



PEDAGOGICAL AND PSYCHOLOGICAL FOUNDATIONS OF THE FORMATION OF DIGITAL COMPETENCE

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Annotation. *This article discusses the pedagogical and psychological foundations of the formation of digital competence. It examines the effective use of information and communication technologies in education, the development of independent thinking, critical thinking, collaboration skills, and information culture among learners. The article also analyzes psychological factors such as motivation, cognitive development, self-regulation, and the formation of safe and responsible behavior in digital environments. It substantiates the interconnection between pedagogical strategies and psychological principles in developing digital competence.*

Key words: *Digital competence, pedagogical foundations, psychological foundations, information and communication technologies, critical thinking, media literacy, independent learning, motivation, cognitive development, digital safety.*

Аннотация. *В данной статье рассматриваются педагогические и психологические основы формирования цифровой компетентности. Освещаются вопросы эффективного использования информационно-коммуникационных технологий в образовательном процессе, развития самостоятельного и критического мышления, навыков сотрудничества и информационной культуры обучающихся. Также анализируются психологические факторы, такие как мотивация, когнитивное развитие,*



саморегуляция и формирование безопасного и ответственного поведения в цифровой среде. Статья обосновывает взаимосвязь педагогических подходов и психологических принципов в развитии цифровой компетентности.

Ключевые слова: Цифровая компетентность, педагогические основы, психологические основы, информационно-коммуникационные технологии, критическое мышление, медиаграмотность, самостоятельное обучение, мотивация, когнитивное развитие, цифровая безопасность.

Annotatsiya. Ushbu maqolada raqamli kompetensiyani shakllantirishning pedagogik va psixologik asoslari yoritiladi. Unda ta'lim jarayonida axborot-kommunikatsiya texnologiyalaridan samarali foydalanish, o'quvchilarning mustaqil fikrlashi, tanqidiy tafakkuri, hamkorlikda ishlashi hamda axborot madaniyatini rivojlantirish masalalari ko'rib chiqiladi. Shuningdek, raqamli muhitda xavfsiz va mas'uliyatli xulq-atvorni shakllantirish, motivatsiya, kognitiv rivojlanish va o'z-o'zini boshqarish kabi psixologik omillarning ahamiyati tahlil etiladi. Maqola raqamli kompetensiyani rivojlantirishda pedagog va psixologik yondashuvlarning o'zaro bog'liqligini asoslab beradi.

Kalit so'zlar: Raqamli kompetensiya, pedagogik asoslar, psixologik asoslar, axborot-kommunikatsiya texnologiyalari, tanqidiy fikrlash, media savodxonlik, mustaqil ta'lim, motivatsiya, kognitiv rivojlanish, raqamli xavfsizlik.

Introduction, the rapid digital transformation of society and ongoing global educational reforms have fundamentally reshaped expectations for what students must know and be able to do. Beyond traditional literacy and numeracy, learners are now required to navigate, evaluate, create, and communicate information effectively in digital environments. As a result, developing digital literacy among secondary school students has become a strategic priority for modern education systems. Schools are expected not only to provide access to technology but also to cultivate the cognitive, social, and ethical capacities needed for meaningful participation in the digital world. In multilingual and culturally diverse contexts, these challenges acquire additional dimensions. For Kazakh-speaking students, the formation of digital skills is closely linked to pedagogical approaches, language accessibility of



digital content, and the psychological readiness of learners to engage with technology in their native language. Therefore, the issue is not limited to technical provision but requires a comprehensive understanding of the psychological and pedagogical conditions that support effective digital learning. Contemporary educational paradigms, particularly those aligned with the concept of Education 5.0, emphasize personalization, the integration of artificial intelligence, interactive learning environments, and the meaningful inclusion of digital technologies into curricula. These approaches highlight the need for teachers who are digitally competent, learning environments that foster motivation and autonomy, and teaching methods that encourage critical thinking, collaboration, and responsible digital behavior. This study seeks to identify the psychological and pedagogical conditions that facilitate the development of digital literacy among Kazakh-speaking secondary school students. By combining theoretical analysis of existing approaches to digital literacy with empirical data obtained from surveys and interviews with teachers and students, the research aims to reveal key factors that contribute to effective digital competence formation. The findings are intended to inform practical recommendations for integrating digital technologies into educational processes in ways that enhance students' readiness to meet the challenges of contemporary society.

Methods, research design, this study employed a mixed-methods research design combining qualitative and quantitative approaches. The purpose of this design was to obtain a comprehensive understanding of the psychological and pedagogical conditions that influence the development of digital literacy among Kazakh-speaking secondary school students. The integration of theoretical analysis and empirical data allowed for a deeper interpretation of the factors affecting digital competence formation. Theoretical analysis, at the initial stage, a theoretical review of scientific literature, educational policies, and existing models of digital literacy and digital competence was conducted. This analysis helped to identify key pedagogical and psychological concepts related to digital learning, including learner-centered education, constructivist approaches, motivation, self-regulation, and media literacy. The theoretical framework also incorporated modern educational trends associated



with the concept of [Education 5.0](#) and the integration of digital technologies into teaching practice. Participants, the empirical part of the study involved secondary school students and teachers from Kazakh-speaking schools. Participants were selected using purposive sampling to ensure relevance to the research objectives. The sample included: Secondary school students of different grades, subject teachers actively using digital tools in the educational process. Data collection methods, data were collected through: Surveys administered to students to assess their level of digital literacy, attitudes toward digital learning, and access to digital technologies; interviews with teachers to explore pedagogical practices, challenges, and perceptions related to digital education; observations of classroom practices where digital tools and interactive methods were applied. The survey questions included both closed and open-ended items, allowing for quantitative measurement and qualitative insights. Interviews were semi-structured to enable participants to freely express their experiences and views. Data analysis, quantitative data from surveys were analyzed using descriptive statistical methods to identify patterns and trends in students' digital skills and learning conditions. Qualitative data from interviews and observations were analyzed through thematic analysis, which allowed for the identification of recurring pedagogical and psychological factors influencing digital literacy development. Ethical considerations, participation in the study was voluntary. Informed consent was obtained from all participants, and confidentiality of personal information was ensured. The research was conducted in accordance with ethical standards for educational research. Limitations, the study was limited to a specific group of Kazakh-speaking schools, which may affect the generalizability of the results. However, the findings provide valuable insights into the pedagogical and psychological conditions relevant to similar educational contexts.

Results, motivation determines how actively and persistently students engage with digital tasks.

- **Intrinsic motivation** grows when learners find digital activities interesting, creative, and meaningful (e.g., creating media, coding, solving real problems).



- **Extrinsic motivation** can be supported through feedback, badges, grades, or gamified elements.
- Digital tools (interactive quizzes, simulations, multimedia) increase engagement and sustain attention.
- Autonomy in choosing digital tasks strengthens ownership of learning.

Pedagogical implication: Design interactive, choice-based digital tasks that connect to real-life contexts and students' interests. Digital environments affect how students **think, process, and retain information**.

- Multimedia content stimulates **attention, perception, and memory** through visuals, audio, and interaction.
- Problem-solving in digital contexts develops **analytical and critical thinking**.
- Hypertext and online research promote **information processing skills** and evaluation of sources.
- Simulations and virtual labs support **experiential learning** and deeper understanding.

Pedagogical implication: Use multimedia, simulations, and research tasks that require analysis rather than passive consumption. Digital learning requires students to manage their own learning processes.

- Students must plan, monitor, and evaluate their work when using digital platforms.
- Online environments require **time management**, goal setting, and independent decision-making.
- Self-regulated learners are better at avoiding distractions and staying focused.
- Reflection tools (digital journals, progress trackers) enhance metacognitive skills.

Pedagogical implication: Teach students how to set goals, manage screen time, and reflect on their digital learning. Psychological readiness is crucial for ethical and safe digital participation.



- Understanding **digital etiquette (netiquette)** and respectful communication.
- Awareness of **privacy, data protection, and cybersecurity**.
- Prevention of **cyberbullying**, digital addiction, and misuse of information.
- Development of **digital citizenship** and responsibility for online actions.

These psychological components are interrelated:

- Motivation drives engagement with digital tasks.
- Cognitive development enables effective information processing.
- Self-regulation ensures productive and independent learning.
- Safe behavior ensures positive and ethical participation online.

Together, they form the psychological foundation necessary for the successful development of digital competence among students.

In conclusion, the development of digital competence among secondary school students is a multidimensional process grounded in both pedagogical strategies and psychological readiness. This study highlighted that effective digital literacy formation goes far beyond access to devices or software; it depends on how learning environments are designed, how teachers integrate technology into instruction, and how students are supported cognitively and emotionally in digital spaces. Frameworks such as **UNESCO** digital literacy guidance and the **European Commission DigComp** model emphasize that digital competence includes critical thinking, creativity, communication, and responsible behavior. The findings show that motivation, cognitive development, self-regulation, and safe digital conduct are key psychological factors enabling students to use technology meaningfully. Pedagogically, learner-centered approaches, interactive methods, and purposeful ICT integration create favorable conditions for these factors to flourish. The study also underlines the importance of teacher digital competence and continuous professional development aligned with standards such as those of the **International Society for Technology in Education**. In line with Education 5.0 principles,



personalized learning and the thoughtful use of artificial intelligence can further enhance digital learning experiences. Overall, establishing supportive psychological and pedagogical conditions ensures that students are not only digitally skilled but also responsible, autonomous, and prepared to meet the challenges of contemporary society.

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