Asian Journal of Social Science Research (e-ISSN: 2600-9706)
Volume 8, Issue 1, 2026
DOI: https://doi.org/10.5281/zenodo.20807895

FACTORS INFLUENCING STUDENTS' INTENTION TO PURSUE STUDY IN SCIENCE STREAM EDUCATION

Abang Fhaeizdhyall[1,*], Ahmad Lutfi Anis[2], Adeline Engkamat[3], Rumaizah Che Md Nor[4], Frannelya Francis[5], Hazman Seli[6]

[1]Academy of Language Studies, [2]Faculty of Applied Sciences, [3,4]Faculty of Computer and Mathematical Sciences. [5]Faculty of Health Sciences, and [6]Faculty of Chemical Engineering, Universiti Teknologi MARA (UiTM) Sarawak Branch, Malaysia

[*]Corresponding author, abang385@uitm.edu.my

Received Date: 02/ 01/2026 Accepted Date: 15/06/2026 Published Date: 30/06/2026

ABSTRACT

This study investigates the factors that influence secondary school students' intention to pursue science stream education in Sarawak. Four factors were identified and investigated based on prior studies, namely, skills development, knowledge enhancement, parental encouragement, and career opportunities. A quantitative research design using a survey questionnaire was employed. The questionnaire was distributed to 30 secondary school students who participated in a STEM competition. The data was analyzed using SPSS software, employing several analysis techniques, namely descriptive, correlation, and multiple regression analyses. The findings indicate that knowledge enhancement is the primary factor that influences participants' intention to pursue STEM education. In contrast, skills development, parental encouragement, and career opportunities were not statistically significant factors in this study, possibly due to students' prior exposure to digital skills, evolving career landscapes, and limited parental engagement in science-related discussions. The results emphasize the importance of prioritizing knowledge-centered and experiential teaching approaches to foster sustained interest in science education. For policymakers and educators, these insights highlight the need for targeted interventions that enrich students' learning experiences to ensure a stronger pipeline of STEM-ready graduates. Future research should expand the sample size and explore additional variables such as teacher quality and peer influence for a more comprehensive understanding.

Keywords: STEM education, influencing factors, knowledge enhancement, learning experiences, Sarawak, secondary school students

DOI: https://doi.org/10.5281/zenodo.20807895

INTRODUCTION

The Future of Jobs Report 2025 by the World Economic Forum shows that strong trends are changing the job market until 2030 (World Economic Forum, 2025). Most importantly, jobs like AI and Machine Learning Specialists, Big Data Analysts, and Renewable Energy Engineers are growing the fastest because they require technological skills, especially in AI, big data, networks, cybersecurity, and digital literacy. In the next five years, the workforce will need to learn this mix of technological skills to be relevant. These skills are expected to grow in importance more rapidly than any other skills. This growing demand shows the significance of Science and Technology streams in secondary-level education. It is important for students to have a strong background in scientific thinking and technological skills, not only for their own career success but also for the country's economic competitiveness in a digital and green economy that is changing quickly.

In Malaysia, the recognition of the necessity to produce science-oriented graduates dates to early 1967, marked by the implementation of the 60:40 Science: Arts program. The 60:40 strategy pertains to the Malaysian Government's objective for 60% of upper secondary students to pursue the Science, while the remaining 40% pursue the Arts (Ong et al., 2021). This policy is reinforced by the government's initiative to be realized through the Science, Technology, and Innovation Policy and Vision 2020. The policy is enforced for both primary and tertiary education institutions. Then, it has since been changed to a 60:40 ratio of STEM to non-STEM, as specified in the Malaysian Education Development Plan (PPPM) 2013-2024 (Ramli & Awang, 2020). This policy aims to engage a minimum of 60 % of students in the STEM disciplines. To attain this objective, the ministry and state education agencies implement several initiatives. Despite the implementation of different initiatives and programs to support this policy, they have yet to yield sustained growth in science stream participation among secondary school students (Jamaluddin, 2025).

Although the percentage of upper-secondary level students enrolled in the science, technology, engineering, and mathematics (STEM) stream shows a progressive increment from 40.95% in 2021 to 45.7% in 2023 (Mahlan et al., 2024) and 50.8% in 2024 (Azahar., 2024), the 60:40 policy goal is still far from being achieved. The same pattern applies to tertiary education in Malaysia, with only 43.5% of its tertiary students earning degrees in STEM fields.

Past studies listed that the key problems that are keeping Malaysia from reaching its 60% goal are a lack of student enthusiasm and interest in studying STEM, problems with teaching caused by time and capacity limits, and frequent changes in the language of instruction (Azahar, 2024). Even with these insights, there have been few studies that have looked at how skills development, knowledge enhancement, parental support, and career prospects affect secondary school students' interest in the science stream at the same time, especially in underrepresented regions like Sarawak.

In recent years, there has been a noticeable decline in the number of secondary school students opting to pursue Science Stream education, despite national efforts to strengthen STEM (Science, Technology, Engineering, and Mathematics) capabilities (Idris et al.,2023). This trend raises concerns about the future workforce readiness in science and technology-driven sectors (Jamaluddin et al., 2025). While various initiatives have been introduced to promote interest in science, the actual factors that influence students' intentions to choose the Science Stream remain inadequately understood. Preliminary observations suggest that factors such as skills development, knowledge enhancement, parental encouragement, and perceived career prospects may play a critical role in shaping students' decisions (Kairi et al. 2024; Malik et al. 2021;

DOI: https://doi.org/10.5281/zenodo.20807895

Abe & Chikoko, 2020; Razali et al. 2020). However, there is limited empirical evidence to identify the relative impact of these factors on secondary school students' interest in science stream education in Sarawak. Most current and past studies investigating the factors were conducted outside of the state of Sarawak (Abdullah et. al., 2024; Arsad & Heong, 2024; Razali et. al., 2020; Malik et. al., 2021). Therefore, without a clear understanding of these influences, it becomes challenging to design effective interventions that can guide students toward science-based education and careers. Therefore, this study aims to explore and analyze the key factors affecting students' intention to pursue Science Stream education at the secondary school level in Sarawak.

In light of the knowledge gaps, this study aims to investigate whether the following four key factors, skills development, knowledge enhancement, parental encouragement, and career prospects, continue to impact the secondary school students' intention to pursue science stream education. This study focuses on the critical transitional phase from lower to upper secondary education, where subject-streaming decisions are first made. Understanding which of these factors remain influential will enable educators, policymakers, and stakeholders to implement more targeted and evidence-based interventions to increase the science stream enrollments in Sarawak. The following research question was formulated to frame the study:

1. To what extent do skills development, knowledge enhancement, parents' encouragement, and career prospects influence secondary school students' interest in science stream education?

LITERATURE REVIEW

STEM activities are closely aligned with Sustainable Development Goal 4 (Quality Education), which emphasizes inclusive and equitable quality education and lifelong learning opportunities for all (United Nations, 2015). By engaging students in hands-on, inquiry-based, and technology-integrated learning, STEM initiatives foster critical thinking, creativity, and problem-solving skills essential for 21st-century citizenship and workforce readiness (Aspin et al., 2021; Lian et al., 2021). Moreover, such activities bridge the gap between theoretical knowledge and practical application, ensuring that students not only master content but also develop the competencies needed to address global challenges (Benek & Dönmez, 2024). In this way, STEM education directly contributes to SDG 4 by promoting accessible, relevant, and future-oriented learning pathways that empower students to pursue science stream education and beyond.

The intention of students to pursue science stream education has been widely studied, and research suggests that multiple interrelated factors play a role. Based on past studies, four primary factors can influence one's attention to further STEM education, namely, developing essential skills, knowledge enhancement, parental encouragement, and career prospects. A conceptual model is developed to illustrate the potential factors that may affect students' intention to pursue STEM education, as shown in Figure 1.

DOI: https://doi.org/10.5281/zenodo.20807895

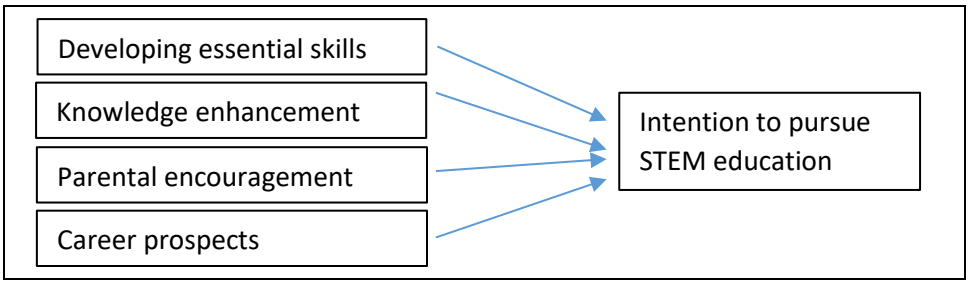


Figure 1. A Conceptual Model of Factors Affecting Students' Intention to Pursue STEM Education

DEVELOPING ESSENTIAL SKILLS

Developing essential skills in STEM refers to building the mix of abilities that learners need to function effectively in science, technology, engineering, and mathematics fields. According to Siekmann and Korbel (2016), this includes foundational skills (like numeracy and information processing), higher-order cognitive skills (such as critical and creative thinking), technical or discipline-specific skills, and socio-emotional skills like curiosity and persistence. In essence, it means preparing learners with a balanced set of technical and non-technical abilities so they can solve real-world problems and adapt to future STEM-related challenges.

One's intention towards science stream education can be influenced through participation in STEM activities. Competition-based modules, which offer hands-on and experiential learning, have been observed to uplift students' motivation and science identity that can lead to genuine interest in STEM fields. For example, Kairi et al. (2024) found that students who engaged in competition-based learning reported significantly higher intentions to pursue tertiary education in STEM, with 96% continuing their studies in related fields. Similarly, STEM programs enhance critical thinking skills (Yreck, 2024), integral to 21st-century competencies such as problem-solving, creativity, collaboration, and communication (Aspin et al., 2021).

Moreover, these skill-based approaches prepare students for the demands of the global workforce. As Lian et al. (2021) highlighted, cultivating 21st-century skills ensures that students become adaptable professionals capable of addressing complex societal and industrial challenges. In this context, self-efficacy emerges as a critical driver: students with higher STEM self-efficacy are more likely to set ambitious academic and career goals in STEM (Chan, 2022). Integrated STEM activities also enhance innovative thinking and design skills, allowing students to perceive STEM learning as enjoyable and practical (Benek & Dönmez, 2024). In fact, Açıkay et al. (2023) concluded that participation in STEM activities significantly improves students' creativity, collaboration, and problem-solving abilities, highlighting the natural alignment between skill development and science stream education.

The studies mentioned in the prior paragraph indicate that skill development, such as creativity, critical thinking, and problem solving, is the tools that increase students' interests in STEM learning. However, others argued that these skills are the outcomes of those who have a high preliminary interest in STEM. These differences varied due to the measurement tools used – from performance tasks to self-reports. Moreover, most of the cited studies emphasized short-term effects rather than long-term effects, and also lacked follow-up courses. These inconsistencies point to the need for a robust finding. Therefore, it can be deduced that developing essential skills can influence students' intention to pursue STEM education.

DOI: https://doi.org/10.5281/zenodo.20807895

KNOWLEDGE ENHANCEMENT

Beyond skill acquisition, enhancing scientific knowledge is another crucial factor influencing students' educational choices. "Knowledge enhancement in STEM" refers to the improvement of students' understanding of science, technology-engineering, and mathematics concepts. Utami, Rochintaniawati, and Suwarma (2020) demonstrated this through a STEM-based instructional module on Earth's structure and dynamics, where pre- and post-test results showed significant gains in students' knowledge—especially in the technology-engineering component. Overall, the term highlights how integrated STEM instruction deepens students' factual and conceptual mastery of STEM content.

Additionally, Malik et al. (2021) demonstrated that scientific knowledge directly contributes to self-efficacy, predicting students' intention to pursue science streams. This finding aligns with Lent and Brown's (2019) Social Cognitive Career Theory, which posits that perceived competence in science encourages persistence in the field.

Interactive and knowledge-rich programs further reinforce this link. Sulaiman et al. (2022) have shown that the students in their study enjoyed learning science through the UTM-STEM program that offered content-focused and engaging modules. Moreover, Blotnicky et al. (2018) highlighted that lower primary students with better science knowledge showed greater confidence to pursue STEM education. In Malaysia, experiential activities such as robotic designs, experiments, and design projects have proven effective in encouraging engagement and confidence (Benek & Dönmez, 2024).

However, these studies were varied in terms of framing the "increased content knowledge", in which they fall into two extremes – those that framed content knowledge as the direct predictor of self-efficacy and STEM education choice, whereas others highlighted the exposure of STEM education to solving real-world problems. Furthermore, these studies applied different types of knowledge assessments in doing their investigation (e.g., recall vs application), which contributes to a lack of comparability across findings. Thus, more investigation is needed to understand the effect of knowledge enhancement on students' intentions towards STEM education. It can be deduced, based on prior studies, that knowledge enhancement can influence students' intention to pursue STEM education.

PARENTAL ENCOURAGEMENT

Parental influence is another significant determinant of students' intention to pursue science stream education. Studies across diverse contexts illustrate the weight of parental guidance in shaping career decisions. Parental involvement refers to the various ways parents engage in their children's education, including providing emotional support, learning resources, monitoring academic progress, and participating in school activities (Siani et al., 2020). In STEM education, such involvement has a profound effect. This supports Lloyd et al. (2018), who found that parental encouragement has a stronger influence than educational level alone. In Cambodia, more than half of parents encourage children toward non-science tracks due to limited awareness of science career opportunities (Pov et al., 2024). Conversely, in South Africa, many STEM students reported family influence as "very influential" or "moderately influential" in their decision-making (Abe & Chikoko, 2020).

In Malaysia, parents' recognition of STEM professional value and career prospects is important to motivate their children. Razali (2021) argued that students' interest in STEM is often in line with their

DOI: https://doi.org/10.5281/zenodo.20807895

parents' perception of the career prospects of STEM fields. Moreover, Leng et al. (2020) asserted that students are more inclined towards STEM education if their parents work in STEM-related industries, or they encourage their children to pursue education in STEM fields.

These studies emphasized that parental support through exposure, guidance, or encouragement, able to shape their children's aspirations and increase their attention to pursue science stream education. Therefore, it can be deduced, based on past studies, that parental encouragement can influence students' intention to pursue STEM education.

CAREER PROSPECTS

"Career prospects in STEM fields" refers to the anticipated job opportunities, long-term employment stability, and economic returns available to individuals in science, technology, engineering, and mathematics disciplines. It encompasses the demand for STEM professionals, the potential for career advancement, competitive salaries, and the ability to leverage STEM skills in evolving industries (Zhou & Shirazi, 2025). Research suggests that strong STEM "career prospects" are a key motivator for students choosing STEM careers, due to their association with economic stability, high employability, and perceived utility.

Career prospects have been shown to influence students' intention to enter the science stream of education. For example, Abdullah et al. (2024) stressed that students in Northern Malaysia became keener about engineering and mathematics after joining STEM activities. Correspondingly, students who participated in the Studio STEM program have developed better competence beliefs and prolonged motivation, which lead to better career aspirations in STEM.

Past studies further indicate that STEM education is both a fundamental and a catalyst for career interest in its fields. For instance, Razali et al. (2020) asserted that motivation to learn science mediates the relationship between attitudes toward STEM and career choice. Moreover, robotics camps, which are part of technology-enhanced learning, have increased students' interest in STEM-related careers (Tekbiyik et al., 2022). Furthermore, STEM careers are recognized as important for economic development in various sectors like engineering, agriculture, health, and aerospace (Badri et al., 2016). Therefore, students' acknowledgement of promising career opportunities strengthens their intention to pursue science education, which also aligns with Malaysia's demand for a future-ready workforce (Idris et al., 2023b).

The studies cited above indicate a significant role played by career prospects in students' intention to pursue STEM education. However, most measure perceived prospects rather than actual labor-market outcomes. Some program-based studies measured optimism immediately after STEM activities, which raised concerns about short-term enthusiasm rather than prolonged aspiration. Moreover, emphasis is also more on high-status jobs (e.g., engineering, medicine), which overlook diverse STEM career pathways. Future studies should measure this construct by including the "other STEM career paths". Therefore, it can be deduced that career prospects can influence students' intention to pursue STEM education.

DOI: https://doi.org/10.5281/zenodo.20807895

METHODOLOGY

A simple random sampling technique was employed in this study. A complete list of all participants registered in the STEM Innovation Competition at Universiti Teknologi MARA, Samarahan Campus, was first obtained. From this list, a sample of 30 students was randomly selected to serve as respondents and completed the administered questionnaire. This sample size is justified enough to meet the requirements of the Central Limit Theorem, which recommends at least 30 observations to ensure reliable statistical analysis. Additionally, RUBIKTOP (2023) claims that the impact of the closeness of normal and t-distributions for samples larger than 30 is responsible for the selection of 30 as the sample size of choice. Apart from that, due to the limited population of competition participants during the event, a sample size of 30 is both feasible and sufficiently representative.

The instrument was developed based on relevant literature from previous studies, aiming to assess students' skill development, knowledge enhancement, parental encouragement, and perceived career opportunities in relation to their interest in science-related fields. The questionnaire consisted of two sections: Section A focused on the respondents' socio-demographic profiles, while Section B addressed the core research questions. Section B comprised five questions to gather responses on students' interest, skill development, knowledge enhancement, parental encouragement, and perceived career in science-related fields. Students evaluated the questions by rating using a 5-point Likert scale, ranging between 1 (Strongly Disagree) to 5 (Strongly Agree). Table 1 lists the interpretation of mean scores based on the three-level according to Pimentel (2010).

Table 1. Interpretation for mean scores

Mean Score Range	Level of Agreement
1.00 – 2.33	Low agreement
2.34 – 3.66	Moderate agreement
3.67 – 5.00	High agreement

The collected data were analyzed using SPSS version 26. Descriptive statistics were used to summarize demographic information through frequencies and percentages. The reliability test was not performed since it involved only one question for each variable. In addition, the normality test has been conducted to assess the distribution of the data before conducting the parametric test. The correlation between the selected variables was analyzed to identify and quantify the strength and direction of the relationship between two or more variables. Multiple linear regression analysis was conducted to identify significant factors that influence students' interest in science stream education. The variables in the linear regression model were compared with a p-value of less than 0.05. The linear regression equation is given as (Sekaran, 2013)

DOI: https://doi.org/10.5281/zenodo.20807895

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon \quad (1)$$

where

Y is students' interest in science stream education, X_1 is skills development, X_2 is knowledge enhancement, X_3 is parents' encouragement, X_4 is career opportunities, β_0 is the intercept, β_i is the coefficient for each independent variable, ϵ is the error term.

RESULTS AND DISCUSSION

DEMOGRAPHIC PROFILE

Table 2. Demographic Profile of Respondents

Demographic	Label	Frequency	Percentage (%)
Gender	Male	12	40.0
	Female	18	60.0
Age	13	1	3.3
	14	4	13.3
	15	11	36.7
	16	6	20.0
	17	8	26.7
Ethnicity	Malay	9	30.0
	Chinese	8	26.7
	Indian	1	3.3
	Iban	6	20.0
	Bidayuh	6	20.0
Form (level of schooling)	1	1	3.3
	2	4	13.3
	3	11	36.7
	4	6	20.0
	5	8	26.7
Participation in STEM activities	1 – 2	9	30.0

	3 – 4	8	26.7
	5 – 6	3	10.0
	7 – 8	5	16.7
	9 – 10	2	6.7
	More than 10 times	3	10.0
Technology Tools Use in STEM Activities	Computers	20	66.7
	Tablets/ iPads	6	20.0
	Robotics Kits	2	6.7
	3D Printers	1	3.3
	Others	1	3.3

Table 2 summarizes the respondents' demographic profile according to gender, age, ethnicity, level of schooling, participation in STEM Education, and technology tools used in STEM activities. Respondents ranged from both lower secondary and upper secondary students. Most of the respondents (36.7%) were in Form 3, who will choose to pursue science or arts stream education when they enter Form 4. The upper secondary students (Form 4 and 5) among the participants of the survey are all science stream students. Only a small percentage of the respondents (10.0%) have participated in STEM activities more than 10 times. Almost all of the respondents have engaged in various technology tools during STEM activities that they participated in.

DESCRIPTIVE STATISTICS

Table 3. Summary statistics of Variables

Variables	Mean (M)	Standard Deviation (SD)	Skewness
Interest	4.37	0.890	-0.283
Skills Development	4.17	0.747	-0.286
Knowledge Enhancement	4.33	0.758	-0.660
Parents' Encouragement	4.27	0.868	-0.568
Career Opportunities	4.20	0.887	-0.738

Table 3 summarizes the descriptive statistics for all variables. Values of mean revealed that the students highly agreed with all the questions that they responded to regarding their interest, skills

DOI: https://doi.org/10.5281/zenodo.20807895

development, knowledge enhancement, parents' encouragement, and career opportunities in pursuing science stream education. This result is aligned with the results of low standard deviation for all variables. It concluded that all the students have consistent responses towards pursuing science stream education. Apart from summarizing the data, a normality test has also been conducted to check the normality assumptions before a parametric test can be done. Values of skewness in Table 2 indicate that data for all the variables are normally distributed since the values range between -2 and 2 (Hair et al., 2022).

CORRELATION ANALYSIS

In this study, the dependent variable is students' interest in pursuing science stream education, while the independent variables are skills development, knowledge enhancement, parents' encouragement, and career opportunities. Table 4 provides the interpretation of the values obtained from the correlation analysis.

Table 4. Interpretation of the size of the correlation

Size of correlation	Interpretation
0.90 to 1.00 (-1.00 to -0.90)	Very high positive (negative) correlation
0.70 to 0.90 (-0.90 to -0.70)	High positive (negative) correlation
0.50 to 0.70 (-0.70 to -0.50)	Moderate positive (negative) correlation
0.00 to 0.50 (-0.50 to 0.00)	Low positive (negative) correlation
0.00	No relationship

Table 5. Results of correlation analysis

Variables	Interest	Skills Development	Knowledge Enhancement	Parents' Encouragement	Career Opportunities
Interest	1.00				
Skills Development	-0.034	1.00			
Knowledge Enhancement	0.630	0.164	1.00		
Parents' Encouragement	0.175	0.315	0.301	1.00	
Career Opportunities	0.256	0.472	0.365	0.555	1.00

Table 5 shows computed values obtained from the correlation analysis. The results show low negative correlation (-0.034) between students' interest in science stream education and skills

DOI: https://doi.org/10.5281/zenodo.20807895

development, while moderately positively correlated (0.630) to knowledge enhancement. Both parents' encouragement and career opportunities have low correlation (0.175 and 0.256, respectively) to students' interest in science. While skills development and knowledge enhancement are not even moderately correlated to parents' encouragement and career opportunities, the analysis suggests that encouragement from parents plays a positive role in students' choice of career opportunities.

MULTIPLE LINEAR REGRESSION ANALYSIS

Results of the multiple linear regression are shown in Table 6. Students' interest in pursuing science stream education is the dependent variable, while skills development, knowledge enhancement, parents' encouragement, and career opportunities are independent variables. Overall, the results showed the utility of the predictive model was statistically significant with F = 0.4652, R^2 = 0.427. The R-squared value suggests that only 42.7% of students' interest in pursuing science stream education can be explained by the independent variables in this study. While the results showed that skills development (β = -0.163, t = -1.112, p = 0.277), parents' encouragement (β = -0.024, t = -0.149, p = 0.883), and career opportunities (β = 0.116, t = 0.673, p = 0.507) were not significant predictors of students' interest in pursuing science stream education, knowledge enhancement was a significant positive predictor of students' interest in pursuing science stream education (β = 0.629, t = 3.778, p < 0.05).

Table 6. Multiple regression analysis to identify significant variables

Variables	Result of Multiple Regression				
	Coefficient	t	p – value	R^2	F test
Constant	2.038	2.415	0.023	0.427	0.4652
Developing Skills	-0.163	-1.112	0.277		(0.006)
Knowledge Enhancement	0.629	3.778	0.001		
Parents Encouragement	-0.024	-0.149	0.883		
Career Opportunities	0.116	0.673	0.507		

The findings show that knowledge enhancement is significant in predicting students' interest to pursue science stream education. According to Bouvier (2011) good academic achievement influences students' attitude towards science education. This could be related to the present education system that emphasizes academic performance in schools and public examinations as the main requirement to pursue further studies. The knowledge that a student acquires from STEM-based activities will influence the growth of positive attitude towards science-stream education. STEM-based learning is potentially able to develop students' thinking skills that incorporate content Technology, Engineering, and Mathematics in science and train students' thinking skills (Murnawianto et al., 2017). Attitude towards STEM differs from a student's interest towards science because attitude is defined as psychological tendency by evaluating certain entities, including the student's experience and environment (Uitto, 2014). However, attitudes towards STEM and science motivation are strongly related and both affect students' interest in science stream education and STEM-related careers (Razali et al., 2020). Hence, this positive attitude also increases the likelihood of students' pursuing science field education, motivated largely by the opportunity to enhance their knowledge about science and technology.

DOI: https://doi.org/10.5281/zenodo.20807895

Skills development was found to be non-significant in influencing students' interest in pursuing science stream education. Skills can be categorized as learning skills, literacy skills, and life skills. It should be noted that all these facets of skills in this age of Artificial Intelligence (AI) are technology-dependent and not limited to the learning of science. As social media dictates our daily lives, the definition of skills and the scope of skills development have differed compared to the last decade. Students who responded to these research questionnaires are mostly literate in digital technology, based on their demographic profiles. They are adequately exposed to technology and social media in schools and at home, making technology and education very much intrinsically linked (Wang et al., 2014). The broad use of technology improves students' conceptual knowledge, where students become more independent in their learning process (Linn & Hsi, 2000; Metcalf & Tinker, 2004). This may be the reason that skills development is not significant in predicting the outcome of our dependent variable.

Although the role of parents is important to ensure that students are constantly motivated towards science (Taneja, 2016), students who possess positive motivation will produce high performance in science subjects, without being influenced by environmental factors, including the conditions and teaching methods in schools (Talib et al., 2009). Although there have been research results that reported a positive correlation between students' motivation and parents' role in encouraging students' interest in science (Ishak et al., 2011), there are findings that showed a significant lack of discussion on the value of science between parents and their children (Blotnicky et al., 2018). This could be suggested as a reason why the present study did not find parents' encouragement as a significant factor in determining students' interest in pursuing science stream education.

Our study also did not find career opportunities as a factor contributing to students' inclination towards science stream education. While research has shown that school students who participated in STEM learning were more likely to pursue science-based careers (Blotnicky et al., 2018; Syukri & Ernawati, 2020), it has also been revealed that those who excelled in science and mathematics in school have low interest in STEM disciplines (Idris et al., 2023a). Despite their excellent academic achievement in science and mathematics, students may overlook STEM-related professions and choose to pursue non-science-related careers (Mohtar et al., 2019; Maltese and Tai, 2011). Technology may also be responsible for this trend as AI technologies are no longer confined to science-related disciplines. Industries are being reshaped to keep up with the rapid pace of technology advancement, creating new categories of jobs. As a result, the skill sets and knowledge necessary for career success are rapidly changing, providing wider career opportunities.

One of the core components of Lent and Brown's Social Cognitive Career Theory (SCCT) is self-efficacy, whereby an individual possesses a strong belief in his/her ability to succeed in a specific task (Lent & Brown, 2019). In the context of this study, it can be suggested that students who consider themselves to be proficient in math and science subjects will expect positive outcomes from a STEM-related learning, be more interested in math and science, and be very inclined to pursue their studies in science-based education.

In the local context, education policies and initiatives by the Sarawak government implemented in recent years may justify the non-significant influence of skills development, parental encouragement, and career opportunities found in the present study. Although the education system remains centralized under the federal government, the state government has embarked on mitigating education policies and delivery to accommodate its unique needs, particularly the

DOI: https://doi.org/10.5281/zenodo.20807895

social and geographic inequalities that exist, by virtue of being the largest state in Malaysia. It is also worth noting that Sarawak has its own Ministry of Education, Innovation and Talent Development (MEITD), through which bold education initiatives have been introduced in the past decade. Key initiatives of the MEITD include the Free Tertiary Education Scheme (FTES), which is aimed at promoting mentorship, career guidance, and well-being services, especially for first-generation university students. The Sarawak Education Enhancement Programme (SEEP) is an intervention scheme implemented by the state to address educational disparities between urban and rural schools. Through SEEP, the government aims to improve public examination performance among schools in the state, increase enrolment in pure science classes, and build talents among school students. SEEP provides free in-school tuition, webinars, and workshops to boost learning outcomes in English, Science, Mathematics, History, and pure Science subjects. The state also provides practical support for students through cash aid, computers, and book vouchers for tertiary students from low-income families, and financial support towards the development of preschool and early childhood centers. These initiatives reduce families' financial burden and are seen as a real means of supporting students at every stage throughout their education journey (Teach for Malaysia, 2025).

While self-efficacy is enhanced by the individual's self-belief, environmental influences play a large role in shaping a student's education path. Socioeconomic factors play a significant role in shaping the growth of education in a country (Liu et al., 2022; Ghaleb et al., 2024; Tan, 2024). Educational expansion that focuses on increasing educational opportunities may not be viable in reducing inequalities in academic outcomes between school students of high and low socioeconomic backgrounds (Liu et al., 2022). However, the initiatives by the Sarawak government's holistic approach towards education are seen as pragmatic steps towards achieving inclusive and equitable education. In the case of Sarawak, practical support provided by the government to ensure a greater learning experience, students' engagement with STEM activities that help build skills and confidence from a young age, and the assurance of better socioeconomic conditions to pursue higher education are suggested to be factors that influence students' intention to pursue science-based education.

CONCLUSION

This study was conducted to investigate the factors influencing secondary school students' intention to pursue science stream education in Sarawak. Four factors were identified based on past studies, namely, skills development, knowledge enhancement, parental encouragement, and career opportunities. The findings revealed that only one factor, that is, knowledge enhancement, emerged as the primary factor that influences students' interest in STEM education. This suggests that when students perceive themselves as gaining meaningful and applicable knowledge in science, they are more motivated to continue the STEM paths.

The findings also revealed that skills development, parental encouragement, and career opportunities did not influence students' attention towards science stream education. This may be due to the evolving nature of skills acquisition in the current era of digitalization, where students are already exposed to technological tools beyond formal education. Similarly, while parental support and career awareness are important, they may not strongly determine students' choices if intrinsic interest and confidence in science knowledge are lacking.

Moreover, this study highlights the significance of reinforcing knowledge-centered teaching and learning pedagogy in STEM education. A stronger motivation to pursue science stream education

DOI: https://doi.org/10.5281/zenodo.20807895

can be cultivated through enhancing students' mastery of scientific activities that are engaging, experimental, and enquiry-based driven. For policymakers and educators, this implies that interventions should prioritize enriching science learning experiences and ensuring students achieve tangible knowledge gains, which in turn may foster sustained interest in science-related fields.

This study also acknowledges its limitations, particularly the relatively small sample size and its focus on a specific group of students in Sarawak. Future research should involve larger and more diverse samples across regions, while also exploring additional factors such as teacher quality, peer influence, and institutional support. Such research would provide a more comprehensive understanding of the dynamics shaping students' science stream choices.

On another note, this study points to the fact that raising student knowledge and mastery, but not just exposure to "skill" activities or counting enrolments, is the lever that is most likely to influence students' stream choice. Therefore, to achieve Malaysia's 60:40 goal, the relevant party should shift implementation focus to regionally tailored pedagogy, measurable learning gains, and career/parent outreach that make a connection between knowledge and actual STEM pathways. In the context of Sarawak, this study highlights the need for region-sensitive, learning-quality-driven strategies tailored to the state, which is evident from knowledge enhancement as the dominant factor in motivating STEM interest.

In conclusion, the study reinforces the central role of knowledge enhancement in motivating students towards science education and emphasizes the need for targeted strategies to build a strong pipeline of future STEM professionals in Malaysia.

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to *Biro Pendidikan N8 Satok* for their support of this research and its publication.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

REFERENCES

Abe, E. N., & Chikoko, V. (2020). Exploring the factors that influence the career decisions of STEM students at a university in South Africa. *International Journal of STEM Education*, 7, 1–14.

Abdullah, N., Dahari, Z., Hussin, R., & Abd Aziz, A. (2024). Empowering Malaysia's Youth: Assessing the Impact of STEM Education. *Journal of Entrepreneurship and Business*, 12(2), 57–66.

Açıkay, N., Bircan, M. E. H. M. E. T., & Karakaş, H. (2023). The effect of STEM activities on primary school students' attitudes towards STEM. *International Journal of Research in Teacher Education,* 14(2).

Arsad, N. N. B. M., & Heong, Y. M. (2024). Enhancing STEM education through pedagogy: Exploring the impact of demographic factors. *Jurnal Pendidikan Teknologi Kejuruan*, 7(3), 170-184.

Aspin, S. H., Ali, M., & Bunyamin, M. A. H. (2021). STEM education in Malaysia: A review. *Learning Science and Mathematics*, 15, 125–139.

Azahar, N. S. H. (2024). *Strengthening STEM foundations in primary education to achieve the 60:40 goal*. Kuala Lumpur: Khazanah Research Institute. https://creativecommons.org/licenses/by/3.0/

Badri, M., Alnuaimi, A., Mohaidat, J., Al Rashedi, A., Yang, G., & Al Mazroui, K. (2016). My science class and expected career choices—a structural equation model of determinants involving Abu Dhabi high school students. *International Journal of STEM Education*, 3, 1–21.

Benek, İ., & Dönmez, İ. (2024). Investigating the Effect of Integrated STEM Activities on Summer School Students' STEM Interests and Opinions. *Cukurova University Faculty of Education Journal*, 53(2), 850-885.

Blotnicky, K. A., Franz-Odendaal, T., French, F., & Joy, P. (2018). A study of the correlation between STEM career knowledge, mathematics self-efficacy, career interests, and career activities on the likelihood of pursuing a STEM career among middle school students. *International Journal of STEM Education*, 5 (22), 1-15.

Bouvier, S. (2011). *Increasing Student Interest in Science, Technology, Engineering, and Math (STEM): Massachusetts STEM Pipeline Fund Programs Using Promising Practices.* Report Prepared for the Massachusetts Department of Higher Education. UMass Donahue Institute Research and Evaluation Group i.

Chan, R. C. (2022). A social cognitive perspective on gender disparities in self-efficacy, interest, and aspirations in science, technology, engineering, and mathematics (STEM): The influence of cultural and gender norms. *International Journal of STEM Education*, 9(1), 1-13.

Chittum, J. R., Jones, B. D., Akalin, S., & Schram, Á. B. (2017). The effects of an afterschool STEM program on students' motivation and engagement. *International Journal of STEM Education*, 4, 1-16.

Ghaleb, A. M., Amrani, M. A., Al Selwi, R. A. M., Hebah, H. A., Saeed, M. A., & Mejjaouli, S. (2024). Socioeconomic Status as a Predictor of the Academic Achievement of Engineering Students in Taiz State, Yemen. *Societies, 14*(12), 246.

Idris, R., Govindasamy, P., Nachiappan, S., & Bacotang, J. (2023a). Exploring the impact of cognitive factors on learning, motivation, and career in Malaysia's STEM education. *International Journal of Academic Research in Business and Social Sciences,* 13(6),1669–1684.

Idris, R., Govindasamy, P., & Nachiappan, S. (2023b). Challenge and Obstacles of STEM Education in Malaysia. *International Journal of Academic Research in Business and Social Sciences,* 13(4), 820 – 828.

Ishak, Z., Low, S. F., & Lau, P. L. (2011). Parenting Style as [20]a Moderator for Students' Academic Achievement. *Journal of Science Education and Technology*, 21(4), 487–493.

Jamaluddin, F., Abdul Razak, A. Z., & Abdul Rahim, S. S. (2025). Navigating the challenges and future pathways of STEM education in the Asia-Pacific region: A comprehensive scoping review. *STEM Education, 5*(1), 53–88. https://doi.org/10.3934/steme.2025004

Kairi, N. I., Jamaludin, N., & Ridzuan, N. D. M. (2024). Competition-Based Learning in Science Camp to Stimulate Upper Secondary School Students' Motivation in Learning STEM. *Sains Humanika,* 16(2), 53–63.

Leng, O. W., Vaghefi, N., Yong, N. K., & Jo-Yee, Y. (2020). *Students' Choice of STEM Study in Secondary and Tertiary Education in Penang.* Penang Institute Issues.

Lent, R. W., & Brown, S. D. (2019). Social cognitive career theory at 25: Empirical status of the interest, choice, and performance models. *Journal of Vocational Behaviour*, 115, 103316.

Lian, Y., Tsang, K.-K., & Zhang, Y. (2021). The Construction and Sustainability of Teachers' Positive Emotions toward STEM Educational Work. *Sustainability*, 13(11), 5769.

Lloyd, A., Gore, J., Holmes, K., Smith, M., & Fray, L. (2018). Parental influences on those seeking a career in STEM: The primacy of gender. *International Journal of Gender, Science and Technology*, *10*(2), 308-328.

Mahlan, S. B., Othman, J., Yusoff, S. A. M., & Othman, Z. (2024). Awareness of Science, Technology, Engineering & Mathematics (STEM) Education among Primary & Secondary School Students in Pulau Pinang, Malaysia. *International Journal of Academic Research in Progressive Education and Development*, 13(3), 1824–1836.

Malik, M. A. A., Nazri, A., Ridzwan, D., Azamin, A., Mustapha, M. F., & Noor, M. R. M. (2021). Factors influencing students' intention to study the STEM stream in upper secondary school. *Journal of Advanced Research in Social and Behavioural Sciences*, 22(1), 21–29.

Maltese, A. V., & Tai, R. H. (2011). Pipeline persistence: examining the association of educational experiences with earned degrees in STEM among U.S. students. *Science Education*, 95(5), 877–907.

Metcalf, S. J., & Tinker, R. F. (2004). Probeware and handhelds in elementary and middle school science. *Journal of Science Education and Technology*, 13(1), 43–49.

Mohtar, L. E., Halim, L., Rahman, N. A., Maat, S. M., Iksan, Z. H., & Osman, K. (2019). A model of interest in stem careers among secondary school students. *Journal of Baltic Science Education*,18(3), 404–416.

Murnawianto, S., Sarwanto, S., & Rahardjo, S. B. (2017). STEM-based science learning in junior high school: Potency for training students' thinking skill. *Pancaran Pendidikan*, 6(4).

Linn, M. C., & Hsi, S. (2000). *Computers, teachers, peers: Science learning partners*. LEA.

Liu, Juan; Peng, Peng; Zhao, Baobao; Luo, Liang. (2022). Socioeconomic Status and Academic Achievement in Primary and Secondary Education: A Meta-Analytic Review. *Educational Psychology Review, Vol. 34* No. 4. p2867-2896.

Ong, E. T., Govindasamy, D., Singh, C. K. S., Ibrahim, M. N., Wahab, N. A., Borhan, M. T., & Tho, S. W. (2021). The 5E inquiry learning model: Its effect on the learning of electricity among Malaysian students. *Cakrawala Pendidikan*, *40*(1), 170-182.

Pov, S., Kawai, N., Chey, R., Khut, S., & Nov, S. (2024). Examining factors influencing students to leave science classes in Cambodia: A two-level hierarchical linear modeling. *Asia Pacific Education Review,* 25(1), 117–130.

Ramli, N. A. M., & Awang, M. (2020). Critical Factors that Contribute to the Implementation of the STEM Education Policy. *International Journal of Academic Research in Business and Social Sciences*, 10(1), 111–125.

Razali, F., Manaf, U. K. A., & Ayub, A. F. M. (2020a). STEM Education in Malaysia towards Developing a Human Capital through Motivating Science Subjects. *International Journal of Learning, Teaching and Educational Research*, 19(5), 411–422.

Razali, F., Manaf, U.K.A., Talib, O., & Hassan, S. A. (2020b). Motivation to learn science as a mediator between attitude towards STEM and the development of STEM career aspiration among secondary school students. *Universal Journal of Educational Research*, 8(1), 138–146.

Razali, F. (2021). Exploring Crucial Factors of an Interest in STEM Career Model among Secondary School Students. *International Journal of Instruction*, 14(2), 385–404.

RUBIKTOP. (2023, September 14). The magic number 30: Why a sample size of 30 is often considered sufficient for statistical significance. Linkedin. https://www.linkedin.com/pulse/magic-number-30-why-sample-size-often-considered-sufficient/

Sekaran, U. (2013). *Research Methods for Business: A Skill Building Approach. (J. C. Marshall, Ed.), Research methods for business (Fourth, Vol. 65)*. John Wiley & Sons, Inc.

Siani, A., Marley, S. A., Smith, C. and Donnelly, J. (2020). Gender and parental education as indicators of students' engagement with STEM subjects. International Journal of Gender Science and Technology, 12(2), 246–261.

Siekmann, G., & Korbel, P. (2016). Defining 'STEM' Skills: Review and Synthesis of Literature. Support Document 1. *National Centre for Vocational Education Research (NCVER)*.

Sulaiman, N. A., Nor Hasniza, I., & Jamaluddin, S. (2022). Effectiveness of UTM-STEM outreach programme in increasing secondary school students' interest in STEM. *ASEAN Journal of Engineering Education,* 6(1), 24–30.

Syukri, M., & Ernawati. (2020). Peningkatan minat belajar siswa melalui model pbl berbasis pendekatan STEM dalam pembelajaran fisika. *PENCERAHAN*, 14(2), 152-165.

Talib, O., Luan, W. S., Azhar, S. C., & Abdullah, N. (2009). Uncovering Malaysian students' motivation to learn science. *European Journal of Social Sciences*, 8(2), 266–276.

Tan, C.Y. (2024). Socioeconomic Status and Student Learning: Insights from an Umbrella Review. *Educ Psychol Rev 36*, 100.

Taneja, A. (2016). *Argumentation in Science Class: Its Planning, Practice, and Effect on Student Motivation*, PhD Thesis, Walden University.

Teach for Malaysia (2025). *Sarawak's Bold Education Agenda: How Sarawak Is Reimagining Education*. https://teachformalaysia.org/my

Tekbiyik, A., Bulut, D. B., & Sandalci, Y. (2022). Effects of a summer robotics camp on student STEM career interest and knowledge structure. *Journal of Pedagogical Research,* 6(2), 91-109.

Uitto, A. (2014). Interest, attitudes and self-efficacy beliefs explaining upper-secondary school students` orientation towards biology-related careers. *International Journal of Science and Mathematics Education,* 12(6), 1425–1444.

United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. United Nations. https://sdgs.un.org/goals/goal4

Utami, A., Rochintaniawati, D., & Suwarma, I. R. (2020). Enhancement of STEM literacy on knowledge aspect after implementing science, technology, engineering and mathematics (STEM)-based instructional modules. In *Journal of Physics: Conference Series* (Vol. 1521, No. 4, p. 042048). IOP Publishing.

Wang, S. K., Hsu, H. Y., Campbell, T., Coster, D. C., & Longhurst, M. (2014). An investigation of middle school science teachers and students' use of technology inside and outside of classrooms: Considering whether digital natives are more technology savvy than their teachers. *Educational Technology Research and Development*, 62(6), 637–662.

World Economic Forum. (2025). *The Future of Jobs Report 2025 [Report]*. World Economic Forum.

Yreck, S. (2024). The effectiveness of STEM education programs on enhancing critical thinking skills among high school students in Malaysia. *Journal of Asian Multicultural Research for Educational Study*, 5(2), 8–16.

Zhou, Y., & Shirazi, S. (2025). Factors influencing young people's STEM career aspirations and career choices: A systematic literature review. *International Journal of Science and Mathematics Education*.