Innovative Remedial Teaching System: Identifying Slow Learners Using Quiz-Based Classification and Interactive Visualizations

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Abstract. The paper deals with a comprehensive methodology for the identification of slow learning students for remedial teaching and skill development. The slow learners face difficulties in the understanding of concepts and require more time and diversified teaching techniques. The approach presented here focuses on early and accurate identification of slow learners by modern technology, data analysis, and personalized learning plans. A quiz-based classifier combined with a 3D interactive model allows for the student to receive personally tailored recommendations and study material. There is also a visual dashboard that can be used by the teacher for monitoring the performance and engagement of the students and thereby offering further support. The proposed system will improve academic performance, foster innovative teaching methods, and enable equitable access to education for all its students.

I. INTRODUCTION

Today, diversity in the educational environment is recorded in ways with which students interact and assimilate knowledge. The most important issue with educators is to figure out who the slow learners are and how to train them. These are students who need more time and distinct approaches to grasping basic concepts and therefore end up with substantial gaps in their knowledge and general results in school. Left unaddressed, these gaps create low self-esteem, lack of motivation, and increased dropout rates. Recent studies indicate the importance of learning strategies tailored - Those that adjust to unique learners' learning styles and the different speeds at which people learn. It is possible now for early acknowledgment of special needs so that teachers can devise targeted interventions that will give them what they need. The remedial instruction is less difficult if detected early, but early detection also boosts the confidence of students in taking charge of their own education. This paper reveals a holistic system that identifies slow learners by utilizing data analytics and a host of modern technologies to educate them in real time by adjusting the materials to resolve this pervasive problem.

An interactive quiz designed to measure the learning preferences and speeds of students forms the very nucleus of this approach. The system classifies learners into fast, average, and slow groups depending on the scores they obtain from the quizzes. This means that the teacher can provide specific recommendations or learning materials for every student based on need, hence ensuring comprehension and retention. This research has implications that go beyond the classroom, supporting an equitable and welcoming learning environment. By focusing on innovative practices that address the diverse needs of all students, we aim to create a more supportive and effective learning experience. This initiative ultimately seeks to improve academic outcomes for slow learners, bridging the achievement gap and reducing dropout rates, ensuring that every student can succeed.

II.RESEARCH METHODOLOGY

This project is multifaceted in approach and includes improving the process of learning by identifying slow learners and providing students with tailored support and education. It involves several methodologies

divided into several key aspects-all targeting different levels of learner assessment and engagement.

Assessment of Learners through Quiz Outcomes: We start by administering a self-administered quiz for the students during our course. We prepare this test to measure the learning style and speed of mastering attained by the participants. We are therefore able to categorize the same students into three categories as slow, average, and fast. It operates through a scoring method that consists of using variables like accuracy of the answers, time used in completing the quiz, and response patterns. For instance, those with a score of 75% and above are classified as fast learners, while those scoring below 40% are identified as slow learners; others fall into the average category. This data-driven approach then provides insight into special learning needs about every learner, allowing the smooth flow of subsequent interventions in the process.

Tailored Learning Suggestions with 3D Interactive Display: Following the classification stage, the system provides learner-specific recommendations on learning based on this classification, allowing one to give an individualized plan to each learner. Examples of such recommendations include resource lists that are thoughtfully selected for the learners, appropriate study strategies, and an innovative 3D interactive model designed to help the learner visualize some complex concepts. A 3D model is a dynamic tool that engages learners to interact with the subject matter in some tangible ways to improve their understanding. This set of differentiated resources deals with the needs found, and the whole methodology will help create a much more conducive learning environment where topics may be accessed at a student's own pace and in line with each one's preferred learning style.

Displaying Student Performance: Our approach has a critical component in using dashboards to track and show indicators of student performance. In this, all components of learning will be captured, such as quiz results or overall progress rates. These will be used by teachers to monitor different levels of engagement, and places where additional support may be required. Therefore, through analysis of these trends in performance, educators can adapt teaching styles and interventions that will meet the requirements of each learner distinctly. The dashboards also enhance transparency and accountability since students will be held accountable for their own learning processes, thus setting up achievable learning goals.

Educational Chat-bot and Student Forum: Towards the end, the project has an educational chatbot that gives correct answers from intelligent feedback responses to topics raised by the students themselves on relevant topics. This AI-driven chatbot uses natural language processing of student questions and responds them accurately and promptly as well as in relation to course materials, learning strategies and other related matters. Such support, by instantaneous approach could help students' clear obstructive barriers and deepen their knowledge. There is also the student forum where the learners can post their questions and thoughts; this will encourage interaction with other students who can comment on the posted questions with different perspectives. The combination of the insightful chatbot and the engaging forum creates a learner-centered learning community, supporting students to participate actively with sharing knowledge resulting in an overall enriching educational experience.

III.THEORY & CALCULATION

Grading scholars is done based on the achievement of scholars in quizzes to distinguish their respective learning groups. The standardized quiz grades rank scholars' aptitudes, therefore becoming the basis for the judgment of scholars regarding their mastery of the subject matter. Guidelines of grading can easily be summarized-the scholars, who scored 40 or lower, fall under the category of being a slow learner, which also means that they need new support and adapted teaching methodologies. The individuals falling between 41 to 74 are average learners in that they require standard literacy tools and challenge them to add to their knowledge.

The scholars scoring 75 and above are classified as fast learners in that they have excellent assimilation of course content and can comfortably access advanced content. Every learner gets recommendations for customized videos after this classification. While average learners are provided with educational videos for improving their appreciation, fast learners are transferred to advanced accoutrements that encourage deeper disquisition and commerce with the subject matter. Slow learners are provided with videos that concentrate on introductory generalities to make their understanding. Utilizing a systematic system for calculation and bracket, all scholars will be availed of the right help and accoutrements according to their unique literacy conditions.

IV. RESULTS AND DISCUSSION

Implementing this system will have several paramount benefits which can very much impact the educational landscape. One of the key benefits is identifying learners who lag early on, which would have otherwise been lost to forgetfulness in traditional classrooms. This system allows for how scholars are grouped to be determined by the results of the interaction quizzes, and because of this, instructors can intervene immediately, giving focused remedial intervention tailored for each learner's needs. This radical method allows scholars to fall before the event and creates a more probative literacy terrain. Another significant aspect that varies pupil engagement is the inclusion of a 3D interactive model in the literacy experience. Studies have come to conclude that visual literacy aids, in this case, particularly 3D models, appeal to pupils who absorb effects more through their visual representation. By allowing students to deconstruct and question sensitive issues, these models make abstract generalities both better understandable and clearer. This enables them to understand simultaneously as well as the provocation and interest of the scholars, which forces them to claw further into the material.

The dashboard feature of the system provides real-time feedback tools for preceptors to make it easy for them to see and know exactly where each student is at each point in time. This would ensure that preceptors can appropriately focus on performance-based criteria such as quiz scores, time spent, and other situations related to overall engagement. This ensures that preceptors can easily identify trends and make informed opinions regarding assignment adaptations. As co-facilitators embody instruction based on individual performance, they can tailor their tutoring approaches best, ultimately resulting in improved academic challenges. The justified literacy plans along with the exciting coffers will also help scholars feel more responsible for their education. As they view improvements from dashboards and receive formative feedback from this learning chatbot, scholars are more likely to take charge of their literacy trip. Such scholars who carry this sense of agency have a more likely propensity toward a growth mindset; they work toward greatness and acknowledge their eventual use for improvement.

V. CONCLUSIONS

This learner bracket system creation, therefore, adds significantly to the educational practices with early discovery of slow learners and substantiated guidance by ensuring that every pupil has support to succeed anyhow of how snappily they pick effects up. 3D models and interactive dashboards add to the literacy experience even further. These slice-edge features do not only keep scholars interested but also give preceptors perceptive information on how well their pupils are performing, thus allowing them timely interventions and changes to their tutoring styles.

The system, too, encourages scholars to make use of the educational chatbot as a backing tool and join a pupil forum where one can ask questions and share in exchanges; thus, it stimulates a culture of cooperation and support. Scholars are best positioned to share gestures and courage, which creates a sense of community and increases literacy. In the long run, this will close the achievement gap and lower powerhouse rates through giving all scholars indifferent access to any great education. Lastly, by looking into the different needs of scholars, it ensures that every student is adequately equipped with an equal opportunity to succeed in the competitive world through offering preparation on potential future academic challenges and continued literacy.

DECLARATIONS

Competing Interests

The authors declare that there are no potential conflicts of interest associated with this publication.

HUMAN AND ANIMAL RELATED STUDY

This research did not involve human or animal subjects.

Ethical Approval

Ethical approval is not required for this study.

Informed Consent

Informed consent was obtained from all participants involved in this research. A statement affirming the participants' consent to publish this research work is available.

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