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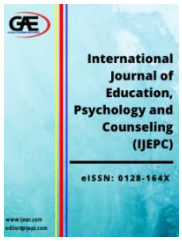

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LEARNING STRATEGIES AND SCIENCE ACHIEVEMENT OF FIRST-YEAR STUDENTS AT VOCATIONAL COLLEGES

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Abstract:

The level of first year students' science achievement at Malaysian vocational colleges in general is low. Although various variables have been associated with science achievement, research on the influence of learning strategies on students' science achievement in vocational colleges is still limited. Therefore, a total of 265 first-year students (aged 16 years) in seven vocational colleges in Sabah were sampled using cross-sectional survey research design. Two research survey instruments were used: 1) Learning and Study Strategies Inventory to measure learning strategies; and 2) Science Achievement Test to measure science achievement. Based on the findings, it was revealed that the level of learning strategies for Skill and Self-Regulation was moderate, while for Will was high. The overall level of science achievement was low. There was also no significant gender difference in all of learning strategies' constructs except for Self-Regulation, while there was a significant difference in the level of science achievement based on learning strategies. Science achievement was discovered to be related and influenced significantly by the Self-Regulation construct of learning strategies. It is suggested that vocational college students to improve their Self-Regulation so that they could attain the desired science achievement. The findings show that it is important for teachers to identify students' learning strategies so that appropriate teaching methods can be planned and implemented to improve their achievement in science.

Keywords:

Learning Strategies, Science Achievement, Vocational College

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Introduction

Along with the advancement of science and technology, the new generation needs to be taught about the importance of mastering the fields of science. This mastery should start from the process of teaching and learning in school that contribute to students' awareness of the science subject's utility, which in turn encourages them to appreciate why science is worth learning and is a useful tool for their professional development.

However, statistics showed that the achievement of first-year students in final science assessment in vocational colleges throughout Sabah was low (Table 1). It was noted that the percentage for students who obtained grade C+ and below increased, and this increment shows that there were more low achievers as compared to high achievers among the first-year students in vocational colleges. In Malaysian vocational college particularly in science subject, science achievement is measured based on two main assessments namely continuous assessment and final assessment. Scores from both of these assessments will be added to get the overall marks and grades in every semester. Thus, it is evident that there is a need to investigate factors that might have contributed to the poor performances in science subject in vocational colleges.

Table 1: Statistics for the Final Assessment of Science Subject of First-Year Students at Vocational Colleges in Sabah

Grade	A	A-	B+	B	B-	C+	C	D+	D	D-	E
2016	21	112	147	294	357	511	56	14	14	14	0
(%)	(1.4)	(7.3)	(9.5)	(19.1)	(23.2)	(33.2)	(3.6)	(0.9)	(0.9)	(0.9)	(0.0)
2017	28	126	140	259	315	490	70	35	21	7	0
(%)	(1.9)	(8.5)	(9.4)	(17.4)	(21.1)	(32.9)	(4.7)	(2.3)	(1.4)	(0.5)	(0.0)

Source: Technical and Vocational Education Division (2018)

Problem Statement

Abu Naim and Tunggak (2014) stated that each individual has unique and different learning strategies, because they have different levels of acceptance and interest in academics. For example, there are individuals who are more inclined to learn individually, while some prefer to study in groups. Besides that, there are also some people who always need the guidance from the tutor or teacher to learn, and there are some people who like to learn using the learning aids such as internet facilities and various reference materials. Learning strategies are specific patterns or combinations of academic activities used by students to gain knowledge (Dumford, Cogswell & Miller, 2016). According to Ormrod (2011), learning strategies include several actions such as taking notes while reading as well as concluding and organizing new obtained information while the teacher is teaching, and providing conducive environment for the learning process. Generally, learning strategies can be regarded as behaviour and thinking that enables a more effective learning process.

According to Yip (2012), there are differences in learning strategies between high-achieving students and low-achieving students, implying that students with high academic achievement possess higher level of learning strategies and studied more effectively than the students who have low academic achievement. Hence, learning strategies play an important role in students' academic achievement.

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Sharma and Neetu (2011) stated that the learning strategies and academic achievement can be differed based on gender, indicating that each male and female student has their own level of learning strategies and has a different level of academic achievement. The differences in terms of learning strategies may be due to the student's awareness of strengthening his/her learning strategies to achieve the desired performance goals, while the differences in academic achievement might be differed due to the efforts made by the student.

Diseth and Kobbetvedt (2010) state that learning strategies and academic achievement or examination grade are positively related, which means that the higher the level of student's learning strategies, the higher the student's academic achievement would be. According to Wan Mohamed and Yunus (2016), students who have a high level of learning strategy will learn more effectively and attain a high academic achievement. Other studies (Diseth & Matinsen, 2003; Yip & Chung, 2005; Yip, 2012; 2013) also found a significant relationship between students' learning strategies and their achievement.

Even though there were many studies that have been conducted to examine the relationship between students' learning strategies and their achievement, there is little study to specifically investigate the influence of learning strategies on vocational college students' achievement in science subject. Thus, this study attempted to examine whether there is an influence of learning strategies on science achievement among first-year students in vocational colleges in Sabah, Malaysia. This study also offered the opportunity to investigate in depth the gender difference related to learning strategies and the differences related to the science achievement based on the students' learning strategies

Literature Review

According to Weinstein, Palmer and Acee (2016), learning strategies compass three main constructs which are Skill, Will, and Self-Regulation. Skill refers to someone's ability to identify, acquire and construct meaning for new information, ideas and procedures, as well as how they prepare and apply knowledge obtained during the test or assessment. Skill consists of three subscales which are: 1) Information Processing; 2) Selecting Main Ideas; and 3) Test Strategies. Meanwhile, Will is related to the willingness of an individual to give effort that is needed to successfully complete academic needs, and this construct also consists of three subscales: 1) Anxiety; 2) Attitude; and 3) Motivation. On the other hand, Self-Regulation involves several individual processes such as using time effectively, concentrating and maintaining focus, reviewing whether learning needs for assignments or tests have been found, and willingness to ask for help from teachers, friends and learning centres. Self-Regulation is based on four subscales: 1) Concentration; 2) Self Testing; 3) Time Management; and 4) Using Academic Resources. Within the social constructivist learning theory, Driscoll (2002) suggested that learning is enhanced when students are actively involved in the learning and when critical thinking is promoted through applied and reflective activities.

In addition to that, Weinstein et al. (2016) also provided a guide to evaluate the level of students' learning strategies. Students' learning strategies can be evaluated based on their scores in Learning and Study Strategies Inventory (LASSI) questionnaire. Scores between 75 and 100 is considered as high, where the students do not have to give high priority to improve learning strategies if they get a score above 75 in any tenth of the LASSI scales except the Anxiety scale. Meanwhile, scores between 50 and 74 is considered as moderate, where the students need to consider to improve learning strategies if they get a score between 50 and 75

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in any tenth of the LASSI scales. Whereas scores between 0 and 50 is considered as low, where they need to improve their learning strategies in order to avoid serious problems in learning.

Purpose of Study

Generally, this study aimed to examine the influence of learning strategies on the first-year students' science achievement in vocational colleges, Sabah, Malaysia. The operational definition of learning strategies was derived from Weinstein's et al. (2016) constructs, which were Skill, Will, and Self-Regulation. Meanwhile, science achievement was referred to the scores obtained from the Science Achievement Test (SAT) instrument which was developed by researchers. The six research questions that guided this study were:

1. What is the level of students' learning strategies in vocational colleges?
2. What is the level of students' science achievement in vocational colleges?
3. Is there a difference in learning strategies based on gender?
4. Is there a difference in science achievement based on learning strategies?
5. Is there a relationship between learning strategies with science achievement?
6. Is there an influence of learning strategies on science achievement?

Research Methodology

Research Procedure

This study used a cross-sectional survey research design and was conducted in all vocational colleges (seven in total) in Sabah, which is one of the states in Malaysia. A cross-sectional survey research design enables the researcher to gather data on a few different variables at one point in time (Lavrakas, 2008). The sample comprised of 267 first-year students with 145 males and 122 females aged 16 years old who studied in the vocational college year 2020. In this study, the total number of populations was 820. According to Krejcie and Morgan (1970), the number of samples for the population of 820 is at least 265 samples. Thus, the sample of 267 students in this study was heterogeneous enough to represent the study population consisting of first-year students in vocational colleges in Sabah, Malaysia. The selection of 267 number of samples was done by using stratified random sampling. In this study, the strata referred to the seven vocational colleges in Sabah, which were in Kota Kinabalu, Tawau Keningau, Sandakan, Kudat, and Lahad Datu. Stratifying the sample could increase the precision and reduce error (Salkind, 2010). It is also convenient for the researcher to know how many students should be randomly sampled from each of the vocational college (strata) in Sabah.

Instrumentation

There were two instruments used in the study, namely Learning and Study Strategies Inventory (LASSI) and Science Achievement Test (SAT).

Learning and Study Strategies Inventory (LASSI)

The researchers used the existing instrument of Learning and Study Strategies Inventory (LASSI) (3rd edition) by Weinstein et al. (2016) to find out the level of students' learning strategies. LASSI was a 5-point Likert type scale instrument (1 – Strongly Disagree; 2 – Disagree; 3 – Neutral; 4 – Agree; 5 – Strongly Agree) which consisted of 60 items to assess students' awareness of the use of learning strategies. LASSI involved three constructs, namely Skill, Will, and Self-regulation. Skill comprised of 16 items which assessed three scales: 1) Information Processing (5 items) – Example: "I relate the topics discussed in class to my

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general knowledge."; 2) Selecting Main Ideas (5 items) – Example: "I can easily identify the important contents of my reading"; and 3) Test Strategies (6 items) – Example: "I easily understand the requirements of the question while sitting for a science test or exam". Will comprised of 20 items and three subscales: 1) Anxiety (7 items) – Example: "I often feel panic when sitting for science tests."; 2) Attitude (6 items) – Example "I have a positive attitude towards attending science classes."; and 3) Motivation (7 items) – Example: "I review my notes before the next class.". Self-Regulation comprised of 24 items and four subscales: 1) Concentration (7 items) – Example: "I am fully focused while studying science"; 2) Self Testing (5 items) – Example: "I test myself to see if I understood what I've learned."; 3) Time Management (7 items) – Example: "I do not like to procrastinate my study time."; and 4) Using Academic Resources (5 items) – Example: "If I have trouble completing a science assignment, I will look for information in the library".

Generally, the LASSI instrument used in this study had an acceptable Cronbach's alpha value (Skill = 0.840, Will = 0.80, Self-Regulation = 0.854, and Overall Item = 0.930). Before this instrument was used in the actual study, the researchers made some modifications to the items in the questionnaire. The modifications were made in the form of the language translation from English to Malay using a back-translation technique. This was because as compared to English, Malay language was more easily understood by majority of the students in the vocational colleges. The translated version was validated by a university lecturer.

Science Achievement Test (SAT)

Science Achievement Test (SAT) was developed by the researchers to measure students' science achievement. The test questions were based on the topics taken from the Vocational College Standard Curriculum (VCSC) for science subject namely body coordination, human nervous system, human brain and its composition, as well as the effects of drugs and alcohols. It consisted of 20 objective questions, where 5 questions (25%) had low level of difficulty, 10 questions (50%) had moderate level of difficulty, and the remaining 5 questions (25%) had high level of difficulty as suggested by Department of Skills Development (2017). The content validity of SAT instrument was checked and reviewed by the Head of the Science Unit of the Vocational College.

Data Analysis

Descriptive statistics (mean, standard deviation, and percentage) was used to analyze the level of students' learning strategies and science achievement. In this study, the level of learning strategies was measured based on the LASSI scores (Weinstein et al., 2016), where the score between 0 – 50 was Low, 50 – 74 was Moderate, and 75 – 100 was High. Meanwhile, the level of science achievement was determined by their score in SAT instrument which can be categorized into five categories which were Very Low (0 – 19), Low (20 – 39), Medium (40 – 59), High (60 – 79) and Very High (80 – 100) (Technical and Vocational Education Division, 2018). Meanwhile, inferential statistics were used to test hypotheses derived from the research question number 3 to 6. Inferential statistics allow the researcher to make predictions from the data, where the data from the sample can be used to make generalizations about a population. An Independent Sample T-test was employed to ascertain gender differences in students' learning strategies, while One-way ANOVA was used to ascertain the differences in science achievement based on learning strategies. Pearson Correlation Analysis was used to ascertain the relationship between students' learning strategies and science achievement, while Multiple Regression Analysis was used to ascertain the influence of learning strategies on science

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achievement. Multicollinearity, normality, and linearity assumption was checked on the data prior to the analysis, and it was revealed that all of the data used in the study fulfilled these three assumptions.

Research Findings

In Table 2, the average mean score of Skill construct for all of the students was 3.55 (71%), indicated that the level of students' learning strategies in this aspect was moderate, with males had a mean score of 3.45 (69%) while females had a mean score of 3.60 (72%). For the Will construct, the average mean score was 3.78 (76%) indicated that the level of students' learning strategies in this aspect was high, with males had a mean score of 3.79 (75.8%) and females with a mean score of 3.77 (75.4%). Lastly, the average mean score of Self-Regulation construct was 3.52 (70.4%) which indicated a moderate level of learning strategies in this aspect, with males had a mean score of 3.59 (71.8%) and females with a mean score of 3.43 (68.6%).

Table 2:Mean Score and Standard Deviation for Learning Strategies

Construct	Gender	Number	Mean	SD
Skill	Male	143	3.45	.51
	Female	122	3.60	.54
	N	**265**	**3.55**	**.53**
Will	Male	143	3.79	.44
	Female	122	3.77	.43
	N	**265**	**3.78**	**.47**
Self-Regulation	Male	143	3.59	.45
	Female	122	3.43	.50
	N	**265**	**3.52**	**.48**

In Table 3, the average score of students' science achievement was 39.13%, indicated that the level of students' science achievement was low. With respect to gender, the average score for males was 37.8%, which was at a low level, while the average score for females was 40.7%, which indicated a moderate level of science achievement.

Table 3:Mean Score and Standard Deviation for Science Achievement

Gender	Number	Mean	SD
Male	143	37.80	14.53
Female	122	40.70	11.60
	265	**39.13**	**13.31**

Based on Table 4, it was discovered that there was no significant gender difference in Skill and Will construct between males and females. On the other hand, a significant gender difference was found in Self-Regulation construct, where males generally held a higher mean score as compared to the females ($t(263) = .2.591$, $p < .05$).

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Table 4:Independent Sample T-Test Analysis for Differences in Learning Strategies based on Gender

Construct	*t*	*df*	*Sig. (2-tailed)*
Skill	1.488	263	.138
Will	.286	263	.775
Self-Regulation	2.591	263	.010

Based on Table 5, it was found that there was a significant difference in the level of students' science achievement based on learning strategies for Skill construct ($F (2, 262) = 9.691$, $p < .05$). Similarly, the level of students' science achievement based on learning strategies for the Will construct also was differed significantly ($F (2, 262) = 8.292$, $p < .05$). For Self-Regulation construct, there was also a significant difference in the level of students' science achievement ($F (2, 262) = 9.829$, $p < .05$).

Table 5: One-Way ANOVA Analysis for Differences in Level of Science Achievement Based on Learning Strategies

Construct		*Df*	*F*	*Sig.*
Skill	Between Groups	3	4.167	.007
	Within Groups	261		
	Total	264		
Will	Between Groups	3	4.682	.003
	Within Groups	261		
	Total	264		
Self-Regulation	Between Groups	3	4.918	.002
	Within Groups	261		
	Total	264		

The results of the Post Hoc Test Multiple Comparisons in Table 6 shows that there were significant differences between the levels of science achievement which were Very Low, Low, Moderate, and High based on the learning strategies. The negative signs on the mean difference indicated that the mean score for the level of science achievement (J) was smaller than the mean score for the level of science achievement (I). For Skill construct, it was noted that the significant difference was found between mean score of low-level students with high-level students with a mean difference of .347 ($p = .024$). Meanwhile, for Will construct, there was a significant difference between: i) mean score of low-level students with moderate-level students with a mean difference of .176 ($p = .020$), and ii) mean score of low-level students with high-level students with a mean difference of. 338 ($p = .010$). For Self-Regulation construct, the analysis shows that the significant differences can be found between: i) mean score of very-low level students with high-level students with a mean difference of 0.472 ($p = .026$), ii) mean score of low-level students with high-level students with a mean difference of 0.406 ($p = .001$), and iii) mean score of moderate-level students with high-level students with a mean difference of 0.357 ($p = .005$).

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Table 6: Post Hoc Test, Multiple Comparisons Analysis for Differences in Level of Science Achievement Based on Learning Strategies

Learning Strategy	(I) Level of Science Achievement	(J) Level of Science Achievement	Mean Difference (I-J)	Sig.
Skill	Very Low	Low	- .078	0.960
		Moderate	- .248	0.386
		High	- .425	0.102
	Low	Very Low	.078	0.960
		Moderate	- .169	0.067
		High	- .347*	**0.024**
	Moderate	Very Low	.248	0.386
		Low	.169	0.067
		High	-.177	0.446
	High	Very Low	.425	0.102
		Low	.347*	**0.024**
		Moderate	.177	0.446
Will	Very Low	Low	.088	0.921
		Moderate	-.088	0.920
		High	-.250	0.422
	Low	Very Low	-.088	0.921
		Moderate	-.176*	**0.020**
		High	-.338*	**0.010**
	Moderate	Very Low	.088	0.920
		Low	.176*	**0.020**
		High	- .162	0.412
	High	Very Low	.250	0.422
		Low	.338*	**0.010**
		Moderate	.162	0.412
Self-Regulation	Very Low	Low	-0.065	0.968
		Moderate	-0.114	0.849
		High	-0.472*	**0.026**
	Low	Very Low	0.065	0.968
		Moderate	-0.049	0.859
		High	-0.406*	**0.001**
	Moderate	Very Low	0.114	0.849
		Low	0.049	0.859
		High	-0.357*	**0.005**
	High	Very Low	0.472*	0.026
		Low	0.406*	**0.001**
		Moderate	0.357*	**0.005**

The result from the correlation analysis in Table 7 shows that there was a significant but weak relationship between Skill and science achievement ($r(265) = .249$, $p < .05$). Similarly, Will ($r(265) = .220$, $p < .05$) and Self-Regulation ($r(265) = .197$, $p < .05$) also was found to be weakly correlated with science achievement. All of the relationship between the constructs of learning strategies and science achievement was positive.

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Table 7: Pearson Correlation Analysis between Learning Strategies and Science Achievement

		Science Achievement
Skill	r	.249**
	Sig. (2-tailed)	.000
	N	265
Will	r	.220**
	Sig. (2-tailed)	.000
	N	265
Self-Regulation	r	.197**
	Sig. (2-tailed)	.001
	N	265

Based on Table 8 and 9, regression analysis shows that a regression model containing learning strategies constructs which were Skill, Will, and Self-Regulation as predictor variables can explain about 6.7% (R square = .067) of the variance in science achievement. However, it was noted that only Skill construct was a significant predictor for science achievement (Beta = .207, $t = 2.085$, $p < .05$).

Table 8:Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.260	.067	.057	12.931

Table 9:Coefficients of Regression Analysis

Predictor	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	12.768	6.785		1.882	.061
Skill	5.242	2.515	.207	2.085	.038
Will	3.130	2.519	.109	1.243	.215
Self-Regulation	-1.162	2.891	-.042	- .402	.688

Discussion

The findings from descriptive statistics revealed that the students in this study had a moderate level of learning strategies as overall, in line with the findings found by Wan Mohamed and Jamal (2016) which also discovered a moderate level of learning strategies among Tenth Graders in Perak, Malaysia. With respect to the learning strategies constructs, students also were discovered to have a moderate level in Skill and Self-Regulation, but a high level of learning strategies in Will construct. This indicated that the students possessed a moderate ability in developing and identifying new ideas and information, as well as in applying their knowledge during an assessment. Besides that, students' ability in maintaining focuses, utilizing time and academic resources effectively, as well as their ability in self-testing also in a moderate level. Thus, students in this study need to consider improving their strategies in these aspects as mentioned by Weinstein et al. (2016) in order to gain better learning. On the other hand, they don't have to give high priority to improve strategies in the aspects of attitude

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and motivation, as this study found that the students exhibited a positive attitude and interest towards learning, and held a discipline and willingness to strive in learning.

In terms of the science achievement, this study however found that the level of science achievement was low among the students. Based on this finding, the low level of achievement in this science subject should be served as an alarm for the educators, schools, parents, as well as the students themselves to take immediate actions to improve their performances in science. Such finding also can be references for various parties to carry out action researches or implementing efforts such as improving and strengthening the teaching strategies in classroom, as well as improving the students' learning strategies in science by fostering their awareness of the importance of possessing a high level of learning strategies (Yip, 2013).

Generally, the male students in this study had a higher mean score in all of the constructs in learning strategies as compared to their female counterpart, except for the Skill construct. However, the analysis from an Independent Sample T-Test discovered that only Self-Regulation showed a significant gender difference, parallel with the findings by Sharma and Neetu (2011). This finding indicated that the male and female students had a similar level of learning strategies for the Skill and Will construct, but the male students in general is noticeably had a higher level of learning strategies in terms of Self-Regulation construct as compared to their female counterpart. The differences in learning strategies between the male and female students were due to the differences in awareness to strengthen Self-Regulation to achieve the desired goals. According to Upadhayay and Guragain (2014), males generally show advantages in cognitive skill ability that is related to working memory, spatial, as well as in mathematics, which would help the male students acquire a higher level of concentration, self-testing, time management and using academic resources as compared to the female students.

Meanwhile, One-way ANOVA analysis revealed that there was a significant difference in students' science achievement levels based on learning strategies. This finding supported the findings by Yip's (2013) study which also discovered that the learning strategies of high-level students differed significantly with low-level students among high school students in Hong Kong. In this study, the significant differences to the learning strategies used by the low-level students and those with higher level of achievement in science were spotted in all of the constructs of learning strategies which were Skill, Will, and Self-Regulation. This can be interpreted as the students who had a high-level achievement in science would have a higher level of learning strategies as compared to the low-achieving students in science subject. In other words, the differences in the level of learning strategies among the students could lead to the differences in the level of science achievement. Thus, it is advised that for the students to identify the level of their learning strategies so that they could attain the desired and better outcomes in science achievement.

Next, Pearson correlation analysis showed that there was a significant positive relationship between students' learning strategies and science achievement. This finding is in line with the study conducted by Diseth and Kobbeltvedt (2010) and Yip (2013) which also discovered that the learning strategies were positively related with students' achievement. The finding of the study indicated that the higher the level of learning strategies, the higher the level of their achievement in science. Additionally, as the finding revealed that the Skill construct has the strongest correlation with science achievement, this proves that it is important to take note on the students' ability in certain aspects such as taking important notes in their revision and

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making preparation for assessments as these aspects are related to their achievement in science. Students' ability to cultivate and improve the level of their Skill of learning strategies also could help to improve the level of their science achievement.

Lastly, the results of multiple regression analysis showed that each independent construct in learning strategies can explain about 6.7% variance in the dependent variable that was science achievement. In addition, multiple regression analysis also discovered that the Skill construct in learning strategies can influence significantly their achievement in science subject. This showed that Skill construct is the most dominant learning strategies construct in predicting students' science achievement because it is also found to be significantly related to the achievement. Thus, for the students in the study, it is beneficial for them to focus on improving their ability in processing information, selecting main ideas and test strategies as these aspects are highly related and could influence their achievement in science. Other than that, in order to improve students' learning strategies, it is suggested that to implement more initiatives at schools such as introduce motivational camps to the students, or having a seminar or counselling sessions for the students to increase their awareness of the importance of having a high level of Skill in learning strategies. Besides that, the students' learning strategies also can be enhanced by guiding the students to perform learning strategies regularly and practically in order to be embodied by them. According to Yip (2012), those learning and study strategies can be thought and improved by direct instruction, as well as through the student–teacher mentoring programme.

Conclusion and Recommendations

This study fills a gap in the literature by assessing the influence of learning strategies on science achievement among vocational college students. Based on the findings, it was revealed that the level of learning strategies for Skill and Self-Regulation was moderate, while for Will was high. The overall level of science achievement was low. There was also no significant gender difference in all of learning strategies' constructs except for Self-Regulation, while there was a significant difference in the level of science achievement based on learning strategies. Science achievement was discovered to be related and influenced significantly by the Self-Regulation construct of learning strategies. Thus, it is suggested that vocational college students to improve their Self-Regulation so that they could attain the desired science achievement. As a suggestion for instruction, science teachers should give extra attention to identifying learning strategies of low-performing students so that appropriate teaching methods can be planned and implemented to improve students' achievement in science.

In this study, students' learning strategies were investigated as the non-cognitive factors that influenced the students'science achievement. Therefore, more future studies need to be done to investigate whether other non-cognitive factors such as motivation, self-efficacy, and confidence could influence students' science achievement. It is also suggested that future studies to apply a mixed method research design such as conducting an interview session at the end of the survey in order to have a better insight on the students' learning strategies.

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