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A MODEL FOR DIAGNOSING THE FORMATION OF TEACHER READINESS IN PRIMARY SCHOOL

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Abstract

The issues of preparing future teachers for working in primary schools in the context of digital transformation in education cannot be addressed without an adequate model for diagnosing this readiness. Therefore, there is an interest in creating a technologically advanced and user-friendly diagnostic method for assessing the readiness of primary school teachers using automated and intelligent tools. The aim of this study is to justify a model for diagnosing the readiness of future teachers to work in primary schools based on the question-criteria approach. The pyramid method (Barbara Minto) is convenient for constructing the substantive elements of the criteria model, as it allows for the selection of necessary diagnostic components and criteria based on a question tree. To develop the model for diagnosing teachers' readiness to foster digital literacy in children, a question tree with three main directions was created. Thus, the proposed method enables the assessment of teachers' readiness level to develop digital literacy in primary school students.

Keywords: digital literacy, primary school teacher readiness, digital literacy diagnostic model, criteria tree.

Аңдатпа

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БАСТАУЫШ МЕКТЕПТЕ МҰҒАЛІМНІҢ ДАЙЫНДЫҒЫН ҚАЛЫПТАСТЫРУДЫ ДИАГНОСТИКАЛАУ МОДЕЛІ

Білім берудің цифрлық трансформациясы жағдайында болашақ мұғалімнің бастауыш мектепте жұмыс істеуге дайындығын қалыптастыру мәселелерін осы дайындықты диагностикалаудың лайықты моделінсіз шешу мүмкін емес. Негізінен мұғалімнің кәсіби дайындығын бағалау бойынша іс-шаралар сараптамалық, тәжірибеде іске асыру қиын тәсілдермен жүргізіледі. Осыған байланысты автоматтандырылған және интеллектуалды құралдарды қолдана отырып, бастауыш сынып мұғалімінің дайындығын диагностикалаудың технологиялық және ыңғайлы әдісін құру қызығушылық тудырады. Жұмыстың мақсаты – критериалды-сұрақ әдісі негізінде болашақ мұғалімнің бастауыш мектепте жұмыс істеуге дайындығын диагностикалау моделін негіздеу. Дайындықтың критериалды моделінің мазмұнды элементтерін құру үшін пирамида әдісін (Барбара Минто) қолдану ыңғайлы, бұл сұрақ ағашының негізінде қажетті диагноз қойылған компоненттер мен критерийлерді таңдауға мүмкіндік береді. Мұғалімнің цифрлық сауаттылықты қалыптастыруға дайындығын диагностикалау моделін қалыптастыру үшін үш негізгі бағыты бар сұрақ ағашы жасалды. Осылайша, ұсынылған әдіс мұғалімнің бастауыш сынып оқушыларының цифрлық сауаттылығын қалыптастыруға дайындық деңгейін бағалауға мүмкіндік береді.

Түйін сөздер: цифрлық сауаттылық, бастауыш сынып мұғалімінің дайындығы, цифрлық сауаттылық диагностикасының моделі, критерийлер ағашы.

Аннотация

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МОДЕЛЬ ДИАГНОСТИКИ ФОРМИРОВАНИЯ ГОТОВНОСТИ УЧИТЕЛЯ НАЧАЛЬНОЙ ШКОЛЫ

Вопросы формирования готовности будущего учителя к работе в начальной школе в условиях цифровой трансформации образования не могут быть решены без адекватной модели диагностики этой готовности. В основном мероприятия по оценке профессиональной готовности учителя проводятся экспертными, труднореализуемыми на практике способами. В этой связи представляет интерес создание технологичного и удобного метода диагностики готовности учителя начальной школы с использованием автоматизированных и интеллектуальных средств. Цель работы – обоснование модели диагностики готовности будущего учителя к работе в начальной школе на основе вопросно-критериального способа. Для построения содержательных

элементов критериальной модели готовности удобно использовать метод пирамиды (Барбары Минто), позволяющей на основе вопросного дерева отбирать необходимые диагностируемые компоненты и критерии.

Для формирования модели диагностики готовности учителя к формированию цифровой грамотности у детей было разработано вопросное дерево с тремя основными направлениями. Таким образом, предложенный метод позволяет оценивать уровень готовности учителя к формированию цифровой грамотности учеников начальной школы.

Ключевые слова: цифровая грамотность, готовность учителя начальной школы, модель диагностики цифровой грамотности, дерево критериев.

Introduction

Currently, the key task of education is the formation of computer literacy of students, which provides a person with the successful use of a computer in future professional activities and a full life in the information society.

The formation of computer literacy of trainees is a complex, multifaceted process that requires consideration of various factors. It is obvious that the formation of computer literacy should begin with the initial stage of primary school. This is evidenced by a large number of studies [1, 2]. The need for purposeful formation of computer literacy of elementary school students determines the scientific and methodological problem of substantiating the necessary and sufficient pedagogical conditions and creating scientific and didactic support for this process.

The main role in solving this problem undoubtedly belongs to the primary school teacher. The issues of formation of the future teacher's readiness to work in primary school in the conditions of digital transformation of education cannot be solved without an adequate model for diagnosing this readiness. Unfortunately, such models are unsystematic and subjective in nature. Basically, measures to assess the teacher's professional readiness are carried out in expert, difficult-to-implement ways in practice. In this regard, it is of interest to create a technological and convenient method for diagnosing the readiness of primary school teachers to form digital literacy of students [3, 4].

The purpose of the work is to substantiate and develop a model for diagnosing the readiness of a future teacher to work in primary school on the formation of digital literacy of students based on a criterion tree.

To implement programs within the framework of the updated content of education, it is not enough to provide teachers with knowledge, skills and contribute to changing their opinions, for this purpose a special unified system should be formed in educational institutions.

We must look for answers to these questions: "How do teachers prepare students for the 21st century?" and "How to lead students to success in the XXI century?". To do this, we need to be supported by information about "how to teach students?".

The concept of literacy is closely related to the teaching of students at the level of primary general education. The concept of literacy both in our country and abroad has developed in accordance with the needs of the time, expanding with the growing demands of society for the development of an individual – from the simplest skills, such as reading, writing, counting, to the possession of a minimum of socially necessary knowledge and skills (functional literacy). With the development of the concept, terms derived from it began to appear, including "digital literacy".

Being literate in the modern world means having skills that include fairly detailed tasks, such as copying and pasting digital content, and more complex work, such as critical analysis and synthesis of information accessed through various texts. Digital literacy considers the full range of skills needed for reading, writing, speaking, viewing and participating in online spaces. All these practices require media literacy, which includes the ability to access, analyze, evaluate, create and participate with the media in all its forms. So, if the practice of reading books and communicating is needed to improve language literacy, then the practice of using gadgets, computers, as well as the capabilities of the digital environment is needed to develop digital literacy [5].

The main advantage of digital literacy, according to the author, is that it contributes to successful learning. It is easier and faster for students with digital literacy to access the necessary data compared to those who use only traditional paper media.

During the coronavirus pandemic, the situation that arose forced teachers to really start developing digital competencies, mastering digital literacy. Online learning has created conditions for the continuity of the educational process. At that time, it was difficult to assess the role of digitalization, for example, when Internet access was restricted to residents due to mass riots in the country, it was like a drag. Most people were at home without access to information. We couldn't do anything: we couldn't work, pay for services, buy groceries, etc. We were addicted to the Internet.

Digitalization has certainly simplified and improved life, but it was only at this moment that we truly realized how globally it is integrated into our lives, and there will be no other way, technology and digitalization will only increase their potential.

The basis of the digital culture of the individual is digital literacy and it is necessary to form it with the beginning of systematic education at school. Let's look at the definition of the concept and the meaning of its formation in primary school age. Various concepts defining digital literacy and related constructions are presented in the literature [for example, information literacy, Internet and communication technology (ICT) literacy, multimedia literacy, 21st century skills] (Alexander, The Disciplined Reading, & Learning Research, 2012; Bawden, 2008; Spante, 2018; Stordy, 2015, et al.), combining various definitions, suggests that digital literacy arises at the intersection of technical, cognitive and socio-emotional competencies of students. The technical aspect of digital literacy includes "the technical and operational skills of students in the use of ICT for learning and in everyday activities." The cognitive aspect includes the skills students need to find, evaluate and create digital information, as well as the ability of students to critically analyze this information [6, 7]. Finally, the socio-emotional aspect of digital literacy requires that students can use ICT for responsible communication, collaboration and other social learning-related purposes (Alexander, 2012; Bawden et al., 2008; Spante et al., 2018; Stordi, 2015).

According to the Order of the Minister of Education and Science of the Republic of Kazakhstan dated November 27, 2020 No. 496, the subject "Information and Communication Technologies" was changed to "Digital literacy" for grades 1-4 in accordance with the updated content (Standard Program, 2021).

The purpose of studying the subject "Digital Literacy" is to provide students with basic knowledge, skills and abilities in computer design, presentation and processing of information, working on the Internet, computational thinking, robotics for the effective use of modern information technologies in practice. The amount of study load: in the 1st grade is 0.5 hours per week (17 hours), from grades 2-4 1 hour per week (34 hours) during the school year [8].

The basic content of the subject "Digital literacy" includes 4 sections: "Computer", "Working on the Internet", "Computational thinking", "Robotics". An analysis of the standard curriculum for the academic subject "Information and Communication Technologies" for grades 1-4 of primary education in accordance with the updated content showed that there are no changes in the content, only the name of the subject has changed (Standard Program, 2021) [9].

Previously, the subject "Information and Communication technologies" was taught by a teacher with a bachelor's degree in the specialty "Computer Science Teacher", who has a secondary professional (computer science teacher in elementary school) or higher education. However, in Kazakhstan, more than 56% of schools are small, which lack staff with special education, respectively, this discipline is taught by a primary school teacher. Within the framework of educational programs, the future teacher, of course, is trained in mastering information technology (a mandatory component of 5 credits). However, it is necessary to clearly distinguish the concepts: to have basic digital literacy and to know the methodology of teaching it to younger schoolchildren.

Methodology

The rapid development of scientific, technical and socio-economic spheres of society determines the informatization of education, which is aimed at introducing information tools, technologies, electronic educational resources and network services into educational institutions. This consists in the introduction of an information and educational environment as a place to place educational materials. A large number of studies in the field of didactics and methods of using information and communication technologies in teaching consider the issues of informatization of education and the introduction of computer technologies into the educational process. At the same time, the emphasis is on the possible didactic potential of information and communication tools, and not on the needs of the development of the entire educational process as a whole. Based on the works of A.P. Ershov, A.V. Kuznetsov, I.V. Roberta, by the informatization of the educational process in primary school, we mean the introduction of information tools and products into educational institutions, as well as pedagogical technologies based on these tools. This leads to the active introduction of the information and educational environment (hereinafter referred to as IOS) into the field of primary general education as a system of resources and tools designed to transmit educational and organizational information. The use of IOS fully assumes that teachers have a certain readiness for activity, which consists in solving professional tasks of readiness for the formation of digital literacy of students in primary schools [10].

Before determining the conditions for ensuring the process of preparing future primary school teachers for the readiness to form digital literacy of students in primary school, it became necessary to diagnose the readiness of students for this activity.

The formation of computer literacy of younger schoolchildren depends on their psychological and age characteristics. Activation of cognitive activity of students should not only ensure the successful assimilation of educational material, but also contribute to the mental development of the child.

In our study, we define the following measures of readiness of primary school teachers: the level of the cognitive component (CC); the level of the activity component (AC); the level of the professional component (PC).

To determine the elements of the structure of the levels of readiness of primary school teachers, we will use the method of the pyramid of B. Minto. As a result, we get a hierarchical tree of questions, leading us to the description of criteria and diagnostic methods (Fig. 1.) [11].

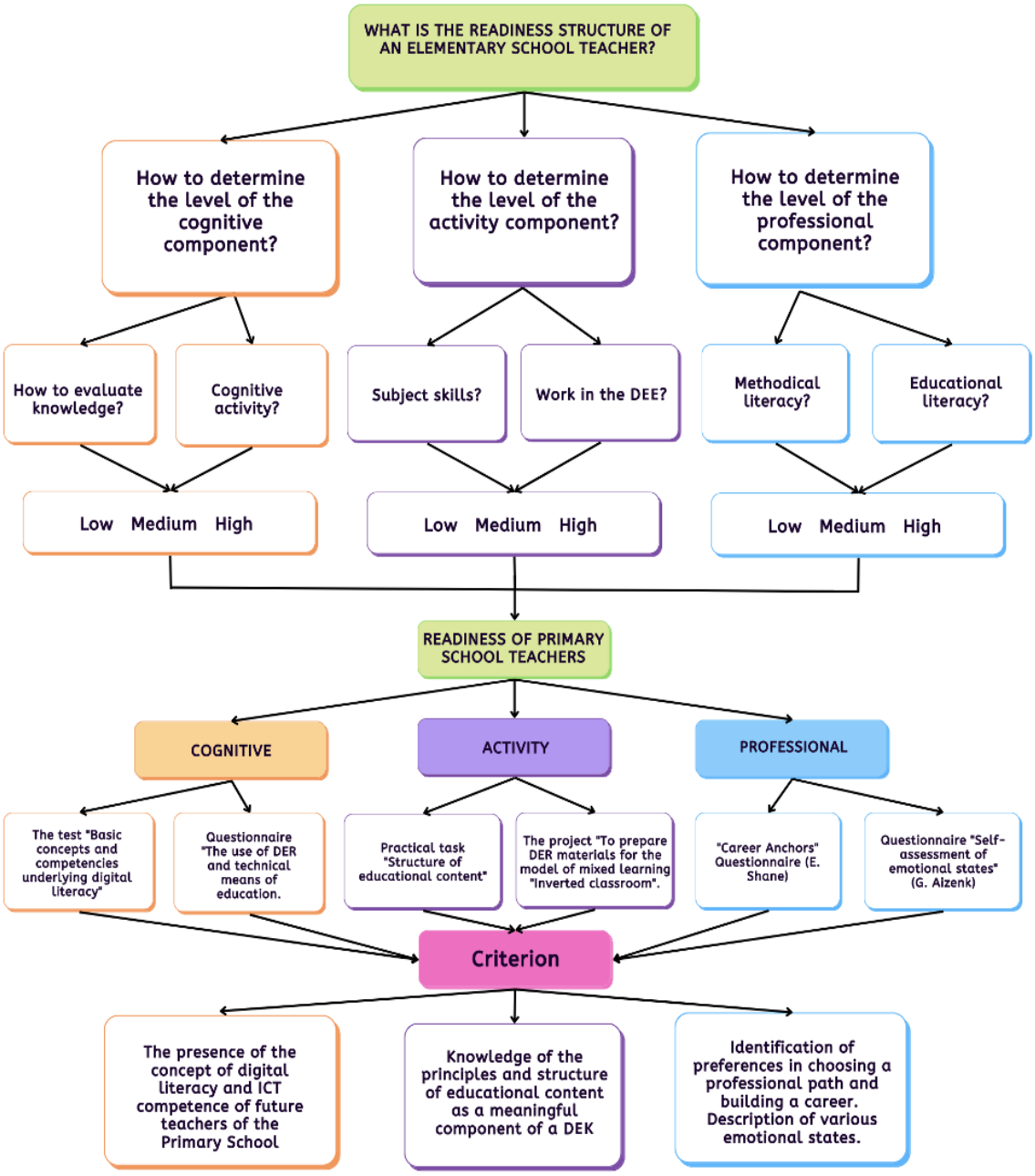

Figure 1. Primary School teacher readiness model

Each meter has its own sublevels, which are determined depending on the number of correctly completed test tasks. When performing the full number of test tasks / questions (100%), indicator 3 is determined; 80% – indicator 2; 60-80% – indicator 1 (Table 1).

Table 1 - The ratio of meter indicators to the level of readiness components

№	Component			Levels	Description of levels
	AC	PC	CC		
1	1	1	1	LOW	Knowledge about the concept of digital literacy and ICT competence is characterized by the level of conscious perception and memory. Skills are not characterized by independence in solving typical pedagogical tasks in a computer-based learning environment. Indicator: 60-80%
2	1	2	1		
3	1	3	1		
4	2	1	1		
5	2	2	1		
6	2	3	1		
7	3	1	1		
8	3	2	1		
9	1	1	2		
10	1	2	2	MEDIUM	Knowledge about the concept of digital literacy and ICT competence is deep, not systematized, not generalized and value-unconscious. Skills are characterized by independence in solving typical pedagogical tasks in a computer learning environment. Possession of critical thinking skills in order to obtain, evaluate and use information based on ICT and present it in a new form to solve tasks in a computer learning environment. Indicator: 80%
11	2	1	2		
12	3	3	1		
13	1	1	3		
14	1	2	3		
15	1	3	2		
16	1	3	3		
17	2	2	2		
18	2	3	2		
19	2	1	3		
20	3	1	2		
21	3	1	3		
22	3	2	2	HIGH	Knowledge about the concept of digital literacy and ICT competence is deeply systematized conscious value. Skills are characterized by creative solution of pedagogical tasks in a computer learning environment The desire and desire for continuous self-education, self-improvement and regular professional development in the field of digital literacy. Indicator: 100%
23	3	3	2		
24	2	2	3		
25	2	3	3		
26	3	2	3		
27	3	3	3		

Let's reflect on the numerical line the numbered ranges of the readiness component levels, which we determine by the identified indicators, considering the dominant aspects: range 1-9 refers to the low level of readiness components, range 10-21 determines the average level of readiness components, numerical range 22-27 is an indicator of the high quality of the readiness component of an elementary school teacher (Fig 2).

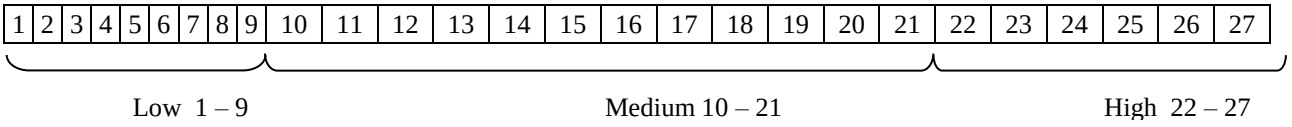

Figure 2. Numerical line of the number indicator of the readiness component

In Table 2, we present the ratio of the number indicator with the essence of the thesaurus (a) of a specialist in the field of digital literacy in terms of indicators of its meters: the upper index is the CC indicator, the lower is the AC and PC indicator.

Table 2 - Numerical Indicators and Thesaurus Alignment with Measurement Criteria for a Specialist

Low level Readiness components	*Average level Readiness components*	*High level Readiness components*
1-$a^{1}_{1.1}$ *2-$a^{1}_{1.2}$* *3-$a^{1}_{1.3}$* *4-$a^{1}_{2.1}$* *5-$a^{1}_{2.2}$* *6-$a^{1}_{2.3}$* *7-$a^{1}_{3.1}$* *8-$a^{1}_{3.2}$* *9-$a^{2}_{1.1}$*	*10-$a^{2}_{1.2}$* *11-$a^{2}_{2.1}$* *12-$a^{1}_{3.3}$* *13-$a^{3}_{1.1}$* *14-$a^{3}_{1.2}$* *15-$a^{2}_{1.3}$* *16-$a^{3}_{1.3}$* *17-$a^{2}_{2.2}$* *18-$a^{2}_{2.3}$* *19-$a^{3}_{2.1}$* *20-$a^{2}_{3.1}$* *21-$a^{3}_{3.1}$*	*22-$a^{2}_{3.2}$* *23-$a^{2}_{3.3}$* *24-$a^{3}_{2.2}$* *25-$a^{3}_{2.3}$* *26-$a^{3}_{3.2}$* *27-$a^{3}_{3.3}$*

For example, $\mathbf{a^{2}_{1\ .3}}$ **–** high index (CC = 2) with insufficient thesaurus volume (DC = 1) and average depth of thesaurus links (PC = 3). The number in the three-dimensional matrix is 15, therefore, defined by **average level of readiness components** with existing deficits in the knowledge component.

The developed diagnostic model of teacher readiness can be represented as a three-dimensional matrix of 27 numbered elements (sectors in the form of a cube) (Fig. 3a, b).

a) b)

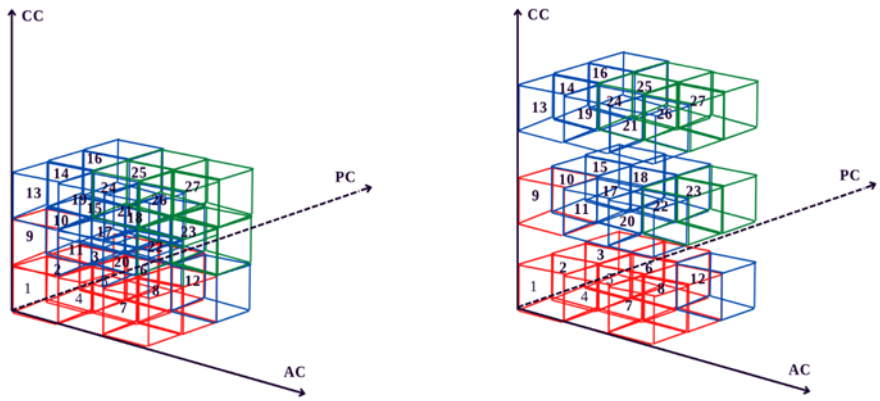

Figure 3 (a) – a cube in its entirety;
Figure 3 (b) - a cube in section three-dimensional model readiness diagnostics

The presented model has a color semantic content, which contributes to the visualization of the results: green sector – high level of readiness components; blue – medium level; red sector – low. Moreover, it should be noted that the colors are distributed according to the quality of the readiness components and have a distributed appearance.

Results

In order to implement the constructed criterion model for diagnosing the readiness of primary school teachers for the formation of students' digital literacy, it was necessary to create diagnostic tools. It includes questionnaires, tests, practical tasks, projects and questionnaires.

The cognitive component of readiness is measured using the questionnaire "The use of DEE and technical means of education" and the test "Basic concepts and competencies underlying digital literacy".

When implementing the questionnaire method, author's developments were used, the reliability of the results of which was ensured by special indirect questions included in the questionnaire and by comparing these results with observation data, generalization of independent characteristics, etc. The test method was used to identify knowledge directly related to the basic concepts of electronic, distance and blended learning, since educational content is one of the ways of transmitting educational information within these types of

training. Basically, this method was used to determine the level of formation of the cognitive component of the activity component and the professional component, since they are indicators of the potential of students that they can be used for the readiness of digital literacy formations.

The activity component can be evaluated on the basis of completed practical tasks "Structure of educational content" and project work. An example of such tasks may be as follows:

Usually educational content consists of the following components:

1. Goals and objectives: specifying what the learner should aim to achieve
2. Theoretical material: basic concepts, theory, justification, laws, facts that are necessary for understanding the subject.
3. Practical tasks: random tasks and applications that apply theoretical material in practice.
4. Interactive elements: opportunities for students to interact with content, for example, tests, quizzes, simulators, etc.
5. Multimedia: inclusion of various elements in educational content, such as video tutorials, audio materials, graphic images, etc.
6. Self-assessment: an opportunity for students to assess their progress and progress in learning, for example, through testing or evaluation of their work.
7. Resources: a list of resources and additional literature that can be used for additional study of the subject.
8. Assessment: a procedure for assessing students' knowledge, which can be carried out using various formats, for example, tests, essays, projects, etc.

In general, the structure of educational content should be organized in such a way as to help students achieve their educational goals and maximize their learning potential.

As a project work, the topics "To prepare materials for the mixed learning model "Inverted classroom" are proposed.

The material for the analysis of the products of activity served as practical tasks that allow you to track the level of readiness for the design of educational content.

The testing of the constructed model was carried out within the framework of future teachers (students) of computer science (2022-2023 academic years) in the "NAO EKU named after S.Amanzholov" at the Department of Computer Modeling and Information Technology. The total number of students is 83 people. Results of the diagnosis of the readiness formation of future elementary school teachers:

Entrance control:

- Percentage of students in the low-level range of readiness components: 23 out of 83 (27.7%);
- Percentage of students in the medium-level range of readiness components: 52 out of 83 (62.7%);
- Percentage of students in the high-level range of readiness components: 8 out of 83 (9.6%).

Final control:

- Percentage of students in the low-level range of readiness components: 6 out of 83 (7.2%);
- Percentage of students in the medium-level range of readiness components: 59 out of 83 (71.1%);
- Percentage of students in the high-level range of readiness components: 18 out of 83 (21.7%).

From the presented results, it is evident that the entrance control showed that the majority of students are in the medium-level range of readiness components, while only a small percentage of students reached the low and high-levels.

In the final control, progress is observed as the percentage of students in the high-level range of readiness components increased, and the percentage of students in the low-level range decreased. The majority of students still fall within the medium-level range of readiness components, but their number has also increased.

These results indicate that students overall demonstrated progress and reached medium and high-levels of readiness, but there are still some deficiencies in knowledge and skills that require further improvement and education.

The overall diagnosis of the readiness of elementary school teachers allows for an assessment of the current level of student readiness and identifies areas where additional training and support are needed to achieve higher levels of readiness components.

A number of studies focus on developing models and methods for diagnosing teachers' readiness to foster digital literacy in primary school students. They propose various criteria and tools to assess teachers' competencies and readiness levels in the field of digital literacy. Some studies pay attention to specific components of teachers' readiness, such as cognitive, pedagogical, and technological aspects.

Other studies concentrate on examining the effectiveness of different educational approaches and programs for developing digital literacy in teachers and students at the primary school level. They analyze which methods and strategies enable more effective development of students' digital literacy and the role that teachers play in this process.

Thus, the overall research efforts in the field of teacher readiness and students' digital literacy in primary school are active and multifaceted.

Research on teachers' readiness to foster digital literacy in primary school offers a wide range of perspectives and opportunities for further investigation. Some of these perspectives include:

Expansion of the research scope: Further research can involve a broader range of teachers and different learning contexts. Studies can be conducted not only in primary school but also in other educational levels to understand how teachers' readiness to foster digital literacy varies across different educational environments.

Development and adaptation of tools and methodologies: Research can be directed towards developing and adapting more precise and reliable tools and diagnostic methodologies for assessing teachers' readiness. This will help in accurately evaluating teachers' competencies and needs in the field of digital literacy.

Examination of the effectiveness of educational approaches: Research can be conducted to assess the effectiveness of different educational approaches, programs, and interventions for developing teachers' readiness to foster students' digital literacy. This will help determine the most effective methods and strategies for achieving desired outcomes.

Investigation of the link between teachers' readiness and students' achievements: Research can explore the relationship between teachers' readiness to foster digital literacy and students' academic achievements. This will evaluate the extent to which effective development of teachers' digital literacy impacts student learning and achievements.

Study of factors influencing teachers' readiness: Various factors such as professional preparation, work experience, attitudes towards technology, and others can be studied to understand their influence on teachers' readiness to foster digital literacy. This will provide a better understanding of the factors that need to be considered in developing teacher readiness enhancement programs.

Overall, the prospects for research in the field of teachers' readiness to foster students' digital literacy in primary school are extensive. Further research will contribute to improving educational practices and policies and facilitate effective development of students' digital literacy.

Conclusion

The criterion model proposed in the paper makes it possible to assess the level of readiness of a teacher for the formation of primary school students' DL. To construct the meaningful elements of the readiness model, the pyramid method (Barbara Minto) was used, which made it possible to select the necessary diagnostic components and criteria based on the question tree. The question tree contains three main directions (cognitive, activity, professional). Criteria were formulated for each question of the tree and their indicators were determined, represented as an information vector (x_1,...,x_n). Suitable test and evaluation materials were selected to calculate the values of these indicators. By scaling the integral values of information vectors for each subject, you can enter a scale for assessing its level of readiness. Diagnostic sheets have been created to collect data, which are filled out based on the results of tests, questionnaires and project work of future teachers. A three-dimensional level scale based on the integral values of information vectors allows you to determine the degree of desired readiness of each student. The color coloring of the diagnostic "three-dimensional cube" allows you to visualize the level of readiness of the teacher for the formation of the CG of elementary school students.

Thus, the paper proposes and substantiates a new method for diagnosing the level of readiness of an elementary school teacher for the formation of students' digital literacy.

References:

1 Абрамова, И.В. Необходимость введения основ компьютерной грамотности в начальной школе и в дошкольном образовательном учреждении / И.В. Абрамова // Символ науки. – 2018. – №1. – С. 10-13.,

2 Зотова, И.А. Формирование компьютерной грамотности младших школьников на уроках технологии в рамках реализации ФГОС НОО / И.А. Зотова // Вестник Бурятского государственного университета. Образование. Личность. Общество. – 2018. – №3. – С. 10-14.,

3 Кизелев, П.А. Компьютерная грамотность / П.А. Кизелев // Эпоха науки. – 2017. – №9. – С. 153-158.,

4 Мазаева, Ю.А. Содержание понятия «компьютерная грамотность» в научной литературе / Ю.А. Мазаева, О.К. Агавелян // Мир науки, культуры, образования. – 2012. – №4. – С. 198-200

5 Bawden D. Et al. Origins and concepts of digital literacy // Digital literacies: Concepts, policies and practices. – 2008. – Т. 30. – №. 2008. – С. 17-32.

6 Bekker T. Et al. Teaching children digital literacy through design-based learning with digital toolkits in schools // International Journal of Child-Computer Interaction. – 2015. – Т. 5. – С. 29-38.

7 Spante M. Et al. Digital competence and digital literacy in higher education research: Systematic review of concept use // Cogent Education. – 2018. – Т. 5. – №. 1. – С. 1519143.

8 Приказ Министерства образования и науки Республики Казахстан от 27 ноября 2020 года №496. https://adilet.zan.kz/rus/docs/V2000021688 (Дата обращения 12 декабря 2021 года)

9 Типовая учебная программа по учебному предмету «Информационно-коммуникационные технологии» для 1-4 классов уровня начального образования по обновленному содержанию (Дата обращения 13 ноября 2021 года)

10 Syzdykbayeva A., Baikulova A., Kerimbayeva R. Introduction of Artificial Intelligence as the Basis of Modern Online Education on the Example of Higher Education // 2021 IEEE International Conference on Smart Information Systems and Technologies (SIST). – IEEE, 2021. – С. 1-8.

11 Barbara Minto(1981). The Minto Pyramid Principle: Logic in Writing, Thinking and Problem Solving.

References:

1 Abramova, I.V.(2018). Neobhodimost' vvedenija osnov komp'juternoj gramotnosti v nachal'noj shkole i v doshkol'nom obrazovatel'nom uchrezhdenii [The need to introduce the basics of computer literacy in primary school and in preschool educational institutions] №1. – S. 10-13., (In Russian)

2 Zotova, I.A. (2018). Formirovanie komp'juternoj gramotnosti mladshih shkol'nikov na urokah tehnologii v ramkah realizacii FGOS NOO [Formation of computer literacy of younger schoolchildren in technology lessons within the framework of the implementation of the Federal State Educational Standard / Bulletin of the Buryat State University. Education. Personality. Society.] Vestnik Burjatskogo gosudarstvennogo universiteta. Obrazovanie. Lichnost'. Obshhestvo. №3. – S. 10-14., (In Russian)

3 Kizelev, P.A. (2017). Komp'juternaja gramotnost' [Computer literacy / The era of science.] Jepoha nauki. №9. – S. 153-158., (In Russian).

4 Mazaeva, Ju.A. (2012). Soderzhanie ponjatija «komp'juternaja gramotnost'» v nauchnoj literature [The content of the concept of "computer literacy" in scientific literature / The world of science, culture, education.] Mir nauki, kul'tury, obrazovanija. №4. – S. 198-200, (In Russian)

5 Bawden D. Et al. Origins and concepts of digital literacy // Digital literacies: Concepts, policies and practices. – 2008. – Т. 30. – №. 2008. – С. 17-32.

6 Bekker T. Et al. Teaching children digital literacy through design-based learning with digital toolkits in schools // International Journal of Child-Computer Interaction. – 2015. – Т. 5. – С. 29-38.

7 Spante M. Et al. Digital competence and digital literacy in higher education research: Systematic review of concept use // Cogent Education. – 2018. – Т. 5. – №. 1. – С. 1519143.

8 Prikaz Ministra obrazovanıa i nauki Respubliki Kazahstan (Order of the Minister of Education and Science of the Republic of Kazakhstan) ot 27 noıabrıa 2020 goda №496. https://adilet.zan.kz/rus/docs/V2000021688. [Data obraşenıa 12 dekabrıa 2021 goda] (In Russian)

9 Tipovaıa uchebnaıa programma po uchebnomu predmetu «Informatsionnokommunikatsionnye tehnologii» dlıa 1-4 klassov urovnıa nachalnogo obrazovanıa po obnovlennomu soderjaniiy (A standard curriculum on the subject "Information and communication technologies" for grades 1-4 of primary education according to the updated content) [Data obraşenıa 13 noiabrä 2021 goda] (In Russian)

10 Syzdykbayeva A., Baikulova A., Kerimbayeva R. Introduction of Artificial Intelligence as the Basis of Modern Online Education on the Example of Higher Education // 2021 IEEE International Conference on Smart Information Systems and Technologies (SIST). – IEEE, 2021. – С. 1-8.

12 Barbara Minto(1981). The Minto Pyramid Principle: Logic in Writing, Thinking and Problem Solving.