INTELLIGENT EDUCATIONAL SYSTEMS OF THE PRESENT AND FUTURE

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Abstract. The field of computer-based training has experienced a series of revolutionary changes since the advent of computers fifty years ago. In 1960, none of the following learning environments existed: adaptive computer-based training, dynamic multimedia, hypertext, hypermedia, interactive simulation, intelligent tutoring systems, animated pedagogical agents, virtual environments and collaborative learning. None of them have become mainstream technologies used at school today, even though they were potentially available to all web users. Coming to 21st century, era of technologies and innovations there have been miracle development in teaching sphere. Created new technologies and approaches for teaching languages are giving productive and effective results.

Keywords: AI in education, advanced educational technologies, filtering system, personalized approach, summative and formative assessment.

Introduction

Education in the 21st century aspects an increasing number of challenges that entail intelligent systems. The learning environments of today and tomorrow must switch distributed and dynamically changing content, a geographical diffusion of students and teachers, and generations of learners who spend hours a day

interacting with multimedia surroundings. The new learning environments are moving beyond kindergarten through college classrooms to distance learning, lifelong education, and on-the-job training. These requirements posture strong demands for intelligent educational systems that are personalized to both students' and teachers' individual needs and that are a seamless part of our complex, mobile lifestyles. In addition to simplifying learning, these systems must prevent learners from getting lost in mass of interactions, modalities, and content.

Intelligent educational systems benefit extremely from their ability to provide adaptivity and personalization. Both cognition and emotion play a vital role in designing systems that are tailored to individual learners.

Increasingly, computer-based education has been artificially intelligent education. Advances in artificial intelligence (AI) in the 1980s, 1990s, and first period of the new millennium have translated to new potentials for learning technologies in several parts. The core advances in AI in those decades led to advances in more specialized use of AI in education – the research and practice communities of learning analytics and educational data mining – from around 2004 to today. As the research field advanced, new methods filtered into systems used by learners at scale. AI is today used to recognize what students know (and their engagement and learning strategies) to predict their future paths, better assess learners along multiple dimensions, and – eventually – help both humans and computers decide how to better support students.

New educational technologies and approaches for the classroom

As computerized educational technologies become more commonly accessible to teachers and students, there is increasing consciousness that the technology does not simply increase convenience for teachers or provide a fun alternative activity for students – it can endorse new methods for teaching and learning.

Personalized Learning. One major trend within learning, driven by these technologies, is the move towards personalizing learning to a greater degree. Personalization of learning did not start with computerized technology – in a sense, it has been available since the first use of one-on-one tutoring, thousands of years ago. However, with the increase in systematized, standardized schooling and teaching over a hundred years ago, awareness increased that many students' learning needs were being poorly met by one-size-fits-all curriculum. Classroom approaches such as mastery learning (each student works on material until mastery and only then moves on to the next topic) were developed, but proved difficult to scale due to the demands on the teacher. Educational technologies provided a ready solution to this problem – the computer could manage some of the demands of personalizing learning, identifying each individual student's degree of mastery and providing them with learning activities relevant to their current position within the curriculum.

Next, educational technologies became more effective at personalizing for differences in students' self-regulated learning – their ability to make good choices during learning that enhance their learning outcomes and efficiency. Modern educational technologies in many cases have the ability to recognize when students are using ineffective or inefficient strategies, and to provide them recommendations or nudges to get back onto a more effective trajectory.

New Pedagogies. Although the most obvious impact of artificially-intelligent educational technologies is through personalizing learning directly, new pedagogies and teacher practices have also emerged. These pedagogies and practices enable teachers to support their students or provide their students with experiences in ways that were generally not feasible prior to the technology being developed.

Perhaps the largest shift has been in the information available to teachers. Dashboards provide teachers with data on a range of aspects of their students'

performance and learning. This has produced a major shift in how homework is used. In the past, homework would need to be brought to class by students. It could be graded by the teacher after that (meaning that feedback and learning support would be delayed), or students could grade it with the teacher in a large group, which is not a very time-efficient approach. In contrast, data from homework technologies today can become available to teachers in real-time. This means that teachers can identify which students are struggling and which materials students struggled on in general before class even starts. This enables strategies where, for instance, teachers identify which students displayed common errors and can identify students who can demonstrate both incorrect and correct problem-solving strategies for whole-class discussion. It also enables teachers to message students who are behind in completing materials, helping get the student back on track.

Similar uses are available for formative assessment systems, which are being increasingly used in contexts where students have high-stakes end-of-year examinations. These systems often go beyond teacher-designed homework in terms of their breadth and comprehensiveness of coverage of key skills and concepts. They are increasingly used by teachers to determine what topics to review with their classes as well as what types of supplemental supports to provide to specific students.

Future potentials

Artificial intelligence has emerged as a powerful tool for improving education in recent years. In her article Yunusova also states that “Numerous AI tools are available to assist students become better writers.” (2024, p:5)

The use of these technologies has expanded, albeit at different paces and in different ways for different technologies. Some technologies have expanded in use quickly, such as the explosion of early warning systems in the United States over the last few years, and some have expanded gradually, such as the slow and sometimes back-and-forth expansion of use of personalized learning technologies,

class by class. Some technologies, particularly for studying classroom interaction and supporting classroom orchestration, have been slow to emerge from research classrooms and need greater support for the development of technology that enable their greater emergence.

Going further, if we can develop an ecosystem where various artificially intelligent technologies coordinate between each other and communicate information to teachers and other stakeholders, we can substantially improve student outcomes. Prediction of whether a student is at risk of dropping out will be facilitated through continual data on student use of personalized learning systems. Integrating formative assessments with classroom orchestration technologies will facilitate measurement of 21st-century skills while empowering teachers with real-time information on how they are developing. The possibilities are combinatorial – almost every possible pair of the technologies discussed in this chapter creates new opportunities when they are integrated together. There is the potential for the school of the future to move towards an integrated learning experience for students, where data is combined not just across learning platforms, but across every aspect of the learning experience. In this situation, teachers of different classes could coordinate to support each student's development of 21st-century skills, working in tandem with a variety of learning platforms to create an integrated, unified learning experience. A student struggling with seeking help, for instance, could be encouraged to do so (appropriately) in group activities in class within a personalized learning platform used by homework, and by an educational robot. Teachers could collaboratively review an integrated dashboard to understand the student's progress and its implications for his/her risk of dropping out of high school. The student's success at building this 21st-century skill could be assessed both formatively and summatively by assessment systems. Such a vision requires solving several challenges – perhaps the first is using policy to develop incentives to encourage the developers of this disparate systems to work together. Ultimately,

the success of such a vision also requires the re-shaping of several systems – platform design, school practices, teacher professional development – to accommodate the opportunities that the new technology brings.

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