

COGNITIVE STRATEGY USE AND SELF-REGULATION AS MEDIATORS BETWEEN PERSONALITY AND ACADEMIC ACHIEVEMENT AMONG CHINESE UNDERGRADUATES IN MALAYSIA

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ABSTRACT

Background and Purpose: The number of Chinese students studying abroad has increased significantly in recent years. As a result, their academic achievements are rapidly gaining attention. This study aims to look into the relationship between the big five personality traits and academic achievement in Chinese undergraduate students in Malaysia. It also aims to investigate if cognitive strategy use and self-regulation have a mediation effect on these personality traits.

Methodology: The 44-item Five Inventory and Motivated Strategies for Learning Questionnaire were used as the instrument. Respondents were picked from year 2 to year 4 at six private universities in Selangor, Malaysia. A total of 430 valid surveys were gathered using stratified random sampling. Structural equation modelling (SEM) and confirmatory factor analysis (CFA) were used for data analysis.

Findings: Findings showed a significant direct effect of the big five personality traits in terms of agreeableness on academic achievement. The full structural model is valid, reliable and fits well with the data. There is a mediation effect of the cognitive strategy use in the relationship between the big five personality (except extraversion trait) and academic achievement. Additionally, self-regulation

mediates conscientiousness and academic achievement, openness to experience traits and academic achievement.

Contributions: This study developed measurement scales for the measurement model and a full structural model based on two mediators.

Keywords: Self-regulated learning strategy, cognitive strategy use, self-regulation, big five personality, academic achievement.

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1.0 INTRODUCTION

The world market for going abroad to pursue higher education has been growing in the last decades. An increasing number of students would like to go abroad to study. In 2012, there were 4.5 million students, all across the world, who received their higher education abroad, and it is estimated that by 2025, this number will rise to 7.2 million. Especially the Chinese students, aim to choose developed countries to further study.

According to the statistics report by the Ministry of Education in China (2018), there were 5,194,900 Chinese students who studied overseas over the last forty years. Another survey revealed that until 2018 there were approximately 5,860,000 Chinese students studying overseas since 1978, the first year of China to allow international study. The Global Think Tank (CCG), the Southwest University of Finance and Economic Development and Research Institute, and the Chinese Academy of Social Sciences-Social Science Literature Press jointly issued an International Talent Blue Book “China's Overseas Study Development Report (2017)” on 18th December 2016. The report showed the number of Chinese students studying abroad continues to remain the first in the world in 2016, around 544,500. In 2017 there were around 608,400 Chinese students going overseas to pursue higher education which was the first time over 600,000 international students for China (Ministry of Education [MOE]). In light of the data from the Ministry of Education of China in 2019, approximately 662,100 Chinese students studied overseas, which has increased up to 8.83% over the year 2018. The main flow of international students is still from the global south to the global north. However, China and some of the other countries like Canada and Malaysia are also gradually becoming the new destinations for international students (Mitchell, 2018).

With the increased number of international students coming to Malaysia for further study, their academic achievement is gradually attracting attention. However, the academic achievement of international students is affected by various factors. This study is mainly focused on big five personality traits. Personality traits represent an individual's typical behaviors across various situations. Originating from Cattell's 16 factors, the big five personality traits—extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience—evolved into the widely endorsed personality model established by Costa and McCrae in 1992. Regarded as the most popular and accepted model in psychology today, this framework, known as the OCEAN or CANOE model, defines and explains individual personalities through these five distinct traits, offering a comprehensive understanding of human behaviour and characteristics. Most researchers have found that students' personality is closely related to their academic achievement (Rosito, 2020). Only the conscientiousness trait was commonly accepted by most of the researchers as it had a positive effect on academic achievement (Sorić et al., 2017; Rosito, 2020). However, the relationship between the other four traits of personality (openness to experience, extraversion, agreeableness, and neuroticism) was not widely recognized by the researchers, and different results of the other four traits were found (Chamorro-Premuzic & Furnham, 2003).

Cognitive strategy use has been applied in educational psychology and it has helped to improve and influence the success of students since the 1970s (Sorić et al., 2017). However, as far as the five personality traits are concerned, the influences of individual differences on the Cognitive Strategy Use were not clear (Bidjerano & Dai, 2007). Self-regulation plays an important role in academic achievement, and it leads to students' success in schools (Daniela, 2015). However, it is still uncertain how individuals with different personalities control their emotions and behavior that influence their academic achievement (Sorić et al., 2017).

2.0 LITERATURE REVIEW

2.1 International Students in Malaysia

With the development of globalization, international education faces fierce competition, and students have more autonomy to select the country they want to study. Malaysia is the new study destination for foreign students. Malaysia and two other countries (Singapore and India) together accounted for 12% of the total number of international students in the world from 2005 to 2006 based on the statistics of World Education Service (2012). As UNESCO's statistics report in 2015, the top 10 destinations for studying abroad all over the world, including China (mainland), India, Kazakhstan, Malaysia, Iran, and Indonesia, are six countries

from Asia. Malaysia placed No.6 which has more than 64,482 international students and 1.4% of the global international student proportion. Besides, the factor of race, location, people, reputation, and culture will all influence the choice of international students to study in Malaysia (Lee et al., 2018). Furthermore, the National Higher Education Strategic Plan 2007-2020 in Malaysia targeted attracting 200,000 international students and positioning Malaysia among the top six global destinations for international education by 2020 (Munusamy & Hashim, 2019). This goal was notably realized, as evidenced by a remarkable 27.5% surge in application volume for 2021. Presently, Malaysia is committed to a lasting objective of expanding its student enrollment base to 250,000 by the year 2025 (Icef Monitor Editor, 2023). The surge in the number of international students in Malaysia has been remarkable. As of September 2019, public universities had enrolled 39,099 international students, while private universities or colleges had enrolled 92,415 international students, as reported by the Ministry of Education Malaysia (Sharma, 2020).

Malaysia is confident to emerge as a prominent education hub in the near future, attracting international students from various parts of the globe, with a notable influx from mainland China. This trend is emphasized by the mutual recognition agreement established between China and Malaysia in 2011. Furthermore, an Education Promotion Centre located in Beijing, China, facilitates the dissemination of pertinent application information and offers assistance to Chinese students seeking to pursue university education in Malaysia. Moreover, the first overseas campus called Xiamen University Malaysia was established in 2015 in Selangor, Malaysia. China and Malaysia have made lots of efforts to build a bridge of cooperation in Education. All measures have been taken by both countries to promote the mobility of international students.

15,000 students from mainland China studied in Malaysia in 2016. There were approximately 14,850 international students from China who studied in Malaysia in 2017. In 2019, about 1,345,000 Chinese students from China were studying in Malaysia and it is the most important country for international students (Statista, 2019). This is followed by Indonesia with 9,340 international students, 7,740 students from Bangladesh, 6,000 students from Yemen and 5,150 students from Pakistan (Hirschmann, 2020). Within 5 years (2015-2019), China has jumped from third to first place while Bangladesh dropped to third place in the ranking among the international students in Malaysia.

2.2 Big Five Personality Traits

The big five personality traits evolved from Cattell's 16 factors, and the majority of psychologists support it which was further developed by Costa and McCrae (1992), and it became the most popular and widely used personality model until today. The big five personality traits are also called the personality five-factor model that explains the personality of the individuals which include extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience.

The openness to experience trait means that people are willing to try new things and take part in intellectual and imaginative activities (Lim, 2020). According to Srivastava (2013), those who are willing to experience are characterized by insightful or imaginative, intellectual, with lots of interests and novel experiences. The conscientiousness trait describes the ability of individuals to regulate and control their impulses and engage in goal-oriented behavior (Grohol, 2019). Moreover, the conscientiousness trait can assess the degree of organization, persistence, and motivation of the individual to accomplish the target (Castillo, 2017). Extraversion reflects a person's tendency and intensity to seek and interact with the environment, especially in social interactions that include the comfort and confidence of the individual in a social situation (Lim, 2020). Moreover, extraversion can evaluate the needed interpersonal interaction, joy capacity, the degree of shyness or outgoingness of an individual (Castillo, 2017). According to Lim (2020), the agreeableness trait focuses more on how individuals deal with others in their relationships, especially in their interactions and orientations. According to Castillo (2017), the agreeableness trait assesses the compassion level for antagonistic thoughts and involves various feelings and actions. The neuroticism trait describes an individual's overall emotional stability by the way the individual perceives the world. There is a possibility that a person may interpret an incident as a threat or difficulty (Lim, 2020). In addition, neuroticism traits can influence the emotional instability of individuals, such as unrealistic thoughts, psychological distress, excessive desires, or response to adaptiveness (Castillo, 2017).

2.3 Cognitive Strategy Use

The utilization of Cognitive Strategy Use (CSU) dates back to the 1970s and has been associated with enhanced student performance (Zimmerman, 2002; Winzer, 2008). CSU encompasses a range of problem-solving techniques such as planning, reasoning, and arithmetic. Notably, CSU operates in tandem with both internal cognitive processes and external factors (Siegler & Shipley, 1995), often referred to as scaffolds, procedural facilitators,

or procedural prompts. It provides a framework for learning when traditional problem-solving methods fall short. Particularly beneficial for students grappling with learning challenges, CSU enhances efficacy.

Research indicates that academically successful students exhibit a propensity to employ CSU in their studies (McEwen et al., 2009). CSU is one of the cognitive dimensions assessed within The Motivated Strategies for Learning Questionnaire (Pintrich & De Groot, 1990), capturing self-regulated learning strategies.

2.4 Self-Regulation

Self-regulation, as described by Ormrod (2009), encompasses the processes through which individuals exert control and evaluate their behavior and learning. It involves the active engagement of students in the learning process, incorporating motivation, metacognition, and cognition (Pardo et al., 2016). Self-regulated learning represents a constructive and beneficial endeavor wherein learners' endeavor to manage their motivation, cognition, and behavior in pursuit of predetermined objectives, influenced and guided by environmental factors (Pintrich, 2004; Schunk, 2005). The self-regulatory activities undertaken by learners serve to modulate the interaction between the environment and individual characteristics, thereby impacting their achievements (Zimmerman, 2002).

Forgas et al. (2009) advised self-regulation as the process of altering oneself or some aspect thereof to align with a particular idea or concept. Alternatively, Zimmerman (2002) defines self-regulation as the deliberate process by which learners translate their mental capacities into academic competencies.

2.5 Academic Achievement

Academic achievement is defined as the evaluation of performance through continuous assessments or examinations, yet consensus regarding its essential components or optimal evaluation methods remains elusive (Steinmayr et al., 2014). Steinmayr et al. (2014) further elaborate on academic achievement, characterizing it as the demonstration of attained objectives within educational contexts such as schools, colleges, and universities.

The measurement of academic achievement relies on various indicators (Steinmayr et al., 2014). Among these, Cumulative Grade Point Average (CGPA) frequently serves as a prominent measure in higher education settings (Zakaria et al., 2019), and is selected as a variable of interest in the present study. Academic achievement can be measured using a variety of indicators. Cumulative Grade Point Average (CGPA) is often reported as one of the main

indicators of academic achievement in higher education (Alyahyan & Düştögör, 2020) which is also selected as a variable in this study.

2.6 Relationship Among Variables

Numerous research has revealed the relationship between personality and academic achievement and different criteria of personality can influence academic achievement (Hakimi et al., 2011; Bergold & Steinmayr, 2018). Extensive literature concluded that conscientiousness has a consistent relationship with academic achievement (Lounsbury et al., 2003; Chomoro & Furnham, 2003; Bratko et al., 2006), while they have different views of the relationship among the rest of the four personality traits and academic achievement.

Self-regulated students may make good use of the strategies in thinking and solving new problems in learning, and they may realize that these strategies assist them in facing challenges (Ozan et al, 2012). Rosito (2020) believed that when a student keenly participates in monitoring, managing and planning their study, they can predict their understanding of study more accurately, change their skills more flexibly, and finally achieve better academic achievement. Self-regulated learners are highly self-effective, vigorous in self-evaluation, and more persistent in comparing progress and goals.

According to Pintrich and De Groot (1990), Cognitive Strategy Use and self-regulation had a positive correlation with the academic achievement of students. The findings from Phakiti (2003) showed that the changes in language test performance can be explained by cognitive strategy use. A previous study discovered and concluded that by using various organizing techniques, learners engaged in a greater degree of cognitive engagement, which may lead to a more complete comprehension and improved academic achievement (Rosito, 2020).

Many past studies made the self-regulated learning strategy the mediator, especially in the relationship between personality and academic achievement but did not explain it via each strategy respectively (Bidjerano & Dai, 2007). More specially, there is much research that has revealed the mediating effect of self-regulation. There are relatively few studies on cognitive strategy use as most of the research explored the effects of cognitive theory (Lemaire, 2010). Therefore, it is necessary to conduct such a study.

To investigate the relationship between the big five personality traits and academic achievement, the mediation effect of the cognitive strategy use as well as self-regulation among the above variables, there are three hypotheses designed for this study as below:

H1: There is a significant direct effect of the big five personality traits on academic achievement.

H2: Cognitive strategy use mediates the relationship between the big five personality traits and academic achievement.

H3: Self-regulation mediates the relationship between the big five personality traits and academic achievement.

3.0 RESEARCH METHODOLOGY

3.1 Research Design

A research design provides key instructions to the researcher on how to fulfill the study's objectives in the most effective manner feasible. It offers a detailed source selection plan which will be utilized to answer the main research questions. This study concentrates on the academic achievement of bachelor's degree students from China in a few private universities in Selangor, Malaysia. To understand the views of the respondents better and deeper, a quantitative research methodology is the best method for this research. Given the research framework and hypotheses, this study employs the distribution of questionnaires as the primary method for gathering empirical data. Once the questionnaires are completed and collected, data analysis will be conducted using SPSS software (version 25) and Amos (version 24).

3.2 Sampling

It is important to confirm the sample size when using the structural equation model for data analysis with particular formulas. For structural equation modeling, a sample size of 200 to 500 people is recommended by Bandalos (2014). Garson (2013) claimed that the sample size should be more than 300. According to Comrey and Lee (1992), a sample size of 300 is good enough and size 500 is very good while MacCallum et al. (1999) highly recommend that the researcher should obtain 500 or more as sample size to observe the different possibilities.

In total 430 respondents from six private universities in Selangor, Malaysia participated in the study. Certain criteria are set to do data sampling, for example, all the respondents are Chinese bachelor's degree international students. Only the second-, third- and fourth-year Chinese international students can be considered as respondents for the questionnaire. Their ages should be 18 and above. A Stratified random sampling technique is used for data sampling in which data is divided into smaller groups based on their year of study. The questionnaire was conducted randomly, and it took approximately 20-30 minutes per session.

3.3 Instrument

The questionnaire is divided into three sections with separate headings. Section one states the information on the background of the respondents. In section two, the big-five personality traits will be measured by the 44-item Big Five Inventory (BFI) which was developed by John and Srivastava (1999). In section three, self-regulation and the use of cognitive strategies will be evaluated using Pintrich and De Groot's (1990) Motivated Strategies for Learning Questionnaire (MSLQ). For this study, the CGPA was selected to measure the academic achievement of students as it is widely used and accepted by a majority of researchers (Zakaria et al., 2019) and is widely used and reported as one of the main indicators of academic achievement in higher education (Alyahyan & Düşteğör, 2020).

The BFI-44 is presently the most popular instrument. Research shows that the application of the instrument is stable in different situations, such as nationality, version of the language, sample size, average age of participants, and the male-to-female ratio (Hongyan et al., 2015). The MSLQ has experienced extensive psychometric development, and the reliability of overall internal consistency, Cronbach alphas, is sufficient (Stoffa et al., 2011). Cognitive Strategy Use and self-regulation are the cognitive scales constructed to measure self-regulated learning strategy under MSLQ (Pintrich & De Groot, 1990; Ilker, 2014).

3.4 Data Analysis

The purpose of data cleaning was to ensure that there was no missing data for the data analysis at the start of this study. To assess the normality of the data for each variable, skewness, and kurtosis were chosen. All the values were within the reasonable range which was recommended by Kline (2015). The Z score was selected to evaluate the imputed variables outliers and Mahalanobis distance (D2) was used to examine the multivariate outliers. To examine the internal consistency reliability of the variables, Cronbach's coefficient alpha was computed. The indicator's factor loading, composite reliability (CR), and average variance extracted (AVE) were selected to check the convergent validity for this study. The Fornell and Larker's criterion was conducted to the discriminant validity.

Structural equation modeling (SEM) and confirmatory factor analysis (CFA) were utilized for analysis in this study. The software SPSS (version 25) and Amos (version 24) were selected as data analysis tools. The measurement model was evaluated for CFA first, then the structural model was used to examine the hypothesis for this study. At least three goodness-of-fit index types should be involved to examine the model's goodness of fit (Kline, 2015) The researcher selected the Chi-squared test (χ^2), the goodness of fit index (GFI) which was created

by Jorskog and Sorbom (1989), Bentler (1990) comparative fit index (CFI), Incremental Fit Index (IFI), and Root-mean-square error of approximation (RMSEA) are the sorts of goodness-of-fit indexes used to assess the fit of all models in this study.

4.0 ANALYSIS AND DISCUSSION

4.1 Validity and Reliability

The Cronbach's coefficient alpha results for all variables are above 0.8 which indicates the instrument has an acceptable reliability level and good internal consistency (Hinton et al., 2004). The CR outcome in Table 1 All more than 0.8 which indicates the convergent exit. The average variance extracted (AVE) cutoff is 0.5. However, if the AVE is less than 0.5 and the CR is larger than 0.6, the convergent validity of the concept is still sufficient (Fornell & Larcker, 1981). Therefore, the convergent validity is still adequate for this construct.

Table 1: Reliability results

Items	Cronbach's Alpha	Composite Reliabilities	AVE
Extraversion	0.872	0.869	0.527
Agreeableness	0.878	0.879	0.512
Conscientiousness	0.880	0.883	0.519
Neuroticism	0.854	0.857	0.502
Openness to experience	0.893	0.894	0.547
Cognitive Strategy Use	0.894	0.895	0.461
Self-regulation	0.889	0.887	0.566

AGR: agreeableness, EXT: extraversion, CON: conscientiousness, NEU: neuroticism, OPE: openness to experience, CSU: Cognitive Strategy Use, SR: self-regulation.

Discriminant validity is to investigate the degree of difference between various constructions under different hypotheses. The value of Fornell and Larker's criterion should be less than 0.85 which indicates that there is an existence of the discriminant validity for the proposed model (Kline, 2015). As shown in Table 2, the values for all the constructs are presented and all the outcomes are within the acceptable level. Therefore, the results showed that the constructs had sufficient discriminant validity for this study.

Table 2: The results of discriminant validity (Fornell and Larcker)

	AGR	CON	EXT	NEU	OPE	CSU	SR
AGR	0.716						
CON	0.362	0.72					
EXT	0.228	0.254	0.726				
NEU	-0.085	-0.130	0.339	0.709			
OPE	0.192	0.282	0.308	-0.119	0.739		
CSU	0.293	0.351	0.197	0.089	0.356	0.679	
SR	0.237	0.423	0.199	-0.027	0.329	0.614	0.752

Note: Diagonals represent the square root of the average variance extracted while the other entries represent the correlations.

4.2 Descriptive Analysis

Mean is a method to measure the concentration trend and it shows the whole distribution. It shows the whereabouts of most of the values. Moreover, this is the most popular measure, and it is very simple to calculate. Standard deviation is a measure of how values are dispersed from the mean. In other words, the standard deviation can measure the variability or dispersion.

Table 3 illustrates the mean and standard deviation held by respondents for this study and it shows that the agreeableness construct contributed to the largest percentage in this study which is the highest mean among all the distribution of the items ($M=3.696$, $SD=0.579$). The cognitive strategy use construct has the second mean ($M=3.665$, $SD=0.620$) among all items. The findings show that the respondents are more inclined to agree with the description of agreeableness personality for themselves, and they like to use the cognitive strategy for themselves while studying. While neuroticism construct has the lowest mean ($M=2.966$, $SD=0.750$) which indicates that the respondent's trend does not believe much that their personality can be described as neuroticism.

The skewness and kurtosis were used for examining the data's normalcy while all the values of constructs within the acceptable range indicated that all items used in this data file were normally distributed for this study. More specially, the value ranges from -0.595 to 0.32 for skewness and ranges from -0.897 to 0.413 for kurtosis as presented in Table 3.

Table 3: Descriptive statistics among all the variables

Variable	Mean	Std. Deviation	Skewness	Kurtosis
CGPA	3.137	1.187	0.32	-0.897
AGR	3.696	0.579	-0.595	0.413
CON	3.213	0.686	-0.023	-0.386
EXT	3.261	0.716	-0.2	-0.247
NEU	2.966	0.750	0.018	-0.539
OPE	3.596	0.630	-0.405	0.355
CSU	3.665	0.620	-0.395	-0.005
SR	3.381	0.774	-0.343	-0.557

A total of 430 respondents participated in this study. As presented in Table 4, data collected from the questionnaire, more than half of them were females (59.3%) and followed by males (40.7%). The gender distribution almost reached a balance level. Most of them were between 20 and 22 years (50.0%) out of the 430 respondents. Followed by the next age group which ranged from 17 to 19 (30.5%). 17.7% were reported to be between the ages of 23 and 25 years and only 1.8% of respondents were more than 25 years. The majority of the respondents were in their 2nd year (61.2%). Some of the respondents (37.7%) were from the 3rd year while only 1.1% were from the 4th year of this study. The respondents' CGPA under groups 3.3 to 3.7 contributed to the largest number of participants in this research (34.7%). Groups 3.0 to 3.3 became the second highest among the six categories (23.0%). The percentage in the CGPA group 2.7 to 3.0 among all respondents was placed 3rd with 22.8%. The distribution of respondents among the rest of the other three groups was below 15%, including 14.4% of respondents in group 2.3 to 2.7/ 3.7% of the respondents with CGPA of more than 3.7, the group with 2.0-2.3 contributed 1.4% of the total respondents.

Table 4: Distribution of the demographics of respondents

Variables	Characteristics	Frequency	Percentage
Gender	Male	175	40.7
	Female	255	59.3
Age	17-19	131	30.5
	20-22	215	50.0
	23-25	76	17.7
	More than 25	8	1.8
Year of Study	Year 2	263	61.2
	Year 3	162	37.7
	Year 4	5	1.1
CGPA	3.7 above	16	3.7
	3.3-3.7	149	34.7
	3.0-3.3	99	23.0
	2.7-3.0	98	22.8
	2.3-2.7	62	14.4
	2.0-2.3	6	1.4

4.3 Statistical Analysis of Hypotheses

The subscales of extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience were used as the five independent variables in the full structural model to examine the hypotheses shown in Figure 1. The factor loading of the measurement scale lower than the 0.5 thresholds was deleted from the proposed measurement model, including EXTA, EXT5, AGR1, AGR3, CON2, CON9, NEU2, NEU5, OPE7, OPE9, OPE10, CSU3, CSU5, CSU10, SR2, SR6, and SR7.

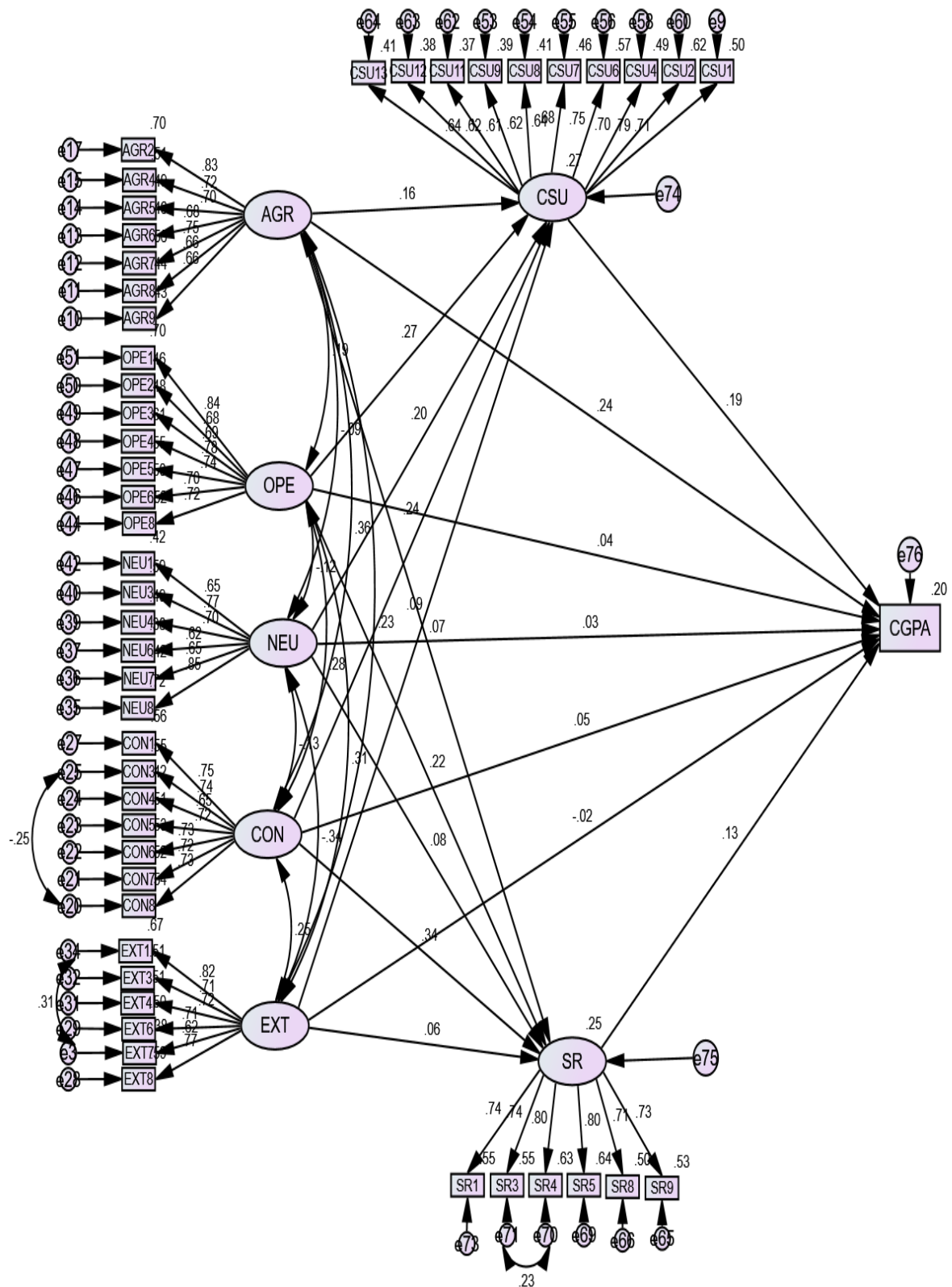


Figure 1: Full structural model

The full structural model and its model fit are presented in Table 5. The chi-square was significant (χ^2 (1146) = 1697.837, $p < 0.001$). The value of GFI is 0.867, which is higher than the cut-off 0.8. The CFI and IFI were 0.945 and 0.946 respectively, which were higher than its cut-off 0.9. The χ^2/df was 1.482 which was less than 5 thresholds. And the value of RMSEA was 0.034 which was below the 0.08 threshold (Mueller & Hancock, 2018).

Table 5: Goodness of fit statistics for proposed measurement model

Fit Index	Value
Df	1146
CMIN (χ^2)	1.482
P-value	0.000
X2 /df	1697.837
GFI	0.867
CFI	0.945
IFI	0.946
RMSEA	0.034

Table 6 represents the direct effect of the big five personality traits and CGPA. It indicates that the agreeableness trait has a direct effect on the CGPA as $p < 0.001$ while the traits of openness to experience, neuroticism, conscientiousness, and extraversion do not have a direct effect on CGPA respectively as the p-value is more than 0.001. To put it in another way, there was a significant direct effect of agreeableness trait on academic achievement.

Agreeableness has a positive correlation with surface and effort learning. De Feyter (2012) also supported that the trait of agreeableness is a valid predictor for academic achievement. Lundberg's (2013) study found that compared with those who have strong social skills but low emotional stability, people with high agreeableness and a sense of responsibility are more likely to get a degree. However, the personality traits of agreeableness had a positive significant correlation with academic achievement which was found in very few past studies (O'Connor & Paunonen, 2007). The findings of the current study backup and support this claim.

The research by Komarraju and Karau (2005) found that students with a higher level of openness were more focused on their studies. Openness has a favorable impact on a student's final achievement of the school, especially when it comes to critical thinking (Bidjerano & Dai, 2007). However, there was a weak link between the attribute of openness to experiences and academic achievement. Whenever team consistency or deadlines are needed, openness to

experience is negatively correlated with academic achievement (Kappe & Vam Der Flier, 2010). The findings of this study also confirm the above point of view which showed that there was no direct effect of openness to experience towards academic achievement.

As for the trait of neuroticism, on the one hand, Martin et al. (2006) believed that little research found a detrimental relationship between neuroticism and academic achievement. Rosito (2020) found that the neuroticism trait significantly contributed to GPA. On the other hand, Matthews and Zeidner (2004) believed that the neuroticism trait has more negative effects than positive effects. Much research summarized the same findings that neuroticism predicted negative effects on the academic achievement of students (Hakimi et al., 2011). As for the findings of this study, it was stated that there was no significant direct effect of neuroticism on academic achievement.

As most research shows, conscientiousness can positively influence academic achievement (Chomoro & Furnham, 2003; Hakimi et al., 2011; Bidjerano & Dai, 2007; Rosito, 2020). However, the results of this study contradicted earlier research findings, in other words, there was no significant direct effect of conscientiousness on academic achievement among Chinese international students in Malaysia.

Rosito (2020) found that the extraversion traits significantly contributed to the GPA, However, most of the research supports the finding that there was a negative relationship with academic achievement. In addition, its negative effect was more significant among university students (Hakimi et al., 2011). The findings of the current study also found the same results.

Table 6: Results for full structural model

Variables			S.E	β	C.R	P
AGR	--->	CGPA	0.129	0.244	4.532	<0.001
OPE	--->	CGPA	0.11	0.035	0.647	0.518
NEU	--->	CGPA	0.072	0.033	0.638	0.524
CON	--->	CGPA	0.103	0.052	0.899	0.369
EXT	--->	CGPA	0.083	-0.021	-0.38	0.704

Table 7 reveals the total, direct and indirect effect of the big five personalities on academic achievement through cognitive strategy use and self-regulation. According to these results, the total effect of agreeableness on CGPA was positive and significant ($\beta=0.283$, $p=0.001$). Results revealed that the direct effect of agreeableness on CGPA was also significant ($\beta=0.244$, $p<0.001$). According to these results, the indirect effect of agreeableness on CGPA through

self-regulation was not significant ($\beta=0.010$, $p=0.166$), however, it is significant on CGPA through Cognitive Strategy Use ($\beta=0.030$, $p=0.005$). Therefore, it declared that self-regulation does not have mediation between agreeableness and CGPA while cognitive strategy use partially mediates the relationship between agreeableness and CGPA.

The results showed the total effect of openness to experience on CGPA was positive and significant ($\beta=0.115$, $p=0.03$). Results revealed that the direct effect of openness to experience on CGPA was not significant ($\beta=0.035$, $p=0.518$). These results showed the indirect effect of openness to experience on CGPA through self-regulation was significant ($\beta=0.029$, $p=0.034$) and the indirect effect of openness to experience on CGPA through cognitive Strategy use was significant ($\beta=0.051$, $p=0.004$). Therefore, it declared self-regulation fully mediates the relationship between openness to experience and CGPA while cognitive strategy use fully mediates the relationship between openness to experience and CGPA.

Based on these results, the total effect of neuroticism on CGPA was positive but not significant ($\beta=0.083$, $p=0.11$). The results revealed that the direct effects of neuroticism on CGPA were also not significant ($\beta=0.033$, $p=0.054$). According to these results, the indirect effect of neuroticism on CGPA through self-regulation was not significant ($\beta=0.011$, $p=0.111$). The indirect effect of neuroticism on CGPA through cognitive strategy use was significant ($\beta=0.038$, $p=0.005$). Therefore, it declared that self-regulation did not have mediation between neuroticism and CGPA while the mediator cognitive strategy use partially mediated the relationship between neuroticism and CGPA.

According to these results, the total effect of conscientiousness on CGPA was positive and significant ($\beta=0.144$, $p=0.009$). Results revealed that the direct effect of conscientiousness on CGPA was not significant ($\beta=0.052$, $p=0.369$). These results showed the indirect effect of conscientiousness on CGPA through self-regulation was significant ($\beta=0.046$, $p=0.035$) and the indirect effect of conscientiousness on CGPA through Cognitive Strategy Use was significant ($\beta=0.046$, $p=0.004$). Therefore, it declared that self-regulation fully mediated the relationship between conscientiousness and CGPA while cognitive strategy use fully mediated the relationship between conscientiousness and CGPA.

Table 7 illustrates that the total effect of extraversion on CGPA was positive but not significant ($\beta=0.004$, $p=0.95$). Results revealed that the direct effect of extraversion on CGPA was negative and not significant ($\beta=-0.021$, $p=0.704$). These results showed the indirect effect of extraversion on CGPA through self-regulation was not significant ($\beta=0.008$, $p=0.274$) and the indirect effect of extraversion on CGPA through cognitive strategy use was not significant ($\beta=0.017$, $p=0.122$). Therefore, it declared that in this study there is no mediation of self-

regulation for the relationship between extraversion and CGPA. Moreover, there is no mediation of cognitive strategy use for the relationship between extraversion and CGPA.

Table 7: Distinguishing total, direct and indirect effects of full structural model

Independent variables	Mediator	Total effect	Direct effect	Indirect effects	Results
AGR-----> CGPA	SR	0.283** (p=0.001)	0.244** (p<0.001)	0.010 (p= 0.166)	No mediation
	CSU			0.030* p=0.005	Partial mediation
CON-----> CGPA	SR	0.144* p=0.009	0.052 p=0.369	0.046* p=0.035	Fully mediated
	CSU			0.046* p=0.004	Fully mediated
EXT-----> CGPA	SR	0.004 p=0.95	-0.021 p=0.704	0.008 p=0.274	No mediation
	CSU			0.017 p=0.122	No mediation
NEU-----> CGPA	SR	0.083 p=0.11	0.033 p=0.524	0.011 p=0.111	No mediation
	CSU			0.038* p=0.005	Fully mediation
OPE-----> CGPA	SR	0.115* p=0.03	0.035 p=0.518	0.029* p=0.034	Fully mediated
	CSU			0.051* p=0.004	Fully mediated

* Significant at 0.05 level, ** Significant at 0.01 level

5.0 CONCLUSION

In summary, all hypotheses (H1, H2, and H3) proposed for this study were partially supported. Firstly, there is a significant direct effect of the big five personality traits (agreeableness) on CGPA for the Chinese international undergraduates in Malaysia. The findings of this study also indicated that there is a mediation effect of the cognitive strategy used in the relationship between the big five personalities (except extraversion) and CGPA. In addition, self-regulation mediates the relation between conscientiousness and CGPA as well as the relation between

openness to experience and CGPA among Chinese undergraduates who study in a private university in Selangor, Malaysia.

This study created the measurement scale for the big five personality traits, cognitive strategy use, self-regulation, and CGPA. A measurement model and a full structural model were proposed based on two mediators that fill the gap of previous research. This study focuses on the Chinese international undergraduates who study in Malaysia which is the major group of international students in Malaysia, and it can give a reference for the Ministry of Education (MOE) and Ministry of Higher Education (MOHE) to implement the relevant education policy for the international student, especially for Chinese students. Moreover, this study provides suggestions for universities or institutions to get more effective and accurate information about students and teachers. This kind of information can provide insight into the characters of different types of students, guide them accordingly and adjust their behavior well so that it may help them to progress in their studies. The university can provide training for the teachers to be familiar with these constructs, such as how to utilize the cognitive strategy and self-regulation in the class to assist their students.

There are certain limitations to this study. It focused only on Chinese international students who graduated in specific academic years, which may limit the generalizability of the findings. The primary selection of respondents from the social sciences at the six private universities may have limited the diversity of course offerings. In addition, the study used cognitive processing and self-regulation as mediators, contributing to knowledge but requiring further in-depth analysis in future research. The further study can explore respondents from different states or universities with different academic backgrounds in Malaysia. It also suggested that future studies may examine other strategies under the self-regulated learning strategy to check the mediating effect of the relationship between personality and academic achievement.

REFERENCES

- Alyahyan, E., & Düşteğör, D. (2020). Predicting academic success in higher education: Literature review and best practices. *International Journal of Educational Technology in Higher Education*, 17(1), 1-21.
- Bandalos, D. L. (2014). Relative performance of categorical diagonally weighted least squares and robust maximum likelihood estimation. *Structural Equation Modeling: A Multidisciplinary Journal*, 21(1), 102-116.

- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107(2), 238-246.
- Bergold, S., & Steinmayr, R. (2018). Personality and intelligence interact in the prediction of academic achievement. *Journal of Intelligence*, 6(2), 27-45.
- Bidjerano, T., & Dai, D. Y. (2007). The relationship between the big-five model of personality and self-regulated learning strategies. *Learning and Individual Differences*, 17(1), 69-81.
- Bratko, D., Chamoro, T., & Saks, Z. (2006). Personality and school performance: Incremental validity of self- and peer-ratings over intelligence. *Personality and Individual Differences*, 41(1), 131-142.
- Castillo, J. (2017). The relationship between big five personality traits, customer empowerment and customer satisfaction in the retail industry. *Journal of Business and Retail Management Research*, 11(2), 11-29.
- Chomoro, T., & Furnham, A. (2003). Personality predicts academic performance: Evidence from two longitudinal university samples. *Journal of Research in Personality*, 37(4), 319-338.
- Comrey, A. L., & Lee, H. B. (1992). Interpretation and application of factor analytic results. In A. L. Comrey, & H. B. Lee (Eds.), *A first course in factor analysis* (p. 2). Lawrence Erlbaum Associates.
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO personality inventory (NEO-PI-R) and NEO five-factor inventory (NEO-FFI) professional manual*. Psychological Assessment Resources.
- De Feyter, T., Caers, R., Vigna, C., & Berings, D. (2012). Unraveling the impact of the big five personality traits on academic performance: The moderating and mediating effects of self-efficacy and academic motivation. *Learning and Individual Differences*, 22(4), 439-448.
- Forgas, J. P., Baumeister, R. F., & Tice, D. M. (2009). *Psychology of self-regulation: Cognitive, affective, and motivational processes*. Psychology Press.
- Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, 18(3), 382-388.
- Garson, G. D. (2013). *Hierarchical linear modeling: Guide and applications*. Sage.
- Grohol, J. M. (2019, May 30). The big five personality traits. *Psych Central*.
<https://psychcentral.com/lib/the-big-five-personality-traits>

- Hakimi, S., Hejazi, E., & Lavasani, M. G. (2011). The relationships between personality traits and students' academic achievement. *Procedia-Social and Behavioral Sciences*, 29(1), 836-845.
- Hinton, D. E., Pham, T., Tran, M., Safren, S. A., Otto, M. W., & Pollack, M. H. (2004). CBT for Vietnamese refugees with treatment-resistant PTSD and panic attacks: A pilot study. *Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies*, 17(5), 429-433.
- Hirschmann, R. (2020, November 23). Number of international students studying in higher education institutes in Malaysia in 2019, by country of origin. *Statista*. <https://www.statista.com/statistics/866731/international-students-in-malaysia-by-country-of-origin/>
- Icef Monitor Editor. (2023). Malaysia exceeds target for new international student applications in 2022. <https://monitor.icef.com/2023/02/malaysia-exceeds-target-for-new-international-student-applications-in-2022/>
- Ilker, E. (2014). A validity and reliability study of the motivated strategies for learning questionnaire. *Educational Sciences: Theory and Practice*, 14(3), 829-833.
- John, O. P., & Srivastava, S. (1999). The big five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 102–138). Guilford Press.
- Jorskog, K. G., & Sorbom, D. (1989). *LISREL 7: A guide to the program and applications*. SPSS.
- Kappe, R., & Van Der Flier, H. (2010). Using multiple and specific criteria to assess the predictive validity of the big five personality factors on academic performance. *Journal of Research in Personality*, 44(1), 142-145.
- Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford Publications.
- Komaraju, M., & Karau, S. J. (2005). The relationship between the big five personality traits and academic motivation. *Personality and Individual Differences*, 39(2005), 557–567.
- Lee, S., Nguyen, H. N., Lee, K. S., Chua, B. L., & Han, H. (2018). Price, people, location, culture and reputation: Determinants of Malaysia as study destination by international hospitality and tourism undergraduates. *Journal of Tourism and Cultural Change*, 16(4), 335-347.
- Lemaire, P. (2010). Cognitive strategy variations during aging. *Current Directions in Psychological Science*, 19(6), 363-369.

- Hongyan, L., Jianping, X., Jiyue, C., & Yexin, F. (2015). A reliability meta-analysis for 44 items big five inventory: Based on the reliability generalization methodology. *Advances in Psychological Science*, 23(5), 755-765.
- Lim, A. (2020, June 15). The big five personality traits. *Simply Psychology*.
<https://www.simplypsychology.org/big-five-personality.html>
- Lounsbury, J. W. Sundstrum, E., Gibson, L. W., & Loveland, J. L (2003). Broad versus narrow personality traits in predicting academic performance of adolescents. *Learning and Individual Differences*, 14(1), 65-75.
- Lundberg, S. (2013). The college type: Personality and educational inequality. *Journal of Labour Economics*, 31(1), 421–441.
- MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods*, 4(1), 84-99.
- Martin, J. H., Montgomery, R. L., & Saphian, D. (2006). Personality, achievement test scores, and high school percentile as predictors of academic performance across four years of coursework. *Journal of Research in Personality*, 40(4), 424-431.
- Matthews, G., & Zeidner, M. (2004). Traits, states, and the trilogy of mind: An adaptive perspective on intellectual functioning. In D. Y. Dai & R. J. Sternberg (Eds.), *Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development* (pp. 143–174). Lawrence Erlbaum Associates Publishers.
- McEwen, S. E., Huijbregts, M. P., Ryan, J. D., & Polatajko, H. J. (2009). Cognitive strategy use to enhance motor skill acquisition post-stroke: A critical review. *Brain Injury*, 23(4), 263-277.
- Mueller, R. O., & Hancock, G. R. (2018). *Structural equation modeling*. Routledge.
- Munusamy, M. M., & Hashim, A. (2019). Internationalisation of higher education in Malaysia: Insights from higher education administrators. *AEI Insights*, 5(1), 21-39.
- Mitchell, N. (2018, January 26). Global universities unprepared for sea change ahead. *University World News*.
<https://www.universityworldnews.com/post.php?story=20180126131034717>
- O'Connor, M., & Paunonen, S. V. (2007). Big five personality predictors of post-secondary academic performance. *Personality and Individual Differences*, 43(5), 971-990.
- Ormrod, J. E. (2009). *Essentials of educational psychology*. Pearson Education Inc.
- Ozan, C., Gundogdu, K., Bay, E., & Celkan, H. Y. (2012). A study on the university students' self-regulated learning strategies skills and self-efficacy perceptions in terms of different variables. *Procedia-Social and Behavioral Sciences*, 46(1), 1806-1811.

- Pardo, A., Han, F., & Ellis, R. A. (2016). Combining university student self-regulated learning indicators and engagement with online learning events to predict academic performance. *IEEE Transactions on Learning Technologies*, 10(1), 82-92.
- Phakiti, A. (2003). A closer look at the relationship of cognitive and metacognitive strategy use to EFL reading achievement test performance. *Language Testing* 20(1), 26-56.
- Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review*, 16(4), 385-407.
- Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82(1), 33-40.
- Rosito, A. C. (2020). The big five personality traits, self-regulated learning, and academic achievement. In *The 3rd International Conference on Psychology in Health, Education, and Organizational Setting (ICP-HESOS 2018)-Improving Mental Health and Harmony in Global Community* (pp. 469-477). Science and Technology Publications.
- Schunk, D. H. (2005). Self-regulated learning: The educational legacy of Paul R. Pintrich. *Educational Psychologist*, 40(1), 85-94.
- Siegler, R. S., & Shipley, C. (1995). Variation, selection, and cognitive change. In T. Simon & G. Halford (Eds.), *Developing cognitive competence: New approaches to process modeling* (pp. 31-76). Erlbaum.
- Sorić, I., Penezić, Z., & Burić, I. (2017). The big five personality traits, goal orientations, and academic achievement. *Learning and Individual Differences*, 54(1), 126-134.
- Srivastava, S. (2013). Measuring the big five personality factors. <http://psdlab.uoregon.edu/bigfive.html>.
- Statista. (2019). Number of international students in Malaysia 2017 by country of origin. <https://www.statista.com/statistics/866731/international-students-in-malaysia-by-country-of-origin/>
- Steinmayr, R., Meißner, A., Weideinger, A. F., & Wirthwein, L. (2014). *Academic achievement*. Oxford University Press.
- Stoffa, R., Kush, J. C., & Heo, M. (2011). Using the motivated strategies for learning questionnaire and the strategy inventory for language learning in assessing motivation and learning strategies of generation 1.5 Korean immigrant students. *Education Research International*, 2011(1), 1-8.
- Winzer, M. (2008). *Children with exceptionalities in Canadian classrooms*. Pearson Prentice Hall.

- Sharma, Y. (2020, December 2). Private universities at risk as foreign students stay away. *University World News*.
<https://www.universityworldnews.com/post.php?story=2020120216283461>
- Zakaria, R., Satari, S. Z., Damahuri, N. A., & Khairuddin, R. (2019). Descriptive analysis of students' CGPA: A case study of Universiti Malaysia Pahang. *IOP Conference Series: Materials Science and Engineering*, 469(1), 1-8.
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice*, 41(2), 64-70.