Thinking About My Future While Sitting in Science Class: Future Thinking and Motivation to Learn

Madeleine Smith, Jennifer Vuong, Matthew C. Graham, Jenefer Husman

University of Oregon, Department of Educational Studies

Introduction

Research has demonstrated that when students are focused on learning goals (rather than performance goals), understand how the course is essential in achieving their future goals, or are confident; they are more self-regulated learners (Husman & Hilpert, 2007). Prior research has focused on which of these factors has the strongest relation to self-regulated learning (Eccles & Wigfield, 2002, Zimmerman, 2008). These factors are all present within a student but have traditionally been researched separately. Therefore, it may be more accurate to study them in relation to each other to see how they influence students' motivation for self-regulated learning. The present study used a profiling approach to identify and find the relation between patterns in students' motivation and self-regulated learning and performance in a science course.

Research Question

1. What motivational and self-regulated learning profiles do students adopt in a required science course?
2. Does performance in a science class differ by profile?

Method

Participants completed a self-report questionnaire on their future thinking, goals, confidence, self-regulation, and knowledge building strategies.

Demographics

	N	%
Gender		
Male	117	30.2
Female	264	68.2
Prefer not to say	7	1.6

Note. Total *N* = 385. Age ranged from 18 to 45 years old (*M* = 19.31, *SD* = 2.13).

Variables

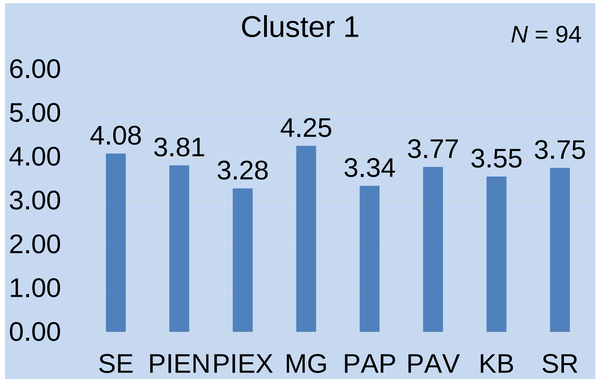
Measure	Abbr.	*M* (*SD*)
[a]Self-efficacy	SE	4.25 (1.35)
[b]Perception of Instrumentality Endogenous	PIEN	3.72 (.84)
[b]Perception of Instrumentality Exogenous	PIEX	2.80 (1.00)
[c]Mastery Goals	MG	4.00 (.79)
[c]Performance-approach Goals	PAP	2.36 (1.00)
[c]Performance-avoid Goals	PAV	2.70 (1.04)
[d]Knowledge Building	KB	3.57 (.85)
[d]Self-regulation	SR	3.36 (.81)

Note. Mean and standard deviation for complete sample. [a]MSLQ (Pintrich et al., 1991), [b]FTPS (Husman & Shell, 2008), [c]PALS (Midgley et al., 2000), [d]SPoCK (Shell & Husman, 2008). Reliability for all scales is α > .76.

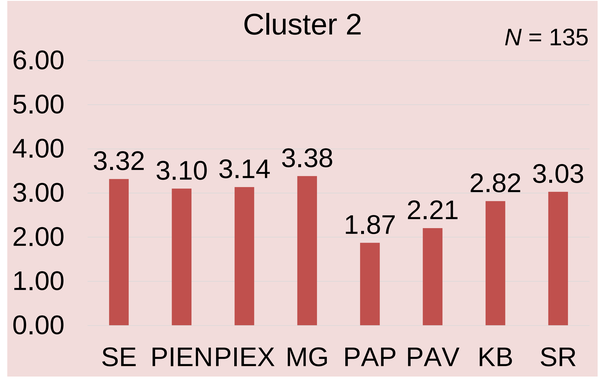
Results: Hierarchical Cluster Analysis

Hierarchical cluster analysis (HCA; Hastie et al., 2009) was used to create profiles based on multiple aspects of students' motivation and how different profiles relate to students' self-regulation and performance. The profiling approach illustrates how independent psychological constructs interact to form clusters, which are referred to here as motivational and self-regulated learning profiles (Nelson et al., 2015). HCA was conducted in SPSS v. 27. A dendrogram and icicle plot were extracted using Ward's method and squared Euclidian distance.

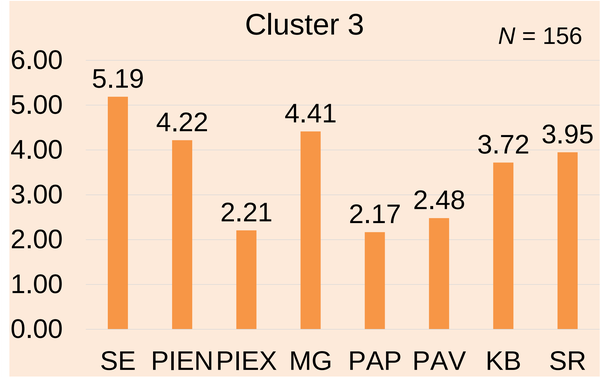
We found that three profiles best explained our data and mirrored prior research findings (Shell & Soh, 2013; Entwistle & McCune, 2004). Cluster 1 represents 24.42% of students. This cluster had high PIEX (*M* = 3.28, *SD* = .93, high PAP (*M* = 3.34, *SD* = .92), and high PAV (*M* = 3.77, *SD* = .76). Compared to the other clusters derived with HCA, we inferred that Cluster 1 represents students who are motivated by performance outcomes. Cluster 2 represents 35.06% of students. The mean scores for each variable were below the grand mean except for PIEX (*M* = 3.14, *SD* = .99). Therefore, Cluster 2 is inferred to be low in motivation and self-regulation strategies. Cluster 3 represents 40.52% of students. This cluster is high in SE, MG, and self-regulation strategies and low in PIEX (*M* = 2.21, *SD* = .72), PAP (*M* = 2.17, *SD* = .92), and PAV (*M* = 2.48, *SD* = .89). Cluster 3 is inferred to be the learning profile of students with personal interest in the course and who are high in motivation and self-regulation.



The "I must do well in this class" student



The "I have to get through this class" student



The "I love this class" student

Results: Analysis of Variance

A one-way ANOVA was used to test cluster profile differences in end of term grades. A statistically significant difference was found between Cluster 1 and Clusters 2 and 3, F (2, 342) = 35.81, $p < .01$. We conducted post-hoc comparisons using Bonferroni's correction which indicated that Cluster 1 and Cluster 2 are not statistically different. When compared to Cluster 3, both 1 and 2 are statistically different, $p < .01$.

ANOVA

	SS	*df*	*MS*	*F*	*p*	η^2_p
Intercept	2334.12	1	2334.12	3624.27	< .01	.91
Cluster	46.12	2	23.06	35.81	< .01	.16
Error	246.02	382	.64			
Total	2831.58	385				

Grades by Cluster

Cluster	*M*	*SD*	*N*
1[a]	2.29	.78	94
2[b]	2.28	.83	135
3[b]	2.99	.79	156

Note. Shared superscript corresponds to non-significant mean difference.

Conclusion

A myriad of factors work in tandem to support student learning and performance. Learning goals, confidence in ability, valuing of the course, and self-regulation strategies influence students' performance in a science course. Using cluster analysis to identify the relations between these variables, three motivational and self-regulated learning profiles were found. 1) Students who have high performance goals, 2) students who are taking the class simply because they must, and 3) students who learn deeply and are personally interested in the course. Cluster 1 and 3 are similar, which indicates that Cluster 3 is better for students' grades. While both clusters have students who are confident and utilizing self-regulation strategies, the difference in performance goals and exogenous perception of instrumentality may be an indicator of the difference between end of term grades for the two clusters. Understanding the different learning profiles students adopt can help secondary science instructors alter the course structure to decrease the emphasis on performance goals.