptitude describes an understanding of the need for EER preparation and awareness of the role of the teacher; they know the purpose and capabilities of programs for creating EER in computer sciences; they have a desire to create an EER and can offer the correct program; but they do not always have the need to develop an EER. *High level* of aptitude for future teachers to develop electronic educational resources is inherent in those who are highly motivated to develop EER; they know

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the subject of computer sciences at a fairly high level; quickly navigate in software analysis; can independently develop an EER in computer sciences; have sufficient insight into the role of teachers in the design and use of EER.

## Discussion

In the study of the works of researchers, several groups of authors who described the essence of EER were identified. The first group of researchers represented by L.Kh. Zainutdinova (1999), A. Abuloum et al. (2019), A.V. Osin (2018) and others believe that electronic educational resources constitute educational materials that are reproduced through electronic devices (Rahdari et al., 2020). By this, the authors mean the types of training materials – these are educational videos and sound recordings, electronic textbooks (Kaldybaev and Ongarbaeva, 2016). For reproduction, a tape recorder, CD player, or computer is used. The second group of researchers (V.V. Grinshkun, E.V. Chernobay and others) tend to understand the meaning of EER more broadly, as an electronic publication that contains systematised material on the corresponding discipline. EER implements the didactic capabilities of information and communication technology in all parts of the learning process: presentation of the content of educational material; assurance of creative and vigorous activity on mastering knowledge, abilities, and skills by students; feedback, monitoring of students' activities (Suzdaltseva and Chernobay, 2012). Third authors suggest understanding the meaning of EER as a learning tool. For example, D.V. Chernilevsky (2002) notes that EER constitutes educational software that reflects a specific subject area, the technology of its study is implemented to a certain degree, and the conditions for the implementation of various types of educational activities are provided for. A similar meaning is proposed by the Russian researcher O.N. Belaya (2018). In her opinion, EER is a learning tool created with the use of computer information technologies. As Zh.Zh. Karbozova (2017) notes, electronic educational resources should be understood as educational software that contains systematic material of a specific subject area, providing students with creative and active mastery of knowledge, skills in this area. In recent years, attempts have been made to present an electronic educational resource as a pedagogical tool, reflecting an integrated approach to education and training and allowing to isolate both the main elements of the content and the interrelation between academic subjects (Kurmanalina, 2002).

The authors understand aptitude as a state or a feature, which means the individual's ability to mobilise resources for the implementation of the intended activity. The most important components of future teachers' readiness for the development of EER include: knowledge, experience, and motivation. Indicators of knowledge features are knowledge of the purposes and effectiveness of EER in the educational process; knowledge of the capabilities and

differences of software for creating EER; knowledge of the content on the subject for which the EER is created. Indicators of the formation of experience in the development of EER can include: analysis of the structure of existing EER; comparative analysis between different EERs and assessment of effectiveness; ability to work with software for creating EER; creating a pedagogical situation for developing an EER. Indicators of future teachers' motivation to develop EER can include: desire and aspiration to develop EER; awareness of the need to create an EER; awareness of the new role of teachers in the development of EER. The conducted experimental work proved the feasibility of the methodology of forming the preparedness of future teachers for the development of EER. The development and use of a special course on the development of EER in the educational process of higher education institutions, independent work on the development of EER on a specific subject allowed to form the aptitude of future computer sciences teachers to develop EER.

## Conclusions

The results of the study on the development of the main provisions on the formation of readiness of future computer sciences teachers for the development and use of EER led to the following conclusions. The study allows to argue that it is possible to successfully shape the aptitude of future teachers to develop electronic educational resources in the educational process of higher education institutions. It is necessary to include a special course on the development of EER as a higher education component in the structure of the training of future computer sciences teachers. The methodology of preparing future computer sciences teachers to create electronic educational resources, on the one hand, provides an algorithm, techniques, and methods of activity for future computer sciences teachers. On the other hand, special emphasis is placed on the independence of the actions of future teachers so that they learn how to independently develop and apply EER of various levels and types. Based on studies to determine the components of the learning process, the components of the methodological system, the authors believe that the methodology for preparing future computer sciences teachers for the development of EER can also be defined as a combination of interconnected and interdependent components: motivationally purposeful; informative; active; evaluativereflective. In authors` opinion, this study does not completely solve the problem of developing and using EER in training.

## References:

1. Mirziyoyev Sh. M. Together we will build a free and prosperous, democratic state of Uzbekistan. Speech at the joint session of the chambers of the Oliy Majlis dedicated to the inauguration of the President of the Republic of Uzbekistan / Sh.M. Mirziyoyev. - Tashkent: Uzbekistan, 2016. - 56 p.



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2. Aripov MM, Haydarov A. Fundamentals of computer science. Textbook - T.: Teacher, 2002. - 432 p.
3. Informatics and information technologies. Electronic multimedia textbook. For professional colleges and academic lyceums. - Tashkent: Institute for the Development of Secondary Special and Vocational Education. 2003.
4. Kayumova N.A. Forming research activities for a future computer science teacher. // Physics, mathematics and computer science. –Tashkent, -2018. -№5. - B. 3-9 b.
5. Kayumova N.A. The conditions of the information-educational system of education and the training of teachers in the field of information and communication technologies. Monograph. T.: “Science and technology”, 2015. -192 p.