INTERDISCIPLINARY ADAPTIVE LEARNING CONTENT AND TASKS BASED ON ARTIFICIAL INTELLIGENCE\

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Abstract:

This study examines the use of artificial intelligence (AI) to design interdisciplinary adaptive learning content and tasks in primary education. AI-based adaptive tasks adjust to students' knowledge, needs, and performance, integrating language, mathematics, natural sciences, and technology lessons with real ecological issues. Interactive exercises, including simulations, gamified and project-based tasks, enhance engagement, independent thinking, and environmental responsibility. This approach effectively fosters individual learning paths and promotes a sustainable environmental safety culture from an early age.

Keywords: Artificial intelligence, adaptive learning, interdisciplinary education, primary education, environmental safety culture, interactive tasks, digital transformation, educational technology.

Introduction. In the era of digital transformation, the integration of artificial intelligence (AI) technologies in the educational process enables the individualization of learning, enhances flexibility, and activates students' cognitive engagement. Particularly in primary education, designing adaptive learning content and tasks through an interdisciplinary approach serves as a pivotal pedagogical mechanism for the effective implementation of a competency-based approach.

Adaptive learning content refers to educational materials tailored to each student's knowledge level, errors, achievements, and individual needs. For instance, within a single topic:

Advanced students → receive complex analytical tasks;

Intermediate students → engage in guided and explanatory exercises;

Struggling students → work with simplified, illustrative, and repetitive exercises.

Adaptive tasks analyze student responses and dynamically adjust subsequent assignments in terms of difficulty. For example, if a student answers correctly, the

following task becomes more challenging; if the response is incorrect, supplementary explanations or simplified tasks are provided. AI automatically evaluates student responses, identifies areas of difficulty, selects appropriate subsequent tasks, and provides recommendations to the teacher. For example, when addressing water pollution within an ecology module, AI can offer the student videos, images, interactive games, or tasks modeled on real-life ecological scenarios.

Interdisciplinary integration constitutes a critical component of AI-based learning content. For example:

In language lessons → textual analysis and critical reflection;

In mathematics → statistical analysis of water consumption;

In natural sciences → observation of ecological processes;

In technology → construction of models using recyclable materials.

AI facilitates optimal interdisciplinary integration, ensuring that tasks across subjects serve a unified didactic objective.

Interactive exercises play a crucial role in enhancing student engagement. Virtual simulations, gamified tasks, scenario modeling, and instant-feedback assessments foster independent thinking, problem-solving, and the development of ecological responsibility.

Interactive exercises, as an integral part of AI-based adaptive learning content, aim to stimulate active participation, cultivate autonomous thinking, and foster ecological awareness. They can take various forms:

Virtual simulations – students can observe real-world ecological processes through computers or tablets. For example, simulating water body pollution, deforestation, or improper waste management, illustrating cause-and-effect relationships visually.

Gamified tasks – ecological scenarios presented in a game format. For instance, assigning points for correct waste sorting, interactive missions for water conservation, or virtual challenges for maintaining green spaces.

Modeled problem-based scenarios – simplified representations of real ecological problems for students. Examples include designing a plan to reduce schoolyard waste or restoring a local water source. AI analyzes student actions, provides supplementary questions, guidance, and directs problem-solving approaches.

Instant-feedback assessments – the system automatically evaluates student answers, provides explanations, visual support, and promotes self-monitoring and consolidation of knowledge.

Creative and project-based exercises – students develop mini-projects to address ecological challenges, such as constructing models from recyclable materials, designing small-scale water filtration systems, or applying sustainable practices in

gardening. AI monitors progress, encourages students, and provides support when necessary.

These interactive exercises transform students from passive recipients into active knowledge creators, fostering independent thinking and ecological responsibility. Moreover, when organized through interdisciplinary integration, students learn to combine knowledge across subjects to develop practical solutions.

Conclusion

In conclusion, AI-based interdisciplinary adaptive learning content and tasks:

Ensure individual learning trajectories for each student;

Reinforce knowledge through interdisciplinary integration;

Foster ecological thinking via tasks linked to real environmental situations;

Promote conscious and sustainable development of environmental safety culture in primary education.

This approach guarantees personalized learning for each student while making the educational process interactive, engaging, and pedagogically effective.

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