

RESEARCH ARTICLE

ACHIEVEMENT GOALS OF MATRICULATION STUDENTS: ROLE OF EPISTEMOLOGICAL BELIEFS

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Abstract

This study investigated how students' beliefs about learning affect their achievement goal orientation. A total of 340 matriculation (foundation) students (47% males, 53% females) from two public universities were given two inventories – epistemological beliefs for science and achievement goal orientation – to measure their epistemological beliefs about science and achievement goal orientation. Results yielded that canonical correlations established by innate ability and quick learning were positively correlated with performance goal, mastery avoidance goal, and performance avoidance goals, but innate ability and quick learning negatively correlated with mastery goal. Further, innate ability and quick learning were predictors of achievement goal orientation. These results provided new empirical evidence on how epistemological beliefs contribute relatively to students' adopting achievement goal orientation.

Keywords: Performance avoidance goal, Performance goal, Performance avoidance goal, Mastery goal, Epistemological beliefs

INTRODUCTION

Many researchers believe that learning and academic achievement are influenced by numerous cognitive variables like students' beliefs about knowledge and learning (epistemology). Specifically, some of them were interested in studying the relationship between epistemological beliefs and the numerous aspects of learning (Hofer & Pintrich, 1997, 2002). The central tenet of this group of researchers is that students' beliefs about the nature of knowledge and learning are part of the underlying meta-cognitive mechanism (Hofer & Pintrich, 1997). Within this framework, the present study aimed at combining two research traditions – epistemology and achievement goal orientation – by exploring the contribution of epistemological beliefs to students' achievement goal orientation. The latter has recently emerged as an important construct in education with its focus on the meaning that individuals assigned to an achievement situation, providing a cognitive structure for organizing how individuals define success and failure, their affective reactions, and their subsequent behaviors (Urduan, 1997; Dweck, 1986). Achievement goals refer to an individual's perceptions on the purposes of his or her achievement behaviors.

Achievement goal theory has sprung as a dominant theoretical framework for studying motivation and competence in academic achievement (Phan, 2009; Harackiewicz & Linnenbrink, 2005; Pintrich, Conley, & Kempler, 2003; Elliot & Thrash, 2001). It assumes that goals are cognitive representations of what individuals are trying to accomplish and their reasons for doing the task (Nicholls, 1989). Equally, research literature has linked students' epistemological beliefs with achievement goal orientation (Laster, 2010; Wheeler, 2007; DeBacker & Crowson, 2006; Hofer, 2000), stating that beliefs students hold concerning the structure and nature of knowledge influence the particular types of achievement goals that they pursue and the nature of their cognitive engagement. For this reason, the present research serves to understand closely the relationship between students' epistemological beliefs and achievement goal orientation, some sort of a window into the psychological processes through which achievement behavior is created to inspire teachers or educators to develop their classroom practices to facilitate students'

achievement (Lau & Lee,2008),

Epistemological Beliefs

Epistemology is a branch of philosophy concerned with the nature of knowledge and justification of beliefs. According to Jehng, Johnson, and Anderson (1993), epistemological beliefs are "socially shared intuitions about the nature of knowledge and the nature of learning and involve knowledge about the limits of knowing, the certainty of knowing, and the criterion of knowing" (p.24). Educational psychologists have viewed epistemological beliefs typically as systems of implicit assumptions and beliefs about the nature of knowledge and its acquisition held by students (Bruning, Schraw, & Ronning, 1999).

There are many methodological approaches (models) that depend on the theoretical model held by researches about epistemological beliefs. Models following a developmental approach (Perry, 1970) postulate that a learner's individual beliefs about different epistemological aspects are coherent and closely related to one another. As a result, beliefs undergo similar changes over time. Contrastingly, multi-dimensional models (Schraw, Bendixen, & Dunkle, 2002; Jehng, Johnson, & Anderson, 1993; Schommer, 1990) propose epistemological beliefs to be a system of more or less independent beliefs; that is, individuals have a system of independent beliefs about different aspects of knowing and learning that differ according to the level of their development (naive to sophisticated) and can also be determined by quantitative methods. To illustrate, Schommer (1990) suggested that epistemological beliefs may exist as a system of independent dimensions, ranging across a continuum from naive to sophisticated beliefs. His use of the term system suggests that more than one belief exists that should be taken into account, and the expression 'more or less independent' means that a student might be sophisticated in some beliefs, but not necessarily in others. The term sophisticated characterizes persons who predominantly believe that knowledge changes over time—the outcome of constructive and reasoned endeavors; whereas, the term naive refers to those who believe that knowledge is predominantly certain and stable. Another conceptual issue in research on epistemological beliefs is their generality or specificity to certain domains of knowledge

(Kienhues, Bromme, & Stah, 2008). Many scholars assume that people possess both domain-general and domain-related epistemological beliefs concurrently (Kienhues, Bromme, & Stah, 2008; Muis, Bendixen, & Haerle, 2006). Domain-specificity has been suggested as a major factor in the study of students' epistemological beliefs. For instance, Muis (2004: 326) suggested that a system of mathematical beliefs may include the "nature of Mathematics knowledge, justifications of Mathematics knowledge, sources of Mathematics knowledge, and acquisition of Mathematics knowledge."

Schommer (1990) suggested five different epistemological dimensions that are omniscient authority or source of knowledge (ranging from the belief that knowledge is handed down by teachers and other experts to the belief that knowledge formed by independent reasoning), quick knowledge (ranging from the belief that learning tends to be a quick process to the belief that learning makes for a gradual process), certain knowledge (ranging from the belief that knowledge is more likely to be certain and unchanging to the belief that knowledge appears tentative and unpredictable), simple knowledge or structure of knowledge (ranging from the belief that knowledge is organized in isolated bits to the belief that knowledge comes organized as complex, interrelated concepts), innate ability (ranging from the belief that the ability to learn is innate and fixed to the belief that ability to learn is acquired through effort). In diverse studies among college and high school students, Schommer and his collaborators developed and validated a questionnaire assessing students' epistemological beliefs in four dimensions – simple knowledge, certain of knowledge, innate ability, and quick learning (Schommer 1993; Schommer, Crouse, & Rhodes, 1992). To Jehng et al., (1993), learning beliefs consist of the following five dimensions – certainty of knowledge, omniscient authority, orderly process, innate ability, and quick learning. The first three dimensions (certainty of knowledge, omniscient authority, and orderly process) are beliefs about knowledge and the last two (innate ability and quick learning) represent beliefs about learning. A large body of theoretical and empirical work led to the development of a contemporary system of epistemological beliefs – certainty of knowledge, simplicity of knowledge, sources of knowledge, and justification for knowing

(Hofer, 2000; Hofer & Pintrich, 1997).

Achievement Goals

Achievement goal orientation theorists seeks to establish at which junctures and at which manner learners become "conscious and operate, either consciously or pre-consciously, to influence motivation, affect, cognition, and behavior before, during, and after an achievement task" (Pintrich, 2000: 97). Achievement goal orientations are a "set of behavioral intentions that determine how students approach and engage in learning activities" (Meece, Blumenfeld, & Hoyle, 1988: 514).

For their part Dweck and Elliott (1983) suggested that achievement motivation involved two broad kinds of goals—learning goals or mastery goals (Ames, 1992) and performance goals. Mastery goals represent "a desire to develop competence and increase knowledge and understanding through effortful learning", while performance goals "a desire to gain favorable judgments and avoid negative judgments of one's competence, particularly if success is achieved through a minimum exertion of effort" (Murphy & Alexander, 2000, p. 28). According to Liu, John Wang, Tan, Ee, and Koh (2009), learners who are mastery goals-oriented tend to appreciate the intrinsic value of learning, if not more motivated in planning their learning process. They also see effort as the main factor defining their success, competence, and learning based on their self-established standards of achievement. By contrast, Learners who are performance goals-oriented tend to define success in terms of ability or performance relative to others (Pintrich, 2000). They also judge their competence and sense of self-worth by how they can perform better than others in normative-based standards set by external authorities. In simple terms, mastery goal orientation reflects an emphasis on learning and understanding, whereas performance goal orientation focuses on demonstrating competence in relation to others (Linnenbrink & Pintrich, 2001).

Performance goal orientation encompassed a desire to obtain favorable judgments regarding one's ability plus a desire to avoid unfavorable ones. Accordingly, Elliot & Church (1997) and Elliot & Harackiewicz (1996) expanded the performance construct to distinguish approach and avoidance motivation. This yielded two

performance goal orientations – performance approach, and performance avoidance. As Midgley, Maehr, Hruda, Anderman, Anderman, Freeman (2000) noted, recent research supports this new three-goal framework (a mastery goal, a performance goal, and performance avoidance goal).

More recently, motivational theorists posited four fundamental goal orientations in which each of mastery and performance goal orientation should differentiate an approach from an avoidance direction (Elliot & McGregor, 2001; Pintrich, 2000). As a result, a two by two achievement goal framework that links the concepts of mastery–performance and approach–avoidance was proposed. Such framework yields four achievement orientations – mastery goals (focused on task-based or intra-personal competence), mastery-avoidance goals (focused on task-based or intra-personal incompetence), performance-approach goals (focused on normative competence), and performance-avoidance goals (focused on normative incompetence) (Shim, Ryan & Anderson, 2008; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Midgley, Kaplan, & Middleton, 2001;). Conceptually, mastery-avoidance goals represent a desire to avoid negative outcomes such as not completing a task fully; and performance avoidance goals represent a desire to avoid demonstrating poor performance relative to others. In general, mastery approach and performance-approach goals are classified as having positive valence (i.e., approaching success), whereas the mastery-avoidance and performance-avoidance goals are deemed as having negative valence (i.e., avoiding failure) (Liu et al., 2009).

Problem statement

Recently, some researchers studied the relationship between epistemological beliefs and achievement goals. Some have considered epistemological beliefs as a personal agent and a very important antecedent for achievement goals (Braten & Stromso, 2005, 2004). Others revealed that the beliefs that learning is quick were the best predictors of learning engagement and outcomes (Schommer et al., 1992; Schommer, 1990;).

Determining relationship between epistemological beliefs and achievement goal orientation is of great significance for this paper. It has been shown that students with naive beliefs about knowledge (in innate ability, quick learning, simple knowledge and certain knowledge) hardly understand complex texts and give up on complex tasks easily (Schommer-Aikins, 2002). They also have a tendency to avoid obstacles and consequently, they express maladaptive behavior and have low achievement (Qian & Alvermann, 2000). Interestingly, nature and intensity of this correlation within our sample may be determined. Most of the previous similar studies were carried out with children in compulsory education and with college students.

Furthermore, there is a clear need for more research that examines possible association between student's epistemological beliefs and adoption of achievement goal orientation (Braten & Stramso, 2004; Elliot, 1999; Elliot & Church, 1997; Elliot & Harackiewicz, 1996). Investigating how dimensions of epistemological beliefs contribute to student's adoption of achievement goal orientation allows us to compare the predictive power of epistemology on achievement goal orientation (Braten & Stramso, 2004). Although research on epistemological beliefs documented the link between dimensions of the epistemological beliefs and achievement goal orientations (Braten & Stramso, 2004; Paulsen & Feldman, 1999), few studies have been attempted to investigate quick learning and fixed ability dimensions. Moreover, the cited link between epistemological beliefs and achievement goals has not been founded much on empirical evidences (Braten & Stramso, 2004). With this in mind, the present study tried to plot patterns of relationships between achievement goal orientation dimension and epistemological beliefs dimensions.

METHODS

Research Participants

All matriculation (foundation) students from seven public and private universities in Kuala Lumpur, Malaysia participated in this study. The desired sample size was determined and cluster random

sampling used to obtain the samples, giving a total of 340 student participant (47% males, 53% females).

Instruments

Epistemological Beliefs Questionnaire for Science (EBQS). The Malaysian version of Epistemological Beliefs Questionnaire for Science (EBQS) developed by Abedalaziz, Hutagalung and Tharbe (2014), is a quantitative measure of epistemological beliefs, based mainly on multi-dimensional theory. It includes 30 items five-point Likert type scale (1=strongly agree to 5= strongly disagree) that measures five distinct dimensions – Source of knowledge, Structure of knowledge (6 items), Source of knowledge (5 items), Speed of learning (7 items), Certainty of knowledge (4 items), and Innate ability (8 items). A low degree of agreement with each statement corresponds to naïve epistemological beliefs and low score in the inventory means naïve epistemological beliefs. Contrastingly, higher score implies advanced epistemological beliefs. The reliability coefficients for the five subscales were registered within the range 0.84 and 0.91.

Sample items from innate ability subscale included: “An expert in science is someone who has a special gift in science” and “I knew at an early age what my scientific ability was.” Those from structure of knowledge subscale had: “I don't care about why something works, just show me how to work on the science problem” and “I find it confusing when the teacher shows more than one way to work on a problem”. From speed of learning subscale items such as: “When it comes to science, most students either get it quickly or not at all” and “It takes a lot of time to learn science”, while those from source of knowledge subscale covered: “I have to believe what scientists say” and “Learning science depends most on having good instructors”. Finally, sample items from certainty of knowledge subscale pointed: “Scientific knowledge is always true” and “All questions in science have one right answer”.

Achievement Goal Inventory (AGO). This instrument developed by Elliot and McGregor (2001) measures mastery-approach goals, mastery-avoidance goals, performance-approach goals, and performance-avoidance goals. Composed of 12 items – with three items per goal – in the 7-point Likert scale format (1 for “Not very

true of me" to 7 for "Very true of me"), the scale was validated to achieve the objectives of this study, employing Exploratory factor analysis and Oblimin Rotation (with eigen value greater than 1, and scree plot test). Only items with factor loading equal to or greater than 0.3 were retained in the four extracted factors representing the subscales or dimensions of achievement goal orientation identified within the sample of Malaysian students. Based on the nature of the items loaded on the factors, the achievement goal orientation dimensions were labeled mastery-approach goals scale ('I want to learn as much as possible from science'), mastery-avoidance goals scale ('I worry that I may not learn all that I possibly could in science'), performance-approach goals scale ('It is important for me to do better than other students in science course'), and performance-avoidance goals scale ('I just want to avoid doing poorly in science').

With the overall alpha coefficient of the entire scale was 0.90, the individual alpha coefficients for different scales were 0.86 for mastery goal scale, 0.87 for performance-avoidance goal scale, 0.83 for performance- approach goal scale, and 0.82 for mastery avoidance scale.

RESULTS AND DISCUSSION

Correlation Analysis

Preliminary statistical analyses were done on the data; the assumption of normality of the data distribution for the AGI scores, TIS Scale, and the EBI were tested by estimating the coefficient of skewness and kurtosis values; and examining the data histograms. Results yielded normal distribution and assumptions of linearity, multivariate normality, and homoscedasticity satisfied.

The Pearson product-moment correlation coefficient was used to determine the existence of a statistically significant relationship between epistemological beliefs about science and achievement goal orientation in the same subject. The Correlation coefficients were interpreted by employing Davis (1971) descriptors (negligible = 0.00 to .09; low = 0.10 to 0.29; moderate = 0.30 to 0.49; substantial,

0.50 to 00.69; very strong = 0.70 to 1.00).

In Table 1, the correlations show a statistically significant relationship between *innate ability* scale scores and achievement goal subscales scores. Positive, moderate relationship between *innate ability* and *performance goal* ($r = 0.46$, $p < 0.01$) and a negative, moderate relationship between *innate ability* and *mastery goal* ($r = 0.44$, $p < 0.01$) were computed. Positive, weak relationships were also established between *innate ability* and *mastery avoidance goal* ($r = 0.24$, $p < 0.01$), as well as between *innate ability* and *performance avoidance goal* ($r = 0.15$, $p < 0.05$).

Table 1. Pearson Correlations between Achievement Goal Orientation and epistemological Beliefs about Science

Variable	Performance Goal	Mastery Goal	Performance Avoidance	Mastery Avoidance
Innate Ability	.46**	-.44**	.15*	.24**
Quick learning	.33**	-.24**	.43**	-.02
Source Knowledge	-.06	.10	.02	-.10
Certainty of knowledge	-.11	-.05	.07	-.06
Structure of knowledge	.02	.06	-.11	-.04

Note: ** significant at $\alpha = 0.01$; * significant at $\alpha = 0.05$

Moreover, the correlations show statistically significant relationships between *quick learning* scale scores and three of achievement goal subscales scores. A negative, weak relationship was registered between *quick learning* and *mastery goal* ($r = -0.24$, $p < 0.01$), but a positive, moderate relationship between *quick learning* and *performance goal* scale ($r = 0.33$, $p < 0.01$). Equally noted was a negative, moderate relationship between *quick learning* and *performance avoidance* ($r = 0.43$, $p < 0.01$), implying that the more likely the participants indicated they are performance avoidance oriented in science course, their quick learning scale scores decreased.

Contrastingly, no significant relationships exist between *source of knowledge* and the four achievement goal orientation variables under study—*performance goal* ($r = -0.06$, $p > 0.05$), *mastery goal* ($r = -0.43$, $p > 0.10$), *performance avoidance* ($r = 0.02$, $p > 0.05$), and *mastery avoidance* ($r = -0.10$, $p > 0.05$). Neither significant relationships were registered between *certainty of knowledge* and the same four variables—*performance goal* ($r = -0.11$, $p > 0.05$),

mastery goal ($r = -0.05, p > 0.10$), *performance avoidance* ($r = 0.07, p > 0.05$), and *mastery avoidance* ($r = -0.06, p > 0.05$). Finally, there were no significant relationships existing between *structure of knowledge* and the same four variables—*performance goal* ($r = 0.02, p > 0.05$), *mastery goal* ($r = 0.06, p > 0.10$), *performance avoidance* ($r = -0.11, p > 0.05$), and *mastery avoidance* ($r = -0.04, p > 0.05$).

Canonical Correlation Analysis

To identify patterns of relationships, canonical correlation analysis was performed: epistemological belief as predictors of achievement goal orientation. The former straddles between a linear combination of the domains of epistemological beliefs about science and the achievement goal orientation variables (the canonical variates). As, such, two different correlations, corresponding to two different pairs of linear combinations exist. R_c^2 indicates how much variance in one set of variables is explained by the other set of variables. Note that R_c^2 can be calculated by squaring and summing all canonical correlations.

In canonical correlation analysis, the Standardized Canonical Coefficients (coefficients) can be interpreted like regression weights (Beta), to show which items are weighted most heavily in the linear combination of variables for each set of variables. These weights are created so as to maximize the correlation between the two sets of variables. More pointedly, canonical Loadings (structure coefficients) are the correlations between each item and the linear combinations of variables for that same set (the canonical variates) (Leech, Barrett, & Morgan, 2011).

The tests of dimensionality for the canonical correlation analysis indicated that two canonical dimensions are statistically significant. The first canonical correlation was 0.81 (66% overlapping variance); the second 0.46 (22% overlapping variance). With both canonical correlations included, the chi-square value, $\chi^2 (20) = 254.74$, registered significant at $\alpha < 0.00$. Equally, when the first correlation was removed, the chi-square value, $\chi^2 (12) = 48.57$, significant at $\alpha < 0.001$.

Examination of the loadings, as shown in the Table 2, with a cut off correlation of 0.30 (Tabachnick and Fidell, 2007), suggests that the first canonical correlation seems to involve a relation between *innate ability* ($r_s = 0.98$), *quick learning* ($r_s = 0.34$), *performance goals* ($r_s = 0.83$), *mastery goals* ($r_s = -0.88$), *performance avoidance goals* ($r_s = 0.34$), and *mastery avoidance goals* ($r_s = 0.39$). These results imply that approximately 69% of the variance in performance goal, 77% of the variance in mastery goal, 12% of the variance in performance avoidance goal and 15% of the variance in mastery avoidance goal were shared with the canonical variate. Furthermore, the second canonical correlation seems to involve a relation between quick learning ($r_s = .83$), mastery avoidance goals ($r_s = 0.40$), and performance avoidance goals ($r_s = 0.90$); suggesting that approximately 16% of the variance in mastery avoidance goal, and 81% of the variance in performance avoidance goal were shared with the canonical variate.

Table 2. Correlation and Standardized Canonical Coefficients between Epistemological Beliefs and Achievement Goal Orientation

Variables	Dimension 1			Dimension 2		
	Loading (r_s)	Coefficient	(r_s) ²	Loading (r_s)	Coefficient	(r_s) ²
Covariates (Independent variables)						
Innate Ability	.98	.97	.96	-.12	-.29	.01
Source Knowledge	.27	-.07	.07	.12	.01	.01
Certainty of knowledge	-.04	-.03	.00	.10	-.31	.01
Quick learning	.34	.18	.12	.83	.84	.69
Structure of knowledge	-.03	-.03	.00	.27	.29	.07
Dependent Variables						
Performance Goal	.83	.50	.69	-.13	-.08	.02
Mastery Goal	-.88	-.56	.77	.18	.22	.03
Performance avoidance	.34	.12	.12	.90	-.93	.81
Mastery avoidance	.39	.17	.15	.40	.44	.16
R_C^{2d} (Squared Canonical Correlation Coefficient)					.88	

Regarding the predictor variables, both of innate ability and quick learning contributed to the predictor canonical variate. The shared variances with the predictor variate by innate ability and quick learning were 96% and 81%, respectively. As shown in table 2, innate ability and quick learning positively correlated with performance goal, mastery avoidance goal, and performance avoidance goal.

This finding indicates that students who believed that learning occurs quickly or not at all or their ability is innate, were more likely to adopt performance goal, mastery avoidance goal, and performance avoidance goal. By contrast, innate ability and quick learning were negatively correlated with mastery goal, indicating that students who believed that learning occurs quickly or their ability, were less likely to adopt mastery goals.

Regression Analysis

Computing for the multiple regression equations with the four goal orientation variables as outcome measures (dependent variables) and the five epistemological belief measures simultaneously entered into each regression equation, results as shown in Table 3 suggest that the five predictors together explained a significant amount of the variance in students' mastery goal orientation: $F(5, 334) = 13.888, p < 0.01, R^2 = 0.225$. The regression of the mastery goal reveals that *quick learning* (Beta = -0.348, $p < 0.01$) and *innate ability* (Beta = -0.322, $p < 0.01$) predict mastery goals to mean that students who hold naive beliefs about quick learning and innate ability were less likely to adopt mastery goals.

Table 3. Unstandardized and Standardized Regression Coefficients for Regression Analyses

Variable	Mastery Goal		Performance Goals		Performance Avoidance Goals		Mastery Avoidance Goals	
	B	β	B	B	B	β	B	B
Quick Learning	-0.269	-0.348**	-0.472	0.620**	0.258	0.400**	-0.158	-0.300**
Innate Ability	-0.211	-0.322**	-0.143	0.221*	0.195	0.357**	-0.123	-0.243*
Certainty of Knowledge	0.116	0.101	-0.082	-0.099	-0.151	-0.217	-0.084	-0.101
Structure of Knowledge	0.060	0.081	-0.121	-0.166	-0.183	-0.096	-0.081	-0.097
Omniscient Authority	-0.013	-0.022	-0.087	-0.102	0.068	0.134	-0.082	-0.099
R ²	0.225		0.281		0.287		0.198	

Note: ** significant at $\alpha = 0.01$; * significant at $\alpha = 0.05$

Equally, for students' performance goals orientation, results suggest a significant portion of the variance was explained jointly by the seven predictors, $F(5, 334) = 18.838, p < 0.01, R^2 = 0.281, P < 0.01$. The regression of the performance goals shows a positive relationship for

quick learning (Beta = 0.620, $p < 0.01$) and *innate ability* (Beta = 0.221, $p < 0.05$), meaning the two are predictors of performance goals. Students who hold naive beliefs about innate ability, and quick learning are performance goals oriented.

In regard to students performance avoidance goals orientation, a significant portion of the variance was explained jointly by the seven predictors, $F(5, 334) = 19.208$, $p < 0.01$, $R^2 = 0.287$, $P < 0.01$. The regression of the performance avoidance goals revealed a positive relationship for quick learning (Beta = 0.400, $p < 0.05$) and innate ability (Beta = 0.357, $p < 0.01$), suggesting that the two are predictors of performance avoidance goals. Students who hold naive beliefs about innate ability, and quick learning are performance avoidance goals oriented.

For mastery avoidance goals, a significant portion of the variance was explained jointly by the seven predictors, $F(5, 239) = 13.258$, $p < 0.01$, $R^2 = 0.198$, $P < 0.01$. The regression of the performance avoidance goals revealed a negative relationship with quick learning (Beta = -0.300, $p < 0.05$) and innate ability (Beta = -0.243, $p < 0.01$). In this case quick learning and innate ability predict performance avoidance goals, implying that students who hold naive beliefs about quick learning and innate ability are mastery avoidance goals oriented.

Implications for Teaching

Correlation analysis revealed that *innate ability* is negatively associated with mastery goal, but positively related to mastery avoidance, performance goal, and performance avoidance goal. However, innate ability posted a significant positive correlation coefficient with performance-approach goal, a result consistent with Paulsen and Feldman's (2005) findings but in contrast with that of Ravindran, Greene and DeBacker (2005) who found no relationship existing between epistemological beliefs and learning goals. These results imply that the more likely the participants indicated they are performance goal oriented in science course, their innate ability scale scores increased, and the more likely the participants indicated they are mastery goal oriented, their innate ability scale scores lessened. Contrastingly, the more likely the participants indicated they are mastery avoidance goal oriented,

their innate ability scale scores increased, and the more likely the participants indicated they are performance avoidance goal oriented, their innate ability scale scores raised.

Beliefs in quick learning are positively related to performance-approach and performance-avoidance goals, whereas, quick learning is negatively related to mastery goal, signifying that the more likely the participants indicated they are performance goal oriented, their quick learning scale scores increased; and the more likely the participants indicated they are mastery oriented in science course, their quick learning scale scores diminished. These results are consistent with the findings in the literature. To illustrate, Braten and Stromso (2004) pointed out that belief in learning as quick and straightforward was positively related to a performance goal orientation and negatively related to learning goals (mastery). To Elliot (1999), performance-approach goals are more complex orientations than mastery goals or performance-avoidance goals. Elliot and Church (1997) found that performance-approach goal was undergirded by both approach (achievement motivation) and avoidance (fear of failure) motive dispositions. Braten and Stramso (2004) further said that the complexity of performance-approach goal was not apparent in terms of personal beliefs or theories, because only naive epistemological beliefs were found to underlie such goals.

Moreover, canonical correlation analysis indicated that students who believe that learning occurs quickly or their ability is innate are less likely to adopt mastery goal, and more likely to assume performance goal, mastery avoidance goal, and performance-avoidance goal. To Braten and Stramso (2004), students who believe that learning is a quick, all-or-none process may consider it a waste of time to strive to increase their competence and master challenging tasks—students who were described to do the academic task for the sake of submission. At the same time, students who believe in quick learning may be especially concerned with incompetence relative to others, because they view persistent effort as a manifestation of their inability to learn. These results seem to be consistent with the view that beliefs in quick learning may orient students away from mastery goals and towards performance goals. Furthermore, students with an innate ability will

tend to adopt performance goal and performance avoidance when academically challenged. This finding seems to be in line with those of Paulsen and Feldman (2005), stating that students with the more naïve belief that the ability to learn is fixed are less likely to maintain an extrinsic goal orientation. Presumably, students who believe that their ability to learn is innate and cannot be increased more tend to operate from an extrinsic orientation than an intrinsic one—they focus on the adequacy of their ability and avoid giving evidence of its inadequacy. Also, results appear to be consistent with the recently researches (Abedalaziz, Chin & AlHarthy, 2013; Chen & Pajares, 2010; Ozkal, Tekkaya, Cakiroglu & Sungur, 2009). For example, Chen and Pajares (2010) found that students holding more sophisticated epistemological beliefs tended to set academic task (mastery) goals while those with naïve perspective tended to set performance goal.

This study further implies that teachers should emphasize meaningful learning to help students develop sophisticated epistemological views, and beliefs about their intelligence. Structural equation models can be used in future investigations to test the direct and indirect paths between these variables, and their relationship to academic achievement.

CONCLUSIONS AND RECOMMENDATION

The results of this investigation add to the understanding of the antecedents of students' achievement goal orientations. Students' beliefs about nature of learning may predict their goal orientation adoptions. Specifically, the belief about the "ability to learn is innate" may play more important roles in performance approach goal or its avoidance. As such, students' belief that the ability to learn is innate or fixed at birth should be minimized, if not eradicated to help teachers develop classroom environments that support conceptual understanding to eventually increase student achievement. Similar investigations may be done to fully grasp the real relationship between epistemological beliefs and goal orientations.

REFERENCES

- Abedalaziz, N., Chin, H.L. C., & AlHarthy, S. (2013). Jordanian version of the epistemological questionnaire beliefs about mathematics: The validation study. *International Review of Contemporary Learning Research*, 2(2), 59-73.
- Abedalaziz, N., Hutagalung, F., & Tharbe, I. (2014). Construction and validation of epistemological beliefs questionnaire for science in the Malaysia Context. International Congress on Interdisciplinary Behavior and Social Sciences 2013. Advances topics in social and behavior sciences. CRC Press, Balkema, Taylor & Francis Group, Netherland. Recent Trends.
- Ames, C. 1992. Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, 84, 261-271.
- Braten, I., & Stromso, H. 2004. Epistemological beliefs and implicit theories of intelligence as predictors of achievement goals. *Contemporary Educational Psychology*, 29, 371–388.
- Braten, I., & Stromso, H. I. 2005. The relationship of epistemological beliefs, implicit theories of intelligence, and self-regulated learning among Norwegian postsecondary students. *British Journal of Educational Psychology*, 75, 539-565.
- Bruning, R. H., Schraw, G. J., & Ronning, R. R. (1999). *Cognitive psychology and instruction*, Merrill/Prentice Hall, Upper Saddle River, NJ.
- Chen, J. A., & Pajares, F. (2010). Implicit theories of ability of Grade 6 science students: Relation to epistemological beliefs and academic motivation and achievement in science. *Contemporary Educational Psychology*, 35, 75–87.
- Church, M. A., Elliot, A. J. & Gable, S. L. (2001). Perception of classroom environment, achievement goals, and achievement outcomes. *Journal of Educational Psychology*. 93(1), 43-54.
- Davis, J. A. (1971). *Elementary survey analysis*. Englewood, NJ:
-
- Abedalaziz, N. et. al. (2015). Achievement of matriculation students: Basis ...

Prentice-Hall.

- DeBacker, T. K., & Crowson, H. M. (2006). Influences on cognitive engagement: Epistemological beliefs and need for closure. *British Journal of Educational Psychology, 76*, 535–551.
- Dweck, C. S. 1986. Motivational processes affecting learning. *American Psychologist, 41*, 1040–1048.
- Dweck, C. S., & Elliott, E. S. (1983). Achievement motivation. In E. M. Hetherington (Ed.), *Handbook of child psychology: Socialization, personality, and social development*, Vol. 4, pp. 643–691. New York: Wiley.
- Elliot, A. J. 1999. Approach and avoidance motivation and achievement goals. *Educational Psychologist, 34*, 169–189.
- Elliot, A. J., & Church, M. A. 1997. A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72*(1), 218-232.
- Elliot, A. J., & Harackiewicz, J. M. 1996. Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology, 70*, 968–980.
- Elliot, A. J., & Thrash, T. M. (2001). Achievement goals and the hierarchical model of achievement motivation. *Educational Psychology Review, 13*, 139–156.
- Elliot, E., & McGregor, H. (2001). A 2 x 2 achievement goal framework. *Journal of Personality and Social Psychology, 3*, 501-519.
- Harackiewicz, J. M., & Linnenbrink, E. A. (2005). Multiple achievement goals and multiple pathways for learning: The agenda and impact of Paul R. Pintrich. *Educational Psychologist, 40*(2), 75–84.
- Harackiewicz, J. M., Barron, K. E., Pintrich, P. R., Elliot, A. J., & Thrash, T. M. (2002). Revision of achievement goal theory: Necessary and illuminating. *Journal of Educational*

Psychology, 94, 638–645.

- Hofer, B. K. 2000. Dimensionality and disciplinary differences in personal epistemology. *Contemporary Educational Psychology*, 25, 378–405.
- Hofer, B. K., & Pintrich, P. R. (Eds.). 2002. *Personal epistemology: The psychology of beliefs about knowledge and knowing*. Mahwah, NJ: Erlbaum.
- Hofer, B. K., & Pintrich, P. R. 1997. The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research*, 67, 88–140.
- Jehng, J. J., Johnson, S. D., & Anderson, R. C. (1993). Schooling and students' epistemological beliefs about learning. *Contemporary Educational Psychology*, 18, 23–35.
- Kienhues, D., Bromme, R. & Stah, E. (2008). Changing epistemological beliefs: The unexpected impact of a short-term intervention. *British Journal of Educational Psychology*, 78, 545–565
- Laster, B. (2010). Structural and correlational analysis of two common measures of personal epistemology. Unpublished doctoral dissertation, Oklahoma State University, USA.
- Lau, K., & Lee, J. (2008). Validation of a Chinese achievement goal orientation questionnaire. *British Journal of Educational Psychology*, 78, 331–353.
- Leech, N. L., Barrett, K.C., & Margon, G. A. (2011). *SPSS for Intermediate Statistics: Use and Interpretation*. Lawrence Erlbaum Associates, Inc., Publishers.
- Linnenbrink, E. A., & Pintrich, P. R. (2001). Multiple goals, multiple contexts: The dynamic interplay between personal goals and contextual goal stresses. In S. Volet & S. J'arvel'a (Eds.), *Motivation in learning contexts: Theoretical and methodological implications*, pp. 251–269. Amsterdam:

Pergamon Press.

- Liu, W.C., John Wang, W.K., Tan, O.S., Ee, J., & Koh, C. (2009). Understanding students' motivation in project work: A 2 x 2 achievement goal approach. *British Journal of Educational Psychology, 79*, 87–106.
- Meece, J. L., Blumenfeld, P. C., & Hoyle, R. H. (1988). Students' goal orientations and cognitive engagement in classroom activities. *Journal of Educational Psychology, 80*, 514–523.
- Midgley, C., Kaplan, A., & Middleton, M. 2001. Performance-approach goals: Good for what, for whom, under what circumstances, and at what cost? *Journal of Educational Psychology, 93*, 77–86.
- Midgley, C., Maehr, M.L., Hruda, L.Z., Anderman, E., Anderman, L., Freeman, K.E., et al. (2000). *Manual for the Patterns of Adaptive Learning Scales (PALS)*. Ann Arbor, MI: University of Michigan.
- Muis, K. R. (2004). Personal epistemology and mathematics: A critical review and synthesis. *Review of Educational Research, 74*(3), 317–377.
- Muis, K. R., Bendixen, L. D., & Haerle, F. C. (2006). Domain-general and domain specificity in personal epistemology research: Philosophical and empirical reflections in the development of a theoretical framework. *Educational Psychology Review, 18*, 3–54.
- Murphy, P. K., & Alexander, P. A. (2000). A motivated exploration of motivation terminology. *Contemporary Educational Psychology, 25*, 3–53.
- Nicholls, J. G. (1989). *The competitive ethos and democratic education*. Cambridge, MA: Harvard University Press.
- Ozkal, K., Tekkaya, C., Cakiroglu J., & Sungur, S. (2009). A conceptual model of relationships among constructivist learning environment perceptions, epistemological beliefs, and learning approaches. *Learning and Individual*

Differences, 19(1), 71-79.

- Paulsen, M. B., & Feldman, K. A. (1999). Student motivation and epistemological beliefs. *New Directions for Teaching and Learning*, 78, 77-80.
- Paulsen, M. B., & Feldman, K. A. 2005. The conditional and interaction effects of epistemological beliefs on the self-regulated learning of college students: Motivational strategies. *Research in Higher Education*, 46(7), 731-768.
- Perry, W. G. (1970). *Forms of intellectual and ethical development in the college years: A scheme*. New York: Holt, Rinehart & Winston.
- Phan, H. P. (2009). Amalgamation of future time orientation, epistemological beliefs, achievement goals and study strategies: Empirical evidence established. *British Journal of Educational Psychology*, 79, 155–173.
- Pintrich, P. R. (2000). An achievement goal theory perspective on issues in motivation terminology, theory, and research. *Contemporary Educational Psychology*, 25, 92–104.
- Pintrich, P. R., Conley, A. M., & Kempler, T. M. (2003). Current issues in achievement goal theory and research. *International Journal of Educational Research*, 39, 319–337.
- Qian, G., & Alverman, D. (2000). Role of epistemological beliefs and learned helplessness in secondary school students' learning science concepts from text. *Journal of Educational Psychology*, 87, 282-292.
- Ravindran, B., Greene, B. A., & DeBacker, T. K. (2005). Predicting pre-service teachers' cognitive engagement with goals and epistemological beliefs. *Journal of Educational Research*, 98(4), 222–232.
- Schommer, M. (1990). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology*, 82, 498–504.

- Schommer, M. (1993). Epistemological development and academic performance among secondary students. *Journal of Educational Psychology, 85*, 406–411.
- Schommer, M., Crouse, A., & Rhodes, N. (1992). Epistemological beliefs and mathematical text comprehension: Believing it is simple does not make it so. *Journal of Educational Psychology, 84*, 435–443.
- Schommer-Aikins, M. A. (2002). An evolving theoretical framework for an epistemological belief system. In B. Hofer and P. Pintrich (Eds.), *Personal epistemology: The psychology of beliefs about knowledge and knowing*, pp. 103-118. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Schraw, G., Bendixen, L. D., & Dunkle, M. E. (2002). Development and validation of the Epistemic Belief Inventory (EBI). In B. K. Hofer & P. R. Pintrich (Eds.), *Personal epistemology: The psychology of beliefs about knowledge and knowing*, pp. 261–275. Mahwah, NJ: Erlbaum.
- Shim, S. S., Ryan, A. M., & Anderson, C. J. (2008). Achievement goals and achievement during early adolescence: Examining time-varying predictor and outcome variables in growth-curve analysis. *Journal of Educational Psychology, 100*, 655–671. doi:10.1037/0022-0663.100.3.655
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*, 5th Ed. Boston, MA: Pearson Education, Inc.
- Urduan, T. (1997). Achievement goal theory: Past, results, future directions. In P. R. Pintrich & M. L. Maehr (Eds.), *Advances in motivation and achievement*, Vol. 10, pp. 99–142. Greenwich, CN: JAI Press.
- Wheeler, D. (2007). Development and construct validation of the epistemological beliefs survey for mathematics. Unpublished doctoral thesis, Oklahoma State University, USA.