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Psychological and pedagogical conditions for the formation of digital literacy of students of the modern Kazakhstan schools

The article discusses the necessity to develop psychological and pedagogical conditions that ensure the success of the process of developing digital literacy among students in the context of digitalization of education. The formation of digital literacy is a comparatively new area of activity that is being applied in many countries of the world and is being actively researched, including Kazakhstan. Digital literacy of students in schools aims at providing effective interaction with digital services, includes the ability to work with any source of information, as well as with all types of information, is expressed in knowledge, skills and abilities that allow students to become active partakers in the socializing Internet environment cyberspace. The authors of the article suggest a classification of psychological and pedagogical conditions that ensure more effective formation of digital literacy of students in the context of digitalization of education in Kazakhstan. However, actual problems and perspectives of the formation of digital literacy is still a scope for further scientific research.

Keywords: digital competence, digitalization of education, psychological and pedagogical conditions, IT skills.

Introduction

The concept of digital literacy or competence is closely related to the concept of digitalization of education. An analysis of modern research in the field of digitalization of education shows that the stage of digitalization comes next after the computerization of education. In our country, the digitalization of education, first of all, should be carried out through the motivation and training of teachers for its effective use. The evaluation of academic success is almost always linked to educational activities based on the use of ICTs, and digital teaching methodology continue to be widely disseminated. Digital literacy as a set of knowledge and skills that are necessary for the safe and efficient use of digital technologies and Internet resources includes both digital consumption and digital competencies and digital security.

Digital literacy is a concept that unites important groups: computer and information skills. Information literacy is the ability to formulate information need, to request, search, select, evaluate and interpret information, in whatever form it is presented. The UNESCO Information for All Program (IFAP), based on international experience, has formulated "indicators for the development of the information society", defining digital literacy as an essential life skill [1]. Today, a new challenge for the effective shift to digital education and successful formation of digital literacy of schools' students is the provision of appropriate psychological and pedagogical conditions of teaching and learning. Psychological and pedagogical support together with psychological and pedagogical conditions of educational environments in the frames of digitalization of educations is a little-lit problem in the modern educational context of Kazakhstan, and this work aims to highlight this aspect in our study.

Materials and methods

A questionnaire for teachers was developed in the frame of the research in order to reveal teachers' ideas about effective psychological and pedagogical conditions for the formation of digital competence of elementary school students (grades 5–8). A google-questionnaire was created and a survey of pedagogic schools was conducted among schools in Astana (30 respondents) and schools in Karaganda (39 respondents). The presented sample can be considered representative, since it covers all categories and positions of teaching staff of schools implementing various educational programs — basic general education, in-depth study of subjects.

The developed questionnaire contains questions of closed, open and mixed type. The logic of questions in the questionnaire allowed:

- to determine the views of teachers about the key psychological problems of modern schoolchildren of different ages (students of 5–7th and 8-9th grades), studying in the conditions of digitalization of education;
- to reveal the opinion of teachers about the effectiveness of the created pedagogical conditions of the educational process in the frame of digitalization of education;
- to reveal the attitude of teachers to digital means of pedagogical and psychological support for schoolchildren.

The analysis of the results of the google poll was focused on the verification of the initial hypothesis of the study, which consisted in the assumption of the need to determine the psychological and pedagogical conditions for the effective formation of digital competence.

Psychological and pedagogical conditions as a key element of successful formation of digital literacy of students

The need for the formation of digital literacy in the territory of the Republic of Kazakhstan is due to the digitalization of domestic education, which involves the use of modern technologies and the creation of targeted and effective tools for the subjects of the educational environment: teachers, students, and their parents. The use of digital technologies is not limited only to the instrumental support of the educational process (Smartboard, multimedia projector, etc.), but is implemented through appliance of existing educational online tools and services into building digital personal educational environments for teachers and students with the construction of possible individual trajectories of the educational activity of the latter. In addition, it should be noted that modern educational programs involve the increase in time allotted for extracurricular activities, which means that the potential of digital tools and digital services increases, which allow organizing and providing a system of remote support, accompanying the activities of students and their parents, delivery and broadcasting of digital educational content, creating conditions for the formation of the competencies of a student of the XXI century, which is noted by such domestic and foreign authors as Barlybayev A.B. [2], Sharipbayev A.A. [3], Mukhametzyanov I.S. [4], Solovov A.V. [5], Zenkina S., Pankratova O. [6], Konovalova S.A., Kashina N.I. [7], Ţălu Ş. [8], Kalantzis M., Cope B. [9], Davidson P.L. [10], Mironenko [11], García-Tudela P. [12], and others.

Ideas in the field of e-learning in Kazakhstan, the development of digital educational content, the development of digital competencies of teachers in the aspect of designing their own digital resources, are reflected in the works of such domestic scientists as Nurgaliyeva G.K., Artykbayeva Ye.V. [13], Tazhigulova A.I. [14], Sarzhanova G.B., [15–17] and others.

The target indicators of the country's development are set by the Strategy “Kazakhstan-2050” [18] to ensure the development of innovative technologies and the modernization of education. However, the existing potential and real threats affect different spheres of the life of society and mankind. Among them are vulnerability from cyber threats, information attacks, low level of information and media literacy not only of children and youth, but also of the adult population, and, as a result, manipulation of public opinion and provocations. That is why it is necessary to provide the process of formation of digital literacy with effective pedagogical and psychological conditions for its effective implementation.

Pedagogical conditions represent a system of norms and rules, both general and special, taking into account the subject area of knowledge, and should include a content component of a complex of objects, processes or phenomena, on which other objects, processes or phenomena depend and which affects the result of the process formation of digital literacy of people of the third age. We agree with the Soviet and Russian teacher V.I. Andreev, who understands pedagogical conditions as “circumstances of the learning process, which are the result of purposeful selection, construction and application of elements of content, methods, and organizational forms of learning to achieve certain didactic goals” [19].

To ensure the process of formation of digital literacy among students, in the conditions of digitalization of education, we have defined the main **pedagogical conditions**:

• *diagnostic* (analysis of regulatory documents, identification of didactic features of students of basic general education, secondary general education, search for opportunities to implement the educational process in the conditions of updated content of education);

• *structuring* (creation of an accessible electronic informational educational environment for all levels of education; modular object-oriented dynamic learning environments, creation of structural elements of the learning process taking into account the specifics and direction of preparation);

• *content* (modeling and selection of content to ensure the effectiveness of digital literacy formation, support of this process with the necessary tools, methodical materials, handouts, printed teaching and methodical manuals, using cloud technologies and remote modular systems);

• *technological* (correspondence to forms and methods that ensure the process of formation of digital literacy);

• *evaluation-resultative* (making a creative atmosphere; approbation of empirical material to determine the level of formation of digital literacy among students, increasing motivation of students; all-round support of students to achieve positive results at various levels (regional, republican, etc.); optimization of existing programs and development of new resources in accordance with the needs, interests, individual capabilities of students).

Speaking of **psychological conditions**, it should be noted here that in the studies of many psychologists, a high correlation between the level of academic success of schoolchildren and the level of development of their cognitive sphere was revealed. The cognitive sphere, which is an integral part of the human cognitive domain, is a system of sensory-perceptual (sensation and perception), intellectual (thinking and speech), mnemonic (memory), attentional (attention) and imaginative (imagination) processes. In the psychological-pedagogical literature, the issues of the relationship between individual cognitive processes and the success of education in the conditions of a traditional school have been sufficiently considered. However, the digital environment has a number of specific features and contains many factors that have both a positive and a negative impact on the process and result of education, as well as on the development of the personality of the subjects of education. In order to fix the problems that arise in schoolchildren when learning in the conditions of digitalization, it is necessary to consider the features of functioning in the cognitive sphere of the processes of attention, memory, thinking, communicative processes, as well as the features of personality development in general [20, 21].

In the results of psychological and pedagogical studies, psychological problems of schoolchildren caused by the digitization of general education were revealed, which need to be emphasized, as this will allow creating the most comfortable learning environment for the successful formation of digital literacy:

● *Psychosomatic health in the digital environment* — the availability of digital technologies and Internet resources has a known side effect — more and more children, especially teenagers, become addicted users. Today, such expressions as “binge-watch”, “hyper-connected”, “extreme Internet users” appear. Adolescents who often use the Internet experience a feeling of loneliness and become victims of bullying. Unrestricted use of the Internet is a signal of their psychosomatic vulnerability and the need for support.

● *Information culture* is defined as a culture of interaction with information that forms the student's ability to navigate in the information environment. It creates the basis for the development of informational qualities of a person: informational literacy, informational thinking, informational behavior, and informational worldview.

● *Information security* — according to scientific literature, about 40% of children who regularly visit the Internet browse websites with aggressive and illegal content, are exposed to cyber-stalking and virtual harassment.

● *Professional self-determination in the digital environment* — professional self-determination is characterized by a personal preference for self-realization in the labor market, which greatly affects the quality of life and the feeling of self-worth. At the end of school, a student sometimes cannot decide between what he wants and what he needs due to the influence of individual and social needs. Therefore, he needs help in the vector of further development.

▪ *Personal and emotional problems* — it is necessary to take into account health risks brought by digitalization. Researchers have proven that digital addiction in school age can lead to the risk of developing other types of addiction: gaming, alcohol, and drug addiction. Insufficient motor activity leads to a delay in the development of the kinesthetic mechanism in the work of the brain, and as a result, it can lead to problems in the development of speech and thinking.

▪ *Communication and behavior* — for a teenager, immersion in the Internet is both an expansion of the circle of communication (and the opportunity to interact “as equals” and not only with peers), and instant communication regardless of the location of the interlocutor, and a kind of guarantee of what the teenager can do his place in society, self-realization, feeling significant for his reference group. But at the same time, this kind of communication creates problems and risks, for example, neglect of social norms and ethics due to certain anonymity of interaction, inability to conduct face-to-face or virtual dialogue.

▪ *Mastering the subject content* — the increasing importance of the problem of mastering the subject content is associated with the belief that by the 8th-9th grade, schoolchildren are more aware of the importance of education, while teenagers experience difficulties with competent time allocation and planning of their activities.

Thus, it can be concluded that the creation of conditions for solving the above-mentioned psychological problems guarantees the safe and effective integration of students into the digital educational environment. The success of this process directly depends on how the described conditions will be applied in practice. The directions of further research in this area are to improve the quality of the research process taking into account the correction of the proposed conditions in the conditions of the continuous educational process.

Research results and conclusions

Let us consider the results of the survey conducted by us, within the framework of the PhD dissertation research. The questionnaire consisted of 20 questions, of which we will focus on the results of three important questions, according to the authors:

1. *What pedagogical conditions are necessary for the effective formation of digital competence of students at school?*

A) regulatory documents;

B) creation of an accessible electronic informational educational environment;

C) support of this process with the necessary tools, methodical materials, handouts, printed teaching and methodical manuals;

D) your option

2. *What psychological conditions are necessary for the effective formation of digital competence of students at school?*

A) observing and supporting psychosomatic health of students in the digital environment;

B) providing informational security for students in the digital environment;

C) supporting students' appropriate development of cognitive processes;

D) your option

3. *How could you support your students with psychological-pedagogical assistance during the process of formation of digital competence? (Open question)*

Let's take a closer look at the results of the survey. Speaking about the choice of pedagogical conditions necessary for the effective formation of digital competence of students at school, more than half of the respondents (51.7%) noted that this is "support of this process with the necessary tools, methodical materials, handouts, printed teaching and methodical manuals" (Fig.). A third (29.7%) of respondents noted that this is "creation of an accessible electronic informational educational environment", one tenth of opinions were divided with the statement — (9.5%) "creation of an accessible electronic informational educational environment" and (9 ,1%) gave their own answers among which there were "optimization of existing programs and development of new resources in accordance with the needs, interests, individual capabilities of students, making a creative atmosphere" and others.

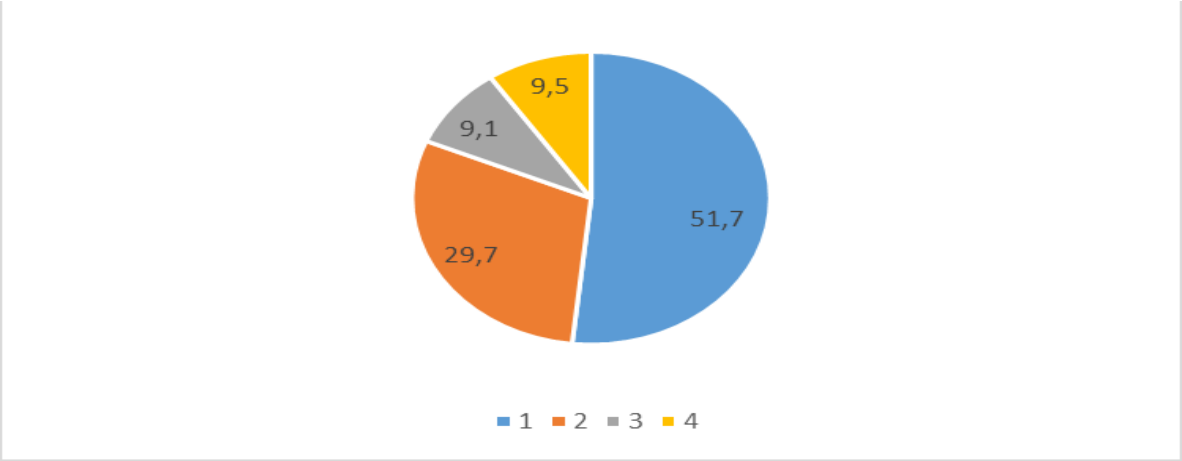

Figure. What pedagogical conditions are necessary for the effective formation of digital competence of students at school?

The results of the following three questions indicate that, according to the teachers' opinion, personal and emotional problems, as well as problems of communication and behavior, mastering subject content and self-determination in the digital environment, their psychosomatic health are the most significant for the formation of digital competence for middle school students. The importance of these problems for teenagers increases.

Among the means of psychological and pedagogical support of students on the way to the formation of digital competence, teachers noted both very effective traditional methods (consultations, organization of excursions, joint events, inclusion in collective creative activities, personal instructions, the teacher's own example), as well as new ones caused by modern conditions of digitalization (organization of chats, groups in social networks and others).

The curriculum for the subject "Digital Literacy" was developed in accordance with the State Compulsory Standard of all levels education. Digitalization of education is aimed at developing digital competencies of schoolchildren that allow them to implement digital technologies such as "computer", "representation and processing information", "working on the Internet", "computing", "robotics", it annually gives every student the opportunity to gain knowledge not only in computer science, but also in other academic subjects, as well as formation of new practical computer skills based on previously acquired experience in school and extracurricular activities. When teaching the subject "Digital Literacy" in school active forms and methods of teaching are used, taking into account age characteristics of students. For a better understanding of the concepts, it is recommended correlate them with the most common specific life examples. To teach this subject, educational and methodological complexes have been created aimed at developing logical and algorithmic thinking, mental and communication skills of students, the formation of universal educational actions, basic theoretical concepts, and skills working on a computer. However, the analysis of the results of pedagogical research and interviews with school teachers shows that schoolchildren have mostly fragmented knowledge of computer science, which is primarily due to the low level of cognitive interest of schoolchildren in this subject. One of the solutions proposed by practicing teachers is the observance of certain conditions to increase students' motivation while studying Digital Literacy, such as the use of electronic educational resources designed so that a set of pedagogical conditions are considered: the use of psychological and pedagogical theories of knowledge acquisition when using computer teaching tools, the use of interactive computer graphics, structuring educational material, taking into account the age and individual characteristics of students when teaching computer science, managing the learning process, etc. Improving the methodological system for developing digital literacy will increase the level of development of students' cognitive interest, as well as the effectiveness of students' assimilation of the material being studied in the subject of Digital Literacy.

The presented results indicate that at present state the society is responding well to innovative processes associated with the digitalization of society and education. Considering the issue of digitalization of Kazakhstani education, it should be noted that the latest global trends have prompted all participants in the pedagogical process to intensify their efforts towards improving digital competence. Summing up the presented, it should be noted that these resources ensure the organization of pedagogical interaction, both in the educational process and beyond, allows teachers to apply elements of educational technologies, thereby increasing the involvement of students in the process of cognition and learning. Aspects that require special attention include a complex system of favorable psychological and pedagogical conditions that need to be implemented into the educational process for further effective formation of digital literacy. The pedagogical aspect of the formation of digital competence still lies in the necessity of optimizing of the existing programs and development of new resources in accordance with the needs, interests, and individual capabilities of students. The psychological aspect of conducting an online lesson deserves special attention, where the teacher must concentrate on informational security as well as psychosomatic health of students. Thus, considering the issue of digitalization of Kazakhstani education, it is necessary to point out the trends being carried out in terms of social and methodological transformations. These include government policies covering education. Among the possibilities of using modern educational technologies, one can find a large number of relevant methods aimed both at teaching a student to learn professional and educational content on their own, as well as for the teacher himself to be able to vary both his ICT capabilities and student knowledge of IT programs and to create favorable psychological and pedagogical support, skillfully operating them in favor of quality education and effective formation of digital competencies.

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А.Е. Балгабаева, Р.М. Айтжанова, Д.М. Жорабекова, Э.Р. Тажибаева

Заманауи Қазақстан мектептері оқушыларының цифрлық сауаттылығын қалыптастырудың психологиялық-педагогикалық шарттары

Мақалада білім беруді цифрландыру жағдайында оқушылардың цифрлық сауаттылығын дамыту процесінің сәттілігін қамтамасыз ететін психологиялық-педагогикалық жағдайларды әзірлеу қажеттілігі қарастырылған. Цифрлық сауаттылықты қалыптастыру — әлемнің көптеген елдерінде қолданылатын және белсенді зерттелетін, оның ішінде Қазақстанда да қызметтің салыстырмалы түрде жаңа саласы. Мектептердегі оқушылардың цифрлық сауаттылығы цифрлық сервистермен тиімді өзара іс-қимылды қамтамасыз етуге бағытталған, кез келген ақпарат көзімен, сондай-ақ ақпараттың барлық түрлерімен жұмыс істей білуді қамтиды; оқушыларға қарым-қатынас жасайтын интернет-ортада, киберкеңістікте

белсенді қатысушы болуға мүмкіндік беретін білімдерде, білік пен дағдыларда көрініс табады. Мақала авторлары Қазақстанда білім беруді цифрландыру жағдайында оқушылардың цифрлық сауаттылығын неғұрлым тиімді қалыптастыруды қамтамасыз ететін психологиялық-педагогикалық жағдайлардың жіктелуін ұсынған. Алайда, цифрлық сауаттылықты қалыптастырудың өзекті мәселелері мен келешегі әлі де ғылыми зерттеулердің маңызы болып қала бермек.

Кілт сөздер: цифрлық құзыреттілік, білім беруді цифрландыру, психологиялық-педагогикалық жағдайлар, IT-дағдылары.

А.Е. Балгабаева, Р.М. Айтжанова, Д.М. Жорабекова, Э.Р. Тажибаева

Психолого-педагогические условия формирования цифровой грамотности учащихся современных казахстанских школ

В статье рассмотрена необходимость разработки психолого-педагогических условий, обеспечивающих успешность процесса развития цифровой грамотности учащихся в условиях цифровизации образования. Формирование цифровой грамотности — сравнительно новое направление деятельности, которое применяется во многих странах мира и активно исследуется, в том числе и в Казахстане. Цифровая грамотность учащихся в школах направлена на обеспечение эффективного взаимодействия с цифровыми сервисами, включает в себя умение работать с любым источником информации, а также со всеми видами информации, выражается в знаниях, навыках и умениях, позволяющих учащимся стать активными участниками в общающейся Интернет-среде, киберпространстве. Авторы статьи предлагают классификацию психолого-педагогических условий, обеспечивающих более эффективное формирование цифровой грамотности учащихся в условиях цифровизации образования в Казахстане. Однако актуальные проблемы и перспективы формирования цифровой грамотности еще остаются полем для дальнейших научных исследований.

Ключевые слова: цифровая компетентность, цифровизация образования, психолого-педагогические условия, IT-навыки.

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