

Cross-Stream Education Pathways: Academic Performance and Transition Experiences of Arts Students in a Science Diploma Program

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Abstract: Malaysia's long-standing Science-Arts streaming policy has contributed to a decline in STEM participation. Implemented in 1967, it has yet to achieve its intended goals. This shortfall has prompted initiatives such as cross-stream admissions to widen access to science education. At Universiti Teknologi MARA (UiTM), Arts-stream students are admitted into the Diploma in Science (AS120). However, there is limited evidence available on their performance and experiences. This study examined the academic outcomes, motivations, challenges, and aspirations of Arts-stream students in AS120 using students' academic performance records (CGPA and PLO attainment) and survey responses. Findings indicated that Arts-stream students achieved moderate CGPA and generally met PLO benchmarks, particularly in applied and skill-based domains. However, gaps in the PLO1 and PLO2 (knowledge and cognitive competencies) require additional instructional support. Survey analysis revealed that students were primarily motivated by career prospects and personal interest, while mathematical difficulties emerged as their greatest academic barrier. Descriptive patterns further showed that students motivated by career prospects and personal interest were more likely to report academic challenges (more than 63%). These included mathematical difficulty, gaps in foundational knowledge and the fast pace of learning. Others reported psychosocial challenges such as low confidence, poor time management, stress, and a lack of belonging. Regarding aspirations, most students (58.6%)

planned to pursue science-related bachelor's degrees. A smaller group (24.1%) intended to switch to non-science fields, while others remained uncertain. Although 76% of students agreed that the cross-stream policy supported their plans, only 55% would stick to AS120 given a second chance. This shows some ambivalence. Overall, the findings suggest that the policy has broadened access and fostered pathways into science. However, sustained engagement in STEM requires stronger academic bridging in mathematics and science fundamentals. It is also a call for psychosocial interventions such as mentoring and confidence-building. Future research should adopt longitudinal, multi-institutional designs to assess long-term outcomes and identify best practices for cross-stream integration.

Keywords: *Cross-stream admission, academic performance, Program Learning Outcome, motivation, challenge*

1. INTRODUCTION

The Malaysian education system has long followed a streaming policy that channels secondary school students into either Arts or Science pathways. The structure was designed to align students with their academic strengths. However, since its implementation in 1967, the policy has not achieved its intended goals. Science-related fields continue to face low student representation, despite the national target of 60:40 Science-to-Arts enrolment. In 2020, 47% of students were enrolled in STEM subjects, but this dropped to 40.95% in 2021 and 40.94% in 2022. Although enrolments recovered to 45.73% in 2023 and further to 50.83% in 2024 (Gimino et al., 2024), participation remains below the national benchmark. Among the contributing factors are insufficient foundational preparation, perceptions of science as “difficult,” and limited awareness of STEM career opportunities (Idris et al., 2023; Phang et al., 2014; Vela et al., 2020; Wong et al., 2022).

While cross-stream admission policies at institutions such as Universiti Teknologi MARA (UiTM) have expanded access to science-based programs for Arts-stream students, concerns remain about their academic readiness, given limited prior exposure to advanced science and mathematics (Idris et al., 2023). A recent study by Julaihi and Mohamadin (2025) found that, with sufficient institutional support, Arts-stream students can achieve the program-aligned

outcomes and succeed. However, the study primarily examined academic performance, leaving other aspects of the student experience underexplored.

This study addresses this gap by examining three dimensions of the cross-stream experience: (1) the academic performance of Arts-stream students in the Diploma in Science (AS120) program; (2) the motivations and challenges shaping their experiences; and (3) the aspirations guiding their educational and career pathways. Specifically, this study seeks to answer the following questions:

- RQ1: How do Arts-stream students perform academically in AS120 with respect to Cumulative Grade Point Average (CGPA) and Program Learning Outcomes (PLO) attainment?
- RQ2: What motivations and challenges influence their decision to pursue and persist in AS120?
- RQ3: What are their aspirations, and how do they perceive the cross-stream policy in shaping their educational and career pathways?

2. LITERATURE REVIEW

2.1 ACADEMIC PERFORMANCE OF CROSS-STREAM STUDENTS

A central issue is whether Arts-stream students can meet the academic demands of science programs. Studies have shown that a lack of a strong foundation in the core sciences and mathematics hinders performance in higher education. Idris et al. (2023) highlighted that insufficient foundational knowledge in mathematics and science remains a significant barrier to STEM education in Malaysia. Similarly, Andrew et al. (2024) found that students without prior chemistry experience struggled significantly in general chemistry courses, underscoring the need for remedial support.

Recent findings from Julaihi and Mohamadin (2025) further reveal that Arts stream students faced the greatest difficulties in knowledge and cognitive domains (PLO1 and PLO2), indicating substantial struggles in foundational science skills. These challenges were associated with courses such as General Chemistry, Organic Chemistry, and Calculus, reflecting foundational

knowledge in science. These findings raise critical questions about the long-term sustainability of cross-stream policies without structured interventions.

2.2 MOTIVATIONS FOR PURSUING SCIENCE PROGRAMS

Motivation plays a vital role in students' decisions to pursue science programs. It influences not only their interest but also their persistence and performance. At the secondary school level, students' intention to study science and pursue STEM careers is shaped by their attitudes, social influences, and self-efficacy, highlighting the importance of early engagement and sustained motivation (Tunku Ahmad et al., 2019; Razali et al., 2020). Motivation in science learning is closely tied to factors such as purpose, effort, belief, and emotion, which affect both emotional response and engagement (Glynn et al., 2007; Membiela et al., 2023).

Several theoretical perspectives help explain how motivation operates in science learning. Expectancy-Value Theory (Eccles & Wigfield, 2002) emphasises career and interest, while Self-Determination Theory (Ryan & Deci, 2000) focuses on autonomy, competence, and relatedness. Likewise, the Science Capital framework highlights how exposure to science experiences and networks shapes aspirations (Archer et al., 2015).

In the Malaysian context, motivation to pursue science programs is shaped by both internal and external factors. Career prospects, personal interest, social influence and institutional reputation remain consistent motivators for higher education choices (Julaihi & Mohamadin, 2024; Mohamadin & Julaihi, 2023; Sarkodie et al., 2020). Career goals remain the strongest motivator, as students often view science-related programs as pathways to professional success and stable employment (Mohamadin & Julaihi, 2023; Sarkodie et al., 2020). Personal interest enhances persistence and satisfaction, encouraging students to remain committed to their chosen field (Julaihi & Mohamadin, 2024). Social influences, including family encouragement, teacher support, and peer interactions, further strengthen students' motivation and confidence to pursue science pathways (Julaihi & Mohamadin, 2024; Mohamadin & Julaihi, 2023). Meanwhile, an institution's reputation and perceived quality also influence enrolment decisions, as students tend to associate well-regarded universities with better academic environments and career opportunities (Sarkodie et al., 2020).

2.3 CHALLENGES IN ADAPTING TO SCIENCE PROGRAMS

Arts-stream students encounter both academic and psychosocial challenges when entering science-based programs.

Academic challenges: Knowledge gaps, particularly in mathematics, scientific reasoning, and experimental methods, are among the most persistent challenges (Julaihi & Mohamadin, 2025; Ng, 2024; Aspin et al., 2022; Andrew et al., 2024; Abd Karim et al., 2023). Arts-stream students often come from curricula that emphasise humanities and arts rather than systematic scientific methods, making subjects like calculus and chemistry appear difficult and intimidating (Abd Karim et al., 2023). The pace of learning in science programs can feel overwhelming, especially when students must quickly grasp abstract and technical content (Julaihi & Mohamadin, 2025). Constraints on curriculum resources, such as heavy syllabus, insufficient teaching support, and limited laboratory access, hinder smooth transition into science programs (Azahar, 2023). Additionally, language barriers, particularly in mastering scientific English and technical terminology, further hinder comprehension and performance (Ng, 2024; Aspin et al., 2022). These difficulties are compounded by mathematics-related anxiety and limited exposure to scientific methodology, making it challenging for students to connect theory with practice (Aspin et al., 2022; Andrew et al., 2024).

Psychosocial challenges: Arts-stream students often report stress, anxiety, and time-management difficulties due to heavier workloads and increased academic demands (Ng, 2024). Confidence issues and feelings of inadequacy are also common, especially when students compare themselves to peers with stronger science backgrounds (Julaihi & Mohamadin, 2025; Aspin et al., 2022). Many of them are perceived as less capable in science-related subjects (Allvsionn, 2022). Such negative perceptions can lower self-esteem and create a sense of exclusion, discouraging active participation in learning and collaboration. These experiences align with the Science Capital framework (Archer et al., 2015), which explains that students with limited exposure to science-related knowledge, networks, and support often face identity and belonging issues that hinder persistence in STEM fields. Moreover, limited access to learning resources and insufficient preparatory exposure can further diminish confidence

and engagement (Idris et al., 2023). Students who perceive science as difficult or “not for them” may develop avoidance behaviours and reduced self-efficacy, particularly in exam-oriented environments with minimal support (Esmail et al., 2024; Andrew et al., 2024).

2.4 FUTURE ASPIRATIONS

Students’ future aspirations reflect more than just immediate program choices; they depend on whether cross-stream policies offer real opportunities, whether they receive adequate support during their studies, and whether their retrospective satisfaction with program outcomes reinforces their commitment to science careers. Many students see science careers as promising, particularly when they believe that education policies such as cross-stream or STREAM frameworks support creativity and interdisciplinary and broaden access (Ng, 2024). However, policies alone are insufficient. Mixed academic outcomes among Arts-stream students in programs such as AS120 indicate that supportive structures are needed to translate aspirations into sustainable success (Julaihi & Mohamadin, 2025).

Career goals, retrospective satisfaction, and perceptions of policy effectiveness influence what students plan after completing their diploma studies. For example, students whose expectations for employability and institutional reputation are met tend to be more satisfied and continue their studies; others may shift fields or enter the workforce if their expectations are not met. In Malaysia, many diploma students view continuing to a degree program as a means of upward mobility. However, their satisfaction with the diploma programs and clarity about future careers influence whether they pursue this path (Julaihi & Mohamadin, 2024). Many remain uncertain about their post-tertiary options, underscoring the need for better career guidance and clearer policy communication (Razali et al., 2020).

3. METHODOLOGY

3.1 RESEARCH DESIGN

This study employed a mixed-methods approach to evaluate both academic performance and experiences of Arts-stream students enrolled in AS120. The design combined quantitative analysis of students’ academic performance records (CGPA and PLO attainment) with survey data on students’ motivations, challenges and aspirations. Their perceptions of the cross-stream policy were also gathered in this study. The framework described in Figure 1 proposes that motivations drive students’ entry into the Diploma of Science program, challenges shape their experiences, and these, in turn, influence their aspirations and views on the policy that enabled their access.

The objective of this study is to design and evaluate a Packet Tracer–based troubleshooting assessment that measures students’ practical diagnostic skills. The paper is organised as follows: Section 2 reviews relevant literature on troubleshooting pedagogy, simulation tools, and skill-based assessments. Section 3 describes the methodology, including the design of the Packet.

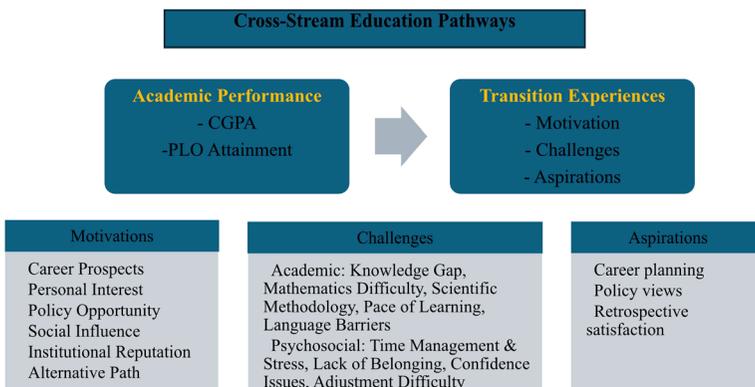


Figure 1. Conceptual Framework

3.2 PARTICIPANTS

The population involved all Arts-stream students admitted to AS120 at the UiTM Sarawak Branch for the October 2022 (20224) intake. The academic performance of 33 Arts-stream students was evaluated. However, only 29 students from this group were analysed, as 4 students failed to submit the Google Form survey.

3.3 INSTRUMENTS

This study includes two instruments:

1. Academic Performance Records: Students' CGPA and PLO attainment data were obtained from the university database to provide objective measures of performance. PLO attainment was assessed against program benchmarks to evaluate whether Arts-stream students achieved the intended learning outcomes.
2. Google Form Survey: A structured survey item was developed based on literature, as stated in Table 1, consisting of three main sections:
 - Section A: Demographic Profile – Gender, Academic Status and CGPA.
 - Section B: Motivations and Challenges – Likert-scale items assessing motivations for choosing AS120 and challenges faced during the study.
 - Section C: Aspiration and Policy Perceptions – Career planning and reflections on cross-stream policy and program choice.

| Construct | Item | Literature |
|----------------|---|--|
| 1. Motivations | <ul style="list-style-type: none"> ● Career Prospect ● Personal Interest ● Policy Opportunity ● Social Influence ● Institutional Reputation ● Alternative Path | <ul style="list-style-type: none"> ● Career Aspiration, Personal Interest, People Influences (Julaihi & Mohamadin, 2024) ● Career Aspiration, Personal Interest, Social Influence, Institutional Reputation (Mohamadin & Julaihi, 2023) ● Reputation of Institution, Personal Interest, Career Desire, Social Influence (Sarkodie et al., 2020) |
| 2. Challenges | <ul style="list-style-type: none"> ● Knowledge Gap ● Mathematics Difficulty ● Scientific Methodology ● Pace of Learning ● Language Barriers ● Time Management & Stress ● Lack of Belonging ● Confidence Issues ● Adjustment Difficulty | <ul style="list-style-type: none"> ● Knowledge gap, Pace of Learning, Confidence Issues, Adjustment Difficulty (Julaihi & Mohamadin, 2025) ● Knowledge Gap, Mathematics Difficulty, Language Barriers, Time Management & Stress, Confidence Issues, Adjustment Difficulty (Ng, 2024) ● Knowledge Gap, Mathematics Difficulty, Scientific Methodology, Language Barriers, Confidence Issues, Adjustment Difficulty (Aspin et al., 2022) ● Knowledge Gap, Confidence Issues, Adjustment Difficulty, Scientific Methodology (Andrew et al., 2024) |
| 3. Aspirations | <ul style="list-style-type: none"> ● Career planning ● Policy views ● Retrospective satisfaction | <ul style="list-style-type: none"> ● Career prospect, cross-stream policy views and program satisfaction (Julaihi & Mohamadin, 2024) ● Scientific Career, SHS policy views and program satisfaction (Ng, 2024) |

Table 1. Development of survey items based on the literature

To ensure the instrument's reliability, the internal consistency of survey items on motivations and challenges was assessed using Cronbach's Alpha, which ranges from 0 to 1. As shown in Table 2, the resulting reliability coefficient ranged from 0.795 to 0.856 (>0.70), indicating acceptable internal consistency and thus confirming the instrument's reliability in measuring the intended constructs.

| Constructs | No. of items | Cronbach's Alpha |
|---------------------------------|--------------|------------------|
| Motivation for choosing AS120 | 6 | 0.795 |
| Challenges during AS120 studies | 9 | 0.856 |

Table 2. Cronbach's alpha

3.4 DATA COLLECTION

Students' academic performance data (CGPA and PLO attainment) were collected from the UiTM database with permission from the Academic and International Affairs Division of UiTM Sarawak. Survey data were collected online via a Google Form, distributed to students through institutional communication channels. Participation was voluntary, and informed consent was obtained prior to data submission.

3.5 DATA ANALYSIS

Quantitative data from students' academic performance records (CGPA and PLO attainment) were analysed using descriptive statistics to evaluate the performance of Arts-stream students and determine whether they met program expectations. Survey responses were similarly analysed descriptively to examine students' motivations, challenges and aspirations. In addition, students' perspectives on the cross-stream policy and their retrospective on whether to choose the same program again if given the chance were also investigated. Finally, responses to open-ended questions were analysed thematically to capture nuanced reflections on policy impacts and overall program experiences.

4. RESULTS AND DISCUSSION

4.1 ARTS-STREAM STUDENTS' PROFILES

From the 182 students admitted into AS120 at UiTM Sarawak for the October 2022 (20224) intake, 43 were Arts-stream students. Table 3 summarises the profiles of these students. The majority were female (74.4%), reflecting a gender imbalance in cross-stream enrolments. In terms of academic status, just over half (51.2%) graduated on time within five semesters, while 16.3% required six semesters and 9.3% were still enrolled in their seventh semester at the time of reporting. However, 11.6% quit, and another 11.6% were dismissed. CGPA data, available for 33 students, showed that only 3.0% attained a CGPA of 3.50 and above, while most achieved between 2.50–2.99 (48.5%) or 3.00–3.49 (39.4%), and a small proportion (9.1%) fell within the lowest band (2.00–2.49). Taken together, these findings indicate that while most Arts-stream

students completed the program and attained average academic outcomes, relatively few excel academically, and the attrition rates highlight the need for additional academic and psychosocial support. The results are consistent with Julaihi and Mohamadin (2025), who found that admitting Arts stream students to science programs is academically viable, provided that appropriate academic support is in place. Only 8 students (27.6%) selected AS120 as their first choice, indicating that fewer than one-third of students entered the program as their top preference. The majority, 19 students (65.5%), chose AS120 as an alternative, suggesting that for most, the program was their secondary option. A small minority of 2 students (6.9%) stated that AS120 was not among their original program choices.

| Profiles | Total |
|--|------------|
| Gender (n=43) | |
| <i>Female</i> | 32 (74.4%) |
| <i>Male</i> | 11 (25.6%) |
| Academic Status (n=43) | |
| <i>Graduated with Vice Chancellor Award</i> | 0 (0.0%) |
| <i>Graduated on time (5 semesters)</i> | 22 (51.2%) |
| <i>Graduated (6 semesters)</i> | 7 (16.3%) |
| <i>Ongoing (semester 7)</i> | 4 (9.3%) |
| <i>Quit</i> | 5 (11.6%) |
| <i>Dismissed</i> | 5 (11.6%) |
| CGPA (n=33) | |
| <i>3.50 and above</i> | 1 (3.0%) |
| <i>3.00 to 3.49</i> | 13 (39.4%) |
| <i>2.50 to 2.99</i> | 16 (48.5%) |
| <i>2.00 to 2.49</i> | 3 (9.1%) |
| AS120 as: | |
| <i>First Choice: Top preference.</i> | 8 (27.6%) |
| <i>Alternative Choice: Secondary option.</i> | 19 (65.5%) |
| <i>Not a Choice: Not originally chosen.</i> | 2 (6.9%) |

Table 3. Profiles of Arts-stream students admitted into AS120

4.2 CGPA ACHIEVEMENT AND PLO ATTAINMENT

Table 4 presents the descriptive statistics for CGPA achievement and PLO attainment among Arts-stream students. The students' CGPA ranged from 2.36 to 3.66, with a mean of 2.96 (SD = 0.27), indicating overall performance near the borderline between second class upper (3.00-3.49) and second class lower (2.50-2.99). Only one Art-stream student from this cohort achieved the first class with a CGPA of 3.66. Overall, these findings suggest that Arts-stream

students exhibit moderate academic achievement, as indicated by their CGPA. This aligns with evidence that prior exposure to science subjects provides a strong advantage in higher education, as reported by many studies. For instance, Julaihi and Mohamad (2025) reported that Arts stream students enrolled in the Diploma in Science program faced significant challenges in core courses such as General Chemistry, Organic Chemistry and Calculus, highlighting the critical role of prior preparation in scientific disciplines.

| | N | Minimum | Maximum | Mean | Std. Deviation |
|--|----|---------|---------|--------|----------------|
| CGPA | 33 | 2.36 | 3.66 | 2.9645 | .27037 |
| PLO1 Mark (Knowledge) | 33 | 38 | 80 | 52.58 | 8.979 |
| PLO2 Mark (Cognitive) | 33 | 38 | 80 | 52.88 | 11.420 |
| PLO3 Mark (Practical Skills) | 33 | 78 | 86 | 82.70 | 2.038 |
| PLO4 Mark (Intrapersonal Skills) | 28 | 79 | 99 | 87.79 | 4.756 |
| PLO5 Mark (Communication Skills) | 33 | 61 | 84 | 71.06 | 5.043 |
| PLO6 Mark (Digital Skills) | 33 | 75 | 89 | 83.55 | 3.113 |
| PLO7 Mark (Numerical Skills) | 33 | 70 | 92 | 84.03 | 6.242 |
| PLO8 Mark (Leadership, Autonomy, and Responsibility) | 33 | 75 | 89 | 81.82 | 3.432 |
| PLO9 Mark (Personal Skills) | 33 | 64 | 88 | 74.36 | 5.578 |
| PLO10 Mark (Entrepreneurial Skills) | 33 | 54 | 90 | 78.64 | 6.841 |
| PLO11 Mark (Ethics and Professionalism) | 33 | 77 | 92 | 84.39 | 4.054 |

Table 4. Descriptive Statistics of Arts Stream Students' CGPA and PLO Attainment

In terms of PLO attainment, variation was evident across different domains. Lower mean scores were recorded for PLO1 (Mean = 52.58, SD = 8.98) and PLO2 (Mean = 52.88, SD = 11.42), which are typically associated with foundational knowledge and cognitive skills. By contrast, higher mean scores were achieved in applied and higher-order domains such as PLO3 (Mean = 82.70), PLO6 (Mean = 83.55), PLO7 (Mean = 84.03), PLO10 (Mean = 78.64), and PLO11 (Mean = 84.39), suggesting stronger performance in practical, problem-solving, and integrative skills. The relatively high attainment in PLO4 (Mean = 87.79) and PLO8 (Mean = 81.82) further highlights the students' ability to meet performance expectations in discipline-specific applications. Although they can meet or exceed PLO benchmarks in applied and skill-based areas, gaps remain in PLO1 and PLO2 (knowledge and cognitive domains) that require additional instructional support

Table 5 and Figure 2 highlight the distribution of course failures across different PLOs among Arts-stream students, revealing clear patterns of academic difficulty. Most students struggled with PLO1 and PLO2, which correspond to foundational knowledge and cognitive skills. Of 33 students, 31 failed at least one course mapped to PLO1, with individual students failing 3 to 16 courses, underscoring persistent challenges in mastering basic science and mathematics concepts. A similar trend was observed for PLO2, where 31 students also experienced failures, though at a lower intensity (1 to 6 courses failed). By contrast, failures were much less frequent in the higher-order and applied PLOs. For example, only a handful of students failed courses associated with PLO3 (n = 4), PLO5 (n = 3), PLO7 (n = 2), PLO8 (n = 1), PLO9 (n = 2), and PLO10 (n = 4), with each case involving a single course.

The pattern suggests stronger student performance in applied and integrative tasks but weaker outcomes in theory-driven, content-heavy areas. The findings align with Julaihi and Mohamadin (2025), who reported higher failure rates among Arts-stream students in PLO1 and PLO2, which reflect substantial challenges in foundational science skills. They are further supported by Eitemüller and Habig (2020), who observed that students lacking prior exposure to essential scientific concepts are more likely to struggle in entry-level courses, unless bridging support is provided. Similarly, Leong et al. (2021) highlighted that misalignment between secondary and tertiary curricula in science subjects can contribute to early academic difficulties. Taken together, these results point to a critical gap: Arts-stream students are capable of developing applied scientific competencies but face substantial barriers in acquiring the foundational disciplinary knowledge that underpins advanced learning, reinforcing the need for stronger bridging and remedial support in early semesters.

| | N | Number of Students | Minimum of Courses | Maximum of Courses |
|-------|----|--------------------|--------------------|--------------------|
| | | Failed | Failed | Failed |
| PLO1 | 33 | 31 | 3 | 16 |
| PLO2 | 33 | 31 | 1 | 6 |
| PLO3 | 33 | 4 | 1 | 2 |
| PLO5 | 33 | 3 | 1 | 1 |
| PLO7 | 33 | 2 | 1 | 1 |
| PLO8 | 33 | 1 | 1 | 1 |
| PLO9 | 33 | 2 | 1 | 1 |
| PLO10 | 33 | 4 | 1 | 1 |

Table 5. Number of Arts-stream students failing courses by PLO

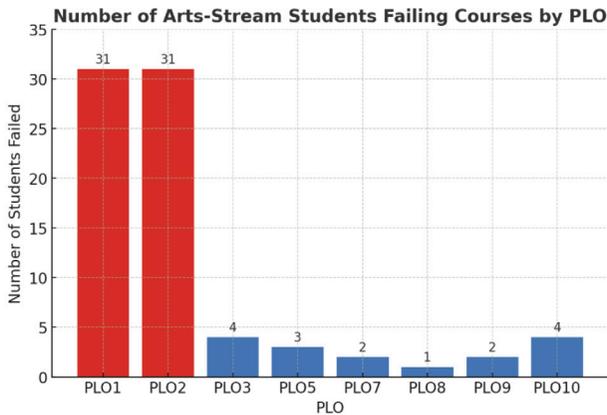


Figure 2. Number of Arts-stream students failing courses by PLO

4.3 MOTIVATIONS AND CHALLENGES

Tables 6 and 7 present a descriptive analysis of students' motivations and challenges during their AS120 studies. The results revealed that students' strongest motivation for enrolling in AS120 was personal interest in science ($M = 4.00$, $SD = 0.76$), followed by the policy opportunity enabling Arts students' entry into science ($M = 3.93$, $SD = 1.07$) and career prospects ($M = 3.90$, $SD = 0.77$). Institutional reputation ($M = 3.79$, $SD = 1.01$) was moderately influential, while the social influence ($M = 3.62$, $SD = 0.82$) and enrolling as an alternative pathway ($M = 3.62$, $SD = 1.05$) were the least endorsed. Overall, the results suggest that intrinsic motivation and policy accessibility are the most salient drivers of program choice, with external or fallback reasons playing a secondary role.

Meanwhile, students' greatest academic challenges were the lack of foundational knowledge in science ($M = 3.93$, $SD = 1.16$) and mathematical difficulty ($M = 3.79$, $SD = 1.18$). Other academic barriers, such as pace of learning ($M = 2.97$, $SD = 1.30$), scientific methodology ($M = 2.72$, $SD = 1.07$), and language proficiency ($M = 2.52$, $SD = 1.06$), were reported less strongly. With respect to psychosocial factors, the most prominent challenges were feelings of not belonging among peers in science ($M = 3.41$, $SD = 1.21$) and confidence issues ($M = 3.34$, $SD = 1.17$). Stress due to workload ($M = 2.86$, $SD = 1.03$) and adjustment difficulties ($M = 2.97$, $SD = 1.18$) were rated

lower. Overall, these findings suggest that cross-stream students are most hindered academically by knowledge and math gaps and, psychosocially, by belongingness and confidence issues.

| Motivation Item | M | SD |
|---|------|------|
| Career Prospects: I believe AS120 offers better job opportunities and higher learning potential. | 3.90 | 0.77 |
| Personal Interest: I have a genuine passion and curiosity for science subjects. | 4.00 | 0.76 |
| Policy Opportunity: The new policy allowing Arts-stream students to enter science programs. | 3.93 | 1.07 |
| Social Influence: I was strongly encouraged by family, teachers, or peers. | 3.62 | 0.82 |
| Institutional Reputation: I wanted to study at UiTM, and this was the best available option for me. | 3.79 | 1.01 |
| Alternative Path: It was an alternative to my first-choice program, which I did not get into. | 3.62 | 1.05 |

Note. Ratings were based on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Table 6. Students' Motivations for Choosing AS120 (N = 29)

| Challenge Item | M | SD |
|--|------|------|
| Academic Challenges | | |
| Knowledge Gap: Lack of prior science subject knowledge. | 3.93 | 1.16 |
| Mathematics Difficulty: Struggling with mathematical concepts and calculations. | 3.79 | 1.18 |
| Scientific Methodology: Difficulty in understanding and applying the scientific method. | 2.72 | 1.07 |
| Pace of Learning: The course pace was too fast. | 2.97 | 1.30 |
| Language Barrier: Difficulty with English or technical terminology used in science subjects. | 2.52 | 1.06 |
| Psychosocial Challenges | | |
| Time Management & Stress: unable to balance the heavy workload, leading to constant stress and anxiety | 2.86 | 1.03 |
| Lack of Belonging: Feeling out of place or isolated among peers with a science background. | 3.41 | 1.21 |
| Confidence Issues: Struggling with self-doubt or feeling like an "imposter syndrome". | 3.34 | 1.17 |
| Adjustment Difficulty: Finding it hard to adapt to different learning styles and cultures. | 2.97 | 1.18 |

Note. Ratings were based on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Table 7. Academic and Psychosocial Challenges (N = 29)

When asked to select their single most important motivation for enrolling in AS120 (see Table 8), career prospects were the top choice (44.8%), followed by personal interest in science (37.9%). Fewer students selected the alternative path (13.8%) or social influence (3.4%). Although “alternative path” was the least endorsed (see Table 6), a few students still chose it as their main motivation. This shows that while most did not see AS120 as a fallback, for some, the chance to enter through this route was personally the most important factor.

| Motivation | Frequency | Percent (%) |
|-------------------|-----------|-------------|
| Career Prospects | 13 | 44.8 |
| Personal Interest | 11 | 37.9 |
| Alternative Path | 4 | 13.8 |
| Social Influence | 1 | 3.4 |

Table 8. Most Important Motivation for Enrolling in AS120 (N = 29)

When asked about their greatest challenge (see Table 9), over one-third (34.5%) identified mathematical difficulty, with 13.8% reporting knowledge gaps and confidence issues. Other challenges, such as the pace of learning, time management & stress, and a sense of not belonging, each accounted for 10.3% of responses. In comparison, 3.4% cited scientific methodology and difficulty adjusting, respectively. The findings reinforce that while students were motivated primarily by career prospects and personal interest, they perceive mathematics as their greatest barrier to success. This is consistent with Aspin et al. (2022), Idris et al. (2023) and Ng (2024), who all reported mathematics as a persistent obstacle in STEM learning. International evidence further supports this pattern, with Eitemüller and Habig (2020) and Leong et al. (2021) showing that inadequate prior preparation and curricular misalignment contribute to early struggles in mathematics-intensive courses.

| Challenge | Frequency | Percent (%) |
|--------------------------|-----------|-------------|
| Mathematics Difficulty | 10 | 34.5 |
| Knowledge Gap | 4 | 13.8 |
| Confidence Issues | 4 | 13.8 |
| Pace of Learning | 3 | 10.3 |
| Time Management & Stress | 3 | 10.3 |
| Lack of Belonging | 3 | 10.3 |
| Scientific Methodology | 1 | 3.4 |
| Adjustment Difficulty | 1 | 3.4 |

Table 9. Greatest Challenge Faced in AS120 (N = 29)

A cross-tabulation of students’ primary motivations and their greatest challenges (Tables 10 and 11) revealed clear patterns. Among those motivated by career prospects, the majority (69.2%) reported academic challenges, most notably mathematical difficulty, knowledge gap and the pace of learning. In comparison, 30.8% reported psychosocial challenges such as confidence issues, time management & stress, or a lack of belonging. Similarly, students motivated by personal interest were more likely to cite academic challenges (63.6%), while only 36.4% identified psychosocial barriers.

Although statistical significance was not reached due to a small sample size, the observed pattern suggests that motivation may shape the nature of challenges experienced by cross-stream students. This pattern resonates with earlier work showing that limited preparation in science and mathematics hampers student success (Aspin et al., 2022; Idris et al., 2023; Ng, 2024) and insufficient prior exposure and curriculum misalignment contribute to early struggles (Eitemüller & Habig, 2020; Leong et al., 2021).

Although psychosocial issues are less prevalent than academic barriers, Ng’s (2024) findings align with the idea that psychosocial factors influence persistence and adjustment, even when academic difficulties dominate. Together, this suggests that cross-stream students require not only academic bridging support but also interventions that build confidence, manage stress, and foster a stronger sense of inclusion.

| Motivation→ Challenge ↓ | Career Prospects | Personal Interest | Alternative Path | Influence of Others | Total |
|------------------------------------|------------------|-------------------|------------------|---------------------|--------------|
| Mathematics Difficulty | 6 | 3 | 1 | 0 | 10 |
| Knowledge Gap | 2 | 2 | 0 | 0 | 4 |
| Confidence Issues | 2 | 1 | 1 | 0 | 4 |
| Pace of Learning | 1 | 2 | 0 | 0 | 3 |
| Time Management & Stress | 1 | 1 | 1 | 0 | 3 |
| Lack of Belonging | 1 | 2 | 0 | 0 | 3 |
| Scientific Methodology | 0 | 0 | 1 | 0 | 1 |
| Adjustment Difficulty | 0 | 0 | 0 | 1 | 1 |
| Total | 13 | 11 | 4 | 1 | 29 |

Table 10. Motivations vs Challenges

| Type of Challenges → Motivation ↓ | Academic Challenges | Psychosocial Challenges | Total |
|--|---------------------|-------------------------|--------------|
| Career Prospects | 9 | 4 | 13 |
| Personal Interest | 7 | 4 | 11 |
| Alternative Path | 2 | 2 | 4 |
| Social Influence | 0 | 1 | 1 |
| Total | 18 | 11 | 29 |

Table 11. Motivation vs Type of Challenges

As shown in Table 12, students who selected AS120 as their first choice were mostly motivated by personal interest (50%), whereas those who chose it as an alternative were mostly motivated by career prospects (47.4%). In contrast, the small number of students who did not choose AS120 showed motivations tied to career prospects and social influence.

| Choice → Motivation ↓ | First Choice | Alternative Choice | Not a Choice | Total |
|----------------------------------|-----------------|-----------------------|-----------------|--------------|
| Career Prospects | 3 | 9 | 1 | 13 |
| Personal Interest | 4 | 7 | 0 | 11 |
| Alternative Path | 0 | 1 | 0 | 1 |
| Social Influence | 1 | 2 | 1 | 4 |
| Total | 8 | 19 | 2 | 29 |

Table 12. Motivation vs Choice

In terms of challenges (see Table 13), mathematics difficulty was the most frequently cited across all groups, particularly dominant among those who did not choose AS120 (100%). First-choice students struggled mainly with mathematics (37.5%), but also reported time management, pace, and confidence as secondary issues. Alternative choice students faced a broader range of academic and psychosocial challenges, suggesting weaker preparation and integration into the program.

| Choice → Challenge ↓ | First Choice | Alternative Choice | Not in Choice | Total |
|---------------------------------|-----------------|-----------------------|------------------|--------------|
| Foundational Knowledge | 1 | 3 | 0 | 4 |
| Mathematical Difficulty | 3 | 5 | 2 | 10 |
| Scientific Methodology | 0 | 1 | 0 | 1 |
| Pace of Learning | 1 | 2 | 0 | 3 |
| Time management & Stress | 1 | 2 | 0 | 3 |
| Lack of Belonging | 1 | 2 | 0 | 3 |
| Confidence Issues | 1 | 3 | 0 | 4 |
| Adjustment Difficulty | 0 | 1 | 0 | 1 |
| Total | 8 | 19 | 2 | 29 |

Table 13. Challenges vs Choice

4.4 FUTURE ASPIRATIONS

Table 14 presents the descriptive analysis of students' immediate plans and career vision after completing their AS120 studies. Analysis revealed that the majority (58.6%) planned to pursue a bachelor's degree in a science-related field, with smaller groups aiming for non-science degrees (24.1%), seeking employment (6.9%), or taking a gap year before deciding on next steps (10.3%). Regarding career vision, 34.5% aspired to science-related careers, 27.6% to interdisciplinary fields, 20.7% to non-science careers, and 17.2% were uncertain.

| | Frequency | Percentage |
|---|-----------|------------|
| Immediate Plan | | |
| Pursue a science-related degree program | 17 | 58.6 |
| Pursue a non-science degree program | 7 | 24.1 |
| Seek employment | 2 | 6.9 |
| Take a gap year before deciding | 3 | 10.3 |
| Long-term Career Vision | | |
| Science-related career | 10 | 34.5 |
| Interdisciplinary career | 8 | 27.6 |
| Non-science career | 6 | 20.7 |
| Uncertain | 5 | 17.2 |

Table 14. students’ immediate plans and long-term career vision

Regarding students’ perceptions of the university’s policy of offering AS120 to Arts-stream students, 38% agreed, 38% were neutral, and 24% disagreed (see Figure 3). By contrast, a stronger consensus was observed regarding the broader cross-stream policy, with 76% agreeing or strongly agreeing that it had enabled their plans (see Figure 4).

When asked whether they would make the same choice, given a second chance, 55% said they would still enrol in AS120, 21% were uncertain, and 24% said they would likely choose other diploma programs (see Figure 5). Taken together, these findings suggest that while the policy has successfully broadened access and fostered science pathways for Arts-stream students, ambivalence and regret are present among a minority of students. This underscores the need for enhanced academic and psychosocial support to ensure sustained engagement and long-term commitment to STEM trajectories.

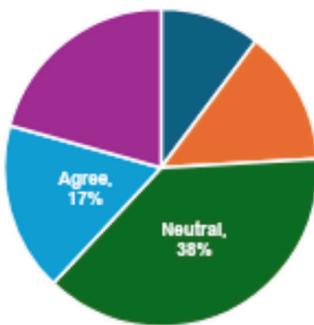


Figure 3. Perceptions of the University Policy to Offer AS120 to Arts Stream Students

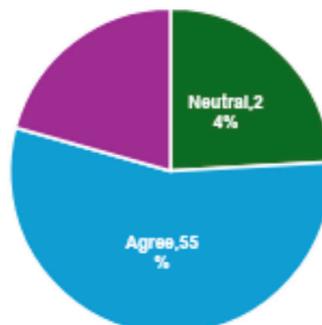


Figure 4. Perceptions of Cross-streams Policy Impact on Future Plans

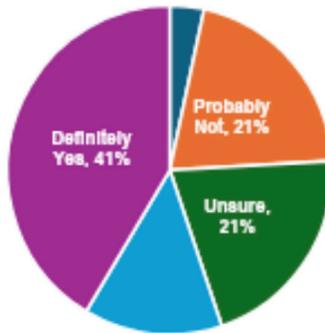


Figure 5. Counterfactual Choice if Allowed to Decide Again

Most students who indicated they would “definitely” or “probably” choose AS120 again emphasised intrinsic interest, academic foundations, and positive experiences. Several highlighted a strong passion for science and the program’s role in preparing them for advanced study:

“It gives me the foundation to pursue in Chemistry. I have a strong passion for Chemistry, and this program prepares me with the essential knowledge and skills to continue further in this field.”

“It provides wide opportunities to continue into a degree.”

Others valued the supportive social environment that helped them pursue their goals and expressed gratitude for discovering their potential in the science stream:

“Even though it was not my first choice, I am having fun while studying this course. My classmates and lecturers were very supportive. When I felt down, my friends comforted me. It was a great experience for me, and this course is the key to pursue my dream.”

“I was interested in learning science since I was in high school. I am grateful for having the chance to know my ability in learning and adapting in the science stream.”

Sometimes it is fun to challenge yourself with something you do not know.”

These views align with Julaihi & Mohamadin (2024), who found that personal interest and program satisfaction are critical drivers of persistence, and Wong et al. (2022), who emphasised that clear pathways to STEM careers sustain student motivation.

In contrast, students who were “unsure” or indicated they would “probably not” choose AS120 reflected struggles with background preparation, program fit, and career relevance. Some admitted that while Science offered valuable new skills, pursuing the Arts is more natural. Others admitted to ongoing struggles and difficulty of adapting to the program without prior preparation, while others expressed frustration over limited job prospects:

“I am unsure because while my background was in Arts, I also find Science interesting and challenging. Studying Science has given me new knowledge and skills, but at the same time, I sometimes feel that continuing in the Arts stream might have been more natural for me.”

“I could see myself choosing either path, and I have not yet gathered enough clarity or personal conviction to commit to one. I want to consider carefully before making a decision.”

“I can see myself handling Science subjects decently at best. I am tempted to quit the course, but I also feel like that would be a waste.”

“I personally think that I have more potential in other courses, but I have currently developed an interest in applied science, though I do find myself struggling sometimes.”

“Probably not because the jobs that I applied for got rejected, and they require experience. Also, a Diploma in Science is too general for most of the jobs available.”

“Since I do not have any basic knowledge in the science stream, I survived this course because I have a family member related to this field who helped me a lot. I would choose a different program if I could turn back time to pursue what I am passionate about.”

“For a non-science stream student, it is kind of hard to adapt well to science”

These concerns are consistent with Andrew et al. (2024) and Idris et al. (2023), who reported that knowledge gaps and weak foundations are significant barriers in STEM education, and align with Mohamadin and Julaihi (2023), who found that misalignment between program content and career opportunities can lead to student dissatisfaction.

Tables 13 and 14 present the benefits and challenges of the cross-stream policy from students' perspectives. This policy allows students to foster new passions and interests in science (86.2%), ensuring equitable access to science education (72.4%), and expanding career opportunities (58.6%). In terms of the challenges, the students highlighted foundational gaps and a lack of tailored teaching approaches as the most pressing issues (69.0%).

| Benefits | Frequency | Percent (%) |
|--|-----------|-------------|
| Allows students to foster new passions and interests | 25 | 86.2 |
| Provides equitable access to science education for all students | 21 | 72.4 |
| Opens a wider range of high-demand career paths for Arts students | 17 | 58.6 |
| Helps meet national goals for a more scientifically literate workforce | 8 | 27.6 |
| Creates a more diverse and interesting classroom environment | 7 | 24.1 |

Table 13. Benefits of the Cross-stream policy (N = 29)

| Challenges | Frequency | Percent (%) |
|---|-----------|-------------|
| Arts students need better foundational preparation (e.g., a bridging program) | 20 | 69.0 |
| Risk of students struggling excessively without adequate support systems | 20 | 69.0 |
| Academic advisors and lecturers need more training to support Arts students | 16 | 55.2 |
| Teaching methods need to adapt to diverse learning backgrounds | 12 | 41.4 |
| Policy might not be well-understood/supported by all staff | 6 | 20.7 |

Table 14. Challenges of the Cross-stream policy (N = 29)

Several students called for bridging programs and extra classes to introduce the basics of Biology, Chemistry, Physics, and Mathematics before diving into advanced topics. Others stressed the need for step-by-step teaching and a slower pace and suggested a peer tutoring or mentorship program. Emotional and social support were also emphasised, with students urging lecturers to avoid discriminatory attitudes:

Informant 1: “The faculty could support Arts students by offering more interactive and practical learning approaches, such as laboratory-based activities, tutorials in small groups, and mentorship sessions. This would make complex science topics easier to understand and keep students motivated. Encouraging collaboration between Science and Arts background students can also create a supportive learning environment.”

Informant 2: “The faculty can help students by preparing and teaching them from the very basic science backgrounds so that they have the ideas about all topics that they will learn later on.”

Informant 3: “To not discriminate and talk down on students from the Art stream because it can cause their confidence level to be down, keep an open mind during their teaching, and be patient when seeing arts students ask for help or even struggle, especially during tests and learning in the classroom. Lecturers need to show that they want to help students. As simple as giving time to students asking questions during non-lecture time.”

Informant 4: “Lecturers can try to change their teaching methods... and not go too fast on the learning pace so that these students will not feel left out or lost.”

Informant 5: “Peer Tutoring, which pairs students from the sciences and arts. I personally benefited from this approach as I received great support from my science friends.”

Informant 6: “I suggest implementing a mentorship program where Arts students are paired with seniors who have successfully transitioned into the Science stream. This will provide guidance, motivation, and real-life insights to help them adapt better and feel more supported.”

These responses align with Julaihi & Mohamadin (2025), who stressed that academic and affective support systems are vital for student success, and Idris et al. (2023), who pointed to pedagogical innovation as key to sustaining STEM participation.

5. CONCLUSION

This study concludes that the cross-stream admission policy at UiTM has successfully expanded access to science education and provided alternative pathways for Arts-stream students to engage in STEM disciplines. The findings showed that these students achieved moderate CGPA scores and satisfactory attainment in most PLO, particularly in applied and skill-based domains. However, persistent weaknesses in foundational knowledge and cognitive competencies (PLO1 and PLO2) highlight the need for enhanced instructional support in mathematics and basic sciences.

Students were primarily motivated by career prospects and personal interest, but faced notable academic challenges, including mathematical difficulties, gaps in foundational knowledge, and the fast pace of learning (more than 63%). Psychosocial issues such as low confidence, poor time management, stress, and lack of belonging further affected their academic adjustment.

In terms of aspirations, 58.6% planned to continue in science-related bachelor's degrees, 24.1% intended to switch to non-science fields, and the rest remained uncertain. While 76% agreed that the cross-stream policy supported their future goals, only 55% would choose the same program (AS120) again, indicating mixed feelings about their experience.

Overall, the cross-stream policy has proven academically viable and socially inclusive. However, its long-term success requires structured academic bridging, adaptive pedagogical approaches, and holistic support systems that address both cognitive and affective needs.

6. SUGGESTIONS

Future research should use longitudinal and multi-institutional approaches to assess the long-term outcomes of cross-stream students in science programs. Comparative studies between Science- and Arts-stream students can help determine how prior preparation affects success and retention. Qualitative studies exploring students' experiences and motivation would enrich the understanding of the challenges of cross-stream transitions. Moreover, studies on the bridging modules, peer mentoring, and inclusive teaching strategies

are also recommended to improve institutional practices and policy reforms. Such evidence-based insights will help strengthen and sustain cross-stream integration in higher education.

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10. CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

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