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Influence Of Adaptive Learning On Learner Experiences In Higher Education

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Abstract: ***Education is now at a point whereby educational software is advanced enough that it can be more easily customized around the needs of students, educators and content creators. Adaptive learning is slowly gaining popularity in higher education due to the belief that it enhances student learning outcomes by providing personalized learning experiences .There is a strong belief that adaptive learning has potential to revolutionize higher education and change the landscape of higher education in the coming years .Instead of broad-based approach, students in higher education can have learning modules tailored around their specific needs, ways of learning and any learning difficulties they have .Adaptive learning is actually a departure from traditional pedagogical methods. Although many educators can see the benefits of adaptive learning the challenge is finding a way to implement it and to do so in a cost-effective way. Adaptive learning enables the learners to access study materials and study at their own pace and this improves student engagement with the study materials compared to traditional learning approaches Some of the challenges of adaptive learning systems is the lack of skills among instructors and learners on how to use the adaptive learning technologies. Lack of access to the internet by the learners is another challenge that limits their ability to access and use the adaptive learning systems This paper is based on the Technology Acceptance Model which is used to explain what influences the instructor and the learner to accept or reject educational technologies. By embracing adaptive learning universities can better support diverse needs of their students and help them reach their full potential, ultimately shaping the future of higher education for the better.***

Keywords: Adaptive Learning, Technologies, Instructor, Learner

I. INTRODUCTION

Days of one-on-one teaching in many higher institutions classrooms are largely gone. Adaptive and digital education can help fill the gap created by shift from one –on-one teaching by providing personalized learning experiences that cater to each student's unique needs and abilities. Adaptive learning has gained popularity within higher education given that it is believed to enhance student learning outcomes by providing personalized learning experiences. This allows learners to interact with course content at their own pace (Lim et al., 2023). In the quest to make education to be as effective, engaging and scalable as possible, adaptive learning technology is the tool that institutions are using to increase the efficacy of education while using limited resources. According to Weber (2019), adaptive learning provides learners with a personalized learning experience mainly in blended and online learning environments. In view of the virtual learning environment in which adaptive learning take place, Harmon (2016) argues that since online learning environments have limited in-person contact between the learners and the instructor, guiding learners who are at different levels of learning within the same class is a major concern to the instructor. Higher education offers students many opportunities to advance their career and develop the 21st century skills relevant to market demands.

Learners have different learning styles and the use of adaptive learning systems and technologies allows instructors to address the needs of individual learner styles (Gebhardt, 2018). The theoretical foundation of this paper is the

Technology Acceptance Model (TAM) which was developed by Davis (1989). it states that the adoption of technology by people is influenced by the perceived usefulness and the perceived ease of use of the technology. The TAM is relevant to this paper the instructor-learner interaction has significantly moved on to the virtual space and is now more technologically driven than ever before. Kenyan institutions of higher learning have also not been left behind in the pursuit of learner-centered education Studies that have been done on adaptive learning technologies that focus on cognitive learning styles have revealed a state of improved learning among students (Dhakshinamoorthy & Dhakshinamoorthy, 2019).

II. THE CONCEPT OF ADAPTIVE LEARNING AND ADAPTIVE LEARNING TECHNOLOGIES

Adaptive learning is a methodology for teaching and learning that strives to develop personalized lessons, course learning materials, learning activities and assessments for individual learners based on their current skills, knowledge and learning style (McGuire, 2021). Adaptive learning uses technology that incorporates artificial intelligence to create a more effective learning path based on the learner's characteristics such as knowledge and skill level. Therefore, adaptive learning technologies are the technological applications that are able to dynamically adjust to the level or type of course content based on an individual learner's abilities or skills in ways that accelerate a learner's performance with both automated and instructor interventions (Capuano & Caballe, 2020). Adaptive learning systems use algorithms to continuously analyze large volumes of data to detect which content and teaching methods a learner responds to best. This information is then used to develop learning materials that address learner skills gap, learning style and learning speed. Adaptive learning leverages data analytics and artificial intelligence to continually assess each students performance, strengths, weaknesses and learning preferences. Moreover, algorithms analyze data much faster than humans. Therefore students get the content, prompts and interventions all of which change in real time based on their individual needs and abilities Adaptive Learning Technologies (ALTs) enable learners to construct their knowledge and take ownership of their learning experiences (Yazon et al., 2012). ALTs can be accessed by the learner through the internet and they adjust to the learning style of the learner based on the learner's responses to questions. It is actually a form of goal-oriented requirements engineering that is able to personalize the learning process by focusing on the needs of the learner (White, 2020). This is because ALTs are able to provide each learner with course materials that match their learning styles and this allows a learner to study and learn at their own pace which makes the learning environment to become personalized.

Adaptive learning is a system that adjusts the content, pace and difficulty level of learning material in real time to meet the individual needs of the student. According to Harris (2023), this customized approach help students to learn more effectively and efficiently, leading to improved outcomes and higher levels of engagements. The findings of a study by Andrew et al. (2018) suggest that learners enjoy learning how to use new technologies. Therefore, user satisfaction and self-efficacy lead to learner usage intentions of an e-learning system. The implication of this is that instructors and learners will use e-learning technology if they perceive the technology to be useful to them, if the technology is easy to use and is supportive of their teaching and learning needs (Zogheib et al., 2015). A good example of an adaptive learning technology in Kenya is the M-Shule which is the first adaptive short messaging service (SMS) learning platform that is designed to improve performance of primary school learners across Kenya and sub-Saharan Africa. Another adaptive learning platform used in Kenya is Elimu Leo which is designed to provide adaptive learning for learners in mathematics. Other examples of adaptive learning platforms used around the world are EdApp, Adaptemy, Knewton, CogBooks, Mooc and Smart Sparrow.

III. TYPES OF CUSTOMIZATIONS FOR ADAPTIVE LEARNING

The exact form that adaptive learning takes depends on the platform that learners is using. However, the three most common types of customizations the learner will experience on adaptive learning platforms are; Adaptive Content which is the most basic adaptation where the learning experience is customized by adapting the course content based on the individual learner. This method of adaptive learning provides "hints" or feedback based on a learner's responses to questions but it does not necessarily change the overall sequence of the curriculum, Adaptive Sequencing or Pathways which uses key indicators of each learner's progress to adapt their individual learning pathway. For example, if a learner is struggling in a specific content area, the adaptive learning platform may add additional practice tests or activities and delay introducing a new topic until the current topic has been mastered by the learner. However, if the learner's level is advanced, the platform can accelerate the learner through the easier topics to get to more challenging course content. Some ALT platforms actually allow learners to choose what they want to learn next instead of putting the learner on a pre-defined learning path. Finally Adapted Assessment, it involves the ALT platform changing the type of questions of the difficulty of the questions in an assessment exercise based on the responses of the learner. This is a form of benchmarking that provides information to instructors on the progress the learners have made in relation to the expected learning outcomes.

IV. THE TECHNOLOGY ACCEPTANCE MODEL

The Technology Acceptance Model was first proposed by Davis (1989) and it is a popular model that can be used to predict the acceptance and use of technology by individuals. This model identifies two factors that influence a person's decision to accept or reject a technology. According to this model, the perceived usefulness and perceived ease of use of the ATLs in question have a direct influence on a person's technological acceptance or rejection. This implies that in the

context of higher education, the actual use of ALTs by instructors and learners is directly determined by their intention to use the technologies. What this means is that the intention to use the ATLs increases, the more likely that the instructors and learners wills actually use the technology. Therefore, if the instructor and learners perceive the ALTs to be useful in achieving their learning objectives and that the ALTs are user-friendly, then acceptance and use of the technologies will occur. However, it should be noted that intentions may not always guarantee that the instructor or learners will actually use the technology since other factors such as lack of access to the ALTs and lack of skills needed to use the technologies.

V. IMPORTANCE OF ADAPTIVE LEARNING

The most significant benefit of adaptive learning according to Liu et al. (2017) is that it makes learning to become more effective. This is because students have different learning styles and speeds and therefore adaptive learning helps to nurture the learner's unique needs for a more effective instructor-learner interaction. Adaptive learning allows the learners to study at their own pace and to be accelerated through topics that they have already mastered. This provides them with more time to focus on complex topics for which they need more time. Self spaced studies is flexible and it allows students to enjoy a better work – life balance, accommodating their unique schedules and learning preference. Adaptive learning also provides instructors with a structure that ensures course learning objectives, learning activities and learner assessments are aligned (Salman, 2018) and it shows learners how each topic or course content relates to the learning objectives. Since the ALTs are able to identify student weaknesses in certain topics, this information can enable instructors to identify the individual learners that may need additional learning materials or instructional support. Furthermore by continually assessing student's performance and adjusting the learning the learning material accordingly, adaptive learning helps students develop deeper understanding of the subject matter, leading to better test scores and overall academic performance (Harris, 2023).

The adaptive learning platforms are able to tailor learning pathways to the needs of the learners and this helps to increase practice opportunities for learners who may not have understood a particular topic. This is beneficial because it helps the learners to stay engaged with learning materials as it matches their style of learning (Hallstrom, 2017). Adaptive learning courseware can significantly reduce the amount of time a student takes to complete a course when evaluation of prior knowledge shows mastery of that content. The individualized learning pathway provided by the adaptive learning courseware can allow the student to move forward to the next module at a pace that is suitable for him or her. If gaps in knowledge are revealed, a robust adaptive learning platform provides remediation as needed, including appropriate feedback. Lastly, ALTs are a cost-effective replacement for the expensive textbooks that institutions have to purchase in the traditional learning approaches of learning in a physical classroom. Another significant importance of ALTs is that they provide instructor with unlimited access to the performance data of their learners and through this data, instructors gain insights on what learner difficulties they need to address in a one to one session and this according to Sharma (2019) helps instructors to be more efficient and pragmatic in their teaching.

Adaptive learning offers personalized educational materials that cater to each student's unique needs. In contrast, traditional education often employs a one-size –fits all approach, which may not be suitable for all students particularly those who struggle with specific subjects or have unique learning styles. It tailors the learning experiences to the individual student, ensuring that each student receives the support they need to succeed. This is especially important in a world of free- lance where specialized skills are in demand. Finally digital education allows for quicker feedback, enabling students to identify areas for improvement and adjust their learning strategies accordingly.

VI. CHALLENGES OF ADAPTIVE LEARNING

The implementation of adaptive learning requires access to the necessary technological infrastructure such as reliable internet connections and devices for students and teachers. This can be a challenge to lower – income and underserved communities. Adaptive learning has its own set of challenges which can limit its adoption by educational institutions as observed by (Barkar, 2022). Some of these challenges include difficulty in convincing instructors that ALTs are the future of learning. This is because many instructors may not be willing to change their method of instruction because they may also not have experience and the skills needed to use the ALTs effectively. It is also difficult for the instructor to verify if the learner is the person who has accessed the learning materials and done the practice tests since it is possible for the learner to have another person do the assessments for him or her. Offering education to learners using ALTs can also be expensive because designing an adaptive learning platform demands the use of the right tools and Hummels (2020) is of the opinion that there are many vendors of ALTs in the market and this puts educational institutions at a high risk of purchasing and using ALTs which still lack any solid evidence of their effectiveness.

It is also possible that with the ALTs becoming more common, instructors may confuse adaptive learning to be a total replacement for instructor teaching. This may lead the instructors to reduce their interaction with learners of the adaptive learning platforms. Adaptive learning platforms also offer customized content for learners and this requires the instructors to create multiple iterations for one course topic. This means that some versions of the content will focus on visual aspects, others on active learning and others may allow for passive learning. Rahil (2021) argues that making many different versions of the learning content to cater for the different learner capabilities can be tiresome and time consuming for instructors. The ALTs provide instructors with a huge amount of data on learner progress and capabilities and this requires the instructors to have data analysis skills to be able to make accurate deductions from the graphs and charts

generated by the adaptive learning platforms. However, the instructors may not have the required data analysis knowledge and skills leading to poor analysis of the data (Jaffar, 2020). Resistance from parents and other stake holders to embrace new technologies and approaches and students also may deem the whole process as demanding. Another challenge for educational institutions is how to deal with the varied stakeholder reactions to the use of ATLs in learning (Venant, 2019). This is based on the argument that students who are so used to learning from a teacher may resist the shift to learning through ALTs.

Some parents may also be skeptical to hear that their children can be taught effectively through learning materials that are dependent on algorithms. These issues can significantly limit the adoption of ATLs in educational institutions if the insecurities of the key stakeholders are not addressed effectively. The adaptive learning technology field is also still very young such that there are no set standards for these ALTs. This can result in confusion for those wanting to implement this new technology. Some ALTs offer some adaptive opportunities, but the adaptive options vary significantly from system to system (Deborah et al., 2021). Many of the fully adaptive learning platforms do not offer student-to-student interaction, and this makes it difficult for the learner to develop collaboration skills.

According to Harris (2023), the successful implementation of adaptive learning requires teachers to amend their instructional strategies and incorporate technology into their classrooms. Providing teachers with the needed training and support is crucial to ensure that they can effectively use adaptive learning systems to enhance their students learning experiences. Finally developing and maintaining adaptive learning systems can be expensive, data privacy and security can be a great challenge. For instance, living in a data driven world with bad actors and willing to gain access to that data raises concerns about privacy and security.Therefore ensuring the responsible use and protection of data is critical to maintaining the confidence of students, parents and educators.

VI. CONCLUSION

Adaptive learning systems are accessible through the internet and this gives the learners flexibility of accessing the learning materials when they are ready to learn. This enhances student-centered learning, promotes learning autonomy while at the same time encouraging self-regulated learning (Kerr, 2016). There is an urgent need to put more focus on training the instructors and learners on how the ALTs work in order to reduce resistance to change and enhance technology acceptance. Instructor training is key to the successful adaptive learning. Tesene (2018) suggests that educational institutions should organize adaptive learning workshops to foster stakeholder buy-n and commitment. This is because without stakeholder buy-in, it is highly unlikely that a successful outcome will occur.

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