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RESEARCH ARTICLE

SCHOLASTIC EXCELLENCE IN APPLIED MEDICAL SCIENCES EDUCATION AT NEWLY ESTABLISHED SAUDI ARABIAN UNIVERSITIES: EFFECT OF STUDENTS' PERCEIVED INTELLECTUAL ABILITY AND INQUISITIVENESS

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ABSTRACT

Introduction: Examination of students' beliefs about themselves, or self-theories, may provide important insight into their behaviour and these results shall contribute to the body of knowledge demonstrating the utility of the motivational concepts for understanding health sciences students' effort and achievement. This study shall examine the relationship between the students' beliefs about their intelligence, their curiosity and inquisitiveness, and whether these adaptive personal beliefs are predictive of their academic achievements.

Method: A Sample of 245 students were randomly selected from different colleges offering medical and health sciences courses from various newly established universities in Saudi Arabia. *Implicit Theories of Intelligence Scale and Curiosity and Exploratory Inventory* were used for measuring the outcomes. **Result:** It was found that the incremental intelligence beliefs accounted for 25% of the variance in students' course grades, $F(3,563) = 40.98, p < .05, \text{adj. } R^2 = .31$, whereas exploratory curiosity accounting for 13% and absorptive curiosity accounting for 8% of the total variance.

Discussion: In our sample, the students' incremental beliefs were significantly higher than their entity beliefs. Our results also showed that the students who believe intelligence is malleable are more likely to inquisitive behaviours; in our sample, the inquisitive behaviour were significantly positively associated with students' course grade leading to excellence in academic performance.

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INTRODUCTION

In recent years, allied health science education has undergone a marked transformation in a desire to understand the students motivational concepts related to learning and their educational goals. All stakeholders have been actively involved in research to further raise the standards of teaching and learning in allied health science education. Researchers have gathered a large amount of information regarding the student's intelligence belief, curiosity, and inquisitiveness, perception about their future and how this motivational concept affects their learning behaviour and educational goals (Dweck and Molden 2005). The excellence in academic performance reflects in students' prospects of achieving success in life expected of them and that they believe education will provide for them. What is important is that students enter the desired profession with the ability to apply the knowledge acquired at the university to a variety of ever-changing situations that they could not foresee before graduating. To prepare such professional is the mark of a quality education and a truer indication of academic excellence. Studies have provided an idea about how the students' personal thoughts affect their learning behavior

(Leondari and Gialamas 2002); we haven't yet delved deep enough into students mind to understand how they modulate their learning behaviour to achieve the desired future goals and academic excellence. It was suggested that the students who are academically unprepared and enter into higher education settings are more likely to experience adjustment problems during their university life, which directly affects their educational achievement and academic excellence (Liet *et al.*, 2005).

Most of the students believe that intelligence has two aspect, namely exceptional linguistic ability, which is evident by good reading comprehension, and good logical reasoning reflected by an ability to find solution to the most complex problems. Most students have either of the two distinct conceptions of their intellectual ability. Some students think that their intelligence is a fixed entity that they possess, and they cannot change it by any means; this is referred to as an entity theory of intelligence. Other students think that their intelligence is variable, which can be improved through their own efforts (Robins and Pals 2002). The students view about their intelligence has been known to provide distinct variations in their perception of learning and their reactions to failure. Curiosity may be defined as a desire to know, to see, or to experience that motivate exploratory behaviour directed

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towards the acquisition of the new information (Litman and Jimerson 2004). Curiosity overlaps with other psychological constructs and it is defined as a positive emotional-motivational system associated with the recognition, pursuit, and self-regulation of novel and challenging opportunities. An important motivational construct directly affects situations reflecting novelty and challenge with educational achievements and academic excellence. Inquisitiveness in students prompts proactive, desired behaviours in terms of better learning. This results in response to knowledge and activities, considered to have novelty, complexity, uncertainty, and conflict their by challenging the students skills and imagination. Studies have suggested two different types of exploratory tendencies; diversive curiosity which actively seek out varied sources of novelty and challenge and specific curiosity which actively seek depth in one's knowledge and experience with a particular information or activity (Litman *et al.*, 2005). Both the components seem to work together; the diversive curiosity encourages interactions with novel information and opportunities, whereas the specific curiosity is activated by uncertain and complex problems instigating the need for more information (Litman and Spielberger 2003).

Curiosity and exploratory behaviour makes the students seek out educationally meaningful interests and desires and thereby is an internally motivating factor for excellence in academic performance. The process initiated by curiosity and inquisitiveness, proposed to lead to positive subjective experiences and better understanding leading to an increase in attention allocation toward novel and challenging knowledge goals. It also leads to cognitive and behavioural exploration of rewarding information and an engagement with these activities resulting in integration of new knowledge by assimilation (Almeida *et al.*, 2008). It has been argued that optimal learning occurs when students' attention and abilities are fully engaged in challenging information. When the students are in a state of absorption they experience clear, immediate goals; maintain deeply focused concentration resulting in better learning. It is suggested that inquisitive students are more likely to actively pursue and take advantage of challenging information that can provide them active learning opportunities and thereby will help them reach their academic goals.

Curiosity is affected by internal and external novelty and challenge and perhaps can be self-generated. Internal processes of introspection, absorption, goal agency and pathways, and the integration of experiences can be expected to lead to greater well-being and increased self-expansion opportunities. As an idiosyncratic measure of what individuals characteristically do on a daily basis, curiosity was positively associated with appetitive personal strivings and reported progress, effort, purpose, social support, commitment, and enjoyment in their pursuit. Considering the potential intervening role of curiosity in skill and knowledge acquisition, the development of interests, goal perseverance, and various positive subjective experiences, the adequate measurement and study of individual differences in curiosity can be expected to open up new avenues of research across disciplines (Marsh and Hau 2004). The knowledge of student's perception about their intelligence, curiosity and their ability to explore more knowledge shall add important information to the intricate factors that influence their university grades and academic

excellence. To understand the students learning behaviour, it is imperative to delve deeper into their conscience, than just evaluating their classroom actions or inferences from their examinations. An understanding of students' beliefs about themselves may provide important insight into their learning behaviour. The student's beliefs about their intelligence, curiosity, and inquisitiveness affecting their confidence for learning, and eventual academic successes make it important that we explore this entire motivation construct threadbare to better equip the students of allied health sciences to deal with their educational goals. Examination of students' beliefs about themselves, or self-theories, may provide important insight into their behaviour and these results shall contribute to the body of knowledge demonstrating the utility of the motivational concepts for understanding health sciences students' effort and achievement. It will also provide important direction for educators, demonstrating the need to support these constructs for better education of the students of health sciences in newly established Saudi Arabian Universities. The proposed study will extend previous work by examining the student's perception about their intelligence and their inquisitiveness affecting academic excellence in a large sample of students from health sciences stream in newly established universities in Saudi Arabia. This study shall examine the relationship between the students' beliefs about their intelligence, their curiosity and inquisitiveness, and whether these adaptive personal beliefs are predictive of their academic achievements and scholastic excellence.

METHODOLOGY

A Sample of 245 students were randomly selected from different colleges offering medical and health sciences courses at various newly established universities in Saudi Arabia. The Implicit Theories of Intelligence Scale (ITIS) a six-item scale has been used to examine the students' perception about their intelligence. Internal consistency of this scale has been reported as ranging from $\alpha = .74$ to $.78$ and a test-retest correlation over a 10 week period of $r = .82$ (Snyder *et al.*, 1991). The Curiosity Exploration Inventory (CEI) has been used to measure both the dimensions of curiosity: exploration and absorption. The CEI has good psychometric properties, is relatively unaffected by social desirability of respondents, is relatively independent on positive effects and has homological network consistent with the theoretical framework. Data for this study has been obtained during the January 2011 to December 2013. Students have been informed about the survey by their course faculty, which they could take at their convenience. Students' course grades were retrieved from the university student's affair office and included in the data set as measured on a 5 point GPA.

RESULTS

Scale scores were obtained for each student by calculating a mean score from the respective items contained in both of the scales used in this study. Pearson product moment correlation coefficients were then completed among the study variables. A dependent samples *t*-test was done to examine for differences in students' incremental and entity beliefs about their intelligence.

Table 1. Correlations among Study Variables

Variables	1	2	3	4
1. ITIS-INCRE				
2. ITIS-ENT	-0.86**	-		
3. CEI-E	0.25**	-0.18**	-	
4. CEI-A	0.09*	-0.07	0.32**	-
5. Grade	0.12*	-0.23*	0.17**	0.19**

Note:** $p < .01$; * $p < .05$. Listwise $N = 245$. ITIS-INCRE= Incremental Beliefs; ITIS-ENT=Entity beliefs; CEI-E=Curiosity and Exploratory Inventory-Exploration; CEI-A=Curiosity and Exploratory Inventory-Absorption. Grade: Course grade on a 5-point scale

Multiple regression was done to examine the predictive ability of intelligence beliefs and inquisitiveness on students' course grade. The result revealed a positive correlation between students' incremental intelligence belief and was positively correlated with both the aspects of curiosity; exploration and absorption ($r = .25$ and $.09$). Both the aspects of curiosity were found to be positively associated with the course grade ($r = .17$ and $.19$). The incremental belief was also found to be positively associated with the course grade ($r = .12$). Conversely, entity beliefs were negatively related to students' course grade ($r = -.23$) (Table 1).

The dependent samples t-test showed that the students' incremental beliefs were significantly greater than their entity beliefs, $t(395) = 8.96$, $p < .05$. Results of the first multiple regression analysis showed that students' incremental and entity intelligence beliefs, their curiosity and inquisitiveness were predictive of their academic performance $F(4,353) = 32.92$, $p < .05$, adj. $R^2 = .31$.

Table 2. Regression analysis among the study variables

Model / Variables	R ²	R ² adj	B	SEB	sr ²
Course Grade					
Model 1	.28**	0.31			
Intercept			0.03	0.05	
CEI-E			.19**	0.12	0.09
CEI-A			.29**	0.13	0.08
ITIS-INCRE			.20**	0.11	0.06
ITIS-ENT			0.04	0.15	-
Model 2	.28**	0.31			
Intercept			0.04	0.09	
CEI-E			.25**	0.07	0.09
CEI-A			.27**	0.06	0.07
ITIS-INCRE			.15**	0.07	0.05

Note:** $p < .01$; * $p < .05$. Listwise $N = 432$. ITIS-INCRE= Incremental Beliefs; ITIS-ENT=Entity beliefs; CEI-E=Curiosity and Exploratory Inventory-Exploration; CEI-A=Curiosity and Exploratory Inventory-Absorption.

After eliminating the non-significant predictor, entity beliefs, the model was re-evaluated. The second model including exploration and absorption curiosity, incremental intelligence beliefs and course grade. It was found that the incremental intelligence beliefs accounted for 25% of the variance in students' course grades, $F(3,563) = 40.98$, $p < .05$, adj. $R^2 = .31$, whereas exploratory curiosity accounting for 13% and absorptive curiosity accounting for 8% of the total variance (See Table 2).

DISCUSSION

Our study provided interesting results with regard to the prevalence of incremental beliefs among the students studying in health sciences specialities in newly established universities in Saudi Arabia. In our sample, the students' incremental beliefs were significantly higher than their entity beliefs. Our results also showed that the students who believe intelligence is malleable are more likely to inquisitive behaviours; in our sample, the inquisitive behaviour were significantly positively associated with students' course grade leading to excellence in academic performance. In contrast, the students who reported entity beliefs were significantly less likely to engage in exploratory and inquisitive behaviour. Findings such as these should stimulate thought among the health sciences educators about how these beliefs develop and how they might cultivate them in their students. Despite our finding that some students had higher incremental beliefs, there are still students who hold entity beliefs that may be vulnerable to this sequence of events. Although it might seem too late at the university level to undo perceptions that students have been developing since early childhood, studies have shown that small interventions do indeed make a difference.

Our study results had shown a positive relationship between intelligence beliefs and students' course grades leading to excellence in academic performance. As previous studies have shown (Aronson *et al.*, 2002; Butler 2000; Dupeyrat and Marine 2005) the effect of intelligence beliefs on performance may be evident if these variables were evaluated over time, and there may be other motivational factors that mediate this relationship (Thompson and Musket 2005). However, the positive association between students' perceived intelligence and their exploratory behaviour still provides important direction for course instructors with regard to nurturing students' adaptive beliefs about learning in the classroom. Diverse curiosity or exploration entails scanning, recognizing, pursuing, and allocating personal resources (e.g., attention) to novel and challenging experiences, regardless of source. Engagement in well-defined activity brings with it specific curiosity and exploration and entails flow-like absorption and investigative behaviors resulting in discovery, pleasure, and skill usage. These two components of curiosity can lead to learning and a sense of mastery by the successful integration of new experiences and the notion that curiosity begets further curiosity. In contrast to other curiosity models (Loewenstein 1994), we have provided theoretical arguments and data to show that higher levels of curiosity constitute an intensely pleasant dimension of human functioning. Based on our model, we would hypothesize that the greatest rewards come from the process of integrating novel and challenging experiences rather than the affect associated with it.

Consistent with prior theory and research on curiosity related constructs (Cury *et al.*, 2006), our findings indicate that being curious is associated with positive subjective experiences; beliefs that goals are attainable and obstacles can be circumvented; general tendencies to enjoy effortful cognitive endeavors and be open to new experiences and ideas; and self-determined tendencies to recognize, pursue, and thrive in challenge. Curiosity is considered to be negatively related to anxiety, boredom, and apathy, which have all been shown to

thwart the self-regulation of attentional resources and learning (Gallagher and Lopez2007).Our results give credence to the faculty practice of encouraging incremental beliefs in students. Praise and feedback have been associated with the development of either entity or incremental beliefs (Gonida *et al.*, 2006). Praise or feedback that emphasizes students' intellectual ability, promotes the idea that ability is innate, and supports students' entity beliefs, whereas communication that acknowledges their effort is much more likely to nurture the idea that they have continued ability to learn, or incremental beliefs (Ommundsen *et al.*,2005). It is also important to emphasize to students that course material is within their grasp, and that learning will occur if they expend the effort to do so (Robins and Pals2002). Students should be encouraged to work harder and attempt multiple strategies to meet their goal. Assignment of complex problems that have no clear-cut answer to provide opportunity for this type of experience. Faculty support that includes identification of acceptable answers as students tackle these types of challenges will foster the idea that effort can result in excellence in academic performance, a core assertion of incremental beliefs leading to inquisitive and exploratory behaviour.Reminding students frequently that intelligence is malleable can serve to reinforce this vital belief. Although seemingly simple, these interventions may provide significant returns with regard to the way students approach learning in the classroom. This will directly affect the student's ability to apply the knowledge in a relevant, real-world setting, which is true marker of academic excellence. When students are engaged in the learning process, real achievement takes place, and their chances to professional excellence increases manifold. Often, all that is required is a change of attitude and the willingness to restructure education so that it prepares students for life, not just for the exam.

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