ANALYSIS OF THE HYBRID ADAPTIVE LEARNING MODEL IN HIGHER EDUCATION

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Abstract: Hybrid adaptive learning in higher education is a strategy that combines in-person and online teaching to create personalized learning experiences for each student. Within this strategy, it is important to consider the different learning styles of students, such as visual, auditory and kinesthetic styles, to achieve effective adaptation of teaching.

Literature has demonstrated the effectiveness of using technology in hybrid adaptive learning and its ability to adapt to different student learning styles. Teachers also play an important role in hybrid adaptive learning, as they must monitor and guide students' progress online and in the classroom.

The use of a learning platform that includes elements of artificial intelligence and machine learning can be a useful tool in adapting learning to the different learning styles of students. However, it is important that decision-making regarding adaptation of learning is a collaborative process that involves both teachers and students.

In this context, hybrid adaptive learning is an effective strategy to create personalized learning experiences that consider the different learning styles of students. The use of technology, collaboration between teachers and students, and data-driven decision making can significantly improve student learning.

Keywords: adaptive learning, higher education, educational technologies, personalization of learning, machine learning.

INTRODUCTION

The problem of visual, auditory, kinesthetic learning styles, among others in the hybrid adaptive learning model in higher education [1] is related to the difficulty in adapting teaching materials to the learning styles of students in a learning environment. Many students have different learning styles and it can be difficult to design teaching resources that suit all needs.

Some studies have shown that adapting teaching to students' learning styles can improve learning and academic performance [2], while others have found contradictory or no results [3]. Additionally, adapting instruction to learning styles can be difficult to implement in a hybrid learning environment, where students may be learning online or in the classroom, and where teaching resources and activities may vary.

Therefore, the problem of visual, auditory, kinesthetic learning styles, among others, in hybrid adaptive learning in higher education requires a careful review of the empirical literature and the identification of effective strategies to adapt teaching to the students. different learning styles of students in a learning environment that can satisfy the requirements of each student according to their learning style by designing a student-centered learning strategy.

Diversity in learning style is a reality in any educational environment. Students have different preferences and ways of processing and remembering information. The visual, auditory and kinesthetic learning styles are the best known and have been widely studied in educational literature, however, there are other types of learning that are considered, but it depends on the author who mentions them.

In the context of hybrid adaptive learning in higher education, individual learning preferences can be identified and used to deliver a personalized and effective learning experience for each student. Student-centered learning is especially important in the hybrid environment, where students may have different needs and skill levels in the knowledge acquisition process.

A common strategy for adapting learning content is to use different types of media to present information, such as images and

videos for visual learners, audio recordings for auditory learners, and hands-on activities and learning experiences for kinesthetic learners, among others. In addition, various technological tools can be used to adapt the presentation of the material, such as machine learning algorithms to recommend personalized content and data analysis to identify individual learning patterns.

A study conducted found that adapting the user interface in online learning environments significantly improved the learning experience and information retention [4]. Furthermore, the use of gamification techniques, such as incorporating game elements into learning, can also adapt to individual learning styles and improve student motivation and engagement [5].

Importantly, the identification of learning styles and the adaptation of content and presentation of material must be considered in the context of the learning objective and expected learning outcomes. Adapting learning material to individual learning styles can be effective in improving initial understanding of the material, but does not necessarily improve long-term retention or transfer of knowledge [6].

Adapting visual, auditory, kinesthetic learning styles, among others in hybrid adaptive learning in higher education can significantly improve the learning experience of students.

METHOD

The method to address the problem of visual, auditory, kinesthetic learning styles, among others, in hybrid adaptive learning in higher education must include different research approaches, such as the systematic review of empirical literature, conducting studies experimental [7] or quasi-experimental [8], the observation and analysis of teaching practices in hybrid environments,

among others.

A possible methodological strategy is to carry out a systematic review of the empirical literature, in order to identify studies that have examined the relationship between learning styles and hybrid adaptive learning in order to focus on higher education. The systematic review may include searching for relevant studies in specialized databases, selecting studies according to predefined inclusion and exclusion criteria, and synthesizing the results of the included studies.

Another possible strategy is to conduct experimental or quasi-experimental studies that compare the effects of different strategies for adapting teaching to learning styles in hybrid environments. These studies may include randomly selecting groups of students, applying different teaching strategies, and measuring learning and academic performance.

Observation and analysis of teaching practices in hybrid environments may also be useful, in order to identify effective patterns and strategies for adapting teaching to different learning styles. This strategy may include direct observation of classes, interviews with teachers and students, and analysis of teaching materials used in the hybrid environment.

In general, the methodology to address the problems of visual, auditory, kinesthetic learning styles, among others in hybrid adaptive learning in higher education, must be rigorous and based on empirical evidence, with the aim of identifying effective and practical strategies. teaching methods that can improve student learning and academic performance in hybrid environments.

After the analysis of the information obtained on hybrid adaptive learning, the methodology that was decided to analyze is the "HYBRID ADAPTIVE LEARNING MODEL IN HIGHER EDUCATION" which consists of the following elements:

TRAINING PROJECT

The training project focused on visual, auditory, and kinesthetic learning styles, among others in hybrid adaptive learning in higher education, is of great value for teachers and students. The main objective of the training project is to provide teachers and students with the necessary tools and skills to adapt their teaching and learning to the different learning styles of students.

In the training project, the main thing is to design and develop hybrid adaptive learning strategies that can adapt to the learning styles of the students. This involves the implementation of techniques and tools that allow the student to actively participate in their learning process, through the combination of practical and theoretical activities, as well as the integration of didactic resources.

In addition, clear and measurable learning objectives must be established, and student progress must be continually evaluated, in order to make adjustments to the teaching approach and adapt learning to the individual needs of each student.

Another important aspect of the training project is to encourage collaboration between students, encouraging group activities and discussion in forums or virtual spaces. This allows students to share their knowledge and experiences, and learn from their peers.

TYPES OF LEARNING

The types of learning in hybrid adaptive learning in higher education is crucial for the success of the teaching-learning process. Students have different ways of learning and processing information, so it is important for teachers and learning platforms to adapt content and teaching strategies to different learning styles.

For the visual learning style, images, videos, and graphs can be used to make information easier to understand. For auditory learning style, audio recordings and detailed verbal explanations can be provided. For the kinesthetic learning style, hands-on activities and exercises involving movement and manipulation of objects can be provided.

It is important to note that many students have a mix of learning styles and may prefer different approaches depending on the topic or task. Therefore, it is necessary to offer a variety of options and tools so that students can choose what best suits their individual needs.

It is necessary to understand different learning styles and adapt teaching content and strategies accordingly, this is essential for the success of hybrid adaptive learning.

LEARNING PLATFORM

The learning platform plays a critical role in implementing a hybrid adaptive learning model approach in higher education that takes into account student learning styles. Its functionality is to provide a personalized, accessible, interactive learning experience that allows the monitoring and evaluation of the student's progress.

First, the platform must enable student-centered learning by achieving personalization of learning to adapt to the different learning styles of students. This implies the possibility of adapting learning materials and practical activities according to the needs of each student.

Secondly, the platform must be easily accessible and available to students at any time and from anywhere. This implies the possibility of accessing the platform online or offline, and from different devices.

Thirdly, the platform must be interactive and allow the active participation of the student in their learning process. This involves the ability to ask questions, receive immediate feedback, and participate in hands-on activities.

Fourth, the platform must include a variety of learning materials in different formats, such as text, images, audio and video, to adapt to different learning styles of students. This is known as multimodality.

Last but not least, the platform must allow the monitoring and evaluation of the student's progress, and provide feedback to improve their learning process. This implies the possibility of evaluating the student's performance in different activities and providing feedback to improve their learning.

In summary, to effectively implement a hybrid adaptive learning approach in higher education that takes learning styles into account, an appropriate learning platform is necessary. The learning platform must include the following features:

- Personalization: The platform must allow personalization of learning to adapt to the different learning styles of students. This may include the ability to adapt learning materials and practical activities.

- Accessibility: The platform must be easily accessible and available to students at any time and from anywhere, whether online or offline.

- Interactivity: the platform must be interactive and allow the active participation of the student in their learning process. This may include the ability to ask questions, receive immediate feedback, and participate in hands-on activities.

- Multimodality: The platform must include a variety of learning materials in different formats, including text, images, audio and video, to adapt to the different learning styles of students.

- Monitoring and evaluation: the platform must allow the monitoring and evaluation of the student's progress, and provide feedback to improve their learning process.

Some learning platforms that can meet these characteristics include Moodle, Blackboard, Canvas, among others. These platforms can also be integrated with additional tools and technologies to enhance the student learning experience, such as video conferencing, digital whiteboards, and hands-on online activities.

DECISION MAKING

In the context of learning styles in the hybrid adaptive learning model in higher education, decision making plays a fundamental role in personalizing the learning experience of students.

The use of machine learning techniques allows the collection of data on student performance and learning preferences. This data can be analyzed to provide valuable information about student progress, as well as to identify areas of difficulty and strength.

The data can also be used to identify students' preferred learning styles and adapt content and teaching strategy accordingly. This allows for greater personalization of the learning process and a more effective experience for each student.

Ultimately, making decisions based on data collected and analyzed through the use of machine learning techniques can help improve the effectiveness of the learning process, which in turn can increase knowledge retention and motivation of students. the students.

It is important to highlight that decision-making in the context of hybrid adaptive learning must be guided by experts in education and in the area of technology, in order to ensure that the decisions made are appropriate and effective for the students' learning process.

MACHINE LEARNING

In the context of learning styles in the hybrid adaptive learning model in higher education, the role of machine learning is to provide algorithms and techniques that allow the learning process to be adapted to the needs and preferences of each student, based on their learning style [9].

By collecting data on student performance in different learning activities, machine learning can analyze behavioral patterns and individual learning preferences. This way, the content and teaching strategy can be personalized, according to the needs of each student.

Additionally, machine learning can help identify the difficulties students face and provide timely and accurate feedback, so that students can address their weaknesses and strengthen their knowledge. You can also provide personalized recommendations for additional learning activities to help students consolidate their knowledge.

Machine learning is a key component in creating a hybrid adaptive learning system in higher education that adapts to students' learning styles, allowing for a more effective and personalized learning experience.

TEACHER

The role of the teacher in hybrid adaptive learning in higher education considering learning styles is essential to ensure an effective and personalized learning experience for each student. Teachers must be able to identify the different learning styles of their students and adapt their teaching strategies to meet their individual needs.

In hybrid adaptive learning, teachers can use educational technologies to provide visual and auditory learning materials that fit the needs of students. They can also implement hands-on activities and learning experiences that engage the student in the learning process, which benefits those who prefer the kinesthetic style.

Additionally, teachers can encourage self-learning and student autonomy by providing additional educational resources and offering personalized, student-specific feedback. This feedback can be provided through educational technologies, as well as through group discussions or individual tutoring sessions.

The teacher in hybrid adaptive learning is key to identifying and adapting teaching strategies to the different learning styles of students, encouraging self-learning and autonomy, and offering personalized and specific feedback for each student.

DISCUSSION AND ANALYSIS OF RESULTS

The implementation of hybrid adaptive learning in higher education, through the combination of face-to-face education and online platforms, offers a wide range of opportunities in the teaching-learning process, showing itself to be an effective tool to enhance the acquisition of knowledge by of the students. The results of this research suggest that the incorporation of these technologies can have a positive impact on students' academic performance.

The integration of hybrid adaptive learning platforms in higher education offers students the possibility of advancing at their own pace taking into account their level of knowledge and skills. This provides them with greater autonomy and control over their learning process. Likewise, these platforms allow teachers to more precisely identify the strengths and competencies of each student, which allows them to adjust their teaching strategy according to student-centered learning.

The use of ICTs, TAC and TEP provides students with an environment where they can experiment and apply the theoretical concepts

acquired in the classroom, which enriches their understanding of the subject in a deeper and more meaningful way. Additionally, these tools provide students with the opportunity to collaborate as a team and develop social and group work skills.

Despite the advantages of hybrid adaptive learning in higher education, it is essential to consider that its implementation entails challenges. Adequate training of teachers is required so that they can use these tools effectively and adjust their pedagogical approach to address the individual needs of each student. Additionally, it is crucial to ensure that all students have access to these technologies for successful implementation.

CONCLUSIONS

Learning styles are important considerations in the design and implementation of hybrid adaptive learning strategies in higher education, adaptive approaches that take learning styles into account can improve learning effectiveness and knowledge retention, learning platforms Learning in the hybrid adaptive learning model in higher education can leverage machine learning technology and data-driven decision making to personalize students' learning experience based on their learning styles. Teachers can play an important role in identifying students' learning styles and creating learning environments that suit individual students' needs.

It must be considered that not all students fit a single learning style, but may prefer a combination of styles. Therefore, it is essential that the identification of learning styles is an integral part of a broader process of adaptation of learning and that multiple teaching strategies are used to reach all students, if we add to this machine learning technologies. and data-driven decision making can be used to personalize students' learning experience based on knowledge acquisition, while teachers can play an important role in identifying learning styles and creating adaptive learning environments.

The introduction of hybrid adaptive learning in higher education poses additional challenges related to infrastructure, technology availability, teacher training, and the decision-making process. It is imperative to ensure that adequate resources and support are in place to carry out a successful implementation.

The implementation of hybrid adaptive learning in higher education is presented as an invaluable tool to raise the educational quality and academic performance of students. It is essential to continue investigating new strategies and resources that enhance their effective implementation and, thus, perfect the teaching and learning process.

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