

Investigating the Relationship Between Motivation and Self-regulated Learning Towards Physics Subject Among Foundation Students

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ABSTRACT

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Physics is evaluated as one of the most challenging subjects among students in the science field during their high school years and becomes more difficult in college or foundation level. Due to various factors incorporated in this study, which investigates the relationship between foundation students' motivation and self-regulated learning toward physics subjects, certain students are unable to receive exceptional results or perform poorly. The study's target group encompassed all foundation students enrolled in physics courses from two Malaysian institutions. The survey adapted from Tuckman's model was used as the instrument for data collection and was created via Google Forms using a 3-Likert scale. This study focuses on students' perspectives, motivation, and self-regulated learning practices for physics subjects. A total data of 262 respondents was successfully obtained and transferred to IBM Statistics (Statistical Package for the Social Sciences) Version 28 for analysis. A conclusive and agreeable result of students' perspectives from the survey is that students themselves must give their best effort to comprehend physics with a very high mean of 2.8740. The greatest mean of 2.6870 for students' motivation indicated that the lecturer's support was a driving force behind their desire to learn. However, the greatest mean value of 2.6794 was found for self-regulated learning suggesting that even if students dislike the subject of physics, they still need to put in a lot of effort to get decent grades. The final findings showed a strong positive correlation, ($r = .634^*$) and ($p = .000$) between students' perspectives and cognitive strategy used among students towards physics subjects. Moderate positive correlations were obtained for both correlations between motivation and cognitive strategy used ($r = .464^*$) and ($p = .000$).

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1. INTRODUCTION

The relationship between motivation and self-regulated learning is crucial in education, as it influences academic achievement, skill acquisition, and personal development. Motivating students to start and continue with their academic pursuits can come from either internal or external sources. It interacts with self-regulated learning, establishing a mutually beneficial relationship between the inclination to learn and the methodical completion of tasks. A focused intervention, educational policy, or instructional methodology may be developed due to this understanding, which can also help researchers, educators, and policymakers identify barriers to and support successful learning practices. This study aims to delve into these interrelationships among foundation students in Malaysian educational institutions. By investigating how motivation influences self-regulated learning behaviours and subsequently impacts students' performance in physics, this research seeks to identify factors that facilitate or hinder academic achievement. Ultimately, the findings will contribute to informing educational practices and interventions designed to support foundation students in optimising their learning experiences and outcomes in physics education. Such insights are crucial for educators and policymakers striving to enhance science education and foster a more supportive learning environment for students pursuing careers in science and technology fields.

1.1 Background of Study

In the dynamic changing landscape of education, academic research has recently concentrated on the investigation of the elements that lead to successful learning. Among the factors, self-regulated learning and motivation have been identified as key variables impacting academic achievement (Yan, 2019). The complex relationship between the capacity to manage and steer one's learning processes (self-regulated learning), and the engine that propels learning (motivation), has substantial implications for students, teachers, and educational researchers. Although self-regulated learning and motivation have been researched separately, it is impossible to ignore how closely related they are. Motivation is the driving force behind self-regulated learning processes (Finn, 2020), impacting the choice and implementation of learning techniques. On the other hand, proficient self-regulated learners frequently demonstrate increased motivation fuelled by a feeling of competence, autonomy, and a mastery-oriented approach to problems.

Physics education poses unique challenges for students, especially those at the foundation level, where foundational concepts are introduced and mastery of these principles is critical for future academic success in science and engineering disciplines. Foundation students, typically transitioning from high school to higher education, face a steep learning curve as they grapple with abstract concepts and mathematical applications inherent in physics. This phase often marks a critical juncture where students' motivation and ability to self-regulate their learning behaviours significantly influence their academic performance.

Motivation plays a central role in shaping students' engagement and persistence in learning physics. Intrinsic motivation, fueled by personal interest and perceived competence, is crucial for sustaining long-term interest and effort in challenging subjects like physics. Extrinsic motivation, such as encouragement from peers or instructors, also plays a role in shaping students' attitudes and efforts towards their studies. Understanding how different motivational factors interact with students' perceptions and experiences in physics can provide valuable insights into enhancing instructional strategies and support systems within educational institutions.

Meanwhile, self-regulated learning (SRL) encompasses a set of cognitive, metacognitive, and behavioural strategies that enable students to actively monitor, control, and regulate their learning processes. Effective SRL practices involve setting goals, planning, monitoring progress, and adjusting strategies as needed. In the context of physics education, where conceptual understanding and problem-solving skills are paramount, fostering SRL skills is essential for students to navigate and succeed in their academic endeavours.

The relationship between motivation and self-regulated learning in the context of physics education is complex and multifaceted. Motivation can influence the adoption and implementation of SRL strategies, as students who are intrinsically motivated may exhibit greater initiative and persistence in employing effective learning strategies. Conversely, students with low motivation may struggle to engage in self-regulated learning practices, impacting their ability to comprehend and apply physics principles effectively.

1.2 Statement of Problem

Self-regulated learning is an active process in which students design, monitor, and regulate their self-learning using learning tools and self-established goals. Research has demonstrated a positive correlation between academic achievement and self-regulated learning. This relationship holds valid for students of all ages, from preschool to university, and suggests that learning strategies play a major role in achieving academic success (Alvi & Gillies, 2021). Researchers have highlighted the significance of motivation in daily life for self-regulated learning (SRL) (Jia et al., 2023). According to Reeves and Stich (2011), the integrity, consistency, and closeness of self-monitoring are necessary for self-regulated learning and necessitate motivation as a constant driver (Reeves & Stich, 2010). Previous research has demonstrated the favourable relationship between motivational components and cognitive engagement (Shi et al., 2021), such as self-regulation techniques, which can assist people in maintaining concentration on their intended objectives. Despite the recognised significance of motivation and SRL in academic achievement, a critical gap remains in understanding their specific interplay among foundation students in Malaysian educational institutions. This study aims to address this gap by investigating how varying levels of student motivation influence their adoption of SRL practices in physics education. Through exploration of these dynamics, the research seeks to identify factors that either facilitate or hinder academic performance, thereby informing educational practices and interventions aimed at optimising learning experiences and outcomes in physics education for foundation students. Such insights are essential for educators and policymakers striving to enhance science education and foster a supportive learning environment conducive to the aspirations of students pursuing careers in science and technology fields.

1.3 Objectives of The Study and Research Questions

This study investigates the relationship between motivation and self-regulated learning towards physics subjects among foundation students. Specifically, this study is done to answer the following questions:

- (i) How do students' perspectives on physics affect self-regulated learning?
- (ii) How do students' motivations affect self-regulated learning?
- (iii) How do learners perceive their self-regulated learning strategies in learning?
- (iv) Is there a relationship between motivation and self-regulated learning strategies?

2. LITERATURE REVIEW

2.1 Motivation to Learn

Motivation is a critical aspect of the learning process among undergraduates, influencing their engagement, persistence, and overall academic success (Singh et al., 2002). There are various factors influencing motivation for learning among undergraduate students, encompassing both intrinsic and extrinsic elements. Intrinsic motivation, rooted in personal interest and enjoyment, is a fundamental driver for undergraduate learning (Olmedo-Moreno et al., 2021). Deci and Ryan's (1985) self-determination theory posits that individuals are intrinsically motivated when they perceive activities as inherently satisfying and aligned with their values. Within the academic context, undergraduates are more likely to be motivated when they find the subject matter personally meaningful and when they can see its relevance to their future goals (Legault, 2017). therefore, fostering a sense of autonomy in choosing courses or research topics can enhance intrinsic motivation. Other than that, the social aspect of learning is also an influential factor in intrinsic motivation. Bandura's Social Cognitive Theory emphasises the role of social interaction in shaping motivation. Peer interactions, collaborative projects, and a supportive learning environment contribute to a sense of relatedness, making the learning process more enjoyable and engaging for undergraduate learners (Schunk & DiBenedetto, 2020). Moreover, positive relationships with instructors and mentors can provide social support, guidance, and encouragement, fostering a sense of competence.

On the other hand, extrinsic factors also play a significant role in motivating undergraduates. External rewards, such as grades, recognition, and career prospects, can drive performance and engagement. However, the type of extrinsic motivation matters (Senior et al., 2018). While extrinsic rewards may provide an initial incentive, an overemphasis on grades and external recognition may result in a decline in intrinsic motivation over time (Jovanovic & Matejevic, 2014). It is important to strike a balance and create an environment where extrinsic rewards complement, not replace intrinsic motivation. The learning environment and teaching methods also affect motivation. Different and interactive teaching strategies, including hands-on activities, discussions, and technology integration, can increase engagement. In addition, a well-structured curriculum that aligns with students' developmental levels and interests contributes to lasting motivation (Haleem et al., 2022). Challenges and obstacles are inevitable in the learning process. Growth Mindset Theory by Dweck (2006) suggests that fostering a belief in the accessibility of intelligence and the value of effort can positively influence motivation (Kapasi & Pei, 2021). Therefore, encouraging undergraduates to see challenges as opportunities for growth rather than insurmountable obstacles can increase their resilience and motivation (Kapasi & Pei, 2021).

2.2 Self-Regulated Learning

Self-regulated learning (SRL) is a critical aspect of students' academic success, involving the ability to independently monitor, control, and regulate one's learning processes. Zimmerman's cyclical model of self-regulation emphasises three phases: forethought, performance, and reflection. This model provides a framework for understanding how students engage in metacognitive processes, set goals, and adapt strategies to enhance their learning experience (Zimmerman, 2000).

In the context of physics education, self-regulated learning plays a vital role in students' mastery of complex scientific concepts. Physics students are often confronted with abstract theories and challenging problem-solving tasks. Research suggests that students who effectively employ

self-regulation strategies tend to perform better academically in physics courses (Cho & Jonassen, 2009). The forethought phase involves goal-setting and planning, where students set specific learning objectives and develop strategies to achieve them. During the performance phase, students engage in learning activities while monitoring their progress, and adjusting strategies as needed. Finally, the reflection phase encourages students to evaluate their performance, identify areas for improvement, and modify their approaches in future learning situations.

The role of self-regulated learning is particularly crucial in physics, as the subject requires a deep understanding of fundamental principles and the ability to apply them to solve complex problems. By fostering self-regulation skills, educators can empower physics students to take ownership of their learning, leading to improved comprehension, problem-solving proficiency, and long-term retention of physics concepts (Winne & Perry, 2000).

2.3 Foundation Students and Physics Education

Foundation students, enrolled in preparatory or bridging programmes, represent a diverse cohort with varying academic backgrounds and readiness level for higher education. These programmes are designed to enhance students' academic skills and knowledge, preparing them for the rigours of university. Foundation programmes are built in the intention to play an important role in improving students' preparedness and fostering intrinsic motivation. However, many foundation students face initial difficulties in setting clear learning goals, monitoring progress and applying effective strategies in the learning. Moreover, navigating the transition from high school to university-level education can be daunting, hence, damaging their confidence and motivation (Teo & Arkoudis, 2019). This is particularly a challenge for foundation students taking the Physics subject. Physics education demands mastery of complex concepts and rigorous problem-solving skills, which can present significant challenges for students in terms of motivation and self-regulated learning. Research highlights that students often struggle with maintaining motivation when faced with challenging problem-solving tasks (Theobald, 2021). Moreover, many physics students lack awareness of effective self-regulated learning strategies, such as goal-setting, monitoring their understanding, and adapting study techniques based on their progress (Wangchuk et al., 2023). These difficulties can hinder their academic achievement and conceptual understanding of physics principles. Therefore, effective pedagogical strategies that promote motivation and enhance self-regulated learning skills are essential in fostering a deeper engagement and mastery of physics concepts among foundation students.

2.4 Past Studies on Motivation to Learn

There have been many past studies on how learning motivation plays a crucial role in determining the level of success in learning achievement. The study by Puspasari and Muyassaroh (2023) is done to investigate the effects of learning motivation and learning discipline on student achievement. This study aims to find the effect of learning motivation and learning discipline on 98 students' achievement in class XII OTKP in Automation of Public Relations and Protocol at SMK PGRI 2 Sidoarjo. Total sampling is used in this research because the total number of respondents is less than 100. The data collection techniques used were questionnaires, interview sessions, and documentation. Meanwhile, data analysis techniques used the normal test, t-test, F-test, homogeneity, and coefficient of determination (R^2). A few indicators for learning motivation and discipline being used in this study show that only 40% of students are focused on class activities, and the rest of the students show a lack of interest in learning, fail to submit the assignment based on the due date, and also like to copy and paste

friends' work, pay less attention to the teacher during class, and skip the class. Some of them are still confused about their future, and the learning environment is less conducive because each class has too many students.

Based on the result, there is a positive correlation between learning achievement and the presence of strong learning motivation. Similar research was also conducted by Leobisa and Namah (2022) who strongly agreed that learning achievement is influenced by student motivation and discipline. This study also looked at the influence of learning motivation and discipline on the learning achievement of Christian Religious Education for 60 students in class VIII State 4 Kupang First Secondary School. The technique of purposive sampling is used in this study. Meanwhile, data collection for research instruments like questionnaires and data analysis used descriptive quantitative techniques. Based on a study, it was identified that the students have low performance due to a lack of self-discipline, often intentionally coming late to follow learning activities in class, and less encouragement from teachers during class sessions.

According to Kristiani and Pahlevi (2021), the purpose of this study is to identify the effect of learning motivation and student discipline on learning achievement simultaneously. This study involved a total of 72 students from classes XI OTKP 3 and 4 at SMK Negeri 10 Surabaya. The research method used in this study is quantitative, as well as the explanatory survey approach for data collection using a Likert scale questionnaire. Meanwhile, the data analysis methods used are the classical assumption test and multiple regression analysis with the help of SPSS 25 for Windows. The independent variables were set as learning motivation (X1), student discipline (X2), and learning achievement (Y) as the dependent variable. The product-moment correlation technique is used in this study, where when the coefficient value is $r_{table} < r_{count}$, then the questions are valid and able to be used as a data collection technique. In this study, student motivation and discipline significantly positively affect student achievement in class. In addition, Khairinal et al., (2020) also agreed that student learning outcomes can be influenced by learning motivation, learning discipline, and peer environment. This study aims for 72 students as respondents in class XI IPS SMAN Titian Teras economics for the academic year 2019/2020. The research method used a data collection technique using a questionnaire and descriptive-quantitative research through a survey. This study shows that learning motivation influences 38.5%, study discipline 28.3%, and peer environment 26.5%. The data indicates that learning motivation has a more significant impact on influencing student learning outcomes compared to learning discipline and the peer environment. According to Robbi, Gusnardi and Sumarno, (2020) state that learning motivation stands as a pivotal element in the process of acquiring knowledge.

The findings from the studies carry implications for both students and teachers. Establishing an effective learning environment requires collaboration between students and teachers. Students need to approach their studies with a clear purpose, fostering a mindset geared towards acquiring knowledge before engaging in lectures to sustain momentum. Simultaneously, educators can leverage these insights as a foundation to prioritise the learning needs of students attending their classes.

However, a study by Safna and Wulandari (2022) strongly disagreed that learning achievement was influenced by learning motivation or learning discipline. This contradicts prior research findings, which asserted that motivation and learning discipline significantly influence student achievement.

Research by Susilawati and Supriyatno (2020) to investigate the online learning process during the era and post-pandemic Covid-19 can affect their learning motivation. The population for this research is 30 students from the MPI Department of the State Islamic University of Maulana Malik Ibrahim Malang. Data collection through a questionnaire and data analysis technique used a paired T-test with an error rate of 5%. The result of this research can be concluded that the online learning process by using WhatsApp can increase the learning motivation among the students. However, research by Meşe and Sevilen (2021) argues that online education has a good impact on their learning motivation. This research samples 12 students from an intact class, and data collection was done through writing samples and semi-structured interviews among the students. A few indicators are used in this research, such as teachers, classmates, organisational problems, and situational problems. The conclusion of this study aims to show that the feedback from students is mostly negative in terms of online learning, which can help increase their motivation.

The implications of the studies for the decline in learning motivation during online education can be attributed to the monotonous nature of its implementation, a lack of guidance and supervision, the challenges of studying from home, and limited teacher innovation.

Research by Tokan and Imakulata (2019) investigates the direct effect of intrinsic and extrinsic learning motivation and learning behaviours among 229 students from the Biology Education Department, Faculty of Teacher Training and Education, University of Nusa Cendana in the academic year 2014/2015. The independent variables consist of intrinsic motivation (X1), extrinsic motivation (X2), learning behaviour (X3) and learning achievement (Y) as the dependent variables. Meanwhile, data collection used questionnaires in the form of the Likert scale, and data analysis was analysed with descriptive and inferential statistics. The findings indicate a direct influence of intrinsic motivation on learning behaviour, with both factors significantly impacting learning achievement. The interplay between intrinsic and extrinsic motivation, along with learning behaviour, collectively shapes the academic success of students in the biology education department. In addition, research by Dewangga and Nasaruddin, (2020) seeks to investigate the hypothesis regarding the impact of students' motivation and behaviour on the learning environment in English language learning. The population was 320 students in class VIII of SMP Pancakarya Tangerang batch 2018–2019, and the sample was 177 students taken randomly by using a sampling technique. This research employed a causal survey approach through path analysis. The data were analysed using LISREL to conduct structural equation analysis. The findings strongly agree that learning motivation and learning behaviours significantly impact learning achievement in the English language.

Both studies above hold implications for teachers, providing a foundation for identifying priorities and guiding actions for students engaged in the learning process at the institution. Provide encouragement and motivation to students to enhance their learning achievements and assist students facing learning challenges with genuine sincerity.

2.4 Past Studies on Self-Regulated Learning Strategies

In recent years, there has been extensive exploration into the significance of self-regulation for academic success. According to Ilishkina et. Al (2022), the purpose of this research is to explore self-regulated learning from a motivational perspective. The sample consisted of 716 students from two Russian universities, according to study programme and year of study. Questionnaires were used as part of the data collection methods, and Mplus 8 and SPSS version 24 were used for the statistical analyses.

According to research, motivational factors are interdependent and are manageable through motivational management strategies. This will be better equipped to scaffold students' self-regulation of their motivation to learn. The implications of this research are to identify new strategies for each of the motivational elements and develop self-regulation guidelines and rules of thumb for students with different motivational orientations. Research done by Pelikan, et al. (2021), investigated the role of self-regulated learning, motivation, and procrastination in perceived competence. The sample involved 2652 Austrian secondary school students. An online questionnaire was used in this research, and quantitative analysis using SPSS version 25 and thematic analysis was employed to analyse qualitative data obtained from open-ended questions. The coding process was facilitated using MAXQDA 2020 software. The results indicated a correlation between students' high perceived competence and increased intrinsic motivation, as well as a more frequent utilisation of self-regulated learning methods such as time management, goal setting, planning, and metacognitive strategies, compared to their counterparts with lower perceived competence. Thus, it is important to prioritise self-regulated learning both in traditional classroom settings and online learning environments. There are several ways to facilitate SRL with students. For example, a teacher may assist them in creating timetables and goals or encourage them to monitor by asking insightful questions. Teachers also can assist students in establishing and achieving realistic goals that increase their sense of perceived competence, which in turn increases their intrinsic drive and academic achievement.

The research El-Adl and Alkharusi, (2020) focused on investigating the connections between self-regulated learning strategies and students' motivation for learning, as well as their academic accomplishments in mathematics. The sample was 238 ninth-grade students in the Sultanate of Oman between 14 and 16 years old. The Motivated Strategies for Learning Questionnaire was used in this research to measure students' self-regulated strategies and motivation. Twenty-two items evaluated self-regulated learning strategies across two dimensions: utilisation of cognitive strategies and self-regulation. Participants responded on a 6-point Likert scale, ranging from 1 (never) to 5 (always). Findings showed that self-regulated learning was positively correlated with academic accomplishment, task value, control of learning beliefs, extrinsic motivation, self-efficacy, and intrinsic motivation in statistically significant ways. Test anxiety, on the other hand, was negatively correlated with self-regulated learning. Similarly, research done by Sukowati et al., (2020) aimed to explore the extent of self-regulated learning and the impact of SRL on the development of learning independence in elementary school students. The study comprised a population of 387 students, from which a sample of 194 students was randomly selected using Slovin's formula. This research consisted of 24 questions graded on a 4-point Likert scale, and the statistical analysis was carried out using SPSS version 24. The research findings indicated that the self-regulated learning and learning independence of elementary school students fell within the medium category. Consequently, it can be inferred that there is a noteworthy correlation between SRL and the learning independence of elementary school students.

The implications from the studies showed that high achievers appear to be adept at using self-regulated and cognitive learning mechanisms. As such, teachers must attend to the needs of pupils who are not meeting expectations by offering instruction in these tactics. Creating learning environments where students are allowed to freely express and discuss their thoughts and emotions about the learning objectives could be an effective strategy. The suggested tactics include encouraging reciprocal contacts with high achievers, establishing progressive goals, accepting accountability for their education, and participating in self-evaluation. Students' development of their cognitive and self-regulation skills may benefit from these activities.

2.6 Conceptual Framework

Figure 1 shows the conceptual framework of the study. According to Rahmat, et.al. (2021), motivation to learn comes derived from confidence from learners. This confidence is then shown in the way learners can become self-regulated learners in the classroom. This study explores the influence of motivation on self-regulated learning strategies such as cognitive strategy uses and self-regulation.

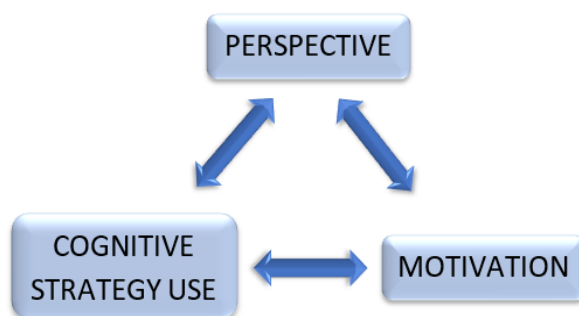


Figure 1: Conceptual Framework of the Study-Relationship between Motivation and Self-regulated Learning

3. METHODOLOGY

This quantitative study explores motivational factors for learning among foundation students. A purposive sample of 262 participants responded to the survey. The instrument used is a 3-Likert-scale survey and is rooted in Pintrich & DeGroot (1990) to reveal the variables in Table 1 below. The survey has three sections. Section A has items on the demographic profile. Section Two has 22 items on motivational beliefs. Section Three has items on self-regulated learning strategies.

Table 1 also shows the reliability of the survey. The analysis shows a Cronbach alpha of 0.772 for section B, a Cronbach alpha of 0.846 for section C, and a Cronbach alpha of 0.812 for section D. Furthermore, the overall Cronbach alpha of this survey is 0.894. This thus reveals the good reliability of the instrument chosen or used. Further analysis using SPSS is done to present findings to answer the research questions for this study.

Table 1: Distribution of Items in the Survey

SECTION	STRATEGY	SCALE	Number of Items	Total Items	Cronbach alpha
ONE	Demographic Profile				
TWO	Motivational Beliefs	B Students Perspective	14		0.772
		C Students Motivation	8	22	0.846
THREE	Self-Regulated Learning Strategies	D Cognitive Strategy Use	10	10	0.812
Total Number of Items				32	0.894

4. FINDINGS

4.1 Findings for Demographic Profile

There were 262 respondents, with 186 females (71%) and 76 males (29%). The respondents in this research are foundation-level physics students from two academic institutions. Respondents are from the Centre of Foundation Studies at UiTM Kampus Dengkil with 124 respondents (47%) and the Centre of Foundation Studies at Universiti Sains Islam Malaysia with 138 respondents (52%).

Table 2: Percentage for Demographic Profile

Q1	Gender	Male	Female
		29%	71%
Q2	Institution	Centre of Foundation Studies, UiTM Dengkil	Centre of Foundation Studies, USIM
		47%	53%

4.2 Findings for Perspective

This section presents data to answer research question 1- How do students' perspectives on physics affect self-regulated learning?

Table 3 shows the mean levels of agreement among students' perspectives towards the physics subject. The result demonstrates that students have the ability to understand physics if they put sufficient effort into their studies (BQ4, mean: 2.8740). As stated by Santyasa et. Al (2019), students who have an insufficient grasp of concepts and are overly reliant on their instructors will be incapable of solving contextual problems. Mbonyiryivuze et. Al (2021) revealed that 95% of the participating students agreed that almost everyone can understand physics if they put in sufficient effort and study. However, students give their perspective that they will give up and leave the physics problem when they are not able to solve the problem within 10 minutes (BQ6, mean: 1.7405). Mbonyiryivuze et. Al (2021) also revealed that 56% of their respondents stated that they continue attempting to solve a problem if they find themselves unable to accomplish it within 10 minutes, whereas 39% of respondents give up trying to solve the problem.

Table 3: Mean from Students' Perspective

Item	Mean
BQ1 Learning physics is fun	2.6069
BQ2 I am good at physics	2.0153
BQ3 Knowledge of physics is useful for everyone	2.7901
BQ4 I can understand Physics if I study hard enough	2.8740
BQ5 Instead of memorising essential knowledge in physics the way it is presented, I relate it to what I already know	2.6336
BQ6 If I cannot solve a Physics' problem within 10 minutes, then I give up and leave it	1.7405
BQ7 I do Physics revision after class has finished	1.9962
BQ8 I spend lots of time to practise physics in assignment	2.3206
BQ9 I have a specific time to study physics	2.1603
BQ10 I think I will receive a good grade in physics subject	2.1603
BQ11 Physics gives me such satisfaction	2.3282
BQ12 I am confident when solving physics problem	2.0115
BQ13 Even when I do poorly on a physics test, I try to learn from my mistakes	2.8053
BQ14 It is important for me to learn what is being taught in physics class	2.7939

4.3 Findings for Motivation

This section presents data to answer research question 2: How do students' motivations affect self-regulated learning?

Table 4 displays the mean levels of agreement among students regarding motivation for learning. Students express that encouragement from the lecturer serves as a motivating factor for studying (CQ6, mean: 2.6870). In line with Susilowati's perspective (2020), teachers are expected to consistently employ engaging teaching methods that foster ongoing student interest in learning. However, university or co-curricular activities seem to have minimal impact on motivating students to study (CQ1, mean: 2.4046). This is because co-curricular activities are perceived to be more influential in fostering the development of soft skills, as highlighted by Siddiky et. Al. (2020), and these skills, in turn, enhance students' communication abilities.

Table 4: Mean for Student Motivation

Item	Mean
CQ1 Participating in any university activities or co-curricular motivate me to study	2.4046
CQ2 Financial circumstances motivate me to study	2.5382
CQ3 Encouragement from parents motivate me to study	2.8092
CQ4 Encouragement from siblings motivate me to study	2.6298
CQ5 Peers relationship motivate me to study	2.7863
CQ6 Encouragement from my lecturer motivate me to study	2.8282
CQ7 The university environment motivate me to study	2.7176
CQ8 The university facilities and infrastructure motivate me to study	2.6870

4.4 Findings for Self-regulated Learners

This section presents data to answer research question 3 – How do learners perceive their self-regulated learning strategies in learning?

The mean levels of agreement among students regarding self-regulated learning strategies are shown in Table 5. A notably high mean value is observed for DQ10, with a mean value of 2.6794. Despite their potential dislike for physics, students recognise the necessity of putting in hard work to secure good grades, not only in the specific subject but across all their courses (Gultom & Oktaviani, 2022). This collective effort aims to safeguard their grade point average (GPA). On the other hand, the low mean value of 2.1908 for DQ3 indicates that not every student effectively manages their study time. This challenge extends beyond physics learners, as students in various subjects face similar difficulties in time management. A study by Alyami et al. (2021) reveals that less than half of the students in the diagnostic radiology technology department agreed that they could effectively manage their time.

Table 5: Mean for Self-Regulation

Item	Mean
DQ1 I acquire the capability to independently access physics topic	2.2595
DQ2 I acquire the capability to summarise physics topics after the class.	2.2290
DQ3 I have the ability to effectively manage my time for studying physics.	2.1908
DQ4 I acquire the capability to explore physics in different approaches (Other than slide notes and reference book)	2.3321
DQ5 When I study, I put important ideas into my own words.	2.5763
DQ6 When studying, I copy my notes over to help me remember material.	2.3817
DQ7 When I am studying a topic, I try to make everything fit together.	2.6412
DQ8 Even when study materials are dull and uninteresting, I keep working until I finish.	2.4656
DQ9 Before I begin studying, I think about the things I will need to do to learn.	2.5649
DQ10 I work hard to get a good grade even when I don't like a class.	2.6794

4.5 Findings for Relationship between motivation and self-regulated learning strategies

This section presents data to answer research question 4 - Is there a relationship between motivation and self-regulated learning strategies?

To determine if there is a significant association in the mean scores between metacognitive, effort regulation, cognitive, social, and affective strategies, data is analysed using SPSS for correlations. According to Jackson (2015), the coefficient is significant at .05 level and a positive correlation is measured on a 0.1 to 1.0 scale. A weak positive correlation would be in the range of 0.1 to 0.3, a moderate positive correlation from 0.3 to 0.5, and a strong positive correlation from 0.5 to 1.0. The results of correlations are presented separately in Tables 6, 7, and 8 below.

Table 6 shows there is an association between perspective and motivation. Correlation analysis shows that there is a moderately significant association between perspective and motivation ($r = .444^{**}$) and ($p = .000$). This means that there is a moderately positive relationship between perspective and motivation.

Table 6: Correlation between Perspective and Motivation

		Perspective	Motivation
Perspective	Pearson Correlation	1	.444**
	Sig. (2-tailed)		<.001
	N	262	262
Motivation	Pearson Correlation	.444**	1
	Sig. (2-tailed)	<.001	
	N	262	262

** . Correlation is significant at the 0.01 level (2-tailed)

Table 7 shows there is an association between perspective and cognitive strategy use. Correlation analysis shows that there is a highly significant association between perspective and cognitive strategy use. ($r = .634^{**}$) and ($p = .000$). This means that there is a strongly positive relationship between perspective and cognitive strategy use.

Table 7: Correlation between Perspective and Cognitive Strategy Use

		Perspective	Strategies
Perspective	Pearson Correlation	1	.634**
	Sig. (2-tailed)		<.001
	N	262	262
Motivation	Pearson Correlation	.634**	1
	Sig. (2-tailed)	<.001	
	N	262	262

** . Correlation is significant at the 0.01 level (2-tailed)

Table 8 shows there is an association between motivation and cognitive strategy use. Correlation analysis shows that there is a moderately significant association between motivation and cognitive strategy use ($r = .484^{**}$) and ($p = .000$). This means that there is a moderately positive relationship between motivation and cognitive strategy use.

Table 8: Correlation between Motivation and Cognitive Strategy Use

		Motivation	Strategies
Perspective	Pearson Correlation	1	.484**
	Sig. (2-tailed)		<.001
	N	262	262
Motivation	Pearson Correlation	.484**	1
	Sig. (2-tailed)	<.001	
	N	262	262

** . Correlation is significant at the 0.01 level (2-tailed)

5. CONCLUSIONS

5.1 Summary of Findings and Discussions

Students' perspectives about physics subjects can sometimes relate to their performance. This study revealed that 95.8% of students agreed they could understand physics better if they studied hard enough. About 93.5% believe that any failure they have from a physics test will make them learn from their mistakes. A noteworthy quantity of students has negative attitudes towards physics because they give up easily if they cannot solve physics problems. Based on this survey of study, students agreed that physics was very useful because it could relate to the surroundings and was fun to learn. Some of the students feel that the confidence level of students with physics will be enhanced if they do revisions after class has finished, have a specific time to study physics, and spend lots of time practising physics. This study also revealed some factors that influence students' motivation to self-regulated learning in studying physics subjects. A notably highest value with 94.3% of the students agreed that encouragement from their lecturers motivates them to study. Others, such as parents, siblings, and peers' relationships, also significantly contribute to motivating them to study physics. The university environment, facilities, and infrastructure are also factors that motivate students to focus more on physics learning. Financial situation and active participation in extracurricular or university activities are two more elements that may serve as motivators for students to pursue physics education.

For students to achieve their full potential, self-regulated learning is of the utmost importance. About 89.3% of students believe they must try hard to make their lessons fit together to maintain a good grade. A considerable number of students also believe that they need to summarise physics topics after class, manage their time very well, keep working on them until they are finished, and try using different approaches other than slide notes and reference books. Any important idea or information from subtopics can be notified using their own words and notes. Students also need to prepare before beginning to study and need to challenge themselves to independently access physics topics. To sum up, there is a moderately positive relationship between motivation and self-regulated learning among students with ($r = .464^*$). Similar research was also conducted by Leobisa and Namah (2020) who strongly agreed that learning achievement is influenced by student motivation and discipline. Furthermore, including games into the instructional process may create a more relaxed environment, enhance motivation to learn, and develop a sense of responsibility in students toward the process of learning (Mokhtar, M. I. et al. 2019).

5.2 Pedagogical Implications and Suggestions for Future Research

Future research should focus more on gender variations in students' performance towards physics. Furthermore, it would be useful to investigate students' performance towards physics in different schools and universities. Specifically, the performance of physics students from various nations could be examined to determine whether their performance on the subject matter was influenced by cultural background. Future research and analysis also could be extended to a sizable number of additional schools or universities for various subtopics not specific to physics subjects only to gain a deeper knowledge of students' performance towards any subjects and how these may affect their conceptual comprehension and attitude.

6. APPENDIX

i. Survey Instrument (quantitative study)

Table 9: Section A - Demographic Profile

Q1	Gender	Male	Female
Q2	Institution	Centre of Foundation Studies, UiTM Dengkil	Centre of Foundation Studies, USIM

Table 10: Section B - Motivational Beliefs (Students Perspective)

ITEM
BQ1 Learning physics is fun
BQ2 I am good at physics
BQ3 Knowledge of physics is useful for everyone
BQ4 I can understand Physics if I study hard enough
BQ5 Instead of memorising essential knowledge in physics the way it is presented, I relate it to what I already know
BQ6 If I cannot solve a Physics' problem within 10 minutes, then I give up and leave it
BQ7 I do Physics revision after class has finished
BQ8 I spend lots of time to practise physics in assignment
BQ9 I have a specific time to study physics
BQ10 I think I will receive a good grade in physics subject
BQ11 Physics gives me such satisfaction
BQ12 I am confident when solving physics problem
BQ13 Even when I do poorly on a physics test, I try to learn from my mistakes
BQ14 It is important for me to learn what is being taught in physics class

Table 11: Section B - Motivational Beliefs (Students Motivation)

ITEM
CQ1 Participating in any university activities or co-curricular motivate me to study
CQ2 Financial circumstances motivate me to study
CQ3 Encouragement from parents motivate me to study
CQ4 Encouragement from siblings motivate me to study
CQ5 Peers relationship motivate me to study
CQ6 Encouragement from my lecturer motivate me to study
CQ7 The university environment motivate me to study
CQ8 The university facilities and infrastructure motivate me to study

Table 12: Section C - Self-Regulated Learning Strategies

ITEM
DQ1 I acquire the capability to independently access physics topic
DQ2 I acquire the capability to summarise physics topics after the class.
DQ3 I have the ability to effectively manage my time for studying physics.

- DQ4 I acquire the capability to explore physics in different approaches (Other than slide notes and reference book)
- DQ5 When I study, I put important ideas into my own words.
- DQ6 When studying, I copy my notes over to help me remember material.
- DQ7 When I am studying a topic, I try to make everything fit together.
- DQ8 Even when study materials are dull and uninteresting, I keep working until I finish.
- DQ9 Before I begin studying, I think about the things I will need to do to learn.
- DQ10 I work hard to get a good grade even when I don't like a class.
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AUTHORS' CONTRIBUTION

AWAL carried out the abstract, objectives, conceptual framework, methodology, discussion, conclusions and implications. HMM did the introduction while NFAK and NK did the literature review sections. AWAL, SAZ and KSSKMN collected and refined the data and performed the data analysis using IBM Statistics (Statistical Package for the Social Sciences) Version 28 for analysis. All authors read and approved the final manuscript.

CONFLICT OF INTEREST

None declared.

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