IeJSME 2025 Vol 19 (1): 44-53

Improving Academic Outcomes Through Remediation: Insights from a Medical Education Pilot Study

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Introduction: This paper explores the impact of a remediation programme on medical students' overall performance. It also suggests a potential remediation framework encompassing planned learning sessions by subject experts, individualised coaching from an alumni group, professional counselling for psychological support, and participants' learning commitment.

Methods: Twenty-seven students were identified as academically weak students (AWS). This was done based on two criteria: students who failed more than one mini test (out of six mini tests) during the delivery of the first-year curriculum, and students who had to repeat the study after failing the end-of-year-1 (EOY-1) exam. A remediation strategy consisting of 1) planned learning sessions, 2) individualised alumni coaching sessions, and 3) counselling sessions were offered to these students. However, participation is optional (Group A (n=12) – participants and Group B (n=15) – non-participants). Evaluation of the remediation programme is performed using mixed-method analysis: 1) comparative analysis of the performance of Group A vs Group B, and 2) qualitative analysis using a semi-structured interview with open-ended questions to obtain students' perceptions of the programme.

Results: Group A showed significantly higher pass rates (83% vs. 66%, $p < .001$) in the EOY-1 exam. Interviews revealed positive perceptions of personalised alumni coaching and its role in enhancing learning and confidence.

Conclusion: The study concludes that early identification and targeted remediation support improve academic outcomes, benefit the student's educational journey, and contribute to quality education.

Keywords: *Remediation programme, medical education, academic performance, peer coaching*

Background

Academic challenges are reported among 6-12% of health professional students.[1] Such challenges can significantly impact academic performance, resulting in withdrawal from the course or discontinuing studies.[2] Reviewing the global statistics specific to the medical programme, the reported attrition rates span from 2.4% to 26.2%, with an average of 11.1%.[3] Conversely, a study conducted in a Malaysian medical school found a 2.1% to 12.1% (with a mean of 5.3%) of first-year medical students who reportedly failed to advance to the subsequent stage of their training.[4] Such a situation can result in adverse consequences impacting students' mental and physical well-being. It also impacts faculty workload with significant time allocated for mentoring and remediation.[2] Eventually, the combination of problems faced by both faculties and students could result in significant financial implications, as the educational institution may necessitate additional time and resources if the challenges are not adequately addressed.[5] One of the strategies widely implemented in tackling poor academic outcomes and attrition is remediation. Reports show that the remediation in medical schools

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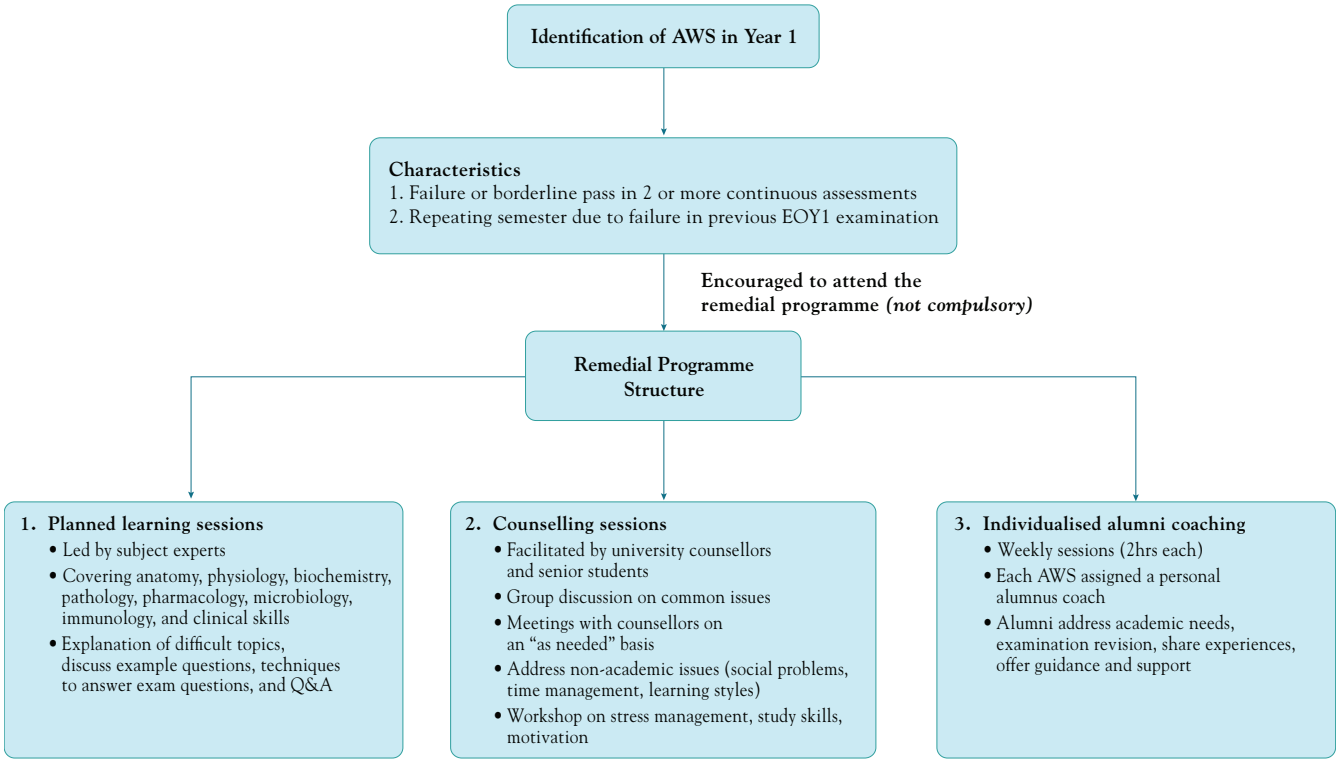
often includes group mentoring, feedback or learning sessions with faculty, regular assessments, discussion or reflection practice with faculty or recently graduated medical students, and counselling. Previous studies report different types of remediation approaches and their effectiveness in improving academic outcomes, clinical reasoning, learning environments, self-directed learning, and non-academic issues such as time management, emotions, and social problems.[6-9] Additionally, the remediation strategies offer equal learning opportunities for students from diverse backgrounds and with varying levels of preparedness and learning styles.[7]

A combination of factors is attributed to poor academic performance. This includes challenges such as difficulty in managing academic workload, health issues, and social problems such as struggles in adapting to university life, and adverse personal and familial circumstances.[2] Furthermore, some students may lack motivation and hold unrealistic expectations.[2] In the Malaysian context, a study found that academically weak students suffer from stress and depression.[10,11] Besides improving performance support to pass exams, it is paramount to consider interventions that improve cognitive and emotional aspects impacting the long-term effectiveness of remediation strategies.[12] Additionally, there is a need for interventions that assist in developing professional identity formation with guided reflection and faculty role-modelling.[13] There is evidence that collaborative learning with peers and personal support are effective remediation strategies as long as peers maintain confidentiality and respect.[14]

Such a collaborative approach to support students has been adopted by IMU University which is one of the largest private universities in Malaysia. The students in the IMU medical programme receive 2½ years of preclinical training through an integrated outcome-based curriculum using the key clinical problems approach. Various teaching and learning tools were used to deliver the curriculum. A collaborative support system referred to as the Remediation Programme was introduced in 2023. The strategies include a holistic one-stop remediation system with academic and non-academic approaches such as planned learning sessions by subject experts, individualised coaching sessions offered by immediate peers and recent graduates alumni both formalised in the curriculum as peer learning and Alumni Coaching Program (ACP). Further counselling sessions on self-reflection, workshops on time management, and improving learning efficacy are offered as non-academic support strategies.

The remediation programme structure is illustrated in Figure I. Academic support, peer learning, and psychological assistance are three important components that can be employed for an effective remediation programme. These three components are reported to lead to academic benefits and promote personal and professional development. These approaches were also shown to assist the transitioning of students to medical schools, especially at the beginning of their studies.[7,8,15,16] The three approaches as adopted by IMU University include 1) planned learning sessions led by subject experts covering anatomy, physiology, biochemistry, pathology, pharmacology, microbiology, immunology, and clinical skills, 2) individualised alumni coaching sessions, and 3) counselling sessions with seniors and university's counsellors. In general, the programme consisted of multiple sessions conducted over 16 weeks and delivered parallel to the regular curriculum of the Semester 2 medical programme.

Figure 1: The Remediation Programme Structure and Student Selection



The planned learning sessions were led by subject experts covering anatomy, physiology, biochemistry, pathology, pharmacology, microbiology, immunology, and clinical skills. A total of 14 planned learning sessions (1hr/session) were conducted by our faculty experts covering explanations of difficult topics, discussions of example questions, techniques for tackling examination questions, and a general question and answer (Q&A) session.

The individualised alumni coaching was conducted weekly (2hr/weekly). Each AWS was assigned a personal coach, a recent alumnus of the university's medical programme.

The following are the criteria for the alumni coach:

1. Completed IMU MBBS Programme or Partners School Track successfully
2. Academically competent (never repeat papers) & recommendation from faculty (personality & ability)
3. Communication ability & language proficiency
4. Alumni must be waiting for government placement for a minimum of six months (if applicable)
5. Alumni must be able to attend training provided (training in coaching)

6. Alumni must be able to commit a minimum of two hours of coaching twice a week for the duration of the remediation programme
7. Added advantage for an alumnus who has received Dean's List or Merit Award or already teaching as CSSC tutors

The selected alumni then attended training in coaching which focused on strategies for managing students in both group and individual settings, understanding student behavior, and facilitating effective exam preparation. Additionally, the training covered techniques for studying effectively for exams. Upon completion of the training, each alumnus will be assigned to an AWS. The assigned alumnus addressed the academic needs of the AWS by coaching the students in their examination revision process. Besides, the alumni shared their unique experiences as students at IMU University, offering personal and professional guidance, up-to-date advice, and essential support to navigate the challenges of medical school. Peer learning assisted approaches, either individually or in groups foster relationships between the coach (seniors) and mentee (juniors) which in turn, promotes academic learning, personal and professional development, as well as psychosocial support.[7,15]

The counselling part of the programme was facilitated by the counsellors from IMU University's Self Development Unit and supported by senior students. A briefing session coupled with sharing by the senior students and group discussions on common issues faced by AWS was done at the start of the programme. After that, the AWS scheduled meetings with the counsellors on a "on an as-needed" basis" to address non-academic issues such as social problems, time management, and learning styles. A series of workshops were organised by counselors to help address non-academic issues. These workshops included sessions on stress management, study skills, and motivation. Psychological support was shown to help medical students with time management, personal reflection, and non-academic issues such as financial and emotional problems.[7,8] Figure I shows the summary of student selection for the remediation programme and its structure.

The objective of the paper is to evaluate the effectiveness of the implemented remediation programme by monitoring students' participation in the remediation programme, by analysing the outcome of their end-of-year 1 (EOY-1) examination and exploring the perception of students of strategies for areas of improvement and enhancing the programme.

Methods

A variety of teaching and learning tools are used to deliver the curriculum, ranging from interactive lectures, flipped classrooms, problem-based learning, case-based learning, team-based learning, clinical skills sessions, community-based learning, and self-directed learning. In Year 1, topics are focused on how the human body responds to injury and abnormal growth; and understanding the basic sciences and clinical problems of cardiovascular, respiratory, and hematological systems. The topics are delivered utilising a modular-based approach and a continuous assessment (mini-exam) is held at the end of each module. The continuous assessments included one-best-answer and multiple-choice questions with a passing score set at 50%.

Identification of the Academically Weak Students (AWS)

Twenty-seven Year 1 students (14.3%) of the year-1 IMU University Medical programme were identified as AWS based on their performance in the continuous assessment or failure. AWS were characterised by 1) failures or a borderline pass in two continuous assessments or more or 2) repeating the semester due to failure in the previous EOY-1 examination (Figure I). The AWS were highly encouraged to attend the programme though it was not compulsory. Briefings about the remediation programme and reminder emails and announcements were also sent regularly to keep the students well-informed.

Analysis

A mixed method analysis with a sequential exploratory design model was performed. Quantitative data collection was done after the exam performance date. The AWS were divided into Group A (n=12), those who participated in the remediation programme, and Group B (n=15), those who did not participate. A Chi-square test was conducted to examine the relationship between participation in the remediation programme and performance in the EOY-1 exam. A p-value < 0.05 was considered statistically significant.

A qualitative study using semi-structured face-to-face interviews was conducted to explore students' perceptions of the remediation programme. An interview guide with open-ended questions was developed to ensure consistency while allowing participants to elaborate on their experiences. The questions focused on key aspects such as perceived benefits, challenges, and suggestions for improvement. Participants were purposefully sampled to include students who had participated in the remediation programme (n = 12) and those who had not (n = 6), ensuring a balanced perspective on its effectiveness. In total, 18 students took part in the interview process.

The interview guide included the following core questions:

1. What aspects of the remediation programme did you find most useful?
2. What aspects did you find challenging or not useful?
3. What additional support should be included in the remediation programme?

Interviews were audio-recorded with participants' consent and transcribed verbatim to ensure accuracy. Data was analysed using thematic analysis: familiarisation, initial coding, theme identification, review, definition, and reporting. To enhance the reliability of the analysis, two independent researchers coded the data separately, and discrepancies were resolved through discussion. Thematic analysis was carried out to determine the impact of the programme on students' overall performance.

This study was exempted from ethical approval as it is an audit of the academic quality improvement process.

Results

The 27 AWS were strongly encouraged to participate in the remediation programme. Of these, 12 students participated in the programme, while the remaining 15 opted not to attend. Students who participated in the remediation programme were grouped under Group A, while those who did not participate were grouped under Group B. A Chi-square test of independence revealed a significant association between participation in the remediation programme

and passing the EOY-1 exam ($\chi 2 = 10.83$, $p < .005$). About 83% of students from Group A passed the EOY-1 exam as compared to 66% of Group B. Figure II shows the outcome of the remediation programme based on the EOY-1 exam academic performance.

Three key themes were generated from the semi-structured interview. The themes are:

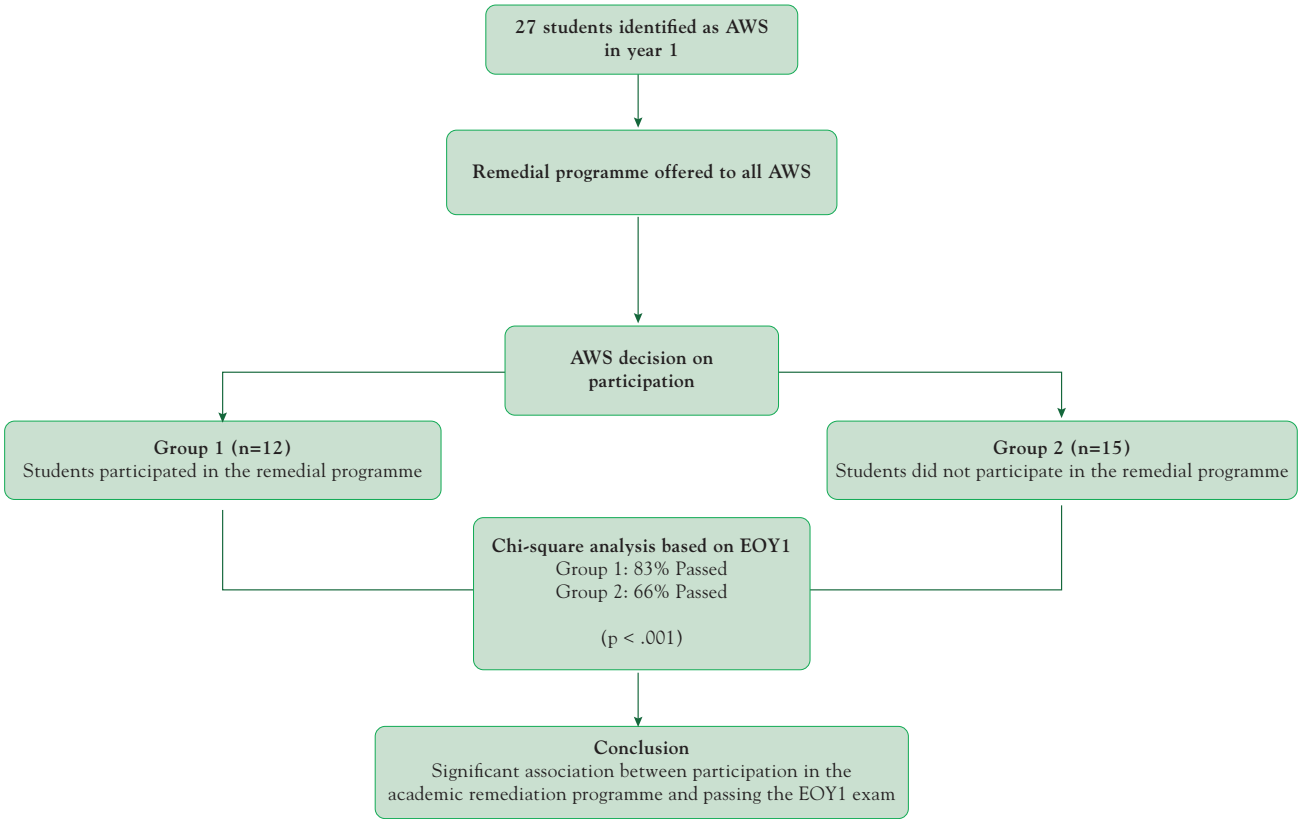
1. **Theme 1**: Improves understanding of basic concept
2. **Theme 2**: Student-facilitator engagement improves student's confidence in learning
3. **Theme 3**: Stigmatisation affects learning motivation

The key themes and open comments are shown in Table I.

Table I: Key Themes Generated from the Semi-structured Interview with Open Comments from Students and Insights

THEME	STUDENTS QUOTE	INSIGHTS
1. Improves understanding of basic concepts	"The one-on-one alumni sessions with my coach really helped me to understand the basic concepts I was struggling with." "Having a coach who was an alumnus made it easier for me to ask questions and clarify doubts without feeling judged." "It's different when someone who has been through the programme explains things; they remember what it's like not to understand."	• Students found the one-to-one personalised learning, especially with alumni coaching, highly effective in addressing learning gaps.
2. Student-facilitator engagement improves confidence in learning	"Some of the facilitators ensured the session was interactive, but a few of them did not engage with us and mentioned that such sessions are for guidance and not teaching." "When facilitators were actively involved, I felt more comfortable and engaged, which really helped my confidence." "The best sessions were those where we didn't just sit and listen; we discussed and debated, and that's when I felt I learned the most."	• Most students reported increased confidence in answering techniques for assessments. • Sessions were described as facilitator-dependent, with some being highly interactive and others less engaging.
3. Stigmatisation affects learning motivation	"I wish not to be identified as an academically weak student." "There's a label that comes with attending these sessions, and it's not always a good one. It makes you feel set apart from others." "Even though the help was useful, I didn't want my friends to know I was going because of the stigma attached."	• Non-attendees mentioned a perceived stigma associated with remediation sessions, leading to decreased motivation to participate.

Figure II: Outcome of Remediation Programme based on Academic Performance



Discussion

Academic remediation interventions are invaluable as a supporting strategy for students struggling with their academic performances. Many studies focus on proposing measures to identify at-risk students using various matrices or interventions which could either be individualised and labor intensive or mainly on closing gaps in the failing subjects.[17,18] However, this paper proposes that the strategies planned and used in this exercise could construct a simple and practical framework to assist AWS in a highly strenuous academic programme. (Figure II) The concept could be more effectively applied when the remediation programme includes academic and non-academic factors and is more diverse in its approach.

The effectiveness of such interventions is gauged by the outcomes of test performances and increased retention rates.[20] Our study aims to investigate the approaches, central themes, and results of remediation within medical education programmes. It is evident from our findings that the students who chose to participate in the remediation programme have significantly higher passing rates as opposed to those who did not attend these sessions. These

differences in performance validate the programme's effectiveness and are consistent with previous research which shows that targeted support strategies positively impact academic performance. In addition, the same research also reported that a well-structured remediation programme can significantly improve academic performance and clinical skills.[20] This is observed in our study and the finding indicates the beneficial effects of the remediation programme on enhancing the academic performance of AWS.

One potential concern that needs to be addressed is the impact of the perception of stigma related to remediation. Stigma may be a potential barrier to students' willingness to participate in remediation which subsequently affects the programme's effectiveness. In our study, stigma has been reported limiting student participation. Strategies proposed include formalisation of the remediation programme into the curriculum and to further supporting the approach with peer and mentoring activities.[21] Research consistently shows that peer learning approaches enhance students' motivation and confidence across different levels of the study.[22] Our results also showed that the alumni coaching programme was well-received among the AWS mainly due to the individual coaching received. Students reported that one-on-one sessions, particularly with alumni coaches, were instrumental in bridging foundational knowledge gaps. This aligns with existing literature emphasising the benefits of personalised learning in medical education, where targeted interventions help reinforce core concepts and improve academic performance.[22] The success of alumni-led coaching suggests that peer-based or near-peer mentoring models may be valuable additions to remediation strategies. Another notable aspect of this coaching programme was the recruited alumni were those who recently graduated from our medical school. The recent alumni are familiar with the system, syllabus, younger so can relate better to the students. At the same time, the alumni involved in the coaching programme were receiving training to ensure they could address the needs of AWS effectively. This is important as the alumni may need to equip themselves with skills like teaching, communication, and mentorship. The training prepares the alumni coaches to provide consistent and quality support to the AWS aligned with our medical programme educational standards and objectives. Trained alumni coaches may become positive role models for the AWS showing them effective learning methods leading to academic success. Along with alumni training, there is a need for faculty training as well. The variability in facilitator engagement in the faculty led learning sessions was a notable factor influencing students' experiences. While some facilitators adopted interactive approaches that boosted students' confidence in assessment techniques, others maintained a more passive role, viewing sessions as guidance rather than active teaching. This inconsistency suggests a need for standardisation in facilitator training to ensure all students receive engaging and supportive instruction. The training on managing AWS should focus on methods for assessing progress and providing feedback to ensure the assistance provided creates a positive impact. However, it is important to acknowledge potential confounding variables, such as variations in the students' academic backgrounds, which could impact the remediation programme outcomes. Apart from that, since participation in the study

was voluntary, students who opted to participate may have been inherently more motivated for self-improvement. This self-selection bias limits the ability to fully isolate the effects of the remediation programme itself, as their engagement and outcomes may not be solely attributable to the intervention. In addition, a dual approach consisting of both academic and non-academic is important as either can influence the other. Consequently, future research should incorporate focus group discussions with AWS and delve into their academic backgrounds to further elucidate the programme's effectiveness.

Conclusion

Early identification of students at risk of failure can be done by tracking their performance in standardised assessments. Students benefit from the remediation intervention which includes examination-focused learning sessions, intensive coaching, and counselling which enhance their learning skills, wellness, and educational journey. This overall improves the quality of education provided to our students.

This study has many limitations. As a pilot study, the relatively small sample size limits the generalisability of the findings. The study was conducted as a single-site study that may not fully capture variations in remediation strategies and different student demographics across institutions. Students voluntarily participated in the remediation programme, and there is a possibility of bias related to those who have attended may have been more motivated influencing their success rates. The lack of longitudinal data as the pilot study was in the early stage of the medical programme with a focus on short-term outcomes such as test performances.

Future Directions

With the positive results as observed in this pilot study, future plans will include expanding the sample size, multicentric study, and longitudinal implementation to enhance the generalisability of findings and assess the long-term effectiveness of the remediation programme. Research should focus on interventions to reduce stigma and improve student participation. There is a need for exploring innovative digital tools such as AI-driven for longitudinal tracking and predictive analysis of students at risk of attrition. Limited exploration on non-participatory factors, further research is needed to explore the full range of reasons why some students chose not to attend remediation sessions.

Acknowledgments

We sincerely appreciate the dedication and support of the academic coordinators and administrators of the School of Medicine, IMU University, as well as the Self-Development Unit and the Alumni Relations & Student Support Office, IMU University. Their invaluable assistance in planning, implementing, and providing administrative support for the remediation programme has been instrumental in the success of this study.

Declaration of interest statement

The authors report there are no competing interests to declare.

Source

The author reports there is no funding associated with their work included in this article.

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