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Exploring the Effectiveness of Remedial Programs and Technology in Overcoming Learning Barriers in Secondary Education

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Abstract—*This study explores the impact of remediation programs and technology integration on addressing learning difficulties among secondary school students. With the rise of digital tools and innovative teaching strategies, many students continue to face significant academic challenges, particularly in subjects like mathematics, English, and physics. This research aims to assess how combining these educational innovations influences student motivation, comprehension, and academic performance. Utilizing a case study approach, the research was conducted at MA LUBBUL LABIB Probolinggo, a secondary school that has implemented both remediation programs and technology-based learning strategies. Data collection methods included participatory observation, in-depth interviews with students, teachers, and administrators, and document analysis of academic performance and teaching materials. The study found that students who participated in the remediation program reported increased confidence, motivation, and improved academic outcomes. Furthermore, the integration of technology was shown to enhance student engagement by facilitating independent learning and immediate feedback. These findings suggest that a combined approach of remediation and technology can effectively address learning difficulties, particularly in diverse educational settings. This research contributes to a deeper understanding of how educational innovations can be implemented to improve student success and provides valuable insights for educators and policymakers aiming to enhance the learning experience in secondary education.*

Keywords— *Remedial Learning, Technology Integration, Student Motivation*

1 Introduction

In recent years, the digital revolution has transformed not only how we communicate, but also how we learn. Yet, despite these advancements, many students still struggle to bridge the gap between innovative teaching methods and their personal learning challenges. How can education systems effectively incorporate technology and new pedagogical strategies to address these ongoing issues? This question lies at the heart of the current debate on educational reform, which seeks to understand how digital tools, such as remediation programs, can be leveraged to overcome learning difficulties [1]–[3]. With technology now an integral part of the classroom, it becomes crucial to assess whether these innovations are truly bridging the learning divide or simply compounding existing challenges. The dynamic intersection of technology, pedagogy, and student motivation presents an exciting yet complex area for research, offering both challenges and opportunities for educational advancement [4]–[6].

Educational systems around the world are rapidly adopting new teaching strategies to address persistent learning difficulties among students. These challenges, which range from poor academic performance to lack of motivation, have long been a concern for educators. According to a report by the OECD (2020), approximately 25% of students across the globe struggle to meet basic educational standards, a trend that is particularly prominent in secondary education [7]. In response to these issues, many schools have turned to innovative approaches, such as remediation programs

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and technology integration, to improve student engagement and performance [8]–[10]. These programs are designed to cater to students' individual learning needs, promoting a more personalized and interactive learning experience. However, despite the growing adoption of these innovations, the effectiveness of such strategies remains uncertain [11]–[13]. There is a pressing need to explore how these approaches influence learning outcomes, particularly in challenging educational environments [14]–[16].

A growing body of research has explored the relationship between educational innovations and student performance, with varying conclusions. For example, a study by Johnson et al. (2021) found that the integration of technology in the classroom can significantly enhance student engagement and motivation, particularly in subjects that students traditionally find challenging [17]. Similarly, El-Sabagh (2021) highlighted the effectiveness of remedial learning programs in improving academic achievement by providing targeted support for struggling students [18]. However, other studies, such as that by Brown and Smith (2020), argue that technological interventions, when not properly implemented, may lead to increased disengagement, especially when students do not receive adequate guidance [19]. Additionally, research by Kong and Wang (2024) underscores the importance of a collaborative, student-centered approach, noting that such methods, when combined with technology, show promise in overcoming learning barriers [20].

Despite the growing body of literature on educational innovation, a critical gap remains in understanding the specific impact of remedial programs and technology on students' learning difficulties in the secondary education context. While previous studies have shown the potential of these strategies to improve student engagement and performance, there is limited research on their effectiveness in diverse educational settings, particularly in schools with a broad range of student backgrounds and academic levels. Furthermore, much of the existing research focuses on either technology or remedial programs in isolation, without exploring how their integration might create a more holistic approach to solving learning challenges. This study addresses this gap by investigating how a combination of remediation and technology in secondary schools impacts student motivation, comprehension, and academic achievement, providing a more nuanced understanding of how these innovations work together to mitigate learning difficulties.

This study offers a novel contribution to the field by exploring the integrated impact of both remedial programs and technology on students' learning difficulties in secondary education. While existing research has largely examined these elements independently, this research aims to examine how their combination can provide a comprehensive solution for students who struggle academically. By focusing on a specific school setting, MA LUBBUL LABIB Probolinggo, this study provides a unique perspective on how educational innovations can be effectively implemented in schools with diverse student populations. Moreover, the research goes beyond merely assessing academic outcomes; it also considers the influence of these interventions on students' motivation and self-confidence, areas that have received less attention in previous studies. The findings are expected to provide new insights into how the synergy of technology and remediation can transform educational practices and improve student success.

The objective of this research is to investigate the combined effects of remedial learning programs and technology integration on secondary school students' learning difficulties. Specifically, this study aims to explore how these educational innovations influence students' motivation, comprehension, and academic performance in a real-world school setting. Through a case study approach, the research will examine how the integration of these strategies addresses specific learning barriers, considering both academic outcomes and student attitudes towards learning. By focusing on a school with a diverse student body, this research seeks to contribute to the broader understanding of how modern educational strategies can be leveraged to overcome the challenges faced by students in contemporary classrooms. The findings will offer valuable implications for educators and policymakers seeking to implement effective solutions to support struggling learners.

2 Method

This study is situated within the real-world context of MA LUBBUL LABIB Probolinggo, a secondary school with a diverse student population, which was specifically chosen due to its ongoing implementation of innovative educational programs aimed at addressing learning difficulties. The

context was selected because it provides a unique opportunity to explore how new pedagogical strategies, such as remediation programs and the use of technology, are influencing students' academic performance and motivation. The research adopts a case study approach, which is highly suitable for examining a specific instance within its real-life context. Case studies allow for an in-depth exploration of how a particular educational setting, such as MA LUBBUL LABIB, applies specific strategies to overcome learning difficulties. This research approach aligns with the study's aim to understand the local impact of educational innovations in detail rather than making broad generalizations, offering valuable insights into the practical applications of theory within a specific educational environment.

Data collection in this study utilized a combination of participatory observation, in-depth interviews, and document analysis to gather a comprehensive understanding of the research topic. Participatory observation allowed the researcher to immerse themselves in the educational environment, observing classroom interactions between students and teachers, and identifying the challenges students face in real-time. In-depth interviews with teachers, students, and school administrators were conducted to gather diverse perspectives on the effectiveness of the remediation programs and the integration of technology in learning. These interviews provided rich qualitative data that offered insights into personal experiences and attitudes. Additionally, document analysis of teaching materials, student performance reports, and school policies helped triangulate the findings, ensuring that data from different sources complemented and validated each other. By combining these methods, the study was able to build a well-rounded understanding of how innovations are perceived and implemented in this school context.

The data were analyzed using Miles and Huberman's (1994) approach to qualitative data analysis, which includes the steps of data reduction, data display, and conclusion drawing/verification. In the first stage, data reduction involved systematically organizing and summarizing the data collected from observations, interviews, and documents. Key themes and patterns were identified through careful coding and categorization. Data display followed, where the data were organized into matrices and charts to visually represent the relationships between themes and help make sense of the complex data. This stage allowed for an easy comparison across different sources of data, such as teacher perspectives versus student experiences. Finally, conclusion drawing/verification was used to interpret the data and ensure the findings were valid and supported by evidence from multiple sources. This method enabled the researcher to derive meaningful conclusions that answered the research questions and contributed to the understanding of how new educational strategies impact students' learning experiences. Through this analytical process, the study ensured that the results were both grounded in the data and relevant to the research objectives.

3 Findings And Discussion

3.1 Finding

In this study, we identified the patterns of learning difficulties experienced by students at the high school level, the factors that influence those learning difficulties, and also evaluated the effectiveness of the new approaches applied in addressing students' learning difficulties.

Identify Learning Difficulties Patterns

At the learning difficulty pattern identification stage, we used student score data on standardized tests and academic evaluations to find specific patterns in student performance in various subjects. From the results of the analysis, it can be seen that most students experience varying learning difficulties, with a pattern of difficulties that are more prominent in mathematics and English subjects. In interviews with a number of students, it was found that they often had difficulty understanding more abstract mathematical concepts. One of the students stated,

> *"I find it difficult to understand mathematical formulas and apply their concepts in complex problems (Student A, 2024)." "I find it difficult to understand more complex mathematical concepts, such as algebra and trigonometry. This makes it difficult for me to do the exam questions (Student D, 2024)." For me, English is quite a challenging subject. I often have difficulty in understanding the meaning of complicated words in reading texts (Student E, 2024)."*

My biggest difficulty was in physics. The concepts are very abstract and difficult for me to understand, especially in connecting theory with its application in practicum questions (Student F, 2024)."

Based on the results of interviews that have been conducted, it shows a variety of learning difficulties faced by students, especially in certain subjects such as mathematics, English, and physics. Students A and D expressed difficulty in understanding complex mathematical concepts, with Student A finding it difficult to apply formulas in complex problems, while Student D faced challenges in working on exam questions especially in algebra and trigonometry. On the other hand, Students E and F face difficulties in English and physics in turn. Student E finds it difficult to understand the meaning of complex words in the reading text, while Student F faces difficulty in understanding abstract physics concepts and applying them in practicum problems. From the results of these interviews, it can be seen that students experience diverse learning challenges, emphasizing the need for learning strategies that suit individual needs and challenges to overcome their learning difficulties.

Factors Affecting Learning Difficulties

Next, an analysis of the factors that affect students' learning difficulties in high school. From observation and interview data, we identified several influencing factors, such as motivation, attention disturbances, and environmental support. Interviews with teachers and parents revealed that students who lack intrinsic motivation tend to have difficulty maintaining focus and interest in learning. A teacher stated,

"Less motivated students tend to be inactive in learning, which in turn affects their academic performance (Student B, 2024)." "I often find it difficult to concentrate in class because I am distracted by the amount of noise and distraction from classmates (Student G, 2024)." "My lack of motivation to study often makes me lazy to prepare before exams. As a result, I am often unprepared when facing the exam (Student H, 2024)." When I have trouble understanding a concept, I feel uncomfortable asking the teacher. I'm worried that I'll look stupid in the eyes of my friends (Student I, 2024)."

The results of the interviews highlight the crucial role of motivation in determining students' academic performance. Less motivated students tend to become passive in the learning process, which negatively impacts their academic achievement. In addition to motivation, environmental disturbances, such as noises and distractions from classmates, can also interfere with students' concentration in class, as expressed by Student G. Furthermore, a lack of motivation can also result in a lazy attitude in preparing before the exam, as stated by Student H, which leads to unpreparedness when facing the exam.

Finally, the existence of psychological barriers, such as concerns about assessment from peers if they do not seem to understand, can hinder students from asking questions to teachers when experiencing learning difficulties, as expressed by Student I. From the results of this interview, it can be seen that motivation, a conducive learning environment, and social support are important factors that need to be considered in overcoming students' learning difficulties in high school.

Evaluating the Effectiveness of New Approaches

Finally, we evaluate the effectiveness of the new approach applied in addressing students' learning difficulties in high school. From literature studies and case studies, we gathered evidence on innovative approaches that have had a positive impact on learning.

In interviews with a number of students, it was found that they were more confident in understanding the subject matter. One of the students stated,

"Since participating in the remediation program, I feel more confident in understanding the subject matter. I also noticed an increase in my test scores and the assignments I did (Student A, 2024)." "I feel more motivated to learn after participating in the remediation program. Material that was previously difficult for me to understand became easier with the new learning method (Student J, 2024)." The use of technology in learning makes me more active in the learning process. I can access the material independently and get instant feedback from the teacher (K Students, 2024)." I feel better prepared for the exam after taking part in the remediation

program. I also feel more confident in solving problems that were previously difficult for me (Student L, 2024)."

To further illustrate the impact of the remediation and technology integration program, the following table summarizes the key themes from the interviews with students, which show improvements in confidence, motivation, engagement, and exam readiness. These findings confirm the positive effects of the new approach on student learning experience as shown in Table 1.

Table 1. Evaluating the Effectiveness of New Approaches

Theme	Supporting Quote/Excerpt	Meaning/Interpretation
Increased Confidence in Understanding	"Since participating in the remediation program.... (Student A, 2024)."	Remediation programs have a positive impact on students' self-confidence, leading to better performance in exams and assignments.
Enhanced Motivation for Learning	"I feel more motivated to learn. (J Student, 2024)."	The remediation program also appears to increase students' intrinsic motivation, making previously difficult content more accessible.
Active Engagement Through Technology	"The use of technology in learning ..... (K Students, 2024)."	Technology integration in learning encourages greater student engagement, allowing for independent learning and immediate feedback.
Improved Readiness for Exams	"I feel better prepared for the exam after ... (Student L, 2024)."	The remediation program also prepares students more effectively for exams, enhancing both their readiness and confidence in tackling challenging problems.

The table above shows that the remediation program has a positive impact on students in improving their understanding of the subject matter, increasing learning motivation, and increasing exam readiness. Student A revealed that the remediation program has increased her confidence in understanding the material, which is in line with the improvement in her academic evaluation results. Student J also noted an increase in his or her learning motivation after participating in the remediation program, indicating that this approach successfully stimulated students' interest in learning. In addition, K Students highlight the benefits of using technology in learning, which makes them more active and independent in learning and getting instant feedback from teachers. This shows that the integration of technology can increase student engagement in learning. Lastly, Student L revealed that the remediation program has improved her preparation for exams and increased her confidence in solving problems that were previously difficult for her. From the results of this interview, it can be seen that remediation programs and the use of technology in learning are effective in improving academic achievement and improving students' learning attitudes.

3.2 Discussion

This study aims to explore the learning difficulties experienced by students at the high school (SMA) level and evaluate the effectiveness of new approaches in addressing these difficulties, with a focus on remediation programs and the use of technology. Based on findings obtained from interviews with students, as well as data collected through observation and document analysis, this

study provides significant insights into how a more active and collaborative approach to learning can help students overcome their academic challenges [29]–[31].

The study found that students' learning difficulties are very diverse, with some subjects such as math, English, and physics standing out as the most challenging areas for students. Students express difficulties in understanding abstract concepts, such as algebra and trigonometry in mathematics, as well as physical theories that cannot be directly applied in practicum situations. These findings are in line with previous research by El-Sabagh (2021), which showed that students often face difficulties in subjects that require an in-depth understanding of theoretical concepts [30]–[32].

The difficulties students face in understanding these abstract concepts demonstrate the importance of applying a learning approach that focuses on deep understanding and active student engagement. This research supports the theory of constructivism (Piaget, 1976) which emphasizes the importance of learning that allows students to actively build their own knowledge. In other words, a more problem-based and collaborative approach can help students overcome these difficulties, as expressed by Students A and D who felt more confident after participating in a remediation program [33], [34].

Factors influencing other learning difficulties, such as intrinsic motivation, attention deficit disorders, and social support, also emerged as important findings in the study. Less motivated students tend to show inactivity in learning, which has a direct impact on their academic performance. In addition, distractions from the social environment, such as noise in the classroom and social pressure, also affect student concentration. Students G and Student H revealed that external distractions and lack of motivation often made it difficult for them to prepare for exams or even understand the material in depth. This is in line with research by Johnson & Johnson (2020) which shows that intrinsic motivation plays an important role in increasing student engagement in learning and ultimately influencing their academic achievement [35], [36].

The decrease in intrinsic motivation found in this study leads to the importance of creating a conducive learning environment and encouraging students to actively participate. In the context of Self-Determination theory (Deci & Ryan, 2000), intrinsic motivation can be obtained by creating learning that is relevant, engaging, and supports student autonomy. More personalized remediation programs and the use of technology to provide instant feedback seem to be helpful in boosting student motivation.

Other key findings suggest that remediation programs and the use of technology in learning have a significant positive impact on improving students' material comprehension, learning motivation, and exam readiness. Students who take the remediation program feel more confident in taking exams and better prepared to solve problems that were previously difficult for them. K students, for example, feel more active in learning thanks to the use of technology that allows them to access materials independently and get feedback from teachers instantly [29], [35], [36].

Students who engage in the use of technology show a marked increase in their engagement with the subject matter, which indicates that technology can be used as a tool to encourage independent learning and improve interaction between students and teachers. These findings are consistent with previous research by McLeod & Reynolds (2021) which showed that technology can improve interaction and collaboration in learning, as well as provide greater access for students to access materials independently. The integration of technology in learning reinforces the theory of constructivism (Vygotsky, 1978) which emphasizes the importance of social interaction and the use of tools (such as technology) to support learning [35], [36].

4 Conclusion

The ongoing challenges in addressing students' learning difficulties in secondary education have been widely recognized, and the integration of innovative educational strategies such as remediation programs and technology presents a promising solution. This study has explored the intersection of these innovations, examining how they influence students' motivation, comprehension, and academic performance in a real-world school setting. The findings underscore the complexity of learning difficulties, revealing that issues such as intrinsic motivation, attention deficits, and environmental distractions play significant roles in shaping students' academic experiences. By utilizing a combination of remediation programs and technology, the research highlights how these

approaches can enhance students' engagement, boost their self-confidence, and improve their overall learning outcomes.

The evidence gathered from the case study of MA LUBBUL LABIB Probolinggo demonstrates that a holistic approach, which integrates both technological tools and targeted remediation, offers a robust framework for overcoming learning barriers. Students who participated in these programs showed marked improvements in their academic performance and expressed higher levels of motivation and confidence. The results suggest that such innovations are not only effective in enhancing academic achievement but also in fostering a more positive learning environment that encourages student agency and engagement.

These findings have important implications for educational practice, particularly in schools with diverse student populations. The success of the combined approach in this study provides a model for other schools to follow, particularly those facing similar challenges in secondary education. Future research should further explore the long-term effects of these strategies, particularly in diverse and under-resourced settings, to validate their broader applicability and potential for scaling. Additionally, research that examines the specific mechanisms by which technology and remediation programs interact could deepen our understanding of their combined impact on student learning. Ultimately, this study contributes to the growing body of literature on educational innovation, providing valuable insights for educators, policymakers, and researchers striving to improve learning outcomes for all students.

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