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AI-Based Generation of Control Questions in Secondary Education

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Abstract
Artificial Intelligence (AI) is increasingly being used in education to improve teaching and assessment processes. AI-based technologies can help teachers generate control questions quickly and adapt them to students' learning levels and subject requirements. Such systems can create different types of questions, reduce teachers' workload, and support assessment that is more flexible. Therefore, the use of AI for generating control questions can contribute to improving the quality and efficiency of assessment in secondary education.

Keywords: Artificial Intelligence, control questions, secondary education, question generation, machine learning, educational technology, automated assessment, personalized learning, digital education.

Introduction

Annotatsiya
Bugungi kunda sun'iy intellekt (SI) texnologiyalari ta'lim jarayonini, xususan, bilimlarni nazorat qilish va baholashni takomillashtirishda keng qo'llanilmoqda. SI asosidagi tizimlar o'quvchilarning bilim darajasi va fan talablariga mos nazorat savollarini tezkor yaratish imkonini beradi. Bu texnologiyalar o'qituvchining vaqtini tejash, turli xil savollar shakllarini yaratish va baholash samaradorligini oshirishga xizmat qiladi. Shu sababli, umumiy o'rta ta'limda nazorat savollarini yaratishda sun'iy intellektdan foydalanish muhim yo'nalishlardan biri hisoblanadi.

Kalit so'zlar. Sun'iy intellekt, nazorat savollari, umumiy o'rta ta'lim, savol yaratish, mashinaviy o'qitish, ta'lim texnologiyalari, avtomatlashtirilgan baholash, individuallashtirilgan ta'lim, raqamli ta'lim.

Абстрактный
В настоящее время технологии искусственного интеллекта (ИИ) активно применяются для совершенствования образовательного процесса, особенно контроля и оценки знаний учащихся. Системы на основе ИИ позволяют быстро создавать контрольные вопросы с учетом уровня знаний учащихся и требований учебного предмета. Это помогает снизить нагрузку на учителей, создавать различные типы вопросов и повысить эффективность

оценивания. Поэтому использование ИИ для генерации контрольных вопросов является перспективным направлением в среднем образовании.

Ключевые слова. Искусственный интеллект, контрольные вопросы, среднее образование, генерация вопросов, машинное обучение, образовательные технологии, автоматизированное оценивание, персонализированное обучение, цифровое образование.

Introduction

The rapid development of artificial intelligence (AI) is creating new opportunities for improving the quality and efficiency of education. One of the promising applications of AI in secondary education is the automated generation of control questions for assessing students' knowledge and learning outcomes. Traditional question preparation requires significant time and effort from teachers, especially when different levels of difficulty and learning objectives need to be considered. AI-based systems can analyse educational content and generate questions according to a specific topic, subject, or difficulty level. Such technologies can support teachers in preparing tests, quizzes, and formative assessment activities while providing students with diverse learning materials. Therefore, the use of AI for generating control questions can contribute to more flexible, efficient, and technology-supported assessment in secondary education.

Artificial intelligence has become an important technological tool in modern education. AI-based educational systems can process large amounts of information, identify important concepts, and generate learning materials according to predefined requirements. In the context of secondary education, these capabilities can be used to create control questions that correspond to curriculum topics and learning objectives.

Traditional question development usually depends on the teacher's experience, available time, and knowledge of assessment methods. Although teacher-created questions can be highly relevant and pedagogically appropriate, preparing a large number of questions for different topics and difficulty levels can be time-consuming. AI can assist teachers by generating an initial set of questions that can subsequently be reviewed and modified. AI-based question generation can support different types of assessment, including multiple-choice questions, true-or-false questions, short-answer questions, and open-ended questions. The system can generate questions from textbooks, lecture materials, educational texts, or other learning resources. This provides teachers with additional opportunities to diversify assessment activities.

The process of generating control questions using AI generally includes several stages. First, educational content is provided to the AI system. The system analyses the text and identifies key concepts, facts, definitions, relationships, and learning outcomes. Based on this information, appropriate questions can be generated.

The second stage involves determining the characteristics of the questions. These characteristics may include the subject, topic, difficulty level, question type, number of questions, and expected learning outcome. For example, a teacher may request ten multiple-choice questions on computer security for secondary school students with three different levels of difficulty.

The third stage is the review and validation of generated questions. AI-generated questions should not automatically be considered correct or pedagogically appropriate. Teachers need to check the accuracy, clarity, relevance, and difficulty of each question. This human review is particularly

important because AI systems may sometimes generate ambiguous, repetitive, or factually incorrect questions.

Table 1. Traditional vs. AI-Based Generation of Control Questions.

Features / Aspects	Traditional Method	AI-Based Method
Time Consumption	High (takes hours to draft a test)	Low (generates questions in seconds)
Question Variety	Limited by teacher's current creativity	High (MCQs, open-ended, scenario-based)
Adaptability	One-size-fits-all for the whole class	Highly adaptive to student's level
Bias & Predictability	Prone to recurring patterns and human bias	Objective, diverse, and data-driven
Scalability	Hard to scale for large question banks	Effortlessly scalable across subjects

The application of AI for generating control questions can provide several benefits for teachers and students. One important advantage is time efficiency. Teachers can generate a preliminary set of questions much faster than creating every question manually. Another benefit is question diversity. AI can generate different versions of questions based on the same educational material. This can help reduce repetition and provide students with a wider range of assessment activities.

AI can also support differentiated learning. Questions can be generated at basic, intermediate, and advanced levels. This allows teachers to prepare assessment materials that correspond to different levels of student knowledge. Furthermore, AI-based systems can contribute to personalize learning. Based on students' previous performance, teachers can use AI to generate additional questions related to topics where students demonstrate weaker understanding.

Despite its advantages, AI-based question generation has several limitations. The quality of generated questions depends strongly on the quality of the educational content and instructions provided to the system. Poorly structured input may result in questions that are unclear or irrelevant. Another important issue is accuracy. AI may occasionally produce incorrect information or formulate questions with misleading answer options. Therefore, teacher supervision remains necessary. There are also concerns related to academic integrity and responsible use of AI. Students should understand that AI is a supporting educational technology rather than a replacement for independent thinking. Teachers should establish clear rules for the appropriate use of AI in learning and assessment.

The introduction of AI does not eliminate the role of the teacher. Instead, it changes the teacher's role from creating every question manually to designing, reviewing, and managing AI-assisted assessment processes. Teachers should determine the learning objectives, select appropriate educational materials, formulate clear instructions for AI systems, and evaluate the generated

questions. They should also ensure that questions correspond to the students' age, knowledge level, curriculum requirements, and learning objectives. Therefore, an effective AI-based assessment model should combine artificial intelligence capabilities with teacher expertise. AI can provide speed and variety, while teachers provide pedagogical judgment and quality control.

AI-based generation of control questions represents a promising approach to improving assessment practices in secondary education. It can reduce teachers' workload, increase the diversity of questions, support different difficulty levels, and contribute to more personalized learning. However, AI should be used as an assisting technology rather than a complete replacement for teachers. Human review is essential to ensure the accuracy, relevance, clarity, and educational value of generated questions. The effective combination of AI technologies and teacher expertise can create a more flexible and efficient assessment environment for secondary education.

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