

Identifying the Profile of a Potential Lifelong Learner

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Abstract

Based on the 21st century's framework from the Singapore's Ministry of Education, students should possess lifelong learning goals in order to be self-regulated and engaged in continuous learning. It is thereby important to understand the profile of a potential lifelong learner. An educational institution or a school should provide learning environments in which students can be more involved in developing their competencies and skills that are related to lifelong learning. However, research in identifying the profile of a potential lifelong learner is still in its infancy. The present study aimed to uncover an in-depth and meaningful understanding of different learners' behaviours, ranging from adaptive to maladaptive patterns of goal orientations. It drew on four different clusters to identify the self-regulation and self-determined behaviours of a lifelong learner. These learner profiles differed significantly in their basic psychological needs (i.e., autonomy, competence and relatedness) and goal orientations (i.e., mastery versus performance).

Introduction

Lifelong learning is defined as “the competence for learning throughout one's lifetime, a domain-specific competence that requires motivation and self-regulated learning” (Lüftenegger, Kollmayer, Bergsmann, Jöstl, Spiel, & Schober, 2015, p. 2). Lifelong learning is increasingly important in the current educational landscape due to the emerging changes in the work and society, as well as the increasingly amount of knowledge in this 21st century (Rogiers, Merchie & Keer, 2019). As such, learners should acquire and develop skills that are needed throughout life. Lifelong learning is thereby recognized as a key competence for students and an important educational goal in schools.

Practitioners and teachers should understand what lifelong learning is and how to identify a lifelong learner. In general, lifelong learning is commonly understood as continued learning and learning throughout one's lifespan or life (also known as “learning for life”). From an educational psychology perspective, lifelong learning refers to the motivation for learning and competence to apply successfully in learning situations. A lifelong learner is motivated and self-regulated. By taking ownership of learning, students can experience a sense of autonomy and the joy of mastery that is inherent to lifelong learning (Ng, 2016). Lifelong learning is crucial for the development of an individual, in terms of skills and knowledge (Lüftenegger, Finsterwald, Bergsmann, van de Schoot, Schober, & Wagner, 2016). In terms of social and education policy, lifelong learning is considered as the “necessity of being able to handle constant change and transition as a result of rapid technological and scientific changes” (p. 720). The rationale for identifying lifelong learners is to understand the characteristics of their profile and their competence to deal with increasing demands of this 21st century. Lifelong learners should also have an enduring motivation and appreciation for learning.

Schools have been encouraged to lay cornerstones for preparing students for lifelong learning. Learners should develop the enduring core of competencies, values and character from a young age so that they have the resilience to succeed and build a strong foundation for lifelong learning (Ng, 2007; 2013). Furthermore, Education Minister Ong Ye Kung advocated that Singapore's students should embrace the attitude and skill of learning for life (Ong, 2018). Secondary schools need to provide an adequate runway for students to adapt to new demands of uncertain future, build their confidence and develop an intrinsic motivation to learn. Nevertheless, there are limited empirical studies on lifelong learning and motivation, as well as how motivation contributes to lifelong learning. Furthermore, it is unclear how the profile of a lifelong learner is linked to achievement goals and self-determined behaviours.

Aligned with the Singapore's Ministry of Education's framework, the present paper sought to understand the learner profiles in terms of varying goal orientations and needs satisfaction in Singapore secondary schools. Based on the Goal Orientation Theory (Elliot & Church, 1997) and the Self-Determination Theory [SDT] (Deci & Ryan, 1985), this study looked into individual differences in motivational profiles in terms of mastery/performance goal approach-avoidance motivation and needs satisfaction. In this study, motivation, being the "drive" and "direction" of an individual behaviour, involves approach-avoidance motivation and three basic psychological needs. Both goal orientation theory and SDT were described subsequently.

Theoretical Framework

Goal Orientation Theory

Goal Orientation Theory (Elliot, 1999) involved two basic kinds of goal: mastery goals, which focus on increasing one's competence, and performance goals that focus on seeking favourable judgements from others. Mastery goals focus on the development of competence through task mastery (Elliot & McGregor, 2001). Competence is at the conceptual core of the performance goal construct and it is defined in terms of the referent or standard that is used in performance evaluation. Learners with mastery goals do their best to completely acquire the subjects and master the tasks.

These two basic goals were then divided into mastery/performance approach versus mastery/performance avoidance. The two-by-two approach is a later version of the goal theory. These four kinds of goals are used to measure a learner's goal orientation. Mastery approach goals focus on developing an individual task mastery whereas mastery avoidance focus on avoiding negative outcomes such as failure (Elliot & McGregor, 2001). An Goal Orientation (AGO) questionnaire was devised to measure these four goals: mastery approach; mastery avoidance; performance approach; and performance avoidance. This instrument comprised three statements reflecting each goal type, with a seven-point Likert scale from *not at all true of me* ("1") to *very true of me* ("7").

Hidiroglu and Sungur (2015) studied 153 seventh grade students attending urban public schools in Turkey through the administration of Achievement Goal Questionnaire and Engagement Questionnaire. Results from a series of multiple regression analysis revealed that mastery approach goals were significantly and positively related to all aspects of engagement in science, while mastery avoidance goals were found to be positively associated with cognitive engagement. Students adopted avoidance goals to avoid failure and looking incompetent. Besides promoting mastery goal orientation, identifying the performance-oriented group of learners may also help educators make decisions concerning how to enhance their teaching.

Recent research showed that achievement goals are important predictors of the quality of learning in students (Remedios & Richardson, 2013). Mastery goals were positively associated to

deep and strategic learning but negatively associated with surface learning. The goal framework provides a useful variations in learning on mastery and performance goals, which can in turn relate to the quality of learning and potentially predict the learning profile of a lifelong learner. As there is limited empirical research in identifying the types of learner profiles in relation to lifelong learning, the present findings could provide insight with regard to developing mastery goals, rather than focusing on performance goals.

Self-Determination Theory

Self-determination Theory (SDT) focused on three basic psychological needs (i.e., autonomy, competence and relatedness) to predict various behavioural outcomes of individuals. Individuals usually have natural integrative propensities that direct them towards satisfaction of needs (Deci & Ryan, 1985). Different individuals engage in diverse behaviours so as to satisfy basic psychological needs. With the fulfilment of these needs, individuals are likely to experience towards intrinsic motivation. It is thereby plausible that learning climates in school settings are critical to foster intrinsic motivation and promote lifelong learning.

Human motivation and self-regulation have greatly contributed to the progress of SDT. Recent studies demonstrated the role of psychological need satisfaction (e.g., competence) on secondary students' intrinsic motivation and effort (Cecchini, Carriedo, & Mendez-Gimenez, 2019). At individual level, students can be either committed or passive to the learning process.

In summary, AGO provides the framework to understand students' goals by identifying their orientations in terms of performance or mastery (approach versus avoidance). SDT focuses on students' innate psychological needs of autonomy, competence and relatedness. Together, SDT and AGO are used in this study to explain the type of needs satisfaction and trajectories of achievement goals. The following section describes the supportive learning context that is needed to foster students' needs satisfaction and motivation in schools.

Literature Review

Teacher's Autonomy Support

Autonomy support refers to identifying and fostering students' intrinsic motivation by offering options; fostering interest with respect to learning; providing rationale and informational feedback; as well as encouraging self-regulated learning (Reeve, 2006). A learning climate with autonomy support fulfills the student need for satisfaction and adaptive outcomes (Cheon, Reeve, & Moon, 2012). Teacher's autonomy support is characterized by the provision of choice and meaningful rationale, as well as the use of neutral language for informational feedback (Deci, Eghrari, Patrick, & Leone, 1994; Mouratidis, Vansteenkiste, Lens, & Sideridis, 2008; Reeve & Jang, 2006). From the SDT perspective, teacher's autonomy-supportive instructional behaviors promote students' motivation and learning through needs satisfaction, namely autonomy, competence and relatedness (Reeve, 2009). To facilitate students' psychological needs, teachers have to create a need-supportive environment that fosters autonomous motivation (Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009).

Previous research within the SDT context supported the benefits of autonomy-supportive learning climate or structure such as increased engagement (Matos, Reeve, Herrera, & Claux, 2018), self-regulated learning (Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009) and academic achievement (Jiang, Yau, Bonner, & Chiang, 2011). A local study also provided evidence of autonomy-supportive instructional behaviours intervention in class, revealing a rich

and meaningful insight to students' expectations of their teachers and teachers' expectations towards their students (Ng, Liu, & Wang, 2016). According to von Eye & Bogat (2006), distinct subgroups of perceived teacher's autonomy support can best be exhibited by cluster analysis.

In terms of social and educational policy, lifelong learning is central for the development of an individual learner's skills and knowledge, in response to constant change and transition in this evolving society (Lüftenegger et al., 2016). As such, it is important to understand the profile of a potential lifelong learner and design appropriate interventions to improve individual skills towards lifelong learning. Furthermore, there is limited empirical research in identifying the profile of a potential lifelong learner in terms of the type of goal orientation. The present study investigated the characteristics of learner profiles with differing goal orientations, in association with perceived teacher's autonomy support, basic psychological needs and academic achievement.

Method

Purpose of the Study

Taking into consideration the gaps in the abovementioned literature, the current study aimed to identify the potential lifelong learners by their goal orientation and self-determined behaviour (i.e., three basic psychological needs satisfaction). Specifically, this profiling study aimed to examine if: (1) there would be distinct student goal orientation profiles on mastery/performance approach and avoidance; and (2) there would be distinct learner profiles in association with perceived autonomy support, needs satisfaction and academic achievement. Our specific hypotheses therefore were: (1) there would be distinct learner profiles with more adaptive clusters exhibiting higher mastery/performance approach goals, and lower mastery/performance avoidance goals; and (2) the most adaptive profile would exhibit highest scores on perceived autonomy support, needs satisfaction and academic achievement. To sum, the key goal in this study was to identify the most adaptive learner profile, i.e., potential lifelong learners.

Participants and Procedure

Data were collected from 782 secondary school students ($M = 14.58$, $SD = .57$) of mixed academic abilities studying in eight Singapore secondary schools. They were main-stream government schools in Singapore, from North, South, East and West zones. The sample comprised 392 males, 382 females (8 did not state gender) from Secondary 2 (i.e., Grade 8) and Secondary 3 (i.e., Grade 9), taking science. Science was the selected academic context because of the motivational components (e.g., interest) linked to learning science (Schumm & Bogner, 2016). Science also involves inquiry skills and scientific concepts that are related to learning beyond classrooms and lifelong learning.

Ethic clearance from the university review board and Ministry of Education were attained. Participants were briefed on the purpose of the study and were assured of anonymity. The researcher followed up with schools to arrange the administration of the questionnaires. Participants took about 15 minutes to complete the questionnaire.

Measures

For each measure, students rated themselves on a 7-point Likert scale, from 1 (*not at all true of me*) to 7 (*very true of me*). The mastery/performance goals were measured by the Achievement Goal Orientation (AGO); perceived teacher's autonomy support was measured by the Perceived Autonomy Support (PAS); and basic psychological needs were measured by Basic Psychological

Needs Scale (BPNS). Academic achievement in terms of school term test grade was collected and then converted to standard score.

Achievement Goal Orientation (AGO). Twenty items of this instrument were used to measure student goal orientations, with four scales namely mastery approach; mastery avoidance; performance approach; and performance avoidance (Elliot & McGregor, 2001). An example of a mastery approach item was “I work hard to learn new things in this class.” A mastery avoidance item was “I am anxious that I may not master all that is supposed to learn in this class.” A performance approach item was “It is important for me to do well compared to others in this class.” And finally, a performance avoidance item was “I just want to avoid doing poorly in this class.” The internal consistency of each scale was satisfactory: $\alpha = .86$ for mastery approach, $\alpha = .61$ for mastery avoidance, $\alpha = .88$ for performance approach, and $\alpha = .67$ for performance avoidance.

Perceived Autonomy Support (PAS). The 15-item instrument was used to measure perceived teacher’s autonomy support (Williams & Deci, 1996). An example of the items was “I feel that my teacher provides me choices and options.” The internal consistency of this scale was very satisfactory: $\alpha = .95$.

Basic Psychological Needs Scale (BPNS). Twelve items of this instrument were used to measure student autonomy, competence, and relatedness (Deci & Ryan, 2000). An example of the items for autonomy was “I am free to express my ideas and opinions...” (4 items); competence was “In school, I feel pretty competent” (3 items); and relatedness was “I feel close to my school mates” (5 items). The internal consistency of each scale was satisfactory: $\alpha = .70$ for autonomy, $\alpha = .74$ for competence, and $\alpha = .85$ for relatedness.

Grades. At the end of the survey administration, a student grade for science was collected. To ensure anonymity, students indicated their school term test grades (out of 100 marks). Their mean test score was 58.36 out of 100 marks ($SD = 16.36$). This grade measure was related to the academic achievement.

Data Analysis

Cluster analysis was conducted to identify homogeneous groupings of participants with distinct profiles of goal orientations. The four clustering variables were based on mastery approach, mastery avoidance, performance approach, and performance avoidance. Hierarchical cluster analysis using Ward’s method with Euclidean distance as a measure of similarity (Hayenga & Corpus, 2010) was conducted. Ward’s method was chosen because it searches the proximity matrix and divides the learners into homogeneous subgroups (Borgen & Barnett, 1987). As cluster analysis solution can be unstable, a *k*-means clustering method was used to confirm the clusters (Wang & Biddle, 2001). The *k*-means cluster profiles were in agreement with those obtained from hierarchical cluster analysis, thus supporting the four-cluster solution. A multivariate analysis of variance (MANOVA) was conducted to test whether SDT variables significantly differed across the four clusters. Using a Bonferroni adjusted a priori *p* value of 0.05, the population means for the four clusters were judged to be unequal on the SDT variables (Grice & Iwasaki, 2007). All multivariate *F* values were reported based on Pillai’s Trace value. The Pillai’s Trace is a more important criterion to determine the multivariate effect (Tabachnick & Fidell, 2007) as it is more robust to violations of multivariate normality assumption (Tang & Neber, 2008). Finally, a

separate analysis of variance (ANOVA) was conducted to examine differences in academic achievement (i.e. grade) across the four clusters.

Results

Descriptive Statistics and Correlations

Table 1 presents the scale means, standard deviations, and inter-correlations among the measured variables. All variables were significantly correlated, except for competence and mastery avoidance, as well as mastery avoidance and grade. Perceived teacher's autonomy support was strongly correlated to autonomy ($r = .56, p < .01$); competence ($r = .51, p < .01$); relatedness ($r = .40, p < .01$); mastery approach ($r = .47, p < .01$); as well as performance approach ($r = .20, p < .01$). Perceived teacher's autonomy support was also associated with mastery avoidance ($r = .13, p < .01$), performance avoidance ($r = .17, p < .01$) and grade ($r = .29, p < .01$).

Autonomy was positively correlated to competence ($r = .54, p < .01$); relatedness ($r = .41, p < .01$); mastery approach ($r = .32, p < .01$); performance approach ($r = .08, p < .05$); as well as grade ($r = .31, p < .01$). Significant correlations were found between grade and three psychological needs, as well as both mastery and performance approaches. However, there was no significant correlation between grade and mastery/performance avoidance.

Table 1. Means, Standard Deviation and Pearson Correlations of the Key Variables ($N = 782$)

No.	Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1	Perceived teacher's autonomy support	4.57	1.18								
2	Autonomy	4.15	.63	.56**							
3	Competence	4.35	.83	.51**	.54**						
4	Relatedness	4.85	.97	.40**	.41**	.37**					
5	Mastery approach	5.47	1.06	.47**	.32**	.42**	.32**				
6	Mastery avoidance	4.84	1.00	.13**	.01	-.01	.08*	.50**			
7	Performance approach	4.71	1.31	.20**	.08*	.15**	.08*	.46**	.50**		
8	Performance avoidance	5.50	.97	.17**	-.01	.05	.16**	.49**	.54**	.57**	
9	Grade	58.36	16.36	.29**	.31**	.37**	.18**	.25**	.03	.25**	.06

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

Profiling of AGO Variables

To answer the first hypothesis, whether there would be distinct learner profiles with more adaptive clusters exhibiting higher mastery/performance approach goals, and lower mastery/performance avoidance goals; cluster analysis was conducted. Based on the agglomeration schedule and dendrogram, four distinct clusters in terms of four goal orientation (i.e., mastery/performance approach and mastery/performance avoidance) variables were uncovered (see Table 2). Z scores above .5 were set as a criterion to describe clusters that scored relatively "high," whereas z scores below -.5 were denoted as groups scoring relatively "low." Table 3 summarises the profiles of each cluster. Each cluster was given a label for the ease of discussion in the next section.

Table 2. *Descriptive Statistics of the Four Clusters*

Variable	Cluster 1 (n = 213) “Low”		Cluster 2 (n = 235) “Moderate”		Cluster 3 (n = 199) “High approach”		Cluster 4 (n = 135) “Low approach”	
	M (z)	SD	M (z)	SD	M (z)	SD	M (z)	SD
Mastery approach	4.92 (-.52)	1.00	5.77 (.28)	.79	6.17 (.66)	.71	4.79 (-.64)	1.11
Mastery avoidance	4.51 (-.33)	.97	5.12 (.28)	.93	4.84 (-.01)	1.04	4.89 (.05)	.96
Performance approach	4.68 (-.40)	1.00	5.50 (.27)	.79	5.88 (.62)	.69	3.62 (-.78)	.77
Performance avoidance	5.13 (-.39)	.96	5.77 (.27)	.86	5.63 (.13)	.98	5.46 (-.04)	.96

Table 3. *Summary of Cluster Profiles on Variables of Goal Orientations*

Cluster	1	2	3	4
Description	Low mastery and performance approaches Low mastery avoidance Low performance avoidance	Moderate high mastery and performance approaches Moderate high mastery avoidance Moderate high performance avoidance	High mastery and performance approaches Moderate mastery avoidance Moderate low performance avoidance	Low mastery and performance approaches Moderate mastery avoidance Moderate performance avoidance
Profile (Label)	Low (Low profile)	Moderate (Average profile)	High approach (Most adaptive profile)	Low approach (Least adaptive profile)

Differences Between Clusters and SDT/Grade Variables

To answer the second hypothesis, whether the most adaptive profile would exhibit highest scores on perceived autonomy support, needs satisfaction and academic achievement; MANOVA analysis was conducted to examine the differences between clusters on SDT and grade variables. Table 4 presents the descriptive statistics and comparison of the four-cluster profiles in association with perceived teacher’s autonomy support and needs satisfaction. Four clusters differed significantly in these variables, Pillai’s Trace = .392, $F(12, 2331) = 29.21$, $p < .001$, $\eta_p^2 = .13$. Subsequently, pairwise comparisons with Tukey’s honestly significant difference (HSD) were conducted to uncover an in-depth description of the four clusters. All four clusters differed significantly in perceived teacher’s autonomy support. Among three psychological needs, perceived competence had the greatest effect on all clusters. Although the four clusters differed in all types of goal orientations, clusters 1 and 2 have similar profiles in terms of autonomy, competence and grade.

All clusters differed significantly in grades ($F(3, 781) = 40.14$, $p < .001$, $\eta_p^2 = .13$). Cluster 3, being the “high approach” and “most adaptive” group, scored the best, followed by Cluster 2 (i.e., average profile) and Cluster 1 (i.e., low profile), respectively. Cluster 4, being the “low approach” profile, fared the worse. Pairwise comparisons showed that clusters 3 and 4 differed significantly ($p < .05$), whereas clusters 1 and 2 were homogeneous groups (see Table 4).

Table 4. Comparison of the Four-cluster Profiles on SDT and Grade Variables

Variable	Cluster 1 (n = 213)		Cluster 2 (n = 235)		Cluster 3 (n = 199)		Cluster 4 (n = 135)		F	η_p^2
	M (z)	SD	M (z)	SD	M (z)	SD	M (z)	SD		
Perceived teacher's autonomy support	4.11 (-.39) _b	1.04	4.86 (.24) _c	.94	5.31 (.62) _d	.58	3.73 (-.71) _a	.72	84.91*	.25
Autonomy	4.07 (-.11) _b	.53	4.15 (.01) _b	.56	4.53 (.59) _c	.59	3.73 (-.65) _a	.66	53.94*	.17
Competence	4.18 (-.20) _a	.58	4.34 (.00) _a	.72	4.97 (.75) _c	.79	3.69 (-.78) _b	.81	91.07*	.26
Relatedness	4.57 (-.28) _a	.88	4.90 (.06) _b	.85	5.35 (.52) _c	.91	4.48 (-.38) _a	1.07	34.81*	.12
Grade	56.35 (-.12) _b	15.27	58.64 (.02) _b	15.67	66.82 (.52) _c	13.59	48.60 (-.60) _a	16.75	40.14*	.13

Note. * $p < .001$. Means in the same row with different subscripts differ significantly at $p < .05$ in the Tukey's HSD comparison.

Discussion

Distinct Learner Profiles

The present findings of cluster analysis provide supporting evidence that students with the highest perceived teacher's autonomy support are likely to exhibit self-determined behaviours and adaptive learning profiles. Cluster analysis, which is a person-oriented approach, offers an in-depth understanding of the learners' profiles (Ng et al., 2016). These learner profiles differed significantly in their basic psychological needs (i.e., autonomy, competence and relatedness) and goal orientations (i.e., mastery versus performance). The two hypotheses of this study were thus significant: (1) there were distinct learner profiles with more adaptive clusters exhibiting higher mastery/performance approach goals, and lower mastery/performance avoidance goals; and (2) the most adaptive profile exhibited highest scores on perceived autonomy support, needs satisfaction and academic achievement.

Drawing on four different clusters, the self-determined behaviours of a potential lifelong learner was identified. Overall, both hypotheses were met: (1) four distinct learner profiles with adaptive clusters exhibited higher mastery/performance approach goals and lower mastery/performance avoidance goals; and (2) the most adaptive profile exhibited highest scores on perceived needs satisfaction and academic achievement.

The four cluster profiles differed statistically in perceived teacher's autonomy support; autonomy; competence; autonomy; and academic achievement, with significant effect sizes. Cluster 3, being the most adaptive profile, exhibited both high mastery and performance approaches, moderate level of mastery avoidance, as well as moderate low performance avoidance. Cluster 3 also scored highest for perceived teacher's autonomy support. This suggests that teachers with autonomy-supportive instructional behaviours were likely to affect students' goal orientation, promoting their approach goals. The type and outcome of a goal are related to the autonomy-supportive context in which that goal is adapted (Benita, Roth, & Deci, 2014). According to Bardach et al. (2018), a learning environment is built from the perspective of teachers and students or teacher-student agreement in their perspectives of mastery goal structures. Hence, a teacher can influence the type and outcome of their goals by supporting students' autonomy in the classroom context.

Perceived competence seemed to be the most pertinent need across the four groups, with the greatest effect size among three psychological needs. This finding is in agreement with a recent local study (Ng, 2016), recognizing the central role of the need for competence across academically-driven learners in Singapore's educational context. In a physical education school

setting, a recent study also demonstrated the role of psychological need satisfaction, competence on secondary students' intrinsic motivation and effort (Cecchini, Carriedo, & Méndez-Giménez, 2019). Clusters 1 and 2 had similar scores for perceived teacher's autonomy and competence. Perceptions of autonomy and competence interact closely with each other to enhance well-being (Deci & Ryan, 2000; Levesque, Zuehlke, Stanek, & Ryan, 2004). Specifically, in school settings where knowledge and skills are essential for academic success, an autonomy-supportive context could foster needs satisfaction. Social contexts such as an autonomy-supportive school environment could fulfil students' psychological needs and support their self-determined behaviours (Ng et al., 2016).

On the other hand, it is interesting to note that students with the least perceived teacher's autonomy support reported low levels of needs satisfaction and grade, suggesting that they might experience the least needs satisfaction when they did not perceive autonomy support from their teachers. In addition, the quality of the teacher–student relationship is related to students' social and cognitive outcomes (Davis, 2003; Ng et al., 2016), which may in turn influence their affect. When students do not have an autonomy-supportive learning environment, the relatedness need might not be supported and this could in turn influence the teacher-student relationship. Ng and colleagues (2015) examined the perspectives of teachers and students on autonomy-supportive instructional behaviors after a classroom intervention. Their qualitative findings revealed that autonomy-supportive instructional behaviors (e.g., provision of choice and explanatory rationale) could create an intrinsically motivating learning context. Hence, such acts may have ramifications on students' perception and learning, indicating an important development in research about teacher-student relationship.

Aligned with the Singapore's Ministry of Education's framework, the present study uncovered the trajectories of a potential lifelong learner. The key theme in Singapore's educational settings is to provide an appropriate learning environment to develop students' intrinsic motivation to learn (Ong, 2018). Hence, findings of this study not only add to the literature of needs for autonomy, competence, and relatedness towards school in adolescents, but also support the importance of psychological needs satisfaction in learners across the four groups. These trajectories of learner profiles provide empirical support for the concept of lifelong learning in identifying self-regulation and self-determined behaviours. This is an important contribution to existing research as the most adaptive cluster had the highest level of mastery approach which relates to active self-regulation. By profiling the type of learners, we can identify potential lifelong learners as they are likely to endorsed low level of avoidance and high levels of approach orientations.

Limitations

Despite the significant findings of the study, no causal conclusions can be drawn. The intention of the study was to identify the profile of a potential lifelong learner. As such, the key limitation in this study is the difficulty in making a causal statement or conclusion without longitudinal analyses. Further research could investigate the intra-individual change of the goal orientations and self-determined behaviours. Although the person-centered analysis offered an in-depth view of each goal orientation and need satisfaction across diverse learners, the impact of teacher's autonomy support on students' goal orientation approach and needs satisfaction could not be detected. Future classroom intervention research could investigate the impact or effect of teacher's autonomy support on student's mastery goal and needs satisfaction. In addition, longitudinal studies could explore if these adaptive classroom learning profile findings extend out-of-classroom

learning contexts where goals and mastery of a task may not be easily defined, and in the absence of teacher's autonomy support.

Implications and Conclusion

The present findings contributed to the research field by documenting the importance of needs satisfaction, motivation and learning. Furthermore, it recognized the central role of the need for competence among secondary school students in the Singapore educational context. By establishing the different learning profiles, competence was identified as the key need satisfaction experienced by the secondary school students. Teachers should provide opportunities of challenging tasks to those students with increased feelings of competence, empower students to learn, and make their own decisions during their learning process (Ng et al., 2016). As teachers can make a difference in students' learning, it is evident that autonomy supportive learning environment or structure could influence student's trajectories of motivation towards learning. With the provision of flexible yet relevant cognitive structures, teachers can promote intrinsically motivated learning amongst students (Deci & Ryan, 1985, 2000). Teachers' autonomy support is thereby important in promoting students' needs satisfaction and task engagement. Personal and peers' autonomy support may also contribute to the individual educational and well-being outcomes. Future research could examine the effects of students' perceptions of autonomy support at both personal and classmates' levels.

In conclusion, the present study uncovered an in-depth and meaningful understanding of different learners' behaviours, ranging from least adaptive to most adaptive patterns of goal orientations. It drew on four different clusters to identify the needs satisfaction and self-determined behaviours important for a lifelong learner. These learner profiles differed significantly in their basic psychological needs (i.e., autonomy, competence and relatedness), goal orientations (i.e., mastery versus performance) and academic achievement.

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