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Determining and analyzing the level indicators of digital competencies in future educators

Maxliyo KHOLMATOVA

Doctoral Student, Department of Pedagogy and Psychology, Denov Institute of Entrepreneurship and Pedagogy, Uzbekistan

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Abstract: This article focuses on identifying students' existing digital competencies. A survey was conducted as the research method. The obtained results were analyzed to examine students' digital skills, their application in professional activities, and their effectiveness. The analysis results are aimed at developing practical recommendations for enhancing students' digital competencies.

Keywords: Future educators, digital competencies, level indicators, survey.

Introduction: In today's world, the rapid development of digital technologies and their widespread application in various fields, including education, necessitate the advancement of educators' digital competencies. Digital technologies not only enhance the effectiveness of the educational process but also elevate the interaction between teachers and students to a new level.

The significance of digital technologies in scientific and technological progress was emphasized in the Address of the President of the Republic of Uzbekistan, Shavkat Mirziyoyev, to the Oliy Majlis on January 24, 2020. Furthermore, the Presidential Decree No. PF-5847, issued on October 8, 2019, "On Approval of the Concept for the Development of the Higher Education System of the Republic of Uzbekistan Until 2030, outlines a series of tasks aimed at integrating digital technologies and modern methods into the educational process.

METHODOLOGY

In Uzbekistan, the development of an information-educational environment that enhances the professional activities of future educators necessitates the creation of recommendations aimed at improving students' ability to effectively utilize modern technologies.

Before addressing this issue, it is important to briefly define the concept of "digital competence." Digital competence refers to the ability to use digital tools and the internet effectively and safely. It encompasses educators' ability to utilize technology and information resources, including skills such as using multimedia tools, ensuring information security, and evaluating and selecting digital resources.

Assessing the level indicators of digital competencies in future educators plays a crucial role in improving the quality of the education system and enhancing pedagogical activities. By evaluating students' existing digital competencies, it becomes possible to determine their ability to apply digital technologies in their professional practice. The data obtained through surveys serve as a foundation for assessing educators' digital competencies and developing effective measures to enhance them.

Literature Review

The development of digital competencies in students' professional activities, the integration of information and communication technologies into the education system to enhance learning quality, the implementation and effective use of modern teaching technologies, as well as the formation of students' professional communicative competence, have been explored in the research works of Uzbek scholars such as U. Sh. Begimqulov, Z. K. Ismoilova, O. X. To‘raqulov, S. N. Allayorova, D. N. Mamatov, G. Sh. Mamutova, and others.

Several foreign researchers, including H. Dowd, L. Harvey, G. Siemens, M. Prensky, and J. Bergmann, have conducted studies on the application of modern technologies in professional training.

One of the key international frameworks in this field is DigCompEdu (Digital Competence Framework for Educators), developed by the European Commission. This framework is designed to assess and enhance students' digital competencies while supporting educators in effectively integrating digital technologies into the teaching process.

Researcher M. I. Kholmatova has studied international best practices, scientific research, and national standards to develop six key criteria for assessing the level indicators of educators' digital competencies.

EFFICIENCY INDICATORS

High Efficiency	Moderate Efficiency	No Efficiency Shown
1. "Digital Literacy" Has the ability to use digital tools (Internet and computer technologies).	**1. "Digital Literacy"** Can partially use digital tools (Internet and computer technologies).	**1. "Digital Literacy"** Does not have an understanding of how to use digital tools (Internet and computer technologies).
2. "Information Management" Has skills in searching, finding, processing, and managing information.	**2. "Information Management"** Has partial skills in searching, finding, processing, and managing information.	**2. "Information Management"** Has no clear understanding of searching, finding, processing, and managing information.
3. "Communication and Collaboration" Has the ability to establish communication, share information, and collaborate using digital tools.	**3. "Communication and Collaboration"** Can partially participate in communication, information sharing, and collaboration using digital tools.	**3. "Communication and Collaboration"** Does not have knowledge about communication, information sharing, and collaboration using digital tools.
4. "Creating Digital Content" Has the skills to create, edit, and share content and programs using digital tools.	**4. "Creating Digital Content"** Can partially perform content and program creation, editing, and sharing using digital tools.	**4. "Creating Digital Content"** Has not developed skills in creating, editing, and sharing content using digital tools.
5. "Security" Has full knowledge of information security and personal data protection in the digital	**5. "Security"** Has partial knowledge of information security and personal data protection in the digital environment.	**5. "Security"** Does not have knowledge about information security and personal data protection in the digital environment.

environment.		
6. "Problem-Solving" Can solve pedagogical problems, find innovative solutions, and apply them in practice using digital tools.	**6. "Problem-Solving"** Can partially solve problems, find innovative solutions, and apply them in practice using digital tools.	**6. "Problem-Solving"** Does not have knowledge of solving problems, finding innovative solutions, and applying them in practice using digital tools.

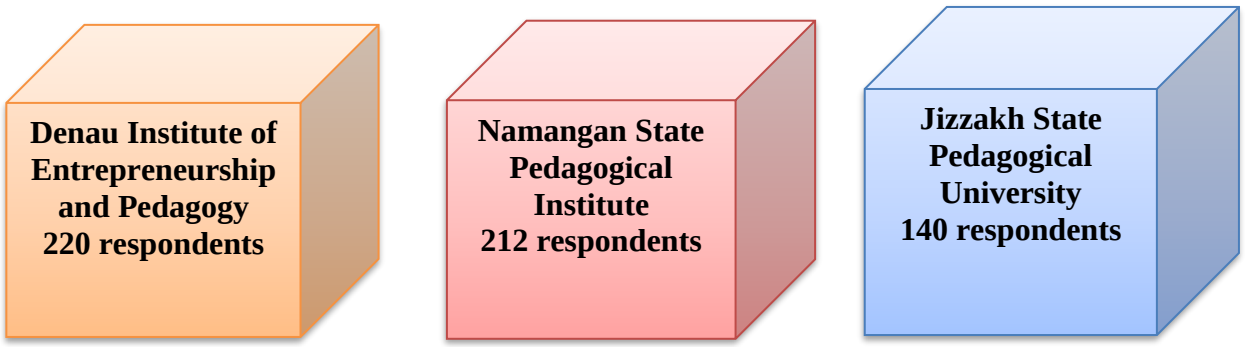
Figure 1. Efficiency Indicators for Assessing the Quality of Digital Competencies in Future Educators

Analysis and Results

Within the scope of the research, a survey was conducted to determine the level of digital competencies among students in higher education institutions.

A total of 572 students enrolled in pedagogy programs at the following universities participated in the survey:

Figure 2. Experimental Sites and the Number of Respondents in the Control-Experimental Group



The survey questions were based on the six indicators mentioned above.

The questions were designed to comprehensively assess students' existing digital competencies, including their skills in using information technology, experience with online learning platforms, knowledge of digital content creation and security, and their ability to integrate digital tools into their pedagogical activities.

The survey results among students based on their level of education were as follows:

- 1st year: 249 students (43.5%)
- 2nd year: 143 students (25%)
- 3rd year: 127 students (22.2%)
- 4th year: 53 students (9.3%)

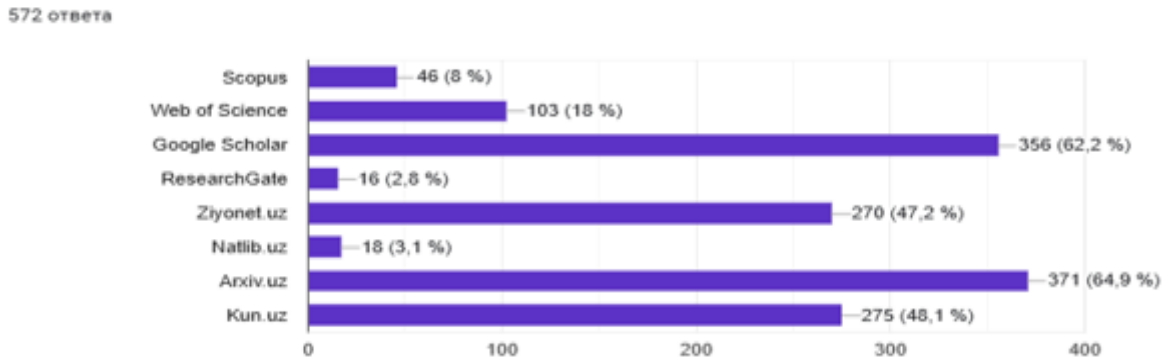
Responses to the question regarding students' access to the Internet were as follows:

- Very good: 18%
- Good: 37.5%
- Average: 36.5%
- Insufficient: 8%

Responses to the question aimed at identifying difficulties in finding information on the Internet were as follows:

- I do not experience any difficulties: 64.5%
- Inability to conduct searches correctly: 11.4%
- Inability to understand search results: 7.3%
- Lack of sufficient search skills: 16.8%

The responses to the question aimed at identifying scientific resources and databases used in education were as follows:



The responses to the question aimed at determining how and for what purposes scientific databases are used, as well as their significance in education, were as follows:

- Searching for articles – 42.8%
- Citing sources – 2.4%
- Searching for research (dissertations, monographs, patents) – 17%
- Keeping up with new developments – 42.8%

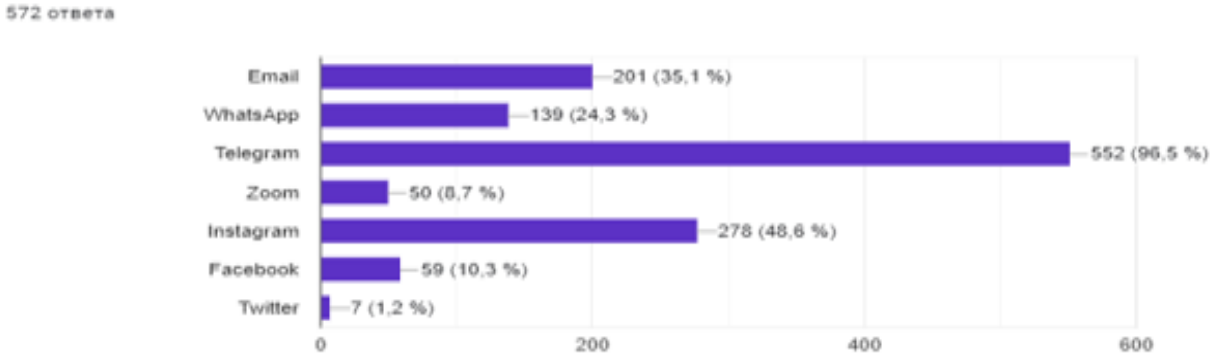
The responses to the question assessing the accuracy of searching for information in scientific databases were as follows:

- Using keywords – 25.3%
- Using filters – 1.2%
- Entering the full topic – 69.1%
- Searching by authors – 4.4%

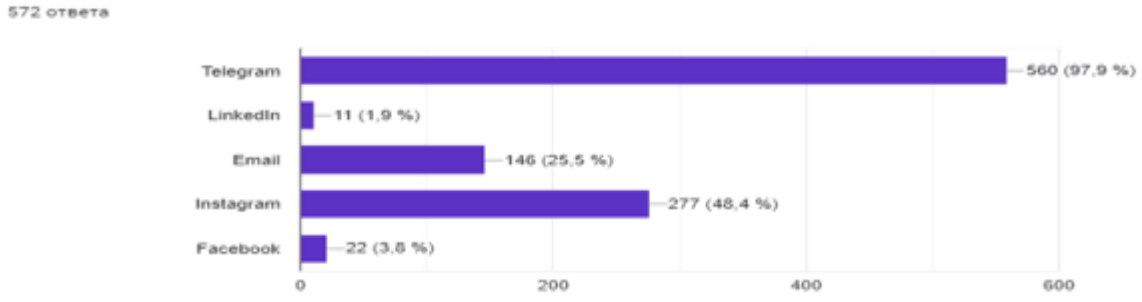
The responses to the question aimed at identifying students' skills in correctly organizing and storing downloaded information were as follows:

- Categorizing by topic – 6.5%
- Organizing by date – 19.9%
- Prioritizing by importance – 20.3%
- Saving as separate files – 53.3%

The results of the question aimed at determining which digital communication tools are most convenient and frequently used by students were as follows:

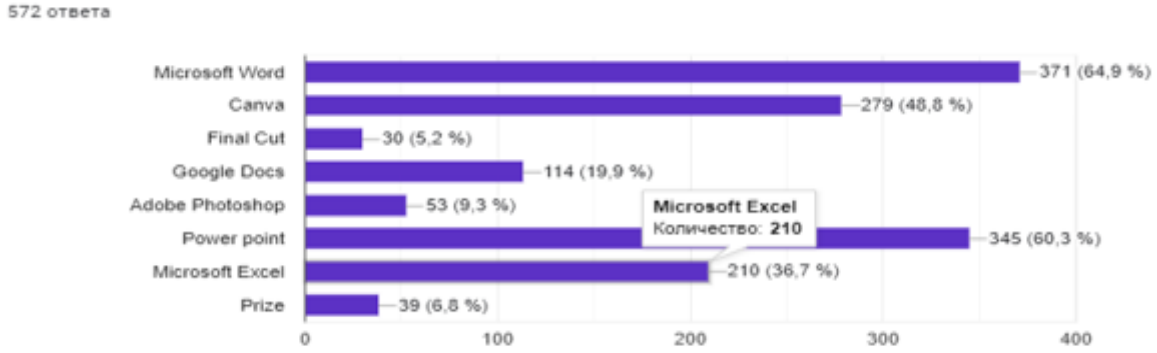


The responses to the question aimed at determining students' knowledge about information-sharing platforms and which platforms they use were as follows:



The responses to the question aimed at identifying which platforms, software, or applications students use to create content for effectively and interactively

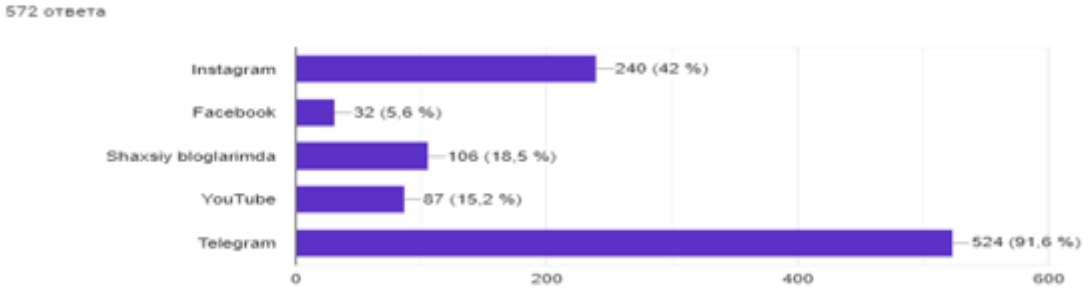
completing homework and independent learning tasks were as follows:



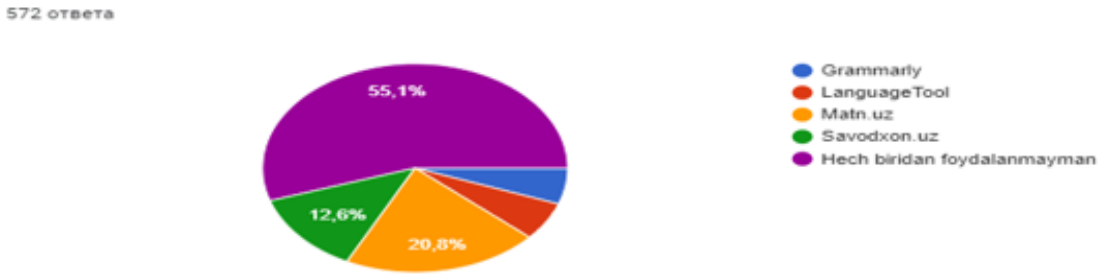
The results of the question aimed at determining students' knowledge of content types and their creation were as follows:

- Text-based articles – 21.5%
- Graphics and images – 8%
- Video and audio materials – 22.2%
- Slides – 48.3%

The responses to the question "Which platforms do you prefer for distributing content?" were as follows:



The responses to the question about which tools are used for editing created content were as follows:



The survey results regarding digital security measures and students' preferences for digital tools in education are as follows:

Measures taken to ensure information security and protect personal data in the digital environment:

- Creating backup copies: 54.4%
- Storing on a hard disk: 5.1%
- Using cloud storage: 22.6%
- Not paying attention to this: 18%

Security issues encountered:

- Hacker attacks: 4.9%
- Spam or phishing emails: 33.7%
- Identity theft: 1.2%
- Have not faced such issues: 60.1%

Preferred digital tools for organizing lessons:

- Multimedia resources: 38.3%
- Interactive lessons: 21.9%
- Distance learning: 6.3%
- Innovative methods: 32.9%
- Other responses included: “all methods,” “books,” “Google”

Understanding of digital competence concept:

- The ability to use digital technologies effectively: 28.8%
- The ability to use digital technologies and the internet purposefully: 22.6%

- The ability to use digital technologies and internet resources safely and effectively: 40.9%
- The ability to improve knowledge through online courses, seminars, and training: 7.7%

The analysis of survey results and responses to open-ended questions revealed several issues in developing students' digital competencies. These include:

- Low interest among students in learning and effectively using modern technologies.
- Limited time and opportunities for students to use digital tools.
- Lack of support and motivation for students to effectively utilize digital tools.
- Absence of specialized seminars, courses, or training to develop students' digital competencies, along with inadequate institutional support.
- Insufficient skills among professors and teachers in effectively integrating modern technologies into the educational process.
- Underdeveloped infrastructure for the effective use of information and communication technologies (ICT) in higher education institutions.
- Inadequate material and technical resources, with a shortage of necessary technological tools in all classrooms.

CONCLUSION

The importance of an effective and scientifically grounded survey for assessing future teachers' digital competencies has been examined. The survey was proposed as a key tool for identifying students' existing digital competencies, considering the role of digital tools and technologies in pedagogical activities and their value in the education system. Additionally, the article highlights the significance of formulating appropriate questions for assessing digital competencies while taking into account the characteristics of pedagogical activities and students' needs.

The analysis of the survey questions shows that it allows for a comprehensive assessment of future teachers' digital competencies. It provides clear and complete insights into their understanding and skills related to digital tools.

Based on this data, students' existing digital competencies were identified, and their challenges and difficulties were analyzed.

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