SELF-EFFICACY AND PERCEPTIONS OF STEM CAREER AMONG B40 PRE-UNIVERSITY GRADUATES

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Abstract

The declining trend in the number of students pursuing STEM majors in Malaysian higher education institutions poses a significant challenge to the country's Education Development Plan and the economy. The reduced participation in the STEM fields could hamper the national aspiration of improving the socioeconomic status of B40 households. This research, guided by the Social Cognitive Career Theory (SCCT), aims to investigate the perceptions of B40 pre-university graduates towards self-efficacy and STEM careers in university. Moreover, it aims to explore the relationship between these factors and the choice of STEM majors in the university. The study involved 377 randomly sampled B40 pre-university graduates who are currently pursuing STEM majors in public universities in Malaysia. Data was collected through an online questionnaire and analyzed using descriptive and multiple regression analysis. The findings indicate that students perceive self-efficacy and perception of STEM careers as critical factors in choosing STEM fields at the university level. Additionally, the study found a positive correlation between self-efficacy and perceptions of STEM careers, which aligns with the SCCT model. The research demonstrates the applicability of the SCCT model in identifying factors influencing students' decision-making regarding STEM fields.

Keywords: B40, environmental factors, outcome expectation, perception of STEM careers, self-efficacy, STEM.

INTRODUCTION

Education serves as a cornerstone for the development of a country. The Malaysian educational system, from preschool to university, is designed to enhance the quality of life of its people. The system plays a crucial role in producing a professional STEM workforce across various sectors, contributing to the country's economic growth and standard of living (Sidin et al., 2020). Pre-university refers to the period before commencing university studies, which typically lasts for one to two years. Pre-university education plays a crucial role in an individual's academic journey, as it allows them to identify their areas of interest and determine the program they wish to pursue in the university. High school Malaysian graduates have several options for enrolling in a pre-university program such as Sijil Tinggi Pelajaran Malaysia (STPM), Sijil Tinggi Agama Malaysia (STAM), Matriculation, Diploma or A-level programs that suit their academic aspirations regardless of their socioeconomic background.

In Malaysia, every household is classified into one of three groups: Bottom 40% (B40), Middle 40% (M40), or Top 20% (T20) (DOSM, 2021). This grouping implies that most students

in the national education system belong to the B40 families, making them the primary beneficiaries of government aid and incentives (Hasan et al., 2021). Although the B40 group is not classified as hardcore poor, households with less than RM2,500 fall below the poverty line and require additional financial assistance to sustain themselves in the current economy (DOSM, 2021). As a result, the country faces a decline in the number of STEM workers due to decreasing student interest in STEM fields in higher education, especially among underprivileged students (Badhrulhisham et al., 2019). Additionally, poverty caused by economic decline has been identified as one of the main causes of student dropouts (Xiao & Song, 2022). Previous research suggests that individuals from disadvantaged backgrounds are often highly motivated to excel academically to improve their family's socio-economic status (Xiao & Song, 2022). However, some studies present contrasting views, indicating that underprivileged students may be more inclined towards employment prospects than academic achievements (Allang et al., 2019). The focus of this study will be on students who have completed pre-university programs offered by the Ministry of Education (MoE), which include STPM, Matriculation and Diploma International Baccalaureate (IB) because these programmes are tailored to provide students from low-income backgrounds (B40) with the opportunity to pursue higher education.

This study aims to investigate the perceptions of B40 pre-university graduates towards self-efficacy and STEM careers in university. According to SCCT, an individual's career path begins with an interest in a particular academic discipline and progresses into the professional field (Zola et al., 2022). The choice of a specific career path depends on individual factors, such as gender and family background, as well as contextual factors, including interest levels, self-efficacy, environment, and perceptions of the field and career prospects (Brown & Lent, 2013). This research focuses on two key components of the SCCT framework, self-efficacy and outcome expectations, as they significantly shape students' interest and motivation toward a particular field. The SCCT model comprises two main domains. The first domain focuses on building interest and achieving educational goals (Brown & Lent, 2013). For instance, a B40 student may acknowledge the influence of their family's socioeconomic status on their academic or professional aspirations and choose to pursue education to break this cycle. The second domain emphasizes the behavioural and practical steps to achieve set goals. For example, having positive self-efficacy leads to constructive outcome expectations, which, in turn, foster a deep interest in achieving those goals.

LITERATURE REVIEW

Self-efficacy

Self-efficacy refers to an individual's belief in their ability to attain a goal (Lent & Brown, 2019; Mau et al., 2020; Mohtar et al., 2019). The fundamental principle of self-efficacy theory posits that an individual's motivation and achievement are closely linked to their confidence and belief in themselves (Lent & Brown, 2019). In this study, self-efficacy pertains to students' perceived ability to perform tasks and skills related to STEM subjects. Research indicates that high self-efficacy strongly correlates with academic achievement in STEM subjects (Mukhid, 2009). More specifically, self-efficacy refers to an individual's perception of their capability to achieve academic excellence at the school level (Yanuardianto, 2019). Excellent academic performance in STEM subjects can lead to the selection of STEM majors in university, as students feel more confident and capable of mastering the subjects they have previously studied (Luo et al., 2021)

Studies examining student self-efficacy have primarily focused on students interested in pursuing STEM majors rather than those in the field. (Zhang et al., 2022). Pre-university graduates are a particularly understudied population concerning self-efficacy. Therefore, it is essential to conduct studies exploring self-efficacy among pre-university programme graduates to comprehensively understand this factor rather than solely focusing on one student group. The

family, particularly parents, play a vital role in shaping a student's decision-making process (Xiao & Song, 2022). Despite this, the specifics of how family influences students' choices remain unclear (Kao & Shimizu, 2019). Termize et al. (2021) suggest that positive support and encouragement from parents, teachers, and peers are crucial in promoting students' motivation and active engagement in learning, particularly in STEM subjects. Therefore, this study focuses on the self-efficacy and outcome expectations factors because these will shape students' interest and motivation in STEM majors.

Research conducted by Arshat et al. (2018) has established a correlation between low-income families and a child's development, with limited financial resources and education hindering opportunities for better employment prospects. It's imperative to provide a comfortable learning environment coupled with relevant social support to enhance student engagement in academics, as observed by Termize et al. (2021). This approach could foster students' interest and motivation, increasing their chances of success. Knowledge acquisition is an iterative process that relies heavily on past experiences (Mohtar et al., 2019). Various studies have concluded that students' inclination towards studying science majors is primarily driven by fun, interest, and self-efficacy (Kaleva et al., 2019). Yusof and Nawi (2021) underscore the critical nature of teachers and the school environment in nurturing students' interest and motivation, given the substantial time students spend on campus.

Outcome Expectation

Outcome expectations refer to an individual's perception of the consequences of their actions. This includes beliefs and perceptions regarding extrinsic reinforcement, such as rewards for positive performance, or intrinsic reinforcement, such as choosing a STEM field for enjoyment rather than higher pay (Termize et al., 2021). Albert Bandura identified several categories of outcome expectations, including physical, social, and self-evaluative outcomes, which can influence a student's decision to pursue a degree in STEM (Lent & Brown, 2019). The SCCT framework suggests that individuals establish goals that align with their self-efficacy and interests. Even though STEM subjects can be challenging for students, those with high motivation are more likely to achieve academic success and continue pursuing STEM subjects in higher education.

Another study by Luo et al. (2021) emphasizes the influence of outcome expectations on students' perceptions of STEM careers, including stereotypes and labels. Students with negative views of certain STEM careers may have lower self-efficacy and reduced motivation to pursue related fields. Therefore, it is crucial to address and challenge negative stereotypes to encourage more students to pursue STEM subjects and careers. The advent of Industrial Revolution 4.0 has increased demand for STEM majors and careers that align with the field of study (Kamsi et al., 2019). However, students' negative perceptions of science and mathematics subjects from primary school through university level is a prevalent issue that discourages them from pursuing STEM-related fields (Sukri & Nachiappan, 2021). A positive attitude, interest, and perception of STEM subjects are core factors that influence students' decisions to choose a STEM career (Zhang et al., 2022). Although many studies have explored the perceptions of STEM subjects and careers among high school students, these studies mainly focused on Western countries (Zhang et al., 2022). Therefore, this research aims to examine the expectations of Malaysian pre-university graduates towards STEM careers, guiding other researchers on the trends in Malaysia.

This study examines the level of self-efficacy and outcome expectations of STEM careers among B40 pre-university graduates. In addition, the study also seeks to explore the relationship between self-efficacy and perceptions of STEM careers in the selection of STEM majors in the university. Therefore, this study is motivated by the following research questions:

1. What is the overall perception of matriculation graduates regarding outcome expectation, self-efficacy, and perception of STEM careers in the selection of STEM majors?
2. What is the relationship between self-efficacy and perceptions of STEM careers on the satisfaction level learning STEM in the universities?

METHODOLOGY

The chosen research design for this study was a survey, enabling the researcher to investigate the relationship between the dependent and independent variables without manipulating the latter (Chua, 2020). This is a quantitative study, with a sample selected using random sampling techniques. This method allows for equal opportunity and probability of selection for each member of the population (Chua, 2020). The study involved 377 randomly sampled B40 pre-university graduates who are currently pursuing STEM majors in public universities in Malaysia.

Conceptual Research Framework

As illustrated in Figure 1, this study focuses on examining the correlation between two independent variables: self-efficacy and perception of a STEM career in relation to the selection of a STEM major in Malaysian public universities.

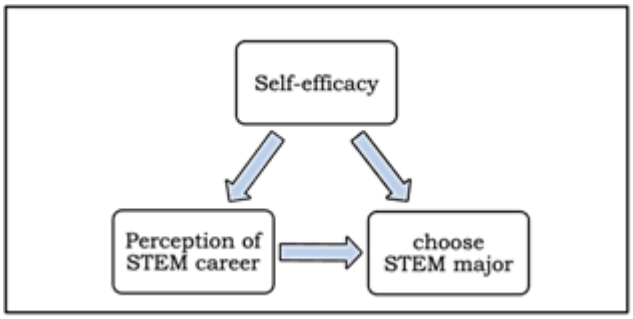

Figure 1. The Research Framework Adapted from Lent and Brown (2019)

Sample of Study

Population refers to a group of individuals, objects, or events that share similar characteristics and are intended to be studied (Chua, 2012). The researcher selected a study population of 19,840 matriculation program graduates from one academic session, namely the 2019/2020 session. This data was obtained from the Higher Education Statistics 2021. The sample size for this study was determined based on the Krejcie and Morgan (1970) Sample Size Determination Table. Referring to the Krejcie and Morgan (1970) sample size determination table, when the population value (N) is 19,840, the minimum required sample size (n) is at least 377 students. The research will focus on students from the first to fourth year in these four faculties, namely (1) Faculty of Medicine, which includes pharmacy and dentistry, (2) Faculty of Engineering, (3) Faculty of Science, and (4) Faculty of Computer Science and Technology.

Instrument and Data Collection

This study uses an online questionnaire containing 20 items. The questionnaire was given to post-matriculation students pursuing STEM courses from year 1 to year 4. The questionnaire was conducted to gather feedback from post-matriculation students regarding the factors influencing the selection of STEM courses at the university. The study utilized a five-point Likert scale to

collect closed-ended responses. The scale ranged from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was adapted to fit the developed and validated scale by Halim et al. (2018) and Sahin and Waxman (2020). Because of that, the translation of the questionnaire from Malay to English (and vice versa) was carried out via back-to-back translation, which was later verified by a language expert before implementation. The questionnaire items were subjected to validity and reliability analysis to ensure they were irrefutable. A total of 30 B40 pre-university graduates pursuing their undergraduate studies in the STEM major at the University of Malaya participated in the pilot study. The Cronbach's Alpha values for each variable ranged from 0.857 (Perception of STEM careers) to 0.942 (Self-efficacy). The values indicate the constructed instrument is reliable (exceeding the 0.65 threshold) and can effectively gauge the respondents' views.

Table 1. The Cronbach's Alpha Value for each Variables

No	Variables	Item	Alpha Cronbach
1	Self-efficacy	10	0.942
2	Perception towards STEM career	10	0.857

Data Analysis Procedure

Descriptive statistical analysis was conducted to address the first research question, which aims to investigate pre-university graduates' self-efficacy and perceptions towards STEM careers in choosing STEM majors. This involved utilizing frequency, percentages, mean, and standard deviation. The second research question aimed to explore the relationship between self-efficacy and perceptions of STEM careers, for which inferential statistical analysis, specifically multiple regression analysis, was employed.

Normality Test

Before conducting multiple regression statistical analysis, it is crucial to verify whether the data is normally distributed. Normality testing can be performed using statistical methods (such as the Kolmogorov-Smirnov and Shapiro-Wilk tests, or skewness and kurtosis) and graphs (such as histograms, stem-and-leaf plots, normal probability plots, or box plots) (Chua, 2020). This study utilized skewness and kurtosis values to determine the normality of the data obtained. Table 2 below displays the results obtained for the Skewness and Kurtosis values that show the Skewness values range from 0.172 (self-efficacy) to 0.543 (perception of STEM career), where the reported values fall within the recommended range of -1 to +1. Additionally, the kurtosis values range from 0.967 (self-efficacy) to 1.236 (perception of STEM career), where these values also fall within the recommended range of -1.96 to +1.96. Therefore, the data distribution for this study is normal.

Table 2. Skewness and Kurtosis values of the items in the research instrument

	Skewness	Kurtosis
Self-efficacy	0.172	0.967
Perception of STEM career	0.543	1.236

Multiple Linear Regression Analysis

Multiple linear regression analysis is used to investigate the relationship between independent and dependent variables. The standard model is implemented, simultaneously inserting all independent variables into the regression equation. The respondents were asked to rate their satisfaction level with studying STEM courses at the university in the final question of the online survey to evaluate

the correlation between the two variables. The resulting multiple linear regression test analysis indicates that the data met the test's assumptions.

FINDINGS AND DISCUSSIONS

Table 3 presents the demographic data of the respondents. The majority, 269 (71.4%), were female, while 108 (28.6%) were male. The respondents were students of public universities across Malaysia. The majority of participants, 303 (80.4%), identified as Malays, followed by Chinese, 42 (11.1%), Indian, 23 (6.1%), and other ethnicities, 9 (2.4%). Among the respondents, 113 (30.0%) were from the faculty of medicine, followed by 100 (26.5%) from the faculty of science and mathematics, 86 (22.8%) from the faculty of engineering, and 84 (22.4%) from the faculty of computer science and technology. These four faculties were selected based on enrolment statistics in higher education. A total of 44 (11.7%) respondents were first-year students, 125 (33.2%) were second-year students, 124 (32.9%) were third-year students and the remaining participants were fourth-year students.

Table 3. Respondents' Demographic Background

	Details	**Frequency**	**Percentage (%)**
Gender	Male	108	28.6
	Female	269	71.4
Race	Malay	303	80.4
	Chinese	42	11.1
	Indian	23	6.1
	Others	9	2.4
Faculty	Medicine	113	30
	Engineering	86	22.8
	Science and Mathematics	100	26.5
	Science Computer technology	84	22.2
Year of study	Year 1	44	11.7
	Year 2	125	33.2
	Year 3	124	32.9
	Year 4	84	22.4

Table 4 presents a summary of the mean and standard deviation for each variable. A small standard deviation indicates that the statistical data set is clustered closely around the mean value (Chua, 2020). Per Table 3, it becomes evident that all variables have small standard deviation values (ranging from 0.55 to 0.59), indicating that the data was very close in value to the mean.

Table 4. Mean Score, Standard Deviation and Interpretation of Each Variables

Variable	**Mean**	**Standard Deviation (SD)**	**Interpretation**
Self-efficacy	4.31	.55	High
Perception of STEM career	4.72	.59	High

Students' Level of Self-Efficacy

Analysis of students' self-efficacy levels towards STEM has been conducted using mean interpretation values as listed in Table 5. According to Silins and Murray-Harvey (2000), the interpretation of mean values can be classified into three levels: low, moderate, and high.

Table 5. Mean Interpretation Values

Mean score value	Interpretation
1.00-2.50	Low
2.51-3.50	Moderate
3.51-5.00	High

Table 5 displays students' level of self-efficacy regarding STEM major selection. Self-efficacy involves an individual's belief in their capability to handle various situations. In this study, self-efficacy pertains to students' confidence and ability to select a STEM major in university. According to Table 5, respondents *(M = 4.5119, SD = 0.5510)* expressed a high level of confidence in their ability to accurately record data, which is a crucial skill in the STEM field. Results also showed that the majority of respondents *(M= 4.4244, SD = 0.56984)* expressed high confidence in completing their studies within the given timeframe. The outcomes also indicate that a significant number of respondents *(M = 4.3528, SD = 0.58818)* agreed that opting for a STEM major in college presents a wide range of promising career opportunities in the future.

Students are more likely to pursue a major that aligns with their confidence in their abilities (Brown & Lent, 2019). According to the social cognitive theory founded by Bandura, an individual has a self-control system that allows them to control their thoughts, feelings, motivations, and actions (Brown & Lent, 2013). High self-efficacy can motivate individuals to achieve academic success and thus choose a field of their interest (Brown & Lent, 2019). The findings of this study concurred with previous studies conducted by Mau et al. (2021) which highlighted that students are inclined towards a STEM major in university due to proficiency in STEM subjects and excellent in solving complex scientific and mathematical problems. The same study also reported that having a high level of self-efficacy can lead to a more fulfilling career and life. This study aligns with previous research indicating that choosing a STEM major demonstrates a sense of responsibility, commitment, and goal-setting. Furthermore, the research findings indicate that students possess a high level of confidence in technical skills such as operating machinery and accurately recording data, which are fundamental requirements in the STEM field.

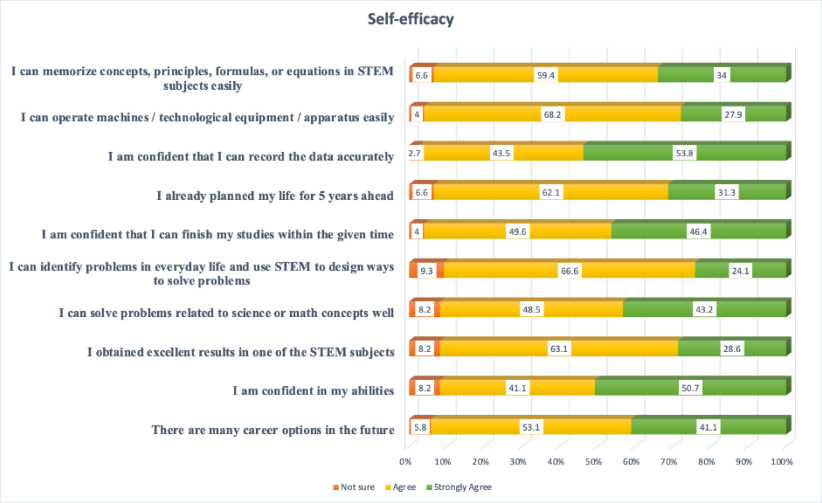

Figure 2. Distribution of Respondents in Percentages According to Their Perception of STEM Career

Table 5. Students' Level of Self-Efficacy

	Self-efficacy (N=377)	Mean	Standard deviation
1	There are many career options in the future	4.3528	0.58818
2	I am confident in my abilities	4.4244	0.64018
3	I obtained excellent results in one of the STEM subjects	4.2042	0.57259
4	I can solve problems related to science or math concepts well	4.3501	0.62693
5	I can identify problems in everyday life and use STEM to design ways to solve problems	4.1485	055945
6	I am confident that I can finish my studies within the given time	4.4244	0.56984
7	I already planned my life for 5 years ahead	4.2467	0.56507
8	I am confident that I can record the data accurately	4.5119	0.55110
9	I can operate machines / technological equipment / apparatus easily	4.2387	0.51187
10	I can memorize concepts, principles, formulas, or equations	4.2732	0.57626

	in STEM subjects easily

Perceptions of STEM Career

Table 6 presents the results of the survey conducted to analyse students' perceptions of STEM careers. Based on the mean interpretation values in Table 4, Table 6 reveals that the majority of respondents *(M = 4.8727, SD = 0.34165)* agreed that individuals pursuing a STEM career can benefit from flexible schedules that allow them to balance work and family time. Next, the majority of respondents *(M = 4.5252, SD = 0.60585)* agreed that individuals employed in STEM fields can significantly improve the quality of life for others. Additionally, most *respondents (M = 4.5093, SD = 0.62360)* also agreed that studying in STEM fields can lead to future employment opportunities. These results highlight the positive perceptions that students have about STEM careers.

Overall, respondents agreed that working in STEM-related fields in the future not only offers high job satisfaction but also promotes a healthy work-life balance, allowing for more time with family. The STEM field also provides lucrative income potential and prestigious career opportunities while promoting creativity and problem-solving. Additionally, working in STEM-related fields also enhances the quality of life. With a wide job market for STEM graduates, it's a field to consider for a fulfilling career. The findings of this study concurred with previous studies conducted by Luo et al. (2021) emphasised the relationship between outcome expectations and students' view of STEM careers, in other words, stereotypes. STEM stereotypes or labels significantly predicted their STEM self-efficacy, which predicted their choice goals. For example, a student interested in the medical field but holds negative stereotypes of surgeons will have negative outcome expectations of being a surgeon and vice versa.

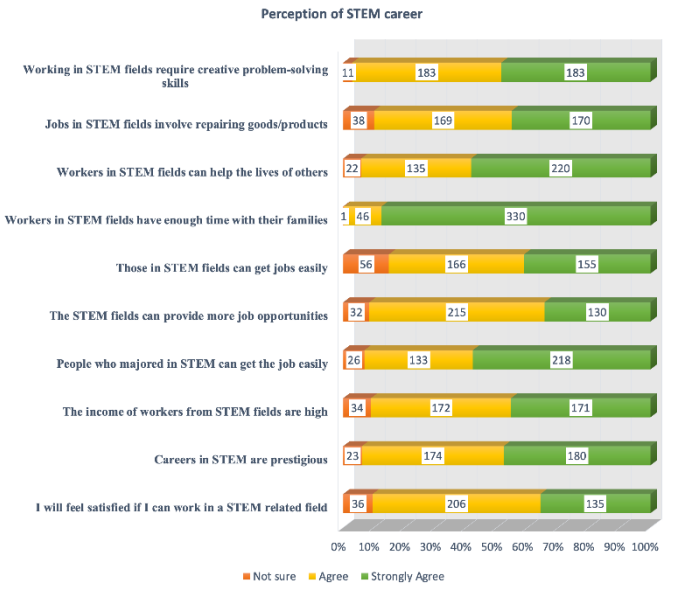

Figure 3. Distribution of respondents in percentages according to their perception of STEM career

Table 6. Students' perceptions of STEM career

Perception of STEM career (N=377)		Mean	Standard deviation
1	I will feel satisfied if I can work in a STEM related field	4.2626	0.62100
2	Careers in STEM are prestigious	4.4164	0.60498
3	The income of workers from STEM fields are high	4.3634	0.64250
4	People who majored in STEM can get the job easily	4.5093	0.62360
5	The STEM fields can provide more job opportunities	4.2599	0.60258
6	Those in STEM fields can get jobs easily	4.2626	0.70145
7	Workers in STEM fields have enough time with their families	4.8727	0.34165
8	Workers in STEM fields can help the lives of others	4.5252	0.60585
9	Jobs in STEM fields involve repairing goods/products	4.3501	0.65595
10	Working in STEM fields require creative problem-solving skills	4.4562	0.55431

The Correlation Between Self-Efficacy, Perceptions of STEM Careers, and Satisfaction Levels of Students Studying STEM Subjects at The University

Table 7 displays the model summary table between two independent variables (the criterion variable) and STEM students' satisfaction in universities. The total correlation coefficient, r= 0.691, is within the range of 0.61-0.80, indicating a strong correlation between the variables. Chua (2020). The obtained R^2 value is 0.477. This indicates that 48.3% of the variance in satisfaction level is the result of the combined effect of two independent variables. According to Chua (2020), the effect size is small when the obtained R^2 value is 0.25; moderate when the obtained R^2 value is 0.50, and significant when the obtained R^2 value is 0.75. Based on the R^2 value from this research, both self-efficacy and perception towards STEM careers moderately affect STEM major satisfaction in university.

Table 7. The Model Summary Table

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.691[a]	.477	.475	.43678

a. Dependent Variable: Satisfaction level
b. Predictors: (Constant), Self-efficacy and Perceptions

Table 8 below displays the results of the ANOVA test used to examine this research hypothesis. The analysis demonstrates a statistically significant outcome *[F (2, 374) = 170.816, p < 0.05].* The large F-value of *170.816* is significant, with a p-value of *0.000*. As a result, the research hypothesis has been accepted, and the null hypothesis has been rejected. This suggests a significant

total influence exists between self-efficacy and perceptions of STEM careers towards the satisfaction of learning STEM in universities.

Table 8. ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	65.175	2	32.588	170.816	.000[b]
	Residual	71.350	374	.191		
	Total	136.525	376			

a. Dependent Variable: Satisfaction level
b. Predictors: (Constant), Self-efficacy and Perceptions

Table 9 presents a coefficient table indicating the impact of two variables, self-efficacy and perception towards STEM careers, on STEM learning satisfaction in universities. Results of the T-test analysis indicate that perception towards STEM careers has a more substantial effect on STEM learning satisfaction in universities (ß=1.156, t=12.636, $p<0.05$) than self-efficacy (b=0.752, t=11.308, $p<0.05$). This finding addresses the third research question, which seeks to determine the dominant factor (self-efficacy and perception towards STEM careers) influencing STEM learning satisfaction in universities. Hence, the standard equation for the multiple regression model for STEM students' satisfaction at university obtained from this study is:

Satisfaction = 0.752 (Efficacy) + 1.156 (Perception)

Table 9. The Coefficient Table That Illustrates The Effects of Each Variable

		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-0.503	0.270		-1.863	0.063		
	Efficacy Score	0.752	0.066	0.504	11.308	0.000	1.000	1.000
	Perception Score	1.156	0.092	0.732	12.636	0.000	0.416	2.404

The findings show that the independent variables, namely self-efficacy and perception towards STEM careers, significantly predicted the satisfaction of learning STEM subjects among pre-university students. This is particularly relevant as these factors may influence students' engagement and motivation in pursuing STEM education. The established regression model highlights the relationship between these variables and the satisfaction levels of B40 pre-university graduates studying STEM subjects at universities.

This result underscores the importance of fostering positive self-efficacy and career perceptions to enhance learning satisfaction. Students who believe in their abilities and have a favourable outlook on STEM careers are more likely to experience higher satisfaction with their STEM education, which can positively impact their academic performance and long-term retention. These findings can inform education policymakers and curriculum developers to focus on building student confidence and improving career guidance to enhance the overall STEM learning experience, particularly for students from underrepresented socioeconomic groups like the B40 cohort.

LIMITATIONS

There are several limitations and constraints to conducting this study. Firstly, the study's scope is limited, as the sample size is restricted to undergraduate students who majored in STEM fields. The study sample is further limited to students from the medicine, engineering, science, computer science, and technology faculties. As a result, this study cannot represent all STEM fields in universities. Secondly, this study concentrates on the factors influencing students' selection of STEM majors in the SCCT context. The factors examined include self-efficacy and perceptions of STEM careers. Therefore, this study is not exploring other potential factors that may contribute to STEM major selection. This study indicates that self-efficacy and perceptions towards STEM careers are significantly interrelated. According to the SCCT model and literature review, the interaction between these factors influences students' career choices. Positive self-efficacy and perceptions of STEM careers are crucial in motivating students to select fields of study. For future research, it would be beneficial to study students in other STEM fields, such as agriculture, sports science, and home economics, to gain a broader understanding of their interest in STEM fields. Additionally, a mixed-methods methodology should be employed to delve deeper into why students are interested in STEM fields. It is also recommended in ensuring equal participation of students from different years of study to explore social interaction between age groups, as students tend to make more mature decisions as they age, as per the SCCT model.

CONCLUSION

In conclusion, this study demonstrates that B40 pre-university graduates' strong self-efficacy and positive perception of STEM careers significantly influence their interest in studying STEM subjects at university. Graduates with high self-efficacy, strong problem-solving skills, and confidence in technical competencies are more inclined to pursue STEM majors, driven by their belief in achieving career success and personal fulfilment. Additionally, positive perceptions of STEM careers, such as job satisfaction, work-life balance, high income, and prestige, further motivate these students to engage in STEM education.

The findings contribute to the Social Cognitive Career Theory (SCCT) by reinforcing the importance of self-efficacy and career perception in shaping students' educational and career choices. This study underscores the need for targeted interventions to boost self-efficacy and provide clearer insights into STEM career prospects, particularly for underrepresented groups like the B40 cohort. The overall STEM environment can be improved by enhancing these factors, leading to a more diverse and motivated STEM workforce capable of addressing global challenges in science and technology.

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APPENDIX

Research Title: Self-efficacy and perceptions of STEM career among B40 pre-university graduates

The purpose of this questionnaire is to obtain information related to the level of STEM self-efficacy and perception of STEM career among pre-university graduates.

This questionnaire takes 10 - 15 minutes to be completed. Please answer the questions according to your perspective. This means, each answer is not judged as right or wrong.

Your cooperation is greatly appreciated. Thank you.

Section A: Demography

1. Gender
   - Male
   - Female

2. Race
   - Malay
   - Chinese
   - Indian
   - Others

3. Faculty
   - Medicine
   - Engineering
   - Science and Mathematics
   - Science Computer and Technology

4. Year of Study
   - Year 1
   - Year 2
   - Year 3
   - Year 4

Section B: Motivation

Self-efficacy refers to your belief in your abilities to handle various situations. In the context of this study, self-efficacy refers to your belief and ability to choose a STEM major at university. Let the researcher know your level of **self-efficacy** that motivates you to choose STEM majors at university by choosing a scale from 1 to 5

Likert Scale				
1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

No	**Statement**	**1**	**2**	**3**	**4**	**5**
1	I chose this major because I am confident with my abilities					

2	I chose this major because I want to work in the field that I love in the future					
3	I chose this major because there are lot of career opportunities being offered					
4	I chose this major because I believed that I could help my family					
5	I do not regret my decision in choosing this major at the university					
6	I am confident that I can finish my studies within the given time					
7	I already planned my life for 5 years ahead					
8	I know the steps that need to be taken if I face academic difficulties					
9	My parents encourage me to choose a STEM major					
10	My parents told me about the advantages of choosing a STEM major					

Section C: Perceptions of STEM careers

Let the researcher know your **perception of STEM careers** that motivates you to choose STEM majors at university by choosing a scale from 1 to 5

Likert Scale				
1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

No	**I chose a STEM major at university because of;**	**1**	**2**	**3**	**4**	**5**
1	I will feel satisfied if I can work in a STEM related field					
2	Careers in STEM are prestigious					
3	The income of workers from STEM fields are high					
4	People who majored in STEM can get the job easily					
5	The STEM fields can provide more job opportunities					
6	Those in STEM fields can get jobs easily					
7	Workers in STEM fields have enough time with their families					
8	Workers in STEM fields can help the lives of others					
9	Jobs in STEM fields involve repairing goods/products					
10	Working in STEM fields require creative problem-solving skills					

Overall, to what extend you satisfied with the STEM courses studied at the university?

Likert Scale				
1	2	3	4	5
Very Unsatisfied (VU)	Unsatisfied (U)	Not Sure (NS)	Satisfied (S)	Very Satisfied (VS)

Respondent Declaration

I hereby confirmed that all the information provided in this form is TRUE.

- Agree
- Disagree