Modeling the Relations of Motivational Variables as Explanatory Factors of Science Achievement in Malaysian Context

Fonny Hutagalung1,*, Wong Su Lee2, and Nabeel Abedalaziz1

1Department of Educational Psychology and Counselling, Faculty of Education, University of Malaya, 50603, Kuala Lumpur, Malaysia
2Faculty of Education, University of Malaya, 50603, Kuala Lumpur, Malaysia

The focus of this study was to test a three-path (two-mediator) model to test the possible meditational pathways by which students' motivational variables (FTP; epistemological beliefs; self-efficacy, implicit of intelligent) are related to their science achievement, mediated through goal orientations and learning approaches. Thus, it is necessary to fill the gap in the literature on students' achievement motivation by developing and testing a hypothetical meditational model that addresses all these factors in a single study, and explores the meditational relationships hypothesized in the model, for a better understanding of the role of goal orientations and learning strategies in Malaysia science education.

Keywords: Motivational Variables, Explanatory Factors, Science Achievement.

1. INTRODUCTION

Currently, the curriculum in Malaysia emphasizes the acquisition of learning ability, the inculcation of scientific attitudes and thinking skills. Besides that, the acquisition of scientific and technological knowledge and its application to the natural phenomena is also equally emphasized. In the Malaysian context, education systems are trying to enhance the effectiveness of learning and success in studying has become the focus among teachers, students, policy makers and also educational researchers. Confronting issues of academic motivation is critical for them. Teachers who design curricula aimed at increasing student interest in the subject matter they teach must also attend to what motivates their students and what leaves them languishing in their seats. Those who study questions such as why students succeed or fail in certain academic contexts must address motivational factors that influence how students perform in particular situations.

Since the early 1960s, research work in the psychology of motivation has focused the factors as individual differences in study methods, parental involvement, school facilities, belief, demographic and intelligence variables. In recent decades, the literature supports achievement goals, FTP, achievement goal orientation and learning strategies as contributing factors of academic success. The prediction and explanation of the factors that contribute to learners’ academic success are important. To date, however, very few attempts made to amalgamate these two strands of inquiry within one research and how the variables determine the success of learning. Adopting a combination of motivation variables, the present study was to explore the modeling the relations of motivational variables as explanatory factors of Science achievement in Malaysia.

2. STATEMENT OF PROBLEMS

For a learner, the purpose of knowledge is not only to remember specific information, ideas and facts but also the search for evaluation, analysis of ideas, broader context and vice versa. In fact, there is a need to learn a new culture of learning will be characterized by greater individualization in the construction of knowledge. A learner has to understand the acquisition of knowledge and balance the development of life skills so that they will understand the concept and value of lifelong learning. In spite of this, providing a quality education to lower and higher secondary students with equity is also a major challenge to the sector. Therefore, it is also essential to understand how students can be motivated to learn and perform well in educational settings with the current standard of Malaysia education.

The literature shows that student characteristics, such as motivation, self efficacy, FTP and epistemology, can have a positive impact on goal orientated performance and learning approach. Especially, Future time perspective (FTP) has emerged recently as an important line of research inquiry in educational psychology. It is concerned with how students perceive and express their relationships to the future that encompasses...
learning activities. Research evidence has focused the relationship between future goals and motivational beliefs, cognitive and academic performance measures. In particular, the work involved in epistemological beliefs and study processing has established findings that indicate the interrelatedness between these constructs and how, in-turn, they combine to influence academic performance directly and indirectly.

3. RESEARCH CONCEPTUAL FRAMEWORK

The theoretical model to be tested in this study, as illustrated in Figure 1, examines the links between variables. Beyond a test of the relationships between variables, such a model also allows addressing the question of the relative contributions of epistemological beliefs, FTP, goal orientation and learning approach in predicting Science achievement.

Furthermore, there appear to be not much studies in Malaysia context to date that have hypothesized a three-path (two-mediator) model to test the possible meditational pathways by which students’ beliefs about science ability are related to their science achievement, mediated through goal orientations and learning approach. Thus, it is necessary to fill the gap in the literature on students’ achievement motivation by developing and testing a hypothetical meditational model that addresses the question of the relative contributions of epistemological beliefs.

A hypothetical meditational model of science achievement is developed by linking all of these propositions and is presented in Figure 1. This study will test the relational pattern of the abovementioned variables using an SEM.

4. RESEARCH OBJECTIVES

Generally, the objective of this study is to examine a meditational model to see if incremental ability, innate ability, FTP, self efficacy is related to students’ science achievement, mediated through goal orientations (mastery, performance-approach, and performance-avoidance) and learning approach. Different specific pathways will be used to test the model to examine the indirect relation on beliefs about science ability with science achievement. Based on implicit theories of intelligence, achievement goal theory and students’ ability about science ability, the achievement model will be tested on the students.

The present study is also to find out whether students’ achievement goals contribute to the prediction of dimensions of learning approaches. A review of research of achievement goals has indicated that students who employ achievement goals are more likely to obtain better academic achievement.

5. PREVIOUS ACADEMIC EXPOSURE IN MOTIVATIONAL VARIABLES

5.1. Relationship Between Implicit of Intelligence and Goal Orientations

Dweck postulated that people’s interpretations of their intelligence are linked with two types of goals: performance goals and learning goals. She also indicated that, people holding an entity theory (entity theorists) may explain negative performance more in terms of their lack of ability than effort, which would render them vulnerable to helpless responses in the face of failure. In contrast, when individuals hold an incremental theory of their intelligence, they tend to orient more toward learning goals, the goal of increasing their ability. Subsequently, many researchers have highlighted the relationship between implicit theories of intelligence and goal orientation (e.g., Robins and Pals, Shih, Braten and Stromso, Cury et al., Dupeyrat and Mariné, 2001).

Some studies reported findings that were consistent with Dweck’s model of the relationship between beliefs and dichotomous goal orientations. More specifically, they found that incremental beliefs about intelligence were associated with learning goals, whereas entity beliefs about intelligence were associated with performance goals. In a study, whose participants were Malaysian primary school students, investigated the relationship of children’s implicit theories of intelligence with their goal orientations, self-efficacy and self-regulation. Correlational analyses showed that effort-beliefs (incremental beliefs) had a positive relationship with intrinsic goal orientations (learning goals), whereas entity beliefs had a positive relationship with extrinsic goals (performance goals). The findings of Robis et al. (2002) and Abdulla were consistent findings with Dweck’s model.

Other studies have reported findings that provided partial support for Dweck and Leggett’s model on the relationship between implicit theories and dichotomous goal orientations (e.g., Dupeyrat and Mariné).

5.2. Goal Orientation and Learning Approach

The different implicit theories of intelligence lead to contrasting aims, pursuits, or goals in academic. Students with an fixed trait made significantly stronger low-ability attributions than did those with an incremental theory, regardless of goal condition. Students were presented with clear performance-goal tasks (tasks that were said to assess their ability, but not teach them anything new) and clear learning-goal tasks (tasks that would give them the opportunity to practice and improve important skills).

Many research has demonstrated that students with entity beliefs of intelligence overwhelmingly adopt goals centred on displays of performance. The students will use approach performance judgments to demonstrate their high ability and try to avoid displays of performance. Conversely, students who view assessments as a measure of effort and temporary knowledge will approach school to learn and develop that knowledge.
Achievement goal theory explains and predicts the relations among goals, achievement-related behaviors, such as learning strategies, and achievement in academic settings. A large number of researchers have investigated relations among these variables (e.g., Chan and Lai). Many of these studies provided a foundation for the present study, and the present study aimed to build upon or extend their findings. By grouped these studies in two categories based on how they differed from the present study, which also served as a basis for justifying the inclusion of the variables measured in the present study. The first category included studies that measured dichotomous goals rather than trichotomous goals. The second category consisted of studies that did not specifically include either or both the deep and surface-learning strategies.

It is important to explore the antecedents of goals by define and explain ‘Implicit theories of intelligence,’ one of the major components of Dweck’s motivation model. It is believed that by understanding students’ perception of their intelligence and abilities, educators can much better understand how students adopt and retain goals in academic settings.

5.3. Relation Epistemology Beliefs and Academic Performance

Researchers have worked to identify how epistemological beliefs relate to learning approach motivation and other such variables. Is clear that academic achievement among students is one of the important evaluation indicators for education, discovery and study of the variables affecting academic achievement. It would result in better predicting the variables affecting academic performance.

Approach Educational research indicates that students’ epistemological beliefs influence learning approaches and subsequent learning outcomes. Research on epistemological beliefs also documented students’ epistemological beliefs relate to their learning approaches and motivation. However, most of the existing research has concentrated on older students (college and high school), and few researchers have attempted to investigate such interrelations by using young learners. Although epistemological beliefs have been the subject of extensive research for many years in Western countries, less has been done in non-Western countries.

Research by Barvarz et al. in the study of the relationship between epistemological beliefs and academic performance of students showed that there is no relationship between rate learning and academic performance. The dimensions of epistemological beliefs and knowledge organization with the highest average speed are the average of the lowest. But the meaning of that beliefs are derived from knowledge of the rate that can be paid to the evaluation they have taken reasonable speed, which is a deep understanding and grasp material action to improve academic performance. And adopt the beliefs of naive and superficial leads to a superficial understanding of the learning rate, which is the low performance is avoided.

5.4. Relationships Among Beliefs, Goals, Strategies, and Achievement

The relationships among implicit theories of intelligence, achievement goals, learning strategies, and achievement failed to emerge, suggesting the need for further investigation of the four constructs. Specifically, Dupeyrat and Marine suggested using a more powerful statistical technique such as SEM that would enable a researcher to control for measurement errors. Although the study investigated the relationship among the four constructs, their hierarchical model failed to show that goal orientations and cognitive engagement mediated the relationship between implicit theories of intelligence and academic achievement.

6. TESTING MEDIATIONAL PATHWAYS

From simple to complex mediational chains, researchers have tried to develop ways to assess mediational relationships (e.g., Baron and Kenny, Sobel, Taylor et al.). Hayes discussed the three most popular methods of testing hypotheses about intervening variable effects. They include the causal step approach popularised by Kenney, the product of coefficients approach mostly well-known as the Sobel test, and the bootstrapping approach to generate confidence intervals of indirect effects.

Consequently, there are a number of studies in educational psychology that have used Sobel coefficient approach to test mediational models (e.g., Diseth, Blackwell et al.). These studies have hypothesised and tested mediational models that have used from simple to more complex mediational chains, including three-path (two-mediator) mediational pathways.

Goals and approaches mediate the relationship between beliefs and achievement. Given the support from the literature for these direct relationships, it is important to investigate whether motivational variables are indirectly related to achievement via goals and learning strategies, by means of valid statistical tests.

7. CONCLUSION

This hierarchical mediational chain was used to build a model of Science achievement, in which the relation of motivational variables with science achievement is mediated through goal orientation and learning strategies. It is believed that by understanding students’ perception of their intelligence and abilities, educators can much better understand how students adopt and retain goals in academic settings.

References and Notes

Received: 14 December 2015. Revised/Accepted: 29 January 2016.