A PEDAGOGICAL MODEL OF ARTIFICIAL INTELLIGENCE-BASED FORMATIVE ASSESSMENT OF STUDENTS INDEPENDENT LEARNING OUTCOMES IN THE CREDIT-MODULE SYSTEM

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Annotation*: The development of the credit- module system has changed the role of the student's in higher education. In this system, learning is no longer limited to classroom participation, it also requires students to plan, organize, complete and reflect on a significant amount of independent learning. The government of Uzbekistan has introduced the credit-module system in higher education based on the European Credit Transfer and Accumulation System, beginning from the 2020-2021 academic-year. Today, one of the main pedagogical problems is that independent learning is often assessed only through final products like essays, reports, presentations, test or projects. This approach may show what a student submitted but it does not fully show how the student acquired knowledge, how the student used feedback, how independent thinking developed or whether the learning outcome was achieved honestly and consciously.Therofore, this thesis proposes a pedagogical model of Artificial Intelligence based formative assessment for students independent learning outcomes in the credit-module system. The central idea is not to replace teacher with artificial intelligence, but also use AI as pedagogical assistant for diagnosis, feedback, reflection, peer-assessment and teacher-decision making.And international experience also shows that higher education systems are moving toward more transparent, feedback-rich, ethically controlled and learning outcome-based assessment models in response to the rise of generative AI.*

Keywords: *credit-module system, independent learning, artificial intelligence, formative assessment, pedagogical model, learning outcomes, self- assessment, feedback, learning analytics, teacher moderation, higher education, generative AI and academic integrity.*

As well known that-credit module system requires different understanding of teaching and assessment. From our experience we know , in traditional education the teacher is often source of knowledge and assessment mainly checks how much information the student has memorized. The credit- module system demonstrates that the student becomes an active participant of learning system and duty of student is considered complete independent tasks, search academic sources, analyze information,

prepare projects and illustrate achievement of learning outcomes.The ECTS(European Credit Transfer and Accumulation System) User's Guide emphasizes the credits should be connected with learning outcomes and student workload and that assessment should confirm whether these results have been achieved. This situation creates methodological question? How can teachers fairly and effectively assess students independent learning? Their submitted works don't show real learning process. Some students may work deeply but present weakly, others may produce polished work with external help. Especially with the development of AI this problem has become more complex than we expected. Nowadays, learners use AI tools for generate text, translate materials, create presentations, summarize sources and revise written work. By this way the reality makes old evaluation practices less reliable and can't response modern world integration of AI in education system. In this situation, the problem is not only academic dishonesty but the greater issue is that assessment must now measure thinking, reflection, progress, judgement and responsible use of technology.

Formative assessment offers a strong theoretical foundation for solving this problem because it focuses on using evidence of student learning to improve the learning process rather than merely recording final achievement (Black and Wiliam, 1998; Sadler, 1989).Black and Wiliam's influential review states that formative assessment can improve learning when information about student progress is used as feedback to modify teaching and learning. According to , Hattie and Timperley also argue that feedback has a powerful influence on learning, but its effect depends on quality, direction, and how students use it. Scientists as Nicol and Macfarlane-Dick (2006) connect formative assessment with self-regulated learning and argue that effective feedback should help students understand standards, evaluate their own work and take responsibility for improvement. In this case if students continue to check only final written products, it becomes difficult to know whether the student actually understood the topic, used correctly sources, improved through feedback or relied to heavily on AI.

International organizations have already recognized this challenge as UNESCO's guidance on generative AI in education emphasizes the need for human-centered implementation, policy development, protection of learners and responsible institutional use. The European Commission also points out that educators need to understand both the potential and risks of AI and data usage in teaching and learning, so that AI is utilized critically and ethically.

Proposed Pedagogical Model

This study aimed model which consists of six interrelated components like initially component is the diagnostic. At the beginning of the module teacher identifies student's initial level of knowledge, digital skills, independent learning habits and ability to work with sources. In this stage AI systems support by helping analyze short

diagnostic tasks as questionaries, and student reflections. Next component which demonstrates AI supported feedback component and Artificial Intelligence can generate draft formative feedback on a student work, analyze unclear arguments, suggest missing evidence, stress weak structure and provide recommendations for next steps. However, feedback should not be accepted mechanically and teacher must check, correct and personalize it.The fourth component is the self- assessment and reflection. Each student should include short reflective note by learning independent task. They should explain what was learned, what difficulties appeared what feedback was used and whether AI was used. Panadero describes it also encourages self regulated learning which key research direction in modern learning theory and assessment. Following this process continues with the fifth component as peer assessment as students can review each other's work in platform using the same rubric. This Peer assessment develops critical thinking, responsibility, and understanding of quality standards.

Finally, last component is teacher moderation and ethical control which this assessment decision belongs to the teacher. Artificial Intelligence driven technologies may provide analysis, feedback suggestions, and progress indicators, but it should not automatically determine a student's grade. Professor moderation is necessary to ensure fairness, academic integrity, contextual understanding, and human judgment. The novelty is not only the simple use of Artificial Intelligence powered technologies but also the novelty lies in combining formative assessment theory, self-regulated learning, rubric-based evaluation, learning analytics, student reflection, peer assessment, AI feedback, and teacher moderation into one pedagogical system (Black and Wiliam, 1998; Sadler, 1989; Nicol and Macfarlane-Dick, 2006; Zimmerman, 2002).At the end this model help teachers provide more timely feedback, help students understand assessment criteria and encourage the development of independent thinking. Also, it creates a more ethical approach to AI use in education by shifting the focus from punishment and fear to transparency, responsibility and learning improvement. For our country Uzbekistan, this can be useful because credit-model system requires strong mechanisms for monitoring and assessing independent learning.

Conclusion. In conclusion Artificial Intelligence formative assessment can improve the quality of student's independent learning in the credit-module system if it is implemented through clear pedagogical model. Artificial Intelligence technologies should not replace the teacher and it should not become an automatic grading machine. But its powerful role is to support feedback, diagnosis, reflection, learning analytics and personalization.

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