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Published by:
Academy of Language Studies, Universiti Teknologi MARA
Cawangan Johor, Kampus Pasir Gudang, Jalan Purnama,
Bandar Seri Alam, 81750 Masai, Johor Darul Ta'zim.
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e-ISBN : 978-967-0033-31-0

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Preface

Pioneering Educational Perspectives: Series 2025 is a collection of thought-provoking insights and research contributions exploring contemporary educational trends and practices. This eBook presents a diverse range of perspectives on innovative teaching methodologies, digital learning strategies, and transformative approaches in education. Designed to serve as a resource for educators, researchers, and practitioners, it aims to inspire meaningful discussions and advancements in the field. Through carefully curated chapters, this publication offers fresh ideas and practical solutions to enhance learning experiences in an ever-evolving educational landscape.

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IDENTIFYING STUDENT AT-RISK VIA BEHAVIORAL RECOGNITION AND LEARNING ANALYTICS DASHBOARD

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ABSTRACT

This paper proposes a novel educational technology solution that leverages behavioral recognition and learning analytics to identify students at risk of academic difficulties or emotional challenges across various educational levels, from primary schools to universities. By combining advanced data analysis techniques with generative AI, the system aims to provide early intervention strategies, personalized support, and actionable insights for educators to enhance their understanding of student learning patterns and improve overall educational outcomes.

KEYWORDS: Student At-Risk, Learning Analytics, Behavioral Recognition, Generative Artificial Intelligence, Educational Technology.

PROBLEM AND OBJECTIVE

An at-risk student is a student who is faces challenges in meeting academic or social expectations, or in completing their high school education. These students often need additional support and resources to help them to succeed in school (Winton, 2023). In today's rapidly evolving educational landscape, there is an urgent need for effective tools to identify and support students who may be struggling academically or emotionally. Within Malaysia, there has been an increased in the dropout rates in secondary school (Rahim, Vethasalam, Gimino, & Teh, 2023). Traditional methods of identifying at-risk students often rely on subjective assessments and can be time-consuming and resource intensive. This application presents a novel approach that utilizes behavioural recognition, learning analytics, and generative AI to provide a more objective, data-driven, and insightful method for identifying students at risk across different educational levels. The solution aims to solve the following challenges:

1. Early identification of at-risk students: Traditional methods of identifying at-risk students can be reactive and may not provide early intervention opportunities.
2. Personalized support: Students at risk often require tailored support to address their specific needs, which can be challenging to provide without effective identification methods.
3. Teacher workload: Identifying at-risk students can be time-consuming for teachers, diverting their attention from instructional activities (O'Donnell, Sharp, Wade, & O'Donell, 2013; Mosier, 2018).
4. Lack of actionable insights: Educators may struggle to interpret and apply learning analytics data to improve their teaching practices (The State of The Sector 2023, 2023).
5. Adaptability to different educational levels: Identifying at-risk students requires considering age-appropriate behaviours and learning metrics across various educational contexts.

The objectives of the design are:

6. To develop a system for behavioural recognition and learning analytics: Create a

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technology-driven solution that can analyse student behaviour and learning data to identify at-risk students.
7. To provide early intervention strategies: Offer targeted support and resources to at-risk students to prevent academic and emotional difficulties.
8. To reduce teacher workload: Automate the process of identifying at-risk students, freeing up teacher time for instruction and personalized support.
9. To improve student outcomes: Enhance academic achievement and overall well-being for at-risk students.
10. To provide actionable insights for educators: Utilize generative AI to generate personalized feedback and recommendations based on the learning analytics data.

DESIGN DESCRIPTION

The design consists of three components: learning analytics dashboard, behavioural recognition models and generative artificial intelligence (AI). The behaviour recognition models are designed to provide insights into student behaviour and emotions in class. Cameras are installed in the classroom to capture recordings of a lesson, which will be analysed by the models. The learning analytics dashboard is designed to act as a central hub for educators to record and access students' data such as their academic performance, attendance, and behaviour in class. The generative AI will be used to provide educators with actionable insights and interventions strategies to assist students at-risk using learning analytics data.

VISUALS

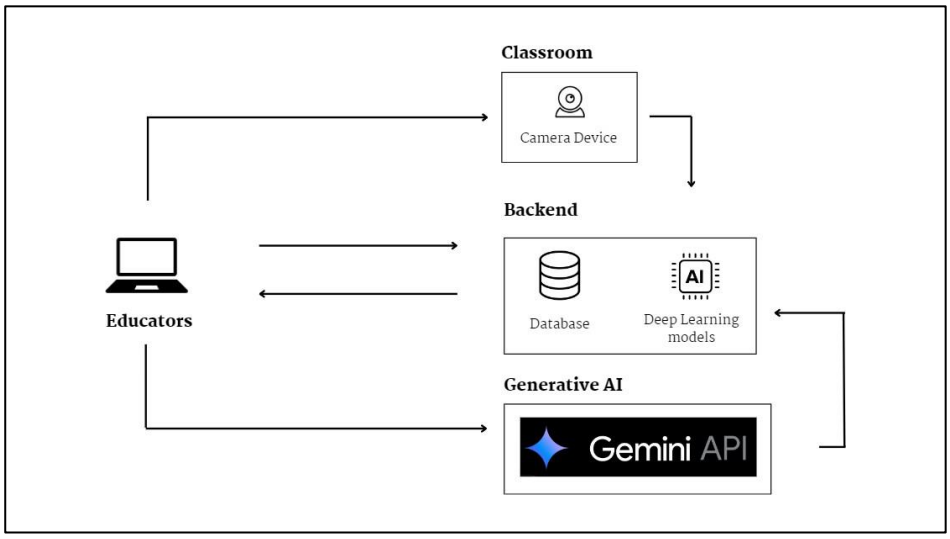


Figure 1: High level overview of design

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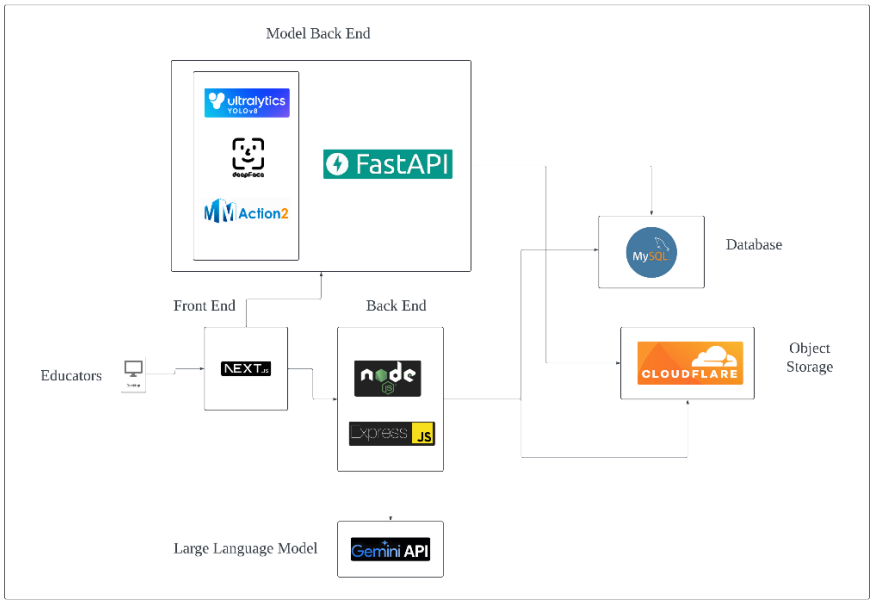


Figure 2: Technology Stack of design

NOVELTY AND UNIQUENESS

The novelty of this approach lies in its combination of behavioural recognition, learning analytics, and generative AI. By analysing a wide range of data points, including student interactions, engagement levels, and academic performance, the system can provide a more comprehensive and accurate assessment of students' risk status. Additionally, the integration of generative AI allows the system to provide educators with actionable insights and recommendations tailored to their specific needs.

BENEFITS TO MANKIND

1. Improved student outcomes: Early identification and intervention can help prevent academic and emotional difficulties, leading to improved student performance and overall well-being.
2. Personalized support: The system can provide tailored support and resources based on individual student needs, enhancing the effectiveness of interventions.
3. Reduced teacher workload: By automating the process of identifying at-risk students, teachers can focus on providing personalized support and instruction.
4. Data-driven decision-making: The system provides educators with data-driven insights to inform their decision-making and improve educational practices.
5. Enhanced teacher understanding: Generative AI can provide educators with personalized feedback and recommendations based on the learning analytics data, helping them better understand student learning patterns and tailor their instruction accordingly.

COMMERCIAL POTENTIAL

The commercialization potential of this technology is significant. Schools and educational institutions are increasingly seeking innovative solutions to improve student outcomes and address the challenges of identifying and supporting at-risk students. The system could be marketed as a software as a service (SaaS) for educational institutions looking to enhance their school's ability to provide personalized support, improve student success, and address the needs of students at different educational levels. Additionally, there is also a potential to collaborate with Malaysia’s Ministry of Education and Higher Education to implement the technology in government schools and IPTA (Malaysia Institute of Higher Learning)

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CONCLUSION

This innovative educational technology solution aligns closely with SDG 4: Quality Education, which aims to ensure inclusive and equitable quality education for all. By providing early identification, personalized support, and actionable insights for educators, the system contributes to reducing educational inequalities and improving the overall quality of education. Through its ability to enhance student outcomes, promote inclusive learning environments, and empower educators with data-driven decision-making, this technology has the potential to make a significant impact on the lives of students and communities worldwide.

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