

COGNITIVE-PSYCHOLOGICAL FEATURES OF THE INTERACTION OF STUDENTS AND ARTIFICIAL INTELLIGENCE IN A DIGITAL EDUCATIONAL ENVIRONMENT

Kadirova Maftuna Ilhom qizi

Named after Abu Rayhan Beruni

Urgench State University

Department of Pedagogy and Psychology

teacher maftunaqadirova001@gmail.com

Abstract: This thesis analyzes the cognitive-psychological mechanisms of interaction between a student and artificial intelligence (AI) in a digital learning environment. The goal is to identify the dynamics of attention, working memory, metacognition, and motivation in the learning process using AI. The methodology is based on the cognitive load approach, the self-directed learning model, and the concepts of human-computer interaction. The scientific novelty is to explain the interrelationship of trust calibration, sense of agency, and reflective control in communication with AI.

Keywords: digital learning, artificial intelligence, cognitive load, metacognition, confidence calibration, sense of agency, self-directed learning.

Introduction: The expansion of digital learning environments has changed the psychological architecture of information reception, processing and application in the educational process. In particular, the popularization of generative and dialogic SI systems has created a new “cognitive partner” for the student: it is not only a source of information, but also a tool that guides thinking, shows errors, suggests task design and reminds of assessment criteria. Therefore, the issue is not only in technological efficiency, but also in what cognitive strategies are formed in the student, who remains in control, where cognitive errors occur and how motivational processes are restructured. From the point of view of psychology, communication with SI is a factor that interferes with the internal mechanisms of learning, creating new configurations in processes such as attention allocation, working memory capacity, metacognitive monitoring and self-regulation [1].

Main part: One of the central concepts of cognitive-psychological analysis is cognitive load: as the number of information channels presented in the digital environment increases, the student's working memory is forced to simultaneously maintain several streams. Reading with the help of SI has a two-way effect. First, SI can reduce internal load by simplifying complex text, giving examples, and providing step-by-step explanations, which is especially useful at the initial level of preparation. Second, the excessive options, frequently updated recommendations, and long dialogues provided by SI increase the external load, as a result of which the student is more likely to accept the “ready-made path” instead of analyzing the problem himself. The main danger here is that cognitive resources are spent on working with the interface rather than on deep processing of the content, that is, the goal-oriented semantic processing of reading may be weakened [2]. Therefore, to make interaction with SI psychologically effective, it is necessary to manage the load balance, adjust the length and complexity of the dialogue to the level of the task, and also encourage the actions of pausing, re-asking, and checking, which are controlled by the student himself.

Attention processes change significantly in interaction with SI, since dialogic systems facilitate the student's focus on a “point response”, but can push aside operations that require scattered attention, such as maintaining context, comparing evidence, and returning to the source. In digital education, the phenomenon of “transient division” of attention is intensified: the student works with the task in one window, SI in another, and sources in a third. In such conditions, the selectivity of attention and the stability of control determine the learning outcome. SI sometimes plays a positive role as an external regulator of attention: for example, it reminds

of the goal, plans stages, and highlights important points. However, at the same time, it can strengthen “cognitive automatism” and weaken the student's internal control mechanisms, especially if the habit of getting a quick answer is formed. Therefore, when analyzing attention processes, it is important to see the delicate balance between "convenience" and "activity": protocols for working with SI should be included in the training design so that activity does not decrease as convenience increases [3].

Metacognition, i.e. the individual's monitoring and management of his or her own cognitive process, has a two-way dynamic in interaction with the SI. On the one hand, the SI can serve as a reflective “window” for the student: it shows errors, identifies areas of misunderstanding, compares alternative solutions, and offers self-assessment questions. In this case, metacognitive monitoring is enhanced, as the student becomes more aware of the limits of his or her knowledge and updates his or her strategy. On the other hand, when the SI answers are presented in an overly confident tone, the student may replace his or her monitoring with the “external confidence” of the SI. As a result, metacognitive illusions arise: the student thinks he or she understands, but in fact only recognizes the text; or accepts the solution given by the SI as correct, without conducting a source check. At this point, the concept of confidence calibration comes into focus: the student must be able to realistically assess the capabilities and limitations of the SI, take into account the possibility of error, and use verification strategies. Calibration is psychologically shaped by experience, feedback, and task complexity; therefore, tasks that teach the verification of SI responses in the educational process should be an integral part of metacognitive culture [1].

Within the framework of the self-directed learning model, interaction with the SI redistributes the stages of planning, monitoring of implementation, and final reflection. In planning, the SI helps to clarify the goal, select resources, and allocate time; however, if the student becomes dependent on a “ready-made plan,” he may lose the ability to independently analyze the task requirements. In the execution stage, the SI provides quick feedback, which increases motivation and allows for early correction of errors, but speed sometimes also increases impulsivity: the student tries to achieve a result with a series of requests without thinking deeply. Although it is useful to discuss questions such as “what did I learn, where did I have difficulty, what strategy will I choose next time” with the SI during the reflection stage, reflection itself must remain the student’s personal responsibility; otherwise, the sense of agency will decrease. A sense of agency is understood as the student’s feeling that he or she is in control of the learning outcome and process; if it decreases, intrinsic motivation may also weaken [4].

Motivational processes in interaction with AI are particularly related to the sense of competence and autonomy. AI, by providing concise and understandable explanations, reinforces the student’s belief that “I can do it”, which increases retention. However, in an overly supportive AI environment, “tolerance for complexity” may decrease, i.e. the student may perceive difficulty as an obstacle that must be overcome immediately, rather than a natural learning signal. As a result, a culture of patience, exploration and learning from mistakes is weakened. Therefore, the principle of “purposeful difficulty” is important in the design of digital learning: AI should not prepare everything, but should work with questions that provoke the student’s thinking, partial instructions and signals that encourage self-examination. Another important issue from a motivational perspective is academic integrity: as it becomes easier to create a text with AI, to find solutions, there is a risk that the student will reduce his contribution. The psychological root of this is often seen in an excessive focus on results and a reduction in the value of the process; therefore, the evaluation system should also value the process, explained decisions, and source verification [5].

As a methodological approach to scientifically studying the cognitive-psychological properties of interaction with SI, a mixed design is effective: it is possible to measure attention and working memory indicators in laboratory conditions through tasks, analyze real behavior with log data on learning platforms, as well as reveal metacognitive experience through

interviews and reflective diaries. Importantly, if the scenarios for working with SI are standardized, that is, if one group is presented with the SI in the role of an “explainer”, another with a “questioner”, and the third with a “verifier”, then the differences in the sense of agency, trust calibration and learning outcomes become more apparent. It is also necessary to take into account individual differences: the level of preparation, digital literacy, cognitive style and level of anxiety significantly change the strategies for communicating with SI. For example, a high-anxious student may perceive the SI’s response as a “final verdict”, while a low-anxious and highly competent student may be critical of the SI. Therefore, psychological recommendations should rely on flexible support rather than a universal prescription [6].

Conclusion: The main conclusion of the thesis is that in a digital learning environment, SI can both save and misallocate the cognitive resources of the student; the outcome depends more on how the interaction with it is organized than on the presence of SI. Maintaining a balance of cognitive load, focusing attention on deep processing, enhancing metacognitive monitoring, and protecting a sense of agency elevate the SI tool to the level of a real educational partner. For the stability of motivation, it is necessary to systematically stimulate the student's independent thinking, verification strategies, and reflection, while maintaining "purposeful difficulty" . Only with such an approach can SI serve as a factor that deepens the cognitive process, rather than simplifying learning.

List of used literature

1. Sweller J. Cognitive load theory. New York: Springer, 2011. 295 p.
2. Mayer RE Multimedia learning. Cambridge: Cambridge University Press, 2009. 304 p.
3. Norman DA The design of everyday things. New York: Basic Books, 2013. 368 p.
4. Zimmerman BJ Becoming a self-regulated learner: An overview. New York: Routledge, 2002. P. 13–39.
5. Siemens G. Knowing knowledge. Vancouver: Lulu Press, 2006. 176 p .
6. Khodjaev B. R. Educational Psychology. Tashkent: Science, 2019. 240 p.
7. Abdurakhmonov F. M. Pedagogical and psychological support in a digital educational environment. Tashkent: Ukituvchi, 2021. 192 p.