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A Motivation Profile Analysis of Malay Students in Singapore

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Abstract

This study aims to examine the motivational profiles of Malay students in Singapore based self-regulated learning framework (Pintrich & De Groot, 1990) and self-determination theory (SDT; Deci & Ryan, 1985). The sample consisted of 740 secondary school Malay students (415 males, 325 females). Using cluster analysis, five different clusters of students were found based on their unique characteristics on self-regulation and learning strategies scores. The clusters were named from best to poor in numeric order. Cluster 1 is characterised by high scores on intrinsic value, self-efficacy, self-regulation, and lower scores on lack of learning strategies and anxiety compared to other clusters. On the other hand, cluster 5 has the lowest intrinsic values, self-efficacy, and self-regulation relative to their scores on other clustering variables. In addition, the more adaptive profiles were also found to score higher in enjoyment and effort, and lower in boredom, compared to other clusters. The findings suggest that intra-individual differences in self-regulated learning behaviour are associated with the expected differences in the type of motivation possessed, and learning outcome measures. Overall, the findings from the study shows that Malays students do possess adaptive qualities known to facilitate learning outcomes.

Keywords: motivation profiles, Malay students, self-determination theory, motivated strategies for learning, cluster analysis

A Motivation Profile Analysis of Malay Students in Singapore

Introduction

Students' ability to regulate efforts and strategies effectively while learning is especially important as such abilities form the basis for life-long learning, an important attribute for success in the 21st Century. According to Pintrich (1995), the epitome of a self-regulated learner is one who is adept at controlling personal behaviour, motivation and affect, and cognition in achieving personally relevant academic goals. The prefix of the "self" and personal volition in self-regulated learning is not accidental as the individual student in question, and not the teachers or parents, determines the quality of one's personal self-regulated learning (Pintrich, 1995). In short, the student is in the driving seat to determine his or her self-regulated learning. Given such emphasis on self-determined and volitional actions in self-regulated learning, it seems logical that the self-determination theory (SDT, Deci & Ryan, 2002), which emphasises the importance of individual psychological needs satisfaction in explaining motivation, would provide an appropriate theoretical lens for further understanding motivation for self-directed learning.

The current study examines both self-regulated learning strategies and SDT with outcome variables using a person-centered approach, instead of the usual variable-centered approach. Variable-centered approach typically groups variables on common underlying dimensions or factors and use regression analysis or structural equation modelling. A person-centered approach, on the other hand, identify homogenous groups of students based on their responses to variables (Wang & Biddle, 2001). This has proven effective as segmentation strategies can be developed to enhance the effectiveness of interventions (Ng, Liu & Wang, 2016; Ng, Wang & Liu, 2015). The purpose of the current study is to use a cluster analytic approach to identify distinct self-

regulated learning strategies profiles and to examine how these profiles differ in their self-determination motivation and outcome variables among Malay students in Singapore.

The purpose of selecting Malay students among other ethnic communities is due to the persistent gap between the academic performance of the Malay students and other ethnic communities in Singapore schools (Tan, 2007). Tan suggests that although there is some evidence of narrowing gap over the past decades, Malay students generally trail behind other ethnic communities, particularly in the proportion of students entering tertiary education. It is hoped that by focusing on the understanding of the motivation profiles of Malay students, findings derived from this narrowly-focused study may shed some light on the future development of targeted and effective intervention for enhancing academic achievements of Malay students, and in turn better prepare them for the challenges of the 21st Century.

Self-Regulated Learning Strategies

Self-regulated learning has been of interest to teachers and educators, it is a 'self-directive process through which learners transform their mental abilities into academic skills' (Zimmerman, 1989, p. 2). Learners will need both the "skills" and the "will" to be successful in learning. The "skills" refer to the cognitive strategies that are effective for learning, such as elaboration, meta-cognition, and rehearsal, just to name a few. The 'will' in learning is the motivation of the learner. Hence, motivation combined with effective use of learning strategy may increase learning performance (Izabela & Marko, 2009; Virtanen & Nevgi, 2010). The motivated strategies for learning questionnaire (MSLQ; Pintrich & De Groot, 1990) has been used extensively in measuring cognitive strategies and motivation. It includes three motivational subscales namely intrinsic value, self-efficacy and test anxiety, as well as two metacognitive

subscales namely cognitive strategy use and self-regulation. However, according to a meta-analysis study by Credé and Phillips (2011), the MSLQ has problematic psychometric properties.

A recent study investigated the psychometric properties of the MSLQ Junior High (Pintrich & De Groot, 1990) with Singaporean secondary students (Kee, Wang, Lim & Liu, 2012). Using exploratory factor analysis and confirmatory factor analysis with two samples, the original 44-item MSLQ was then reduced to 28 items with stronger factor structure. Subsequently, Ng and her colleagues (Ng et al., 2015) further refined the MSLQ to 25 items with a congeneric approach of confirmatory factor analysis. This study is one of the first to use this newly tested MSLQ.

Self-determination Theory

The constructs of MSLQ are closely linked to self-determination theory (SDT; Liu et al., 2014). SDT is a theoretical framework which offers great insights in understanding students' motivation in classroom learning. According to SDT, when three basic psychological needs (competence, autonomy, and relatedness) are satisfied, intrinsic motivation and well-being will be enhanced. The need of competence is associated with the pursuit of optimal challenges which are parallel with one's abilities, and is a 'felt sense of confidence and effectance in action' (Ryan & Deci, 2002, p. 7). The need of autonomy concerns one's preference for behaviour to be voluntary and reflectively self-endorsed (Ryan & Deci, 2002). Finally, the need of relatedness 'concerns the psychological sense of being with others in secure community or unity' (Ryan & Deci, 2002, p. 7). It has been suggested that these three innate psychological needs are essential to fulfil in order to maintain intrinsic motivation (Niemiec & Ryan, 2009).

The extent to which the three innate psychological needs are being satisfied is linked to how different degrees of self-determination would result in different motivational regulation on a

continuum (Deci & Ryan, 2000). The lower end of the continuum is represented by *amotivation*, which refers to a total lack of motivation, and the individual has no intention to act. This is followed by different forms of extrinsic motivation, which indicates one's behaviours are driven by external sources. First, the least self-determined form of extrinsic motivation is termed *external regulation*, which refers to behaviour that is driven by external means, such as rewards or authority. Second, *introjected regulation* refers to behaviour which is self-dictated, such as acting out of guilt avoidance or ego-enhancements. Third, the most self-determined form of extrinsic motivation is termed *identified regulation*, which refers to behaviours driven by an individual's choice or values. On the top end of the continuum, *intrinsic motivation* refers to behaviour that is not driven by any external incitement, and instead undertaken solely for its own sake and enjoyment. Such behaviours have an *internal perceived locus of causality* (Ryan & Connell, 1989), whereby one's behaviour stems from one's personal choices, values, and interests. Typically, the Academic Self-Regulation Questionnaire (SRQ-A; Ryan & Connell, 1989) is used to assess the motivational regulation in learning among students. Two summary indices can be computed to represent the relative autonomy in motivation: autonomous motivation (by combining identified and intrinsic regulations) and controlled motivation (by combining external and introjected regulations) (e.g., Gagné et al., 2010, 2015; Williams, Grow, Freedman, Ryan, & Deci, 1996).

SDT is significant in the domain of education, since students' motivation to learn offers a potential area of resource which educators may tap on (Niemiec & Ryan, 2009). The application of SDT to educational settings have aimed to promote positive outcomes such as increased interest in learning, greater enjoyment of school work, and derivation of more satisfaction in schools (Deci, Vallerand, Pelletier, & Ryan, 1991; Niemiec & Ryan, 2009). Based on SDT,

human motivation in engaging in a particular behaviour is driven by three innate psychological needs: competence, autonomy, and relatedness (Deci & Ryan, 1985). Individuals are inclined to satisfy these needs because they are considered to be necessary for personal growth and well-being (Liu, Wang, Tan, Koh, & Ee, 2009b). Satisfaction of these needs lead to greater motivation, while individuals feel less motivated when these needs are unfulfilled (Ryan & Deci, 2000).

There have been several studies which have examined the influence of satisfying these needs on motivation levels in the education context (Cox & Williams, 2008; Ng et al., 2016; Wang, Liu, Koh, Tan, & Ee, 2011). For example, it has been found that these three psychological needs were found in experiences of a satisfying learning experience among South Korean students, and satisfaction of these needs was associated with greater academic achievement (Jang, Reeve, Ryan, & Kim, 2009). Autonomy has been the most salient among the three needs to cultivate intrinsic motivation (Deci & Ryan, 2000). Controlling teaching behaviours such as restraining students' criticisms and limiting the choices offered to students tend to diminish students' effort to learn in school, and worsen problems with defiance, passivity, and indifference (Haerens, Vansteenkiste, Aelterman, & Van den Berghe, 2016).

Satisfaction of the three psychological needs has been suggested to aid self-regulated learning behaviour (Deci, Ryan, & Williams, 1996). This can possibly be achieved through creating a learning environment which aims to fulfil these needs, and hence helping students to progress towards self-determined motivation. A typical measure for assessing autonomy-supportive environment is the Learning Climate Questionnaire (LCQ) developed by Williams and Deci (1996).

Although there are many studies which have examined needs satisfaction in education settings, relatively fewer studies examined self-regulated learning behaviour in relation to SDT variables directly at the intra-individual level in the field of academic learning. Recently, some studies adopted a cluster analytic approach to examine individual differences in self-regulated learning based on Motivated Strategies for Learning Questionnaire (MSLQ) among students in Singapore context (Liu et al., 2014; Ng et al., 2015). It has been found that needs satisfaction is important in promoting self-regulated learning behavior, such as self-efficacy, value, metacognition, elaboration, and rehearsal and lower anxiety. Cluster analysis has been recommended as a method to determine the role of motivational profiles (clustering by motivation variables) in outcome variables (Wang & Biddle, 2001). In this approach, individuals with similar characteristics would be grouped together and segmentation strategies can later be developed to increase the effectiveness of interventions. Several past studies have also employed this approach in examining students' motivational profiles in educational settings (Boiché, Sarrazin, Grouzet, Pelletier, & Chanal, 2008; Liu, Wang, Tan, Ee, & Koh, 2009a; Ng et al., 2016; Wang & Biddle, 2001). Although some researchers advocate another more advanced technique called latent profile analysis (LPA; Wang et al., 2016), cluster analysis is still the preferred method for the current study as it allows the results to be compared with previous studies that used similar approach.

Purpose of the Present Study

This study aims to examine the motivational profiles of Malay students in Singapore based self-regulated learning framework (Pintrich & De Groot, 1990) and SDT (Deci & Ryan, 1985). In this study, cluster analysis was applied to identify subgroups of students with homogenous MSLQ learning profiles. Subsequently, the interrelationships between SDT

variables and outcome variables can be examined to validate the profiles identified. It was hypothesized that students with more 'adaptive' MSLQ profiles would exhibit more positive motivation, autonomy and other outcome variables, compared to those with 'less adaptive' profiles.

Method

Participants and Procedure

The sample of the study consisted of 740 secondary school students (415 males, 325 females) from 24 tuition centres which caters to only Malay students. The students were from three academic streams in Singapore. The Express stream students (N = 208) are those who are given four years to complete their Singapore-Cambridge General Certificate of Education (GCE) "Ordinary" level, the Normal Academic stream students (N = 368) are those given four years to complete the GCE 'Normal' level examinations with the option to take GCE 'O' level examinations in the fifth year. The Normal Technical stream students (N = 164) are those who are academically less-inclined and take subjects of a more technical nature, such as Design and Technology.

Ethical approval was sought from the university Ethical Review Board. Consent was first obtained from the head tutors of each tuition centre before arrangements were made for the administration of the surveys to the students. Participants were informed that there were no right or wrong answers, assured of the confidentiality of their responses, and encouraged to ask questions if necessary. Completion of questionnaires took about 15 minutes, and participants were allowed to withdraw at any time they wished.

Measures

Motivated Strategies for Learning Questionnaire (MSLQ). Five subscales from the MSLQ developed by Pintrich and De Groot (1990) and validated by Ng et al. (2015) with Singapore sample which consists of a total of 25 items were used. Students were assessed on intrinsic value (four items; e.g., 'In class, I prefer work that is challenging so I can learn new things'), self-efficacy (four items; e.g., 'Compared with others in this class, I think I'm a good student'), test anxiety (four items; e.g., 'I am so nervous during class tests that I cannot remember facts I have learnt'), lack of self-regulation (three items; e.g., 'When work is hard, I either give up or study only the easy parts'), and learning strategies (eight items; e.g., 'I ask myself questions to make sure I know the material I have been studying'). Students responded by indicating the degree to which they agreed with the statements on a 7-point Likert scale ranging from 1 (not at all true) to 7 (completely true).

Academic Self-Regulation Questionnaire (SRQ-A). We used 14 items from the Academic Self-Regulation Questionnaire (SRQ-A) developed by Ryan and Connell (1989) to assess the behavioural regulation in learning among students. Students were assessed on external regulation (four items; e.g., 'Because I will get into trouble if I don't'), introjected regulation (four items; e.g., 'Because I want the teacher to think I'm a good student'), identified regulation (three items; e.g., 'Because I want to learn'), intrinsic motivation (three items; e.g., 'Because learning things in the classroom is fun'). Students responded by indicating the degree to which they agree with the statements on a 7-point Likert scale ranging from 1 (not at all true) to 7 (completely true). Autonomous motivation was computed by averaging the scores of identified and intrinsic regulations, and controlled motivation was computed by combining external and introjected regulations.

Learning Climate Questionnaire (LCQ). We used the Learning Climate Questionnaire (LCQ) developed by Williams and Deci (1996) to assess the extent to which the lessons students underwent were conducted in an autonomy-supportive environment. This measure consisted of 15 items (e.g., 'I feel like my teacher provides me with choice and options'). Students responded by indicating the degree to which they agree with the statements on a 7-point Likert scale ranging from 1 (not at all true) to 7 (completely true). Scores were calculated by averaging the individual item scores. Higher average scores indicate a higher level of perceived autonomy support from the tutors, and vice-versa.

Intrinsic Motivation Inventory (IMI). We used three subscales from the Intrinsic Motivation Inventory (IMI) developed by McAuley, Duncan, and Tammen (1989), consisting of 12 items to assess students' feelings about their schoolwork. Students were assessed on effort (five items; e.g., 'I put a lot of effort into my schoolwork'), enjoyment (five items; e.g., 'I enjoy doing my schoolwork very much'), and boredom (two items; e.g., 'I think schoolwork is boring'). Students responded by indicating the degree to which they agree with the statements on a 7-point Likert scale ranging from 1 (not at all true) to 7 (completely true).

Data Analysis

A series of Confirmatory Factor Analyses (CFAs) were conducted to examine the validity of the main measures (MSLQ, SRQ-A, LCQ, and IMI) using EQS for Windows 6.1 (Bentler, 2006). In addition, an overall CFA was conducted for all measures to check for discriminant validity of the factors. To assess the fit of these measurement models to the data, model fit was assessed using commonly used goodness-of-fit indices: the Bentler-Bonett non-normed fit index (NNFI); the comparative fit index (CFI); and the mean square error of approximation (RMSEA) and its 90% confidence intervals. Typically, values greater than .90 and .95 for NNFI and CFI

are considered to indicate adequate and excellent fit to the data, respectively, while values smaller than .08 or .06 for the RMSEA reflects acceptable and excellent model fit. (Hu & Bentler, 1999; Marsh, Hau, & Grayson, 2005).

All other data were analyzed using the Statistical Package for the Social Science (SPSS 25.0). In the main analysis of this study, descriptive statistics and internal consistency coefficients were tabulated.

Before conducting cluster analysis, key variables were standardized using z scores (mean of 0 and a standard deviation of 1) to facilitate interpretation of the results. After which, hierarchical cluster analysis using Ward's method was conducted to identify the cluster differences in MSLQ profiles among the students. The agglomeration schedule and dendrogram were used to decide the number of different clusters.

After the clusters have been obtained, a cross- tabulation of cluster by gender and academic stream was conducted using chi-square test to determine differences in distribution. In the main analysis, two one-way multivariate analysis of variance (MANOVA) was used to examine the differences in among the clusters and dependent variables. A partial eta square of .01, .06, and .14 is by convention interpreted as small, medium, and large effect size, respectively (Green & Salkind, 2003). If a MANOVA showed significant differences, follow-up tests were conducted using analysis of variance (ANOVA) and post hoc Tukey tests.

Results

Psychometric Properties of Measures and Descriptive Statistics

The results of the CFAs for MSLQ (Scaled χ^2 = 621.65, *df* = 260, NNFI = .911, CFI = .923, RMSEA = .043, 90% CI of RMSEA = .039 to .048), SRQ-A (Scaled χ^2 = 240.98, *df* = 53, NNFI = .917, CFI = .944, RMSEA = .070, 90% CI of RMSEA = .061 to .079), LCQ (Scaled χ^2

= 237.06, *df* = 82, NNFI = .962, CFI = .970, RMSEA = .052, 90% CI of RMSEA = .044 to .059), and the IMI measures (Scaled χ^2 = 285.00, *df* = 47, NNFI = .920, CFI = .947, RMSEA = .074, 90% CI of RMSEA = .064 to .084) revealed acceptable fit indices, supporting the factor validity of these measures. The combined CFA for all measures also revealed satisfactory fit indices (Scaled χ^2 = 3259.61, *df* = 1910, NNFI = .916, CFI = .922, RMSEA = .034, 90% CI of RMSEA = .032 to .035), supporting the discriminant validity of the measures. Table 1 shows the means, standard deviations, and Cronbach's alpha coefficients of all the variables measured. The participants scored high in intrinsic value, identified regulation, intrinsic motivation, autonomy-support climate and effort. Table 2 shows the correlations of the main variables. Intrinsic task value, self-efficacy, and learning strategies were positively correlated with autonomous motivation, autonomy-support, enjoyment and effort. Test anxiety was related to controlled motivation and boredom. Autonomous motivation was positively associated with autonomy-support, enjoyment and effort and was negatively associated with boredom.

Motivational Profile of Students

Z scores which are ±.50 or greater were used as criteria to determine whether a group scored relatively 'high' or 'low', while ±.30 indicates that the clusters scored 'moderately high' or 'moderately low' in comparison to the rest of the students. The results of the hierarchical cluster analysis (using dendrogram and agglomeration schedule) showed that there were five different clusters in terms of MSLQ profiles among the students. The numbers of students in each cluster were broken down into gender groups as well as different streams (Express, Normal Academic, and Normal Technical).

Table 3 presents the descriptive statistics of the five cluster profiles in association with the various MSLQ variables, and Table 4 shows the descriptive statistics of the motivation variables, and outcome variables among the five clusters.

The first cluster, which consisted of 178 students (24.1%), had the most ideal MSLQ profile, with high intrinsic value, high self-efficacy, high learning strategies, low in test anxiety and lack of self-regulation. This cluster can be labelled as the 'Highest Motivated Strategies for Learning' group. There were 100 boys and 78 girls, with 28.7% from express stream, 44.4% from NA stream, and 27.0% from NT stream.

In the second cluster, we found 107 students (14.5%) with high academic motivation. Although they have high intrinsic value, self-efficacy, learning strategies, they have high lacking of self-regulation and high test anxiety. This cluster can be labelled as the 'High Motivated Strategies for Learning' group. There was equal distribution of boys and girls in this cluster (54 boys, 53 girls). Majority of this cluster of students were from normal academic stream (53.3%) while the minority (12.1%) came from normal technical stream.

Majority of the students were grouped in the third cluster, where 256 students (34.7%) were found with moderate levels of academic motivation. This cluster can be labelled as the 'Moderate Motivated Strategies for Learning' group. Majority of these students were boys (60.9%), and half of them in this cluster (50.0%) were from the normal academic stream. There were 28.1% from the express stream and 21.9% from the normal technical stream.

In the fourth cluster, 157 students (21.3%) were found with low levels of academic motivation. This cluster of students have low intrinsic value and self-efficacy as well as low learning strategies, and scored high in lack of self-regulation and test anxiety. This cluster can be labelled as 'Low Motivated Strategies for Learning' group. Majority of these students were girls

(54.1%) and they came from the normal academic stream (52.2%). There were 24.8% from the express stream and 22.9% from the normal technical stream.

The final cluster, which consisted of 40 students (5.4%) had the lowest MSLQ profile. They have the lowest intrinsic value, self-efficacy, learning strategies, and test anxiety among all students. This cluster can be labelled as 'Lowest Motivated Strategies for Learning' group. They are mostly boys (88.5%). Majority of these students (50%) came from normal academic stream while the rest were from the express (22.5%) and normal technical (27.5%) streams.

The results of the cross-tabulation chi-square tests showed that there were no differences among the five profiles in academic streams, however, the gender differences were significant ($\chi^2_4 = 17.92$, $p < .001$). There appeared to be gender differences in Clusters 3, 4 and 5.

The results of the first MANOVA with autonomy-support, autonomous motivation and controlled motivation as dependent variables and cluster as independent variable were significant, Pillai's Trace = .462, $F(12, 2181) = 33.12$, $p < .001$, $\eta^2 = .15$. Follow-up ANOVAs found significant differences in autonomy-support ($F(4, 727) = 63.99$, $p < .001$, $\eta^2 = .26$), autonomous motivation ($F(4, 727) = 90.92$, $p < .001$, $\eta^2 = .33$), and controlled motivation ($F(4, 727) = 17.32$, $p < .001$, $\eta^2 = .09$). Post-hoc tests showed that there were significant differences in all the pair-wise comparisons (all *ps* < .01), except between clusters 1 and 2 in autonomous motivation, between clusters 1 and 3, 1 and 4, and 3 and 4 in controlled motivation, and clusters 1 and 2 in autonomy-support (see Table 4).

The results of the second MANOVA also showed significant multivariate effect among the clusters, Pillai's Trace = .285, $F(12, 2148) = 18.79$, $p < .001$, $\eta^2 = .10$. Follow-up ANOVAs found significant differences in enjoyment ($F(4, 716) = 44.16$, $p < .001$, $\eta^2 = .20$), effort ($F(4, 716) = 49.48$, $p < .001$, $\eta^2 = .22$), and boredom ($F(4, 716) = 12.28$, $p < .001$, $\eta^2 = .06$). Post-hoc

tests showed that there were significant differences in all the pair-wise comparisons (all *ps* < .01), except between clusters 1 and 2, and between clusters 4 and 5, in enjoyment, between clusters 2 and 3, and between clusters 4 and 5 in controlled motivation. For boredom, cluster 1 scored significantly lower in boredom compared to all other clusters (see Table 4).

Discussion

The purpose of the present study was to identify the motivation profiles of Malay secondary students in Singapore based on self-regulated learning framework and self-determination theory. The understanding of the motivational characteristics could be helpful in designing intervention programme for students attending the tuition centres.

From the cluster analysis, five different clusters of students were found based on their unique characteristics on the MSLQ scores. The clusters were named from most adaptive to most maladaptive in numeric order. Cluster 1 was most adaptive while cluster 5 was the most maladaptive among the clusters. In fact, Figure 1 showed that these two clusters (1 and 5) have cluster profiles that are almost opposite of each other. Cluster 1 is characterised by high scores on intrinsic value, self-efficacy, self-regulation, and lower scores on lack of learning strategies and anxiety compared to other clusters. On the other hand, cluster 5 has the lowest intrinsic values, self-efficacy, and self-regulation relative to their scores on other clustering variables.

Cluster 2 also had high intrinsic value, self-efficacy, and self-regulation, however, the higher levels in anxiety and lack of learning strategies would place Cluster 2 as less adaptive to Cluster 1. This is further validated by the results of the MANOVAs. Cluster 2 had higher controlled motivation and boredom and lower effort than Cluster 1. It is noteworthy that the profile of Cluster 2 was not found in previous studies (Kee et al., 2012, Liu et al., 2014). It appears that a large group of Malay students value their study and have high self-efficacy and

self-regulation, but they also need some help in effective learning strategies and relaxation skills to lower their anxiety.

Clusters 1 and 2 were found to have relatively adaptive self-regulated learning characteristics, while clusters 4 and 5 had maladaptive characteristics. The adaptive clusters were found to have more autonomous motivation, while the maladaptive clusters possessed more controlled motivation instead. In addition, the better MSLQ profiles were also found to score higher in enjoyment and effort, and lower in boredom. The findings suggest that intra-individual differences in self-regulated learning behaviour are associated with the expected differences in the type of motivation possessed and in learning outcome measures. In a nutshell, better self-regulated learning behaviours are associated with more autonomous motivation, greater enjoyment, effort and lower boredom. This is consistent with previous studies (e.g., Kee et al., 2012; Liu et al., 2014). This adds support to the literature that having the appropriate self-regulatory strategies are essential for enhancing the motivation of the learners.

Further, it is also important to note that among the five clusters, there are no significant difference among the three educational streams (Express, Normal-academic, and Normal-technical). Within the different academic streams, similar proportions of learners' profiles could be found. Liu and her colleagues' study (Liu et al., 2014) only involved junior college students while Kee et al.'s study did not differentiate the participants by academic streams. This study adds to the literature on the insignificance of the streaming effects on students' self-regulation strategies and motivation, at least in the Singaporean context.

The strength of cluster analysis lies in its ability in identifying intraindividual qualities that characterises meaningfully classifiable groups of people. Overall, the findings from the study shows that close to a quarter of the Malay students surveyed possess highly adaptive

qualities known to facilitate learning outcomes, and another 14.5% also displaying high academic motivation with have high intrinsic value, self-efficacy and adaptive learning strategies. Particularly, those in Cluster 1 seems to have both the "will" and the "skill" to learn. A typical student in this cluster would be someone with strong autonomous motivation, weak controlled motivation, and favourable MSLQ profiles. Such an adaptive profile was observed in previous studies too (e.g., Kee et al., 2012; Liu et al., 2014). Given this information, the implicit goal is to lead other students towards acquiring profile closer to Cluster 1. For example, those in cluster 2 could be helped by additional intervention on coping and learning strategies.

Among all the variables studied, it is apparent that the autonomy-support learning climate is the one that can benefit from intervention most readily, as previous studies had demonstrated the effects of autonomy-supportive intervention in training teachers to be more autonomy supportive (e.g., McLachlan & Hagger, 2010) using the SDT framework. Indeed, tutors should aspire to create the ideal classroom conditions which can encourage students to motivate themselves. Creating an autonomy-supportive learning climate is one such possible way to increase the self-regulated learning behaviour of students. Some of the modifications to one's teaching behavior include: adopting students' perspective, provide explanatory rationales, using noncontrolling language, displaying patience to let students learn at their pace, and acknowledging and accepting students' expression of negative affect (Reeve, 2009). It is understandable that some tutors may find it difficult to learn and implement an autonomy-supportive learning environment as it may require extra effort from them. However, with its associated potential huge benefits in helping students achieve academically, there is a need for a structured training programme for tutors to understand and learn the ways to create an autonomy-supportive learning environment.

Although it is impossible to ascertain the possible effects of a successful autonomy-supportive intervention simply by reading the current cluster analysis results, the findings corroborate with previous studies in demonstrating that an autonomy-supportive learner climate predisposes enjoyment, effort and lower boredom. For example, Black and Deci (2000) found positive association between student's perception of workshop leader's autonomy support and interest/enjoyment. Another study by Reeve, Jang, Carrell, Jeon and Barch (2004) also showed that students were more engaged when they displayed autonomy-supportive instructional behavior. Beyond the classroom setting, the roles parents play should not be underestimated. For instance, Froiland (2015) provided some evidence to suggest that parent's autonomy-supportive style can have positive effects on child's attitude towards learning and school. Previously studies have shown that autonomy-support climate is positively related to more adaptive MSLQ profiles (Liu et al., 2014; Ng et al., 2015). Collectively, these findings point to the usefulness of autonomy-supportive learning climate in facilitating positive learning behavior and experiences.

There are a few limitations and implications for future studies. First, the study is cross-sectional and thus causal inference cannot be made. Future studies should collect additional data at a later time period to check the predictive validity of the clusters. Second, as the current study only collected three psychological outcome variables, additional variables such as students' grade can be collected to check if the profiles could be differentiated by academic achievements.. Third, interventions can be conducted in future studies to investigate if students learning profiles could be altered.

In summary, the present study shows that there are five distinctive clusters within the sample of Malays students surveyed based on MSLQ. The results gathered is informative in that it illustrates that the fundamental intraindividual differences among this sample is similar to

others previously studied (e.g., Kee et al., 2012; Liu et al., 2014), dispelling any possible myth that Malay students are necessarily lacking in learning skills and motivation.

This study has made two important contributions. First, it has shown that using a cluster analytic approach, it is possible to group students according to their learning strategies and proposes that segmentation strategies can be implemented for specific groups of students to enhance the effectiveness of the intervention programmes. Second, this study also reinforces the importance of the autonomy-supportive climate that the teachers create in the classroom.

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Table 1. Descriptive statistics and internal consistency coefficients for all variables

Variables	Alpha	Mean	SD
Intrinsic Value	.81	4.93	1.04
Self-Efficacy	.83	4.05	1.07
Test Anxiety	.73	3.98	1.26
Learning Strategies	.83	4.45	1.06
Lack of Self-Regulation	.59	3.58	1.22
External Regulation	.72	4.11	1.61
Introjected Regulation	.73	3.73	1.35
Identified Regulation	.84	5.30	1.29
Intrinsic Motivation	.85	4.53	1.39
Autonomy-Support	.95	4.83	1.13
Enjoyment	.92	3.79	1.42
Effort	.71	4.51	1.10
Boredom	.73	3.92	1.54

Table 2. Correlation matrix for all variables

	1	2	3	4	5	6	7	8	9	10
1. Intrinsic Value										
2. Self-Efficacy	.57**									
3. Learning Strategies	.67**	.50**								
4. Lack of Self-Regulation	-.23**	-.13**	-.10**							
5. Test Anxiety	.07	-.02	.23**	.46**						
6. Autonomous Motivation	.66**	.46**	.56**	-.22**	.10**					
7. Controlled Motivation	.18**	.23**	.26**	.25**	.35**	.22**				
8. Autonomy-Support	.58**	.47**	.49**	-.14**	.09*	.52**	.22**			
9. Enjoyment	.49**	.43**	.43**	-.17**	- .03	.52**	.14**	.39**		
10. Effort	.52**	.40**	.50**	-.27**	- .01	.58**	.11**	.40**	.64**	
11. Boredom	-.19**	-.07	-.17**	.28**	.14**	-.32**	.11**	-.10**	-.35**	-.42**

Note: * $p < .05$, ** $p < .01$

Table 3. Descriptive statistics of the five MSLQ profiles

	Cluster 1 (n = 178) "Best MSLQ"		Cluster 2 (n = 107) "High MSLQ"		Cluster 3 (n = 256) "Moderate MSLQ"		Cluster 4 (n = 157) "Low MSLQ"		Cluster 5 (n = 40) "Poor MSLQ"	
Variables	M (SD)	*Z*	M (SD)	*Z*	M (SD)	*Z*	M (SD)	*Z*	M (SD)	*Z*
Intrinsic Value	5.88 (.63)	.92	5.68 (.64)	.72	4.82 (.58)	- .10	4.01 (.64)	-.88	3.00 (.81)	-1.85
Self-Efficacy	4.80 (.98)	.70	4.69 (.88)	.60	4.05 (.61)	- .01	3.09 (.77)	-.90	2.80 (1.21)	-1.17
Learning Strategies	5.20 (.77)	.70	5.44 (.77)	.93	4.18 (.64)	- .25	3.86 (.85)	-.55	2.56 (.85)	-1.77
Test Anxiety	3.49 (1.18)	-.39	5.44 (.94)	1.15	3.52 (.82)	-.36	4.62 (1.04)	.50	2.69 (1.04)	-1.02
Lack of Self-Regulation	2.40 (.82)	- .97	4.64 (1.05)	.87	3.50 (.89)	- .07	4.51 (.79)	.76	2.87 (.97)	- .58

Table 4. Descriptive Statistics of the Five Profiles

	Cluster 1 (n = 178) "Best MSLQ"		Cluster 2 (n = 107) "High MSLQ"		Cluster 3 (n = 256) "Moderate MSLQ"		Cluster 4 (n = 157) "Low MSLQ"		Cluster 5 (n = 40) "Poor MSLQ"	
Variables	M (SD)	*Z*	M (SD)	*Z*	M (SD)	*Z*	M (SD)	*Z*	M (SD)	*Z*
Autonomous	5.77_a (.98)	.69	5.54_a (.92)	.50	4.79_b (.95)	- .10	4.15_c (1.11)	- .62	3.24_d (1.29)	-1.36
Controlled	3.87_a (1.43)	- .04	4.68_b (1.32)	.59	3.77_a (1.11)	- .12	3.98_a (1.09)	.04	2.91_c (1.13)	- .79
Auto-Support	5.47_a (1.02)	.56	5.53_a (.92)	.62	4.66_b (.86)	- .15	4.24_c (1.07)	- .52	3.64_d (1.14)	-1.06
Enjoyment	4.60_a (1.42)	.57	4.22_a (1.28)	.30	3.72_b (1.12)	- .05	3.00_c (1.33)	- .55	2.58_c (1.24)	- .85
Effort	5.22_a (1.06)	.64	4.77_b (.95)	.24	4.43_b (.83)	- .07	3.91_c (1.08)	- .54	3.51_c (1.08)	- .91
Boredom	3.24_a (1.59)	- .44	4.22_b (1.47)	.19	4.07_b (1.33)	.09	4.20_b (1.64)	- .18	4.19_b (1.51)	.17

Note: Means do not share the same subscript differed at $p < .01$ in post-hoc tukey tests.

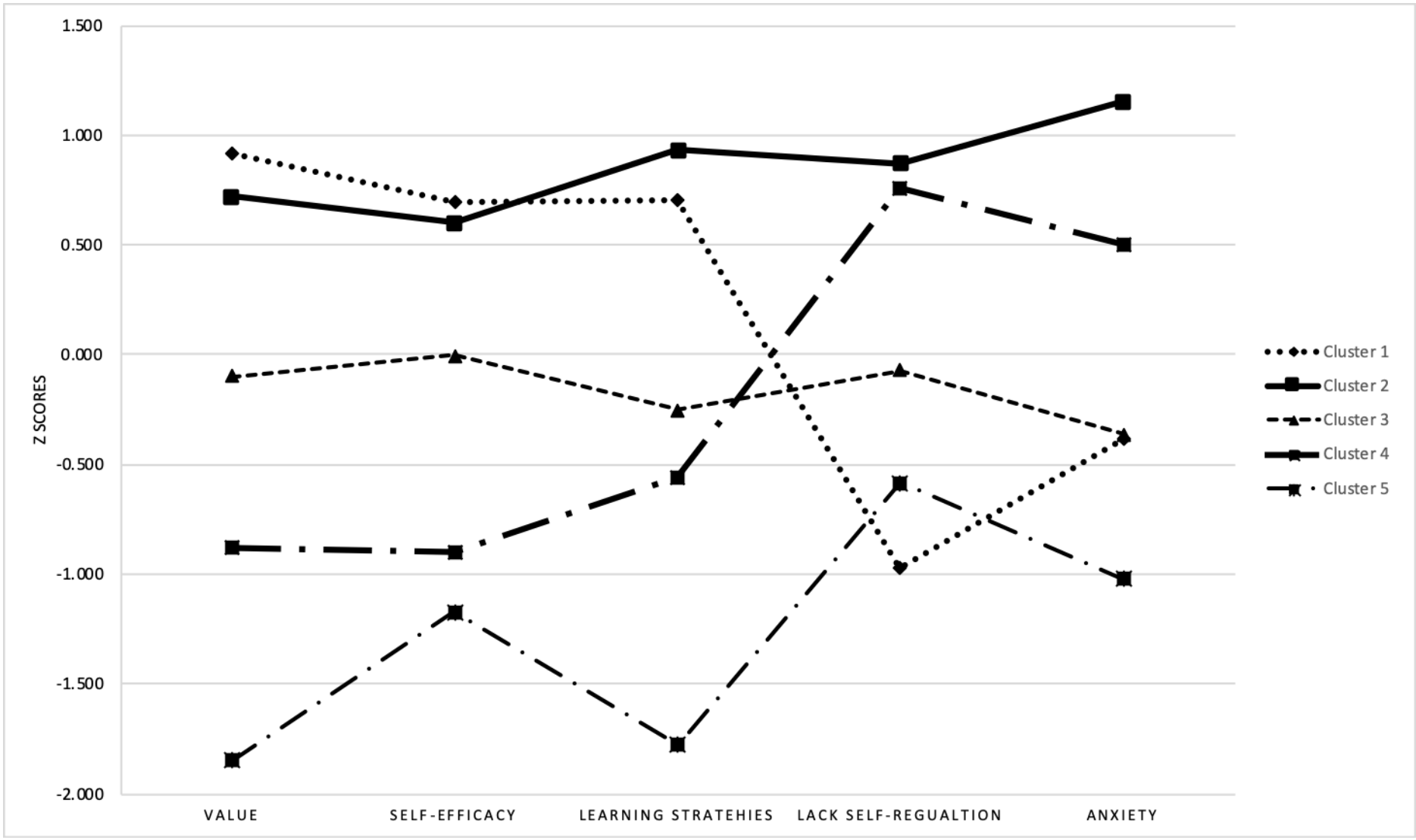

Figure 1. MSLQ profiles of the students.

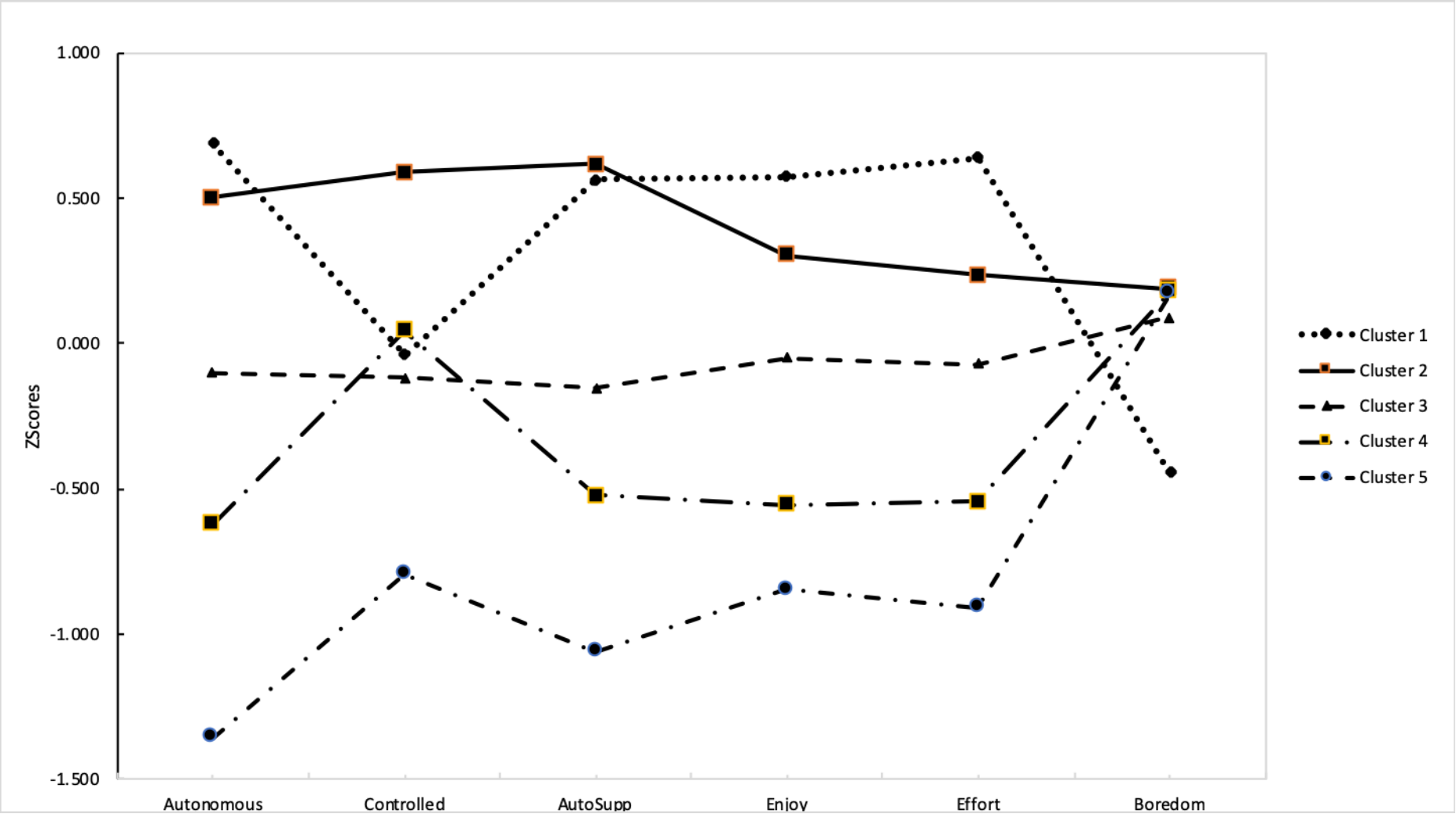

Figure 2. Cluster profiles of the outcome variables.