Motivation, cognitive engagement, and academic achievement

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Abstract

The purpose of this study was to test predictions of a model explaining the impact of motivational factors include perceived ability, perceived instrumentality, achievement goals on cognitive engagement and academic achievement. Participants were 1371 junior year high school students from 19 public high schools distributed across Tehran. They were selected through random cluster sampling and completed a series of questionnaires. Students’ academic achievement scores were gathered 3 months after questioning. Data was analyzed by software LISREL 8.54 and the results strongly supported the model demonstrating that perceived ability, perceived instrumentality and achievement goals predict cognitive engagement and academic achievement.

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Keywords: Perceived ability, Perceived instrumentality, Achievement goals, Cognitive engagement, Academic achievement, Structural Equation Model

1. Introduction

Academic achievement is one of the most important indicators of learning and understanding in all educational systems. Students with higher academic achievement are more likely to finish high school and succeed in their future academic and professional lives (Joppke & Morawska, 2003). The importance of academic achievement and its role in students’ future have enticed the educators to determine the influential factors and subsequently present different models. The first models in this arena were governed by motivational or cognitive approaches; today it is obvious that students’ achievement is the result of systematic interactions between various cognitive and motivational variables.

Students’ academic achievement is associated with their cognitive strategies. This assumption has been extracted from the theory of processing levels (Anderson & Reder, 1979) and elaborated processing (Craik & Lockhart 1972). According to this assumption, different types of cognitive strategies lead to different levels of learning and achievement. Several researches have shown that the use of deep strategies is associated with higher achievement (Green & Miller 1996; Graham & Golan, 1991; Miller, Greene, Montalvo, Ravindran, & Nicholls, 1996). On the other hand, the studies using structural models to explain the relationship between cognitive and motivational
variables with academic achievement have shown that learning strategies and deep processing have prominent roles to play as mediating variables (Green & Miller, 1996; Pintrich & Garcia 1991).

Despite the significance and necessity of learners’ awareness of cognitive strategies, it is important to know when and how to use strategies as well. Achievement goals (Dweck, 1989; Elliott, 1999) perceived ability (Green & Miller 1996) and perceived instrumentality (Greene, Miller, Crowson, Duke & Akey, 2004) are the three motivational factors that are related to cognitive strategies.

Studies have shown that students who aim at improving competence (have learning goals) in comparison with students whose goal is to show (have performance goals) use more of deep processing strategies (Green & Miller 1996; Meece, Blumenfeld & Hoyle 1988; Miller, Behrens, Greene, & Newman, 1993).

Two important factors affecting goals adoption by students comprise perception of ability and the important needs or concerns. In goal theory revision, Elliott (1999) refers to fundamental needs and perception of competence as major reasons for the goals adopted by students. Therefore, future goals, or perceived instrumentality may be considered as major concerns of students.

Perceived instrumentality implies tasks as means to achieve personal goals that are considered valuable in the future (Husman & Lens, 1999; Miller & Brickman, 2004); it is enacted when students engage in learning for its value in his or her future (Brickman & Miller, 2001; Mensch, Miller & Brickman, 2004). These perceptions, playing a role in motivational behavior, focus on goals which are valuable in the future.

The present study examines the structural model showing how motivational variables composed of perceived ability and perceived instrumentality may affect academic achievement through cognitive strategies.

2. Method
2.1 Participants
Participants were 1371 junior year students from 52 high schools in Tehran selected through random cluster sampling. There were 708 (52%) male and 663 (48%) female students.

2.2 Instruments
2.2.1 Achievement goals:
Student achievement goals were assessed by Approaches to Learning (ATL) scale (Miller, DeBacker & Green 1999). The original scale includes 32 questions to assess four types of student achievement goals, learning, performance-approach, performance-avoidance, and future goals/perceived instrumentality. Additionally ATL also addresses student’s perceived ability in the course and valuing. Explanatory factor analysis showed a four factor measurement model confirmed by confirmatory factor analysis. These factors were Learning goals (5 items), performance goals (8 Items), future/instrumentality goals (8 items) and perceived ability (8 items). The 32 items utilize a 5-point scale from: 1 = strongly disagree, to 5 = strongly agree. The subscale reliabilities were as follows: learning goals ($\alpha = 0.86$), performance goals ($\alpha = 0.87$), future/instrumentality goals ($\alpha = 0.94$) and perceived ability ($\alpha = 0.87$). Four-factor model is reported in Table 1.

<table>
<thead>
<tr>
<th>RMSEA</th>
<th>RMSR</th>
<th>IFI</th>
<th>CFI</th>
<th>NNFI</th>
<th>GFI</th>
<th>DF</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0710</td>
<td>0.08</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
<td>0.97</td>
<td>371</td>
<td>2547.80</td>
</tr>
</tbody>
</table>

2.2.2 Motivated strategies learning Questionnaire (MSLQ):
The MSLQ was designed by Pintrich (1993) to assess students' motivational orientations and their use of learning strategies. In this study only its cognitive scale was used. This scale includes 19 items to assess shallow and deep cognitive learning strategies.

3. Results
Structure equation model was conducted using LISREL 8.54 (Jöreskog, & Sorbom, 2002) in order to assess how well the suggested model fit the data. Fig. 1 shows the path coefficients for the suggested relationships among the
variables in the model. Based on the fit indices, the hypothesized model fit the data quite well. The $\chi^2$ value for the present model was 1017.56 ($p = 0.377$), indicating that the observed and model-implied correlation matrices were not significantly different. GFI and CFI indices reached optimal levels (.90 and >) at .97 and .93, respectively. The SRMR was .049, well below $.10$, indicating acceptable fit. Finally, the RMSEA value for the present model was .053, clearly falling within optimal levels ($<.05$).

Achievement was significantly and positively predicted by perceived ability ($\beta=.20, t=4.36$) and deep strategy use ($\beta=.10, t=2.10$), whereas it was predicted significantly and negatively by shallow strategy ($\beta=-.15, t=-3.53$) and performance goal ($\beta=-.20, t=-5.6$). It should be noted that achievement was not predicted by learning goal ($\beta=.038, t=0.78$).

Table 2. Correlations among the achievement, cognitive strategies use, achievement goals, and motivational perception variables ($n=1371$)

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 achievement</td>
<td>12.69</td>
<td>3.92</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>2 Deep strategy</td>
<td>13.62</td>
<td>3.33</td>
<td>0.15</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3 Shallow strategy</td>
<td>13.73</td>
<td>3.56</td>
<td>-0.07</td>
<td>0.34</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4 Learning goals</td>
<td>17.58</td>
<td>4.41</td>
<td>0.12</td>
<td>0.43</td>
<td>0.27</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5 Performance goals</td>
<td>31.60</td>
<td>8.96</td>
<td>-0.20</td>
<td>0.03</td>
<td>0.16</td>
<td>0.09</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6 Perceived instrumentality</td>
<td>60.78</td>
<td>12.52</td>
<td>0.15</td>
<td>0.32</td>
<td>0.23</td>
<td>0.56</td>
<td>0.12</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7 Perceived ability</td>
<td>37.97</td>
<td>6.66</td>
<td>0.20</td>
<td>0.39</td>
<td>0.18</td>
<td>0.46</td>
<td>0.06</td>
<td>0.44</td>
<td>1</td>
</tr>
</tbody>
</table>

Shallow strategy is predicted by performance goals ($\beta=.17, t=3.85$) and perceived instrumentality ($\beta=.29, t=6.24$) while deep strategy is predicted by learning goal ($\beta=.39, t=6.24$) and perceived ability ($\beta=.28, t=5.71$).

4. Discussion
With respect to the predictive model, the study’s hypotheses were generally supported. Cognitive strategies directly, and perceived ability and performance goals both directly and indirectly predict academic achievement. Unlike the performance goals which both directly and indirectly predict academic achievement through shallow strategies, learning goals have no significant direct relationship with achievement though it predicts it indirectly through deep strategies. These results, like those of other researches (Green et al, 1996; Miller et al., 2004; Kardash & Amlund, 1991; Graham & Golan, 1991) supported the positive relation between deep strategies and achievement on one hand and negative relation between shallow strategies and achievement on the other. However, it is essential to note that in the current study the strength of this relationship was not high, particularly as it related to deep strategies where significant relationship was indeed on the brink.

In explaining the lack of significant relationship between learning orientation and academic achievement, noting Schunk and Zimmerman view (1994) on the importance of social context and goals might be helpful. They believe such goals might sometimes affect learners’ cognition though at other times context-specific factors such as social goals may make learners behave differently.

Although the related theoretical foundations and research background explicate students who have a learning orientation to have better academic achievement, direct relationship between learning goals and achievement was not shown as significant in this study. According to Schunk and Zimmerman, educational context have some contingencies in which students who have a learning orientation may not necessarily get better results. It seems that competitive contexts, social comparisons, and extrinsic valuing do not permit students with learning goals to achieve better scores.

Perceived ability influences academic achievement both directly and indirectly. This finding is in accordance with the studies examining the relation between perceived ability and self-efficacy with achievement which show the importance of having a positive image of one’s ability in the student. The significance of perceived ability is not only because of its power in prediction of academic achievement, but also for its role in prediction of other motivational elements such as goals and perceived instrumentality.

One of the hypotheses of this study was that perceived ability influences learning goals and perceived instrumentality. This is because the perception of high ability leads to approach motivation. This explanation is in agreement with Bandura’s view which asserts self-efficacy influence goal selection.

In the present model perceived ability comes prior to goals. The research based evidence (Green et al, 2004; Hardre et al, 2007; Lim, Lau & Nie 2008; Nien & Duda, 2008) supports this point of view and its underlying logic. Accordingly, students chose their goals based on their experiences and interpretations that lead to the formation of their beliefs regarding their abilities.

The relation between perceived ability and perceived instrumentality have been shown previously (Green et al, 2004; Hardre et al, 2007; DeBacker, Miller, Walker & Mencsel, 2007). A possible explanation for this relationship is that experiencing a sense of empowerment in a field creates the belief that investment in its future might possibly bring about success. On the other hand, perceived incompetence is not a good prognosis for success in the future.

One of the notable points in the results is that use of deep cognitive strategies is not anticipated by the perceived instrumentality. This implies that even when the learning activities are perceived as a tool for achieving future goals, students do not necessarily use deep strategies. This finding can be attributed to the existing education system and level of expectations from students. It seems that students gradually find out that achievement is possible without deep engagement, relating new information to previous knowledge, and critical thinking.

References


