

Effect of Epistemological beliefs, learning approach and Reflective thinking on academic achievement

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Abstract: - The purpose of this study was to investigate the Effect of Epistemological Beliefs, Learning Approach, And Reflective Thinking On Academic Achievement. Through multistage cluster sampling 332 subjects (176 females, 156 males) were selected from all male and female mathematic student in Tehran Universities. To collect the data three questionnaires, i.e, Schommer Epistemological Questionnaire (EQ, Schommer, 1990), Revised Study Process Questionnaire (R-SPQ-2F, Biggs, Kember & Leung, 2001)' and Reflective Thinking Questionnaire (RTQ, Kember et al, 2000). The results indicated that the obtained model fit the data adequately. It was found that epistemological beliefs predicted learning approach and academic performance and learning approaches predicted reflective thinking and academic performance. Furthermore, learning approaches mediated the effect of epistemological beliefs on reflective thinking and academic performance.

Key-Words: Epistemological beliefs, learning approach, Reflective thinking

1 Introduction

Learning and academic performance are influenced by numerous cognitive variables. Among them epistemological beliefs, learning approach, and reflective thinking are the most important:

Epistemological beliefs

Epistemological beliefs are beliefs which are about the nature of knowledge and knowing (Hofer & Pintrich, 1997). During the last two decades, these beliefs have become targets of increased research interest (Buehl & Alexander, 2001; Hofer & Pintrich, 2001)

There are many methodological examinations and theoretical models of epistemological beliefs. In empirical research which suggest that dimensions of epistemology exist as a continuum (Hofer, 2004: hofer & pintrich, 1997). Schommer reorganizes epistemological beliefs as a system of more or less independent beliefs. "By system, it means that there is more than one belief to consider, and by more or less independent, it means that a learner could be sophisticated in some beliefs, But not necessarily sophisticated in other beliefs" (Schommer, 1993, p.407). Four dimensions of epistemological beliefs were hypothesized, ranging from naive to sophisticated: (a) structure of knowledge (ranging from isolated bits to integrated concepts); (b) stability of knowledge (ranging from certain to evolving); (c) speed of learning (from quick or not at all

to gradual) and (d) ability to learn (ranging from fixed at birth to improvable) (Schommer, 1994a, 1994b; Schommer-Aikins & Hutter, 2001).

Learning approach

Theoretical and empirical research evidence indicates three major learning approaches: surface, deep and achieving (Phan & Deo, 2007). Student learning approach (SAL) has two major learning approaches to learning were identified: deep and surface. According to this theoretical perspective, students may adopt a deep approach to learning with an intention to understand the author's meaning and linking it to their prior knowledge and personal experience. In contrast, students may also adopt a surface learning approach where the main emphasis is on studying merely for the intention of reproducing information without any further analysis. In Australia, investigations conducted by Biggs, using a Quantitative methodology, in which large samples, questionnaires, and multivariate analyses were employed, yielded similar results to those found in European research.

Reflective thinking

The notion of reflective thinking originates from the work of John

Dewey (1933) in which he described it as «active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the conclusion to which it tends.» (p. 9). Reflective thinking, according to Dewey, emphasizes the consequences of ideas and suggests future physical action to confront and to solve a variety of personal and professional obstacles. At present, the work of Leung and Kember (2003) is prevalent as it examines SAL within previous framework of reflective thinking. Leung and Kember advocated four stages of reflective thinking; in their order: habitual action, understanding, reflection and critical reflection. Habitual action is a mechanical and automatic activity that is performed with little conscious thought. Understanding is learning and reading without relating to other situations. Reflection concerns active, persistent and careful considerations of any assumptions or beliefs grounded in our consciousness. Finally, critical reflection is considered as a higher level of reflective thinking that involves us becoming more aware of why we perceive things, the way we feel, act and do. In the Present study the main objective was examination of the causal influence of both epistemological beliefs and SAL on reflective thinking, and the subsequent causal effect of reflective thinking on students' academic achievement.

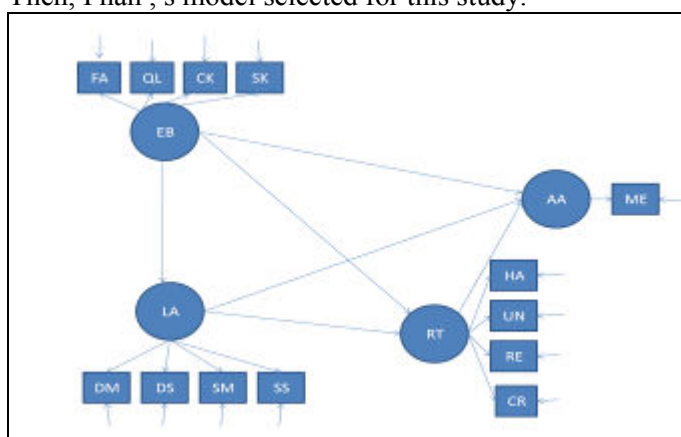
2 Method

Model conceptualization:

According of relevant literature, four models were found:

1. Cano (2005)
2. Phan (2006) (1)
3. Phan (2006) (2)
4. Phan (2008)

Then, Phan , s model selected for this study.



According to this model:

This study examined the relation among epistemological beliefs, learning approach and reflective thinking with academic achievement.

Subjects

The participants consisted of 332 subjects (176 female, 156 male) were selected from the population of the study that included all male and female mathematic student in Tehran Universities.

Instruments

Study process questionnaire (R-SPQ-2F)

Existing research studies using Biggs' study process questionnaire (SPQ) have indicated the recurrent theme that the major learning approaches are best described by a two-factor structure (Leung & Kember, 2003;). The revised SPQ, developed recently by Biggs et al. (2001), offers an alternative with consistent research evidence supporting for its use (Biggs et al.2001; Leung & Kember, 2003). The R-SPQ-2F consists of 20 items grouped into two approaches – deep and surface. Each subscale (e.g. deep motive (DM)) comprises five items answered on a 7-point Likert scale ranging from 1 (always true of me) to 7 (only rarely true of me); for example, 'I find that at times studying gives me a feeling of deep personal satisfaction' (deep motive), 'I find that I have to do enough work on a topic so that I can form my own conclusions before I am satisfied' (deep strategy), 'My aim is to pass the course while doing as little work as possible' (surface motive) and 'I only study seriously what's given out in class or in the course outlines' (surface strategy). A full version of the 20 items may be obtained from Biggs et al. Researchers using this instrument have reported reliability estimates ranging from .57 to .72 for the four subscales (Biggs et al.; Leung & Kember, 2003).

Reflective Thinking Questionnaire (RTQ)

The Reflective thinking questionnaire (RTQ) developed by Kember et al. (2000) Contains 16 items descriptive of the four types of reflective thinking.

These items are organized on a seven-point scale ((1) definitely agree , (7) definitely disagree) include, for example: 'In this course we do things so many times that I started doing them without thinking about it' (habitual action); 'To pass this course you need to understand the content' (understanding); 'I often re-appraise my experience so I can learn from it and improve for my next performance (reflection) and 'This course has challenged some of my firmly held ideas' (critical reflection).

Epistemological Beliefs Questionnaire

Epistemological beliefs were measured using the Schommer's (1990) 63-item EQ. The EQ has been used in previous studies to reflect four distinct dimensions of personal epistemology: Innate Ability; Simple

Knowledge; Quick Learning; and Certain Knowledge. These ratings provide an indication of a participant's range of beliefs along a continuum from a higher score (naive belief) to a lower score (sophisticated belief). Furthermore, the EQ has been shown

Table 1: Means, standard deviation and Cronbach alpha for scales and subscales of the EQ, R-SPQ-2F and RTQ

Sub-scales	Mean	Sd	Alpha
EQ			
Fixed ability	25/11	5/49	0/68
Quick learning	24/92	5/47	0/62
Certainly knowledge	25/50	4/81	0/59
Simple learning	26/51	5/21	0/65
R-SPQ-2F			
Deep motive	13/61	5/47	0/72
Deep sterategy	12/32	5/32	0/69
Surface motive	12/52	4/47	0/66
Surface sterategy	12/24	4/42	0/69
RTQ			
Habitual action	12/67	3/28	0/59
understanding	10/006	4/81	0/60
reflection	11/26	4/41	0/66
Critical reflection	10/01	4/38	0/58

Table 2: Covariance matrix used in the hypothesized model

	FA	QL	CK	SK	DM	DS	SM	SS	HA	UN	RE	CR	MEA
FA	29/90												
QL	14/29	27/01											
CK	10/49	11/69	22/09										
SK	16/09	16/89	11/16	34/24									
DM	-10/90	-11/32	-3/54	-14/71	29/36								
DS	-9/61	-9/20	-4/26	-12/02	24/01	23/26							
SM	8/13	8/70	2/40	6/64	-10/66	8/24	18/36						
SS	5/03	7/07	3/46	2/87	-9/23	7/57	14/31	18/21					
HA	2/002	7/24	3/70	4/61	-4/74	4/18	5/02	6/84	9/56				
UN	3/29	6/13	5/53	5/81	-7/99	7/24	6/57	3/49	5/14	18/26			
RE	-1/56	-3/12	-1/63	-2/56	8/70	9/42	-4/64	-5/51	-2/88	-8/02	12/66		
CR	-3/62	-5/68	0/55	-2/07	11/17	10/64	-7/32	-6/84	-3/45	-3/87	5/08	14/51	
MEA	-10/89	10/98	11/29	-6/25	32/02	28/54	-14/75	-4/51	0/89	2/38	-2/74	7/71	265/91

Note: Fixed ability; QL, Quick learning; CK, Certain knowledge; SK, Simple knowledge, DM, Deep motive; DS, Deep strategies; SM, Surface motive; SS, Surface strategies; HA, Habitual action; UN, Understanding; RE, Reflection; CR, Critical reflection; MEA, Academic achievement.

3 Results

Estimation of the initial path analysis indicated relatively goodness support for the hypothesized model.

Figure 1: general goodness support for the hypothesized model

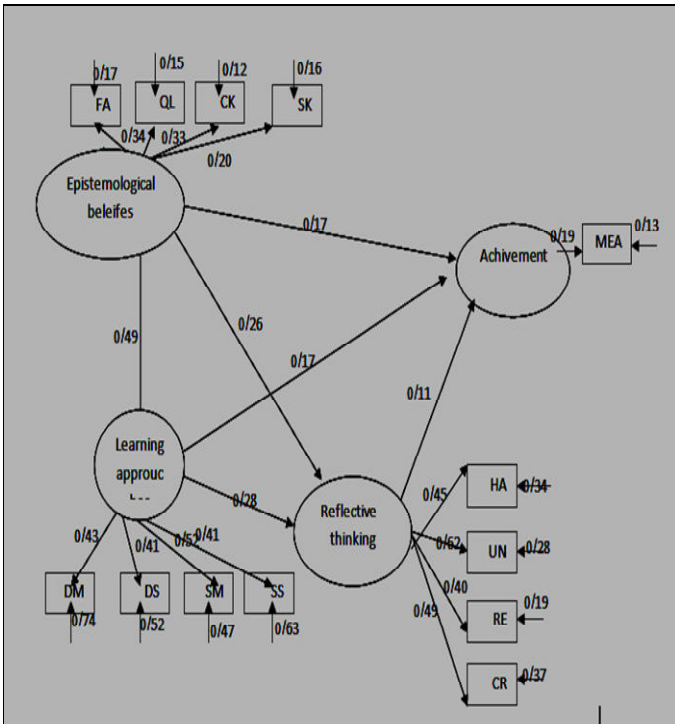


Figure 3: goodness support for the hypothesized model in male

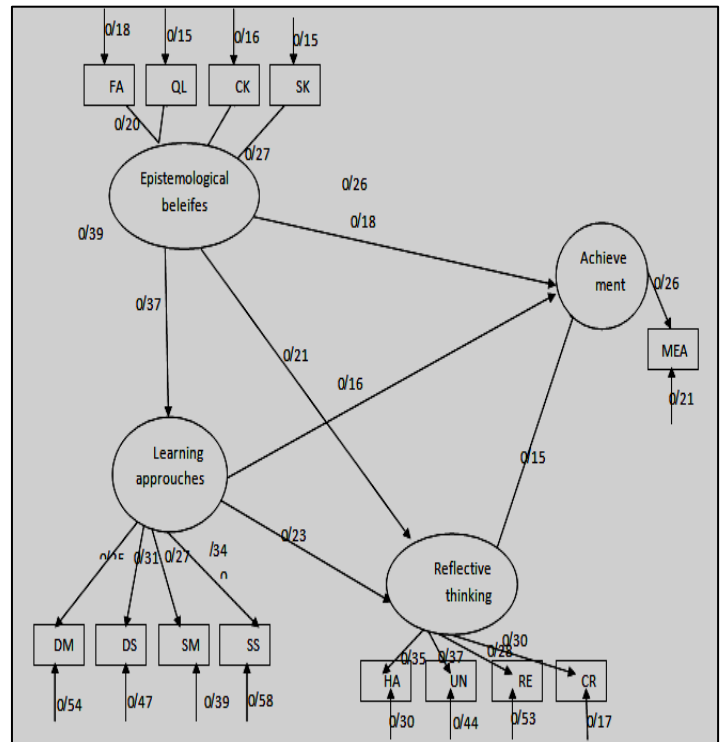
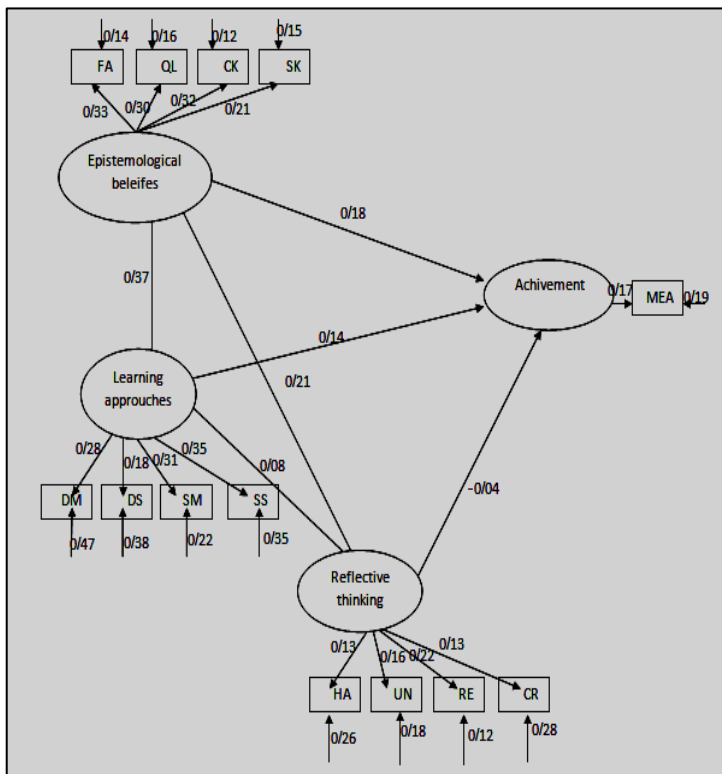


Figure 2: goodness support for the hypothesized model in female



4 Discussion

The purpose of this study was the examiner of causal influence of both epistemological beliefs and SAL on reflective thinking, and the subsequent causal effect of reflective thinking on students' academic achievement. As predicted, students' epistemological beliefs influenced their approaches to learning. This finding is in line with previous studies that examined the relationship between epistemological beliefs and learning approaches (Cano, 2005; Phan, 2006, Phan, 2008). As predicted, both epistemological beliefs and learning approaches predicted academic performance. These findings are consonant with previous studies that examined the relationship between epistemological beliefs and academic performance (Cano, 2005; Hofer, 2000; Schommer-Aikins et al., 2005, phan, 2006, phan, 2008). The present findings showed to learning approaches predicted reflective thinking. This evidence supports previous contentions that students who make use of particular learning approaches in their studying are more aware of their reflective thinking practice (phan,2006, phan, 2008). And epistemological beliefs not predicted reflective thinking

Despite the non-significant structural relationship between reflective Phan (2006) and Phan (2008) showed that epistemological beliefs predicted reflective thinking, because of students' beliefs about the nature of learning and knowledge influence their reflective thinking in learning. Previous research has advocated a similar line of reasoning, suggesting that epistemological beliefs may operate as part of a larger system to determine students' higher-order thinking. Results of the causal-mediating model also supported the cross-lag model; SAL mediates the effect of epistemological beliefs on academic performance. Previous research studies have similarly found that epistemological beliefs indirectly influence Academic performance via SAL (Cano, 2005; phan, 2006, phan, 2008).

In this research found that reflective thinking not predicted academic performance (phan,2008). It seems more than plausible that in many tertiary institutions, the teaching and assessment procedures that take place at present do not require or encourage the use of reflective thinking. The absence thereof in reflective thinking may consequently result in a lack of academic performance increase.

Despite the non-significant structural relationship between epistemological beliefs and reflective thinking and academic performance, the results are significant as they indicate the interrelatedness between the three theoretical frameworks in examinations of students' academic success. Only phan(2008) to date has

amalgamated and tested the three theories in academic settings within the one study.

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