

An Overview of Adaptive Learning Fee-based Platforms

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Abstract: Because of the sanitary crisis created by the appearance of covid-19, the education system was forced to change its system to a flexible online one; the adaptive e-learning has become the pedagogical model of the first choice for successful education in the era of 2021. Adaptive e-learning platforms exist in abundance to offer personalized knowledge to improve learners' personal skills, respond to their needs, and satisfy their interests, allowing them to master their learning. The core purpose of this paper is to provide the current state of the art by reviewing the existing adaptive, fee-based learning platforms based on a survey that was conducted to define the characteristics and features of each platform, with the vision to help learners choose The most suitable adaptive e-learning platform.

1 INTRODUCTION

Everybody has the potential to learn; according to Harold Pashler, different people learn information in different ways, but the most successful way is to provide learning depending on a student's individual needs (Harold, McDaniel, Rohrer, & Bjork, 2008). However, most of the learning models are based on a standardized approach unsuitable for individualized learning, ignoring the interests and abilities of each learner; they present a course in the same way for everyone. Benjamin Bloom (1984) has described the effectiveness of individual "personalized" learning; using it, we easily understand students' learning experiences adapted to their individual needs, skills, and interests. Therefore, to fill in the gaps in traditional learning methods, the contemporary education system has provided adaptive e-learning methods; however it is difficult to apply them in traditional education since it requires many resources, and it is not practical to have one teacher for every student. In addition, personalized learning is not yet widespread in schools. Many aspects still need to be researched. Nevertheless, this approach can help reduce the stigma of adapted education and better suit the needs of students with differences in learning abilities.

Many e-learning platforms are available on the internet; however, the provided material cannot solve

all learners' problems due to the common syllabus and monotonous learning styles (Abdalla & Dhupia, Implementing Adaptive e-Learning Conceptual Model : A Survey and Comparison with Open Source LMS, 2019). At the same time, adaptive e-learning platforms are among the technological innovations that can effectively deal with this issue.

In adaptive education systems, the characteristics of the learner are considered, and the learning environment is appropriately adapted to provide support and improvements to the learning process (Khalid, Hagra, Alghazzawi, & Aldabbagh, 2017), (Shute & Zapata-Rivera, 2012), (Oxman & Wong, 2014). These systems are attracting much attention because of their capacity to deliver instructional content and analysis by proactively adapting to students' specific requirements and needs (Khalid, Hagra, Alghazzawi, & Aldabbagh, 2017), (Shute & Zapata-Rivera, 2012), (I., 2012).

This study will focus on evaluating some existing adaptive fee-based learning platforms in higher and secondary education, based on technical, pedagogical features, and provided characteristics, as well as a comparison between these adaptive e-learning platforms. Therefore, twelve adaptive fee-based e-learning platforms (Knewton, Smartsparrow, Scootpad, Yokimi, Dreambox, Aleks, Claned, Lrn, Kinteract, Zzish, Embibe, Realizeit) were chosen to complete this study.

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The rest of this paper is organized as follows. The second section introduces similar works in emerging systems, followed by a review and an analysis of the platforms' pedagogical and organizational benefits and drawbacks.

2 RELATED WORK

In the last few years, an immense need for adaptive learning has been created, which has attracted the attention of many researchers. Therefore, an amount of effort has been made to review adaptive e-learning systems outlined as follows. In (Akrivi, Christos, & Maria, 2018), authors reviewed some learning management systems (LMS), as well as content management systems (CMS), namely Moodle, ATutor, Drupal, Joomla and WordPress and compared them based on many technical and educational aspects such as ease to use, accessibility, customization, interactions, usability, etc. the main objective of their study is to provide useful information to higher education to choose LMS or CMS regarding their proper needs. In a similar context, the study in (Abdalla & Dhupia, Implementing Adaptive e-Learning Conceptual Model : A Survey and Comparison with Open Source LMS, 2019), provides a comparison among similar LMS, for instance, EduBrite, TalentLMS, Edmods, Sakai based on their features, practical feedback from the students and instructor, and the target customer size. The study aims to help university students and instructors to choose a suitable learning management system.

In (Kasim & Khalid, 2016), the authors discuss multiple learning management systems, which are Sakai, Blackboard, SuccessFactor, and SumTotal and compare them based on several characteristics such as integration with other systems, accessibility, users' interactions, flexibility, synchronous and asynchronous interactions, etc. This study provides a conclusion on the selection of platforms to be adopted by the higher education institution. The authors in (Yilmaz & Erol, 2019) present a comparative study of learning management systems and e-learning author tools, which are preferred in Turkey, based on their technical and educational features as well as disadvantages to contribute positively. In (Florence, Yan, Robert, & Carl, 2020), the authors present a systematic review of research on adaptive learning based on publication trends, instructional context, research methodology components, research focus, adaptive strategies, and technologies. The study in (Abhinaw & Eswaran, 2018), reviews several

learning management systems, namely Adobe Captive Prime, TalentLMS, Docebo, Litmos, Coursemill, Moodle, Blackboard, Electronic Educational Environment (EEE) LMS, based on a comparison of the identified and essential features. In this study (Tsolis, et al., 2010), the authors reviewed some traditional learning management systems and existing adaptive e-learning systems and propose implementing a combined solution to benefit from the advantages of both technologies.

3 FEE-BASED E-LEARNING PLATFORMS

KNEWTON: Knewton is a personalized adaptive platform headquartered in New York City, used by more than 15 million students around the world. It identifies and supports the process of continuous personalized learning through knowledge maps and real-time monitoring and response to student interactions (communication, collaboration and game), as well as identifying and bridging the knowledge gaps while the students are doing homework to get them where they need to go (Peng, Ma, & Spector, 2019). In addition, Knewton is one of the first platforms to actively put data analysis technologies at the service of education (Osadcha, Osadchyi, Semerikov, Chemerys, & Chorna, 2020).

SMARTSPARROW: Smartsparrow is a platform that allows mentors to easily build graphically rich online tutorials. They decide on the structure of their courses, and the platform does the rest. It is an intuitive authoring tool that offers real-time interactive learning components; it provides the student with a space adapted to their specific needs using questions and feedback. Smartsparrow is based in Sydney Australia, and over 700 leading institutions trust it; this technology allows improving the e-book offer to create new generation e-books that are more attractive.

SCOOTPAD: Used by over 400 schools in the USA, it provides a tool for teachers and administrators to create adaptive learning playlists for students. Students begin a unit by taking an assessment; this assessment determines the student's needs and weaknesses and what instruction the student should receive in real-time. As the student progresses, ScootPad adapts to his or her progress, presenting different lessons, exercises and assessments for each student. While students work, data is sent in real-time to a teacher's dashboard.

YOKIMI: Launched in November 2018 in France, and installed by more than 10000 users; it is the first pedagogical artificial intelligence that represents a maths teacher in the form of an instant messenger; it is an artificial intelligence that helps to progress in maths for primary school students. This chatbot begins by asking questions to determine the level of the learner in order to adapt the exercises to his or her needs. Yokimi allows ensuring personalized monitoring, continuous support, pedagogical explications, and using point-earning exercises to motivate the students.

DREAMBOX: Dreambox Learning Math is an interactive K-8 intelligent, adaptive and self-paced mathematics platform, used in the USA and Canada by nearly three million students and serving 120,000 teachers; it offers interesting hands-on activities based on the principle of game theory. It creates a personalized path for students based on the level they have reached and adapts this path as students learn. As learners complete the lessons, they earn coins, which can be used to play games or customize their avatars, wallpaper, and music (Carrie, 2020).

ALEKS: ALEKS stands for Assessment and LEarning in Knowledge Spaces; it is an adaptive learning system for mathematics, chemistry, and business, used in the USA by more than 25 million students throughout the world. At the core of Aleks is an artificial intelligence engine that evaluates each student individually and continuously. Aleks is only adaptive in the outer loop, where it reinforces mastery learning: students can only practice problems after they have mastered all the required prerequisites. Student interaction in Aleks is focused on selecting a skill to master (Benjamin, et al., 2018).

CLANED: CLANED is a collaborative application that creates a personal learning environment for each student; it suits schools, universities, and corporations; it is used by nearly two million students in 2 000 schools across India and 15 customer countries. In this environment, the students can study, collaborate and find learning materials that correspond to their individual needs and skills because CLANED builds on students' orientation and learning strengths and identifies areas of improvement.

LRNR: Lrnr is a cloud-based adaptive learning platform used in the united states; it integrates educational content with easy-to-use personal learning tools, interactive assessments, customized learning paths, and precise analysis to facilitate the delivery of personalized learning experiences that make studying and learning more powerful, efficient, and engaging. Lrnr works by continuously and

seamlessly collecting and analysing huge quantities of data in real-time as each student interacts with the platform. Then, using a sophisticated combination of cognitive analysis, artificial intelligence, machine learning in order to determine each student's strengths, weaknesses, knowledge gaps, and optimal combinations of instruction and content (Aravind, 2015).

KINTERACT: Kinteract is an assessment portfolio and platform that facilitates speedy feedback and collaboration between educators and their students and oldsters. Employed in the United Kingdom by many schools, Designed for college students between the ages of three and eighteen. Driven by artificial intelligence, KINTERACT, the digital learning platform permits following personal development and academic performance at any stage of the education journey.

EMBIBE: Embibe is a platform that allows students to maximize learning outcomes, used in India by 160 million subscribers. Among its many offerings: adaptive practice, university videos, user forums, news and information articles, and evaluation tests that help students prepare for various competitions. The platform supports different types of tests for all levels of learning. As with all adaptive teaching tools, Embibe works by personalizing mentoring and academic guidance, offering each student the course, assignments, and revisions most suited to their needs.

ZZISH: ZZISH is a platform that supports over two million students and 145,000 teachers in 170 countries. This tool allows teachers to quickly and easily access information on the classroom and student performance, so they can identify the most important learning gaps and help individuals learn better and faster based on their learning needs, more effectively than ever before. A powerful feature of Zzish is that, by displaying real-time data on the electronic whiteboard in a fun and engaging way, it can turn almost any application into an interesting game for the whole class.

REALIZEIT: Realizeit is an adaptive learning platform used in the United States; it enables one to understand critical learner factors, quickly create the right design and develop the learning product. A self-learning engine that continually shapes the experience to optimally deliver what each learner needs to maximize their achievement. The Brandon Hall Group acknowledged Realizeit as the winner of the 2020 Excellence in Technology Award. Realizeit has revolutionized the standard learning model by adaptively integrating science and technology

learning while preserving and amplifying the art of teaching and learning.

Table 1 : Pros, cons & price of fee-based platforms.

Platform	Pros	Cons	Prices
Knewton	High adaptivity. High customization	Limited content & low learner autonomy	39.95\$/single course, 79.95\$/multiple courses
Smartsparrow	High adaptivity. High learner autonomy	Limited pedagogical design style	39\$/month/author/30 students
Scootpad	High students monitoring	Dull and repetitive experience	3\$/year/student
Yokimi	High availability	A big difference in price between the premium and enhanced packages	9,99\$/month
Dreambox	High adaptivity	Annoying advertisements	12,95\$/month/student
Aleks	High learner autonomy & Integration with LMS	Privacy limitation	19,95\$/month
Claned	Fast & easy to use	Usability challenges (limited guidance)	Not provided
Lrnr	Engaging activities. Available on cloud & mobile	Limited learner autonomy	30\$ - 40\$/student/year/semester
Kinteract	Safe & Easy to use interface	The application crashes randomly	Not provided
Embibe	Easy to use interface	Android application needs improvement.	Not provided
Zzish	Real-time interaction	The application crashes randomly	5.75\$/teacher/month billed annually
Realizeit	High autonomy	Limited learner autonomy	Not provided

Table 1 represents a set of advantages and disadvantages of different fee-based adaptive e-learning platforms, as well as their prices.

4 DISCUSSION

After reviewing the adaptive e-learning systems presented previously, we found that some limitations of existing platforms are related to the privacy, repetitive contents, learner autonomy, or the need for feedback based on learners' social-emotional state. This says a mechanism of sentiment analysis during the learning process is needed for these platforms, as well as integrating more attractive and diverse content or different learning style will be useful to suit each learning path and enhance efficiency and performance.

From a technical angle, the platforms are characterized by a user-friendly environment, not requiring any technical or programming skills, an easy deployment as well as offering a wide range of customization options.

In addition, the fee-based platforms are featured with a high adaptivity, high assessment, and high collaboration, which means that the content can be adapted to the learner's data, with the capacity to assess learning in collaboration with the educator to maximize the engagement, such as Knewton, Smartsparrow, Scootpad, Dreambox, Aleks, and Zzish. However, most of these platforms are not mobile compatible and are expensive. That said Yokimi is a great mobile application, yet there is only a French version.

5 CONCLUSION

Educating means developing a person's potential to improve as a human being. Everyone seeks to learn more in order to improve in a field and to acquire new knowledge. Personalizing learning, skills, behaviours, and approaches in the traditional context means having a teacher for every student, which is not easy and requires strategy, reflection, and many resources. For this reason, adaptive e-learning platforms were developed. Adaptive e-learning is a combination of pedagogical techniques developed to provide students with a unique and personal experience, with the ultimate goal of increasing their learning abilities.

This research is an evaluation of different existing adaptive fee-based platforms that can be used by

teachers to produce customized courses, as well as students to better assimilate the lessons. From an educational perspective, the fee-based platforms provide an environment that understands the learners' differences and converts them into training content and processes that are suitable for each student. From a technical perspective, fee-based platforms are featured by a user-friendly environment that not require any technical or programming skills for deployment, high adaptivity, high user autonomy, and a real-time interactions, but most of these platforms are not mobile reactive.

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