The Role of Adaptive Personalized Technologies in the Learning Process:
Stepik as a Tool for Teaching Mathematics

Raushan Zhilmagambetova, L.N. Gumilyov Eurasian National University, Kazakhstan*

https://orcid.org/0000-0001-9431-2168

Zhanat Kopeyev, Seifullin Kazakh Agrotechnical University, Kazakhstan

Akhan Mubarakov, L.N. Gumilyov Eurasian National University, Kazakhstan

Ainagul Alimagambetova, Esil University, Kazakhstan

ABSTRACT

This article is devoted to the development of an adaptive personalized online course in mathematics for students, which was implemented on the Stepik platform. The authors discuss a non-linear approach to online learning that adapts to the needs of the student as they progress through the course content, which leads to an individual learner's experience based on prior knowledge. Within the framework of this article, the authors consider the experience of Aktobe Higher Polytechnic College in the task of implementing an adaptive personalized online course, and also offer specific methods and technologies. For this reason, the authors are exploring Stepik adaptive personalized learning software as an educational platform and designer of open online courses and interactive training lessons, using videos, tests, and various tasks with automatic verification and instant feedback.

KEYWORDS

Adaptive Personalization of Learning, Electronic Course in Mathematics, Integration of Elements, Mixed Learning Format

INTRODUCTION

Today, students are faced with a vast flow of information. The personal qualities of each individual, and accordingly, the degree of assimilation of the material is different. At the same time, various external factors can influence the learning process. The creation, and application, of an intelligent adaptive platform will solve the problems associated with the individualization of the education process.

Bloom (1984) describes a phenomenon known as two sigmas (two curves of the normal distribution of student results), where a student, trained individually, according to an individual program, showed results 98% higher than a control group trained by standard methods. Peng et al. (2019) discuss that, in 2012, adaptive personalized learning was implemented by the World School Council in London in several types of educational systems, such as adaptive hypermedia, intelligent

*Corresponding Author

learning systems, computerized adaptive tests, and computer pedagogical agents. The method has also been used by the University of Colorado since 2012.

The purpose of this study is to conduct an experiment with students using an adaptive personalized learning system and find out the impact of such methods on student learning achievement. The Adaptive Approach to College Mathematics Teaching is a methodological approach that allows the teaching of mathematics to be adapted to learning levels, thinking styles, and leading modalities to ensure a sustainable quality of learning outcomes. The results obtained allow teachers to gain a clear understanding of adaptive personalized learning and provide them with a tool to take into account and provide implementation for the individual characteristics and capabilities of students, as well as serve as a guide for future relevant research and practice.

The authors conducted experimental work on the development of an electronic personalized adaptive training course based on Stepik in the discipline of mathematics for students in the first year of study in the area of training information systems at Aktobe Higher Polytechnic College. To conduct this study, the following research questions will be considered:

1. What adaptive platforms are used in foreign and domestic education systems?
2. How does one effectively apply the adaptive personalized learning system Stepik in mathematics education?
3. How have student academic outcomes improved as a result of using this adaptive personalized learning platform?

LITERATURE REVIEW

Zotova et al. (2021) discuss the perception of adaptive learning as one of the key trends in the digital transformation of education, which was the result of a tectonic shift in the scientific analysis of adaptive learning problems in the mid-2000s. As a result, in 2003, about a hundred articles on the subject of "adaptive learning & education" were registered in the Scopus database. Then, in 2017, about 600 were already registered (note that in 1997 there were less than 20). Bond et al. (2018) discuss the beginning of the emergence of courses, in the mid-90s, in various disciplines, more often language, mathematics, and physics, in which certain mechanisms of adaptive learning were implemented. Morze et al. (2021) discuss the implementation of adaptive learning systems in the educational process of higher education in terms of scope, type of adaptive learning, functional purpose, integration with existing learning management systems, and the use of modern technologies.

The researchers argue that using the concept of blended learning facilitates the structuring of an e-learning course and determines how it can be adapted. The work of Watson (2008) has been used by many professors to show how blended learning with adaptive programs promotes constructive understanding and learning. Lynch and Dembo (2004) discuss that by analyzing the studied material, students understand and remember much more and; therefore, blended learning is more effective. Grover et al. (2015) discuss that one of the most important advantages of both distance learning and blended learning, is their independence from the social and personal factors of students. Such programs allow people to learn regardless of age, and physical and mental abilities, which makes education more accessible to everyone.

Molenaar et al. (2021) discuss the developmental perspective of self-regulated learning (i.e., how learners regulate their efforts, accuracy, and erudition), using adaptive learning technology, as well as instantaneous learning curves. Their result confirms that adaptive technology can improve self-regulated learning and improve learning efficiency. Papanicolaou et al. (2003) discuss an Internet-adaptive educational hypermedia system called INSPIRE designed to support personalized learning over the Internet and traditional classroom learning as a complementary resource. The proposed method includes adaptive and adaptable behavior based on the student's model and characteristics, such as the level of knowledge and learning style.

Related Content

Developing Self-Directed Learning to Cope With Open and Distributed E-Learning

Bernadette Winefrede Geduld (2019). *Student Support Toward Self-Directed Learning in Open and Distributed Environments (pp. 103-124).*

www.irma-international.org/chapter/developing-self-directed-learning-to-cope-with-open-and-distributed-e-learning/233323

Making it Rich and Personal: Crafting an Institutional Personal Learning Environment

Su Whiteand Hugh C. Davis (2011). *International Journal of Virtual and Personal Learning Environments (pp. 23-39).*

www.irma-international.org/article/making-rich-personal/60126

Formula Editors and Handwriting in Mathematical E-Learning

Morten Misfeldtand Anders Sanne (2012). *Virtual Learning Environments: Concepts, Methodologies, Tools and Applications (pp. 1578-1593).*

www.irma-international.org/chapter/formula-editors-handwriting-mathematical-learning/63211

Concepts behind Serious Games and Computer-Based Trainings in Health Care: Immersion, Presence, Flow

Jana Birkenbuschand Oliver Christ (2013). *Serious Games and Virtual Worlds in Education, Professional Development, and Healthcare (pp. 1-14).*

www.irma-international.org/chapter/concepts-behind-serious-games-computer/75804

Monitoring Students' Activity and Performance in Online Higher Education: A European Perspective

Fernando Lera-López, Javier Faulin, Angel A. Juanand Victor Cavaller (2012). *Virtual Learning Environments: Concepts, Methodologies, Tools and Applications (pp. 1276-1293).*

www.irma-international.org/chapter/monitoring-students-activity-performance-online/63192