



Epistemological Belief and Learning Approaches of Students in Higher Institutions of Learning in Malaysia

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This is an investigation of the students' beliefs about the nature of knowledge or epistemological beliefs, and the relation of these beliefs on their learning approaches. Students chosen as samples of the study were from both public and private higher institutions of learning in Malaysia. The instrument used in the study consists of 49 items measuring students' epistemological beliefs and 20 items on their learning approaches. Items on epistemological belief were adapted and modified from Schommer's Epistemological Questionnaire (1990) and Schraw, Bendixen and Dunkle (2000) Epistemic Beliefs Inventory that assesses students' beliefs about simple knowledge, certain knowledge, quick learning, and fixed ability to learn. Items on learning approaches were adapted from Bigg's forty-two-item Study Process Questionnaire (SPQ), designed for tertiary-level students. The instrument was administered to 1405 students of higher institutions of learning both public and private. Differences in epistemological beliefs among students of these higher institutions, ethnic and between genders were examined.

Key Words: Epistemological Beliefs, Learning Approaches, Higher Institutions of Learning in Malaysia, Higher Institutions, Learning, Students

INTRODUCTION

Research on epistemological beliefs and its contribution to education particularly in identifying student's knowledge, their abilities and the learning strategies they adopt has been long undertaken and had been a matter of interest to many researchers (Cano, 2005; Nist & Simpson, 2000 and Marton & Saljo, 1984). This is because the factors that motivate students to learn and their ensuing success or failure to a considerable extent, depends on the learning approaches they adopt in the course of their study. The

relation of students' belief and motivation to learn is related to their epistemological beliefs which play an important role in student's knowledge acquisition, the reasoning process and their level of academic achievement. The importance of epistemological assumptions that underlie the process of knowing a certain knowledge had also been acknowledged by Benson and Griffith (1991) who believe that knowledge should not be construed as one that is merely consisting of a set of skills.

Research on students' learning approaches had been numerous since the late 1970s. Marton and Saljo (1976), for instance, had identified the 'surface' and the 'deep' approach each having a distinct meaning with regards to understanding knowledge. A surface approach describes the intention to reproduce information in a manner that is unreflective of the knowledge learned, while the deep approach involves the intention to understand knowledge in depth.

Epistemological beliefs are beliefs about the nature of knowledge and learning. In the late 1980s, Schommer integrated epistemological dimensions and conceived them as a system of independent beliefs which means that there are **multiple beliefs that compose one's personal epistemology**. One of the claims pertaining to this is, one's epistemological belief may change over time. In spite of one believing that deep learning of knowledge is gradual, he or she may also hold the belief that knowledge is best characterized as isolated bits and pieces.

Many studies have explored the relationships between epistemological beliefs and psychological processes, such as mathematics teaching and learning (Gill, Ashton & Algina, 2004; Schommer & Crouse, 1992). Studies on the epistemological beliefs in science learning (Neber & Schommer, 2001) and academic achievement (Scevak & Cantwell, 2001) had also been explored. However, the study of personal epistemology began with the work of William Perry, Jr. (1968) whose research team interviewed Harvard undergraduates over their four-year college experience and concluded that many first-year students believe that simple, unchangeable facts are handed down by omniscient authority (Schommer, 1990). To further highlight this point, Schommer (1990) conceptualized the following five dimensions of epistemological beliefs namely: (1) stability of knowledge (Certain Knowledge) which characterizes knowledge as ranging from one that is tentative to unchanging; (2) Structure of Knowledge (Simple Knowledge) which posits knowledge as ranging from isolated bits to integrated concepts and whether knowledge is dispersed or integrated at an abstract conceptual level; (3) Source of Knowledge (omniscient Authority) which describes knowledge as handed down by authority to knowledge that is acquired through reason or logic; (4) Speed of Knowledge (Quick Learning) relating knowledge as one that is fast acquired or rather is a slow and gradual process and (5) Control of Knowledge Acquisition (Innate Ability) viewing knowledge as one fixed at birth or an ability that can be acquired through life-long improvement.

Schommer's extensive studies on epistemological beliefs among others, also conclude that the less students believed in quick learning, simple knowledge, certain knowledge and fixed ability, the better were the CGPS that they earned. This point is made

pertinent when it was revealed that belief in simple knowledge, certain knowledge and quick learning decreased from freshman to senior years (Schommer, 1993).

Although no differences were found between boys and girls with regard to belief in certain knowledge and simple knowledge, they did differ in their belief in quick learning and fixed ability. This is found in Schommer's study (1990) in which girls were less likely to believe in quick learning and fixed ability. Probably, this gender difference in belief in quick learning can be partly attributed to the explanation for the finding that girls are more likely to show less confidence in their understanding and are more accurate in their comprehension monitoring (Pressley & Ghatala, 1989).

Epistemological belief and learning approach is also discussed from the five epistemic dimensions as measured by the Epistemological Beliefs Inventory (EBI) (Bendixen, Schraw & Dunke, 1998). These consist of (1) simple knowledge-knowledge - comprising of concrete facts (naïve learners), (2) certain knowledge, the belief that absolute knowledge exists and will eventually be known, (3) omniscient authority, the belief that authorities have access to otherwise inaccessible knowledge, (4) quick learning, the belief that learning occurs in a quick or not-at-all fashion and (5) fixed ability, the belief that the ability to acquire knowledge is innate or genetically determined.

On the other hand, King and Kitchener (1994) had investigated students' conceptions of knowledge and affirmed that in the early stages of development, individuals believe that knowledge is simple which in the later stages, its certainty can be determined by an authority.

METHOD

This study aims at establishing the relationship between epistemological belief and learning approaches amongst students of higher institutions of learning in Malaysia based on their demographic background namely: gender, ethnic differences, programmes or areas of specialization, location of higher institutions of learning and year of study.

Population and Sampling

There are nineteen public universities in Malaysia with an estimated of 350,000 students. Four public universities were selected. Based on Cochran's formula, an estimated 500 students of each university will be selected totaling 2000 as sample size (Cochran in Bartlett, James E., Kotrlik, Joe W. & Higgins, Chadwick C., 2001). Before administering the questionnaires, permission was first sought from the Educational Planning Research Division (EPRD), Ministry of Education (MOE) of Malaysia to conduct the research. After permission was granted by EPRD, the researchers proceeded with requesting for the permission from the Deans of the higher institutions chosen. This was done by writing a formal letter of application and followed by individual appointment with the respective deans for this purpose before consent was finally granted to researchers to conduct the research. Confidentiality of the participants' data was duly maintained throughout the administration of the instrument

and analysis of data. Participants' names were not written in the questionnaires as instructed.

Instrument

An instrument consisting of two parts was used in the study, one for measuring epistemological beliefs and the other, on the study approaches of students. Items in the instrument were adapted from Schommer's 63-item on Epistemological Beliefs and Bigg's forty-two-item Study Process Questionnaire (SPQ) designed for tertiary-level students respectively. Permission for the use of Schommer's instrument was made by contacting her via email. In the email to Schommer, the researchers provided the following information requested by Schommer namely:

name, address, phone number, and e-mail address of the investigator(s), institutional affiliation, characteristics of the sample and purpose of using the test. The instrument constructed for this research which adapted Schommer's instrument 63-item instrument was further validated by a panel of experts in the areas of epistemology and learning approaches.

Data Collection

Data was administered by the researchers on the respective students from two public universities and two private higher institutions of learning. Participants who were not able to return the research instrument when the researchers were there will be required to return it through mail. Follow-up phone calls and reminders were sent to participants who did not respond after three weeks. Students enrolled from the seventh to the final semesters were used as participants for this study. It is assumed that such students would have had acquired a matured level of epistemological beliefs and are consistent in their learning approaches.

Cronbach's Alpha Test was used to measure the reliability of the items for the two variables used in the study. For epistemological belief, the reliability measured was 0.76 while the learning approaches the reliability was 0.81. The reliability measure for the deep approach was 0.80 while the surface approach was 0.83.

FINDINGS AND DISCUSSION

There are several findings based on this study that need to be highlighted. Findings of this study relate to the research questions addressed as (1) What are the characteristics of the epistemological beliefs and study approaches held by university students?, (2) Are there any significant differences in epistemological beliefs and study approaches of university students based on age, program, gender, ethnic group and year of study? And, (3) Is there any significant relation between epistemological beliefs and learning among university students? From the findings of this study, several conclusions and implications can be arrived at.

One of the findings shows that there is a weak and negative correlation between students' academic performance based on their Cumulative Grade Point Average (CGPA) and their deep approach learning ($r = -0.10$, $p < 0.05$). This shows that the more

inclined the students towards adopting the deep learning approach, the higher is their CGPA.

Findings established from this study also reveals that there is a high and significantly positive correlation between the various epistemological beliefs of students and their inclinations towards adopting the surface learning approach ($r=0.54$, $p<0.05$). Students with less complex epistemological beliefs were found to be more inclined using the surface learning approach.

Table 1: Comparing epistemological belief and learning approach based on gender

	Gender	N	Mean	SD	df	t	Sig
Epistemological Belief	Male	402	2.86	0.27		7.73	0.00
	Female	817	2.73	0.26			
Learning Approach	Male	446	2.70	0.52		-2.93	0.00
	Female	916	2.78	0.46			

** $p < 0.05$

Based on gender factor, findings of study also show that there is a significant difference ($t=7.73$, $p<0.05$) in the students' epistemological beliefs in which female students were found to have a more complex epistemological beliefs than the male students (Mean=2.86, $p<0.05$). The findings cohere with the findings which show that female students were more inclined to adopt the deep learning approach (Mean = 2.78, SD=0.46.) compared to their male counterparts (Mean = 2.70, SD = 0.52). This finding coheres with the view of Richardson & King (1991) who suggest that some research showed that woman tend to score higher on deep and achievement approaches, while men have higher surface approach scores. On learning approaches, findings show that there is a significant difference between the male (Mean = 2.70, SD = 0.52) and female students ($t=-2.93$, $p<0.05$).

Table 2: Epistemological beliefs and learning approaches based on program of study

	Program	N	Mean	SD	df	t	Sig
Epistemological Belief	Science	683	2.79	0.28		2.75	0.00
	Social Science	539	2.70	0.27			
Learning Approach	Science	770	2.70	0.49		-4.66	0.00
	Social Science	596	2.82	0.46			

** $p < 0.05$

Findings established from this study also reveals that there is a high and positive correlation between the various epistemological beliefs of students based on their program of study/ areas of specialization. With regards to this, the epistemological beliefs of students from the social sciences discipline were found to be more complex compared to students from the physical science discipline. Students from these two knowledge disciplines also differ significantly in their learning approaches ($t = -4.66$, $P < 0.05$) with a mean of 2.70 and SD of 0.49 for the science students. For the social science students a mean of 2.82 and SD of 0.46 was established based on the findings. Students from the social science program were more inclined to use the deep learning approach compared to the physical science students who tend to use the surface learning approach. A study by Watkins (2001), showed that amongst the physical

students, the Physics fared better than the Biology majors as the latter used the rote-learning strategies for the most part in their learning approach.

Table 3: Epistemological belief and learning approach based on higher institutions of learning/universities

	<i>University</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>df</i>	<i>F</i>	<i>Sig</i>
Epistemological Belief	Public HEI	986	2.75	0.27		-6.23	0.00
	Private HEI	236	2.87	0.26			
Learning Approach	Public HEI	1118	2.10	0.57		-5.2	0.00
	Private HEI	271	2.30	0.57			

** p < 0.05

Based on higher institutions of learning or universities both public and private, findings denote that there is a significant difference in the students' epistemological beliefs of the public higher institutions of learning (Mean = 2.75, SD=0.27) and the private institutions (Mean=2.87, SD = 0.26). The epistemological beliefs of students of public institutions were found to be more complex compared to that of the private institutions. A significant difference was also noted (t=-5.24, p<0.05) based on the surface learning approach which suggests that students of the private higher learning institutions were more apt to use the surface learning approach compared to their counterparts from the public learning institutions (Mean =2.10. SD= 0.57). The selection of students based on meritocracy into the public higher institutions of learning (Md. Yunus *et al.*, 2006) can be a possible factor for the complex epistemological beliefs among students of the public higher learning institutions compared to students of the private higher institutions.

Nevertheless, findings of this study did not show any significant difference between students from the two categories of institutions of learning that relates to the deep surface learning approach.

Table 4: Epistemological beliefs and learning approach based on year of study

	<i>Year of Study</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>df</i>	<i>F</i>	<i>Sig</i>
Epistemological Belief	First	514	2.74	0.27	3	9.79	0.00
	Second	288	2.76	0.26			
	Third	294	2.80	0.30			
	Fourth	116	2.88	0.25			
Deep	First	574	2.72	0.46		3.16	0.00
	Second	329	2.77	0.50			
	Third	332	2.82	0.49			
	Fourth						
Learning Approach	First	582	2.03	0.55		19.13	0.00
	Second	329	2.12	0.56			
	Third	331	2.24	0.61			
	Fourth	135	2.37	0.54			

** p < 0.05

As seen in Table 4 above, a significant difference in epistemological beliefs of students based on year of study (F =9.79, p<0.05) is noted. Post Hoc test using Benferroni Test

shows that the mean score of Year One students (Mean =2.74, SD= 0.27) differs significantly with the mean score of Year Three (Mean= 2.80, SD =SD =0.30) and Year Four students. The epistemological beliefs of Year One students were found to be more complex compared to that of Year Four.

Besides the findings discussed above, the study also yields the following results. There is a significant difference among students of the four categories year of study in their use of the deep learning approach ($F = 3.16, p < 0.05$). Post hoc analysis confirmed that the mean score of Year Three students (Mean = 2.82, SD =0.49) differed significantly with the mean score of Year One students (Mean = 2.72, SD =0.46). Year Three students were more inclined to use the deep learning approach compared to the Year 1, Year 2 and Year 4 students. A significant difference was also found among students from the four levels of year of study in their use of the deep approach in learning ($F=3.16, p < 0.05$). Post Hoc analysis revealed that the mean of Year Three students (Mean=2.82, SD=0.49) differed significantly with the mean score of Year one students (Mean=2.72, SD =0.46). A significant difference in the surface learning approach among students of all the four levels of study years was also established from the findings ($F= 19.13, p < 0.05$). The first year students (Mean 2.03, SD = 0.55) differ significantly from the third (Mean=2.24, SD0.61) and fourth year students (Mean= 2.37, SD=0.54). The fourth year students were found to be more inclined using the surface learning approach compared to the first, second and third year students. This situation can be attributed to the factors such as rigorous time schedule, demand of the curriculum, examinations, familiarity with questions techniques and time constraints as suggested by Gow, Balla, Kember & Stokes (1989).

Based on ethnic as one of the variables studied, findings, however, did not did not show any significant difference among students of various ethnic origins in their epistemological beliefs. However, in the use of learning approaches, findings show that there is a significant difference as seen in Table 5 below:

Table 5: Learning approaches of students based on ethnic

	<i>Ethnic</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>df</i>	<i>F</i>	<i>Sig</i>
Deep Approach	Malay	915	2.78	0.45	3	10.08	0.00
	Chinese	172	2.57	0.50			
	Indian	55	2.74	0.58			
	Others	69	2.77	0.53			
Surface Approach	Malay	924	2.09	0.55	3	5.24	0.00
	Chinese	172	2.26	0.58			
	Indian	54	2.13	0.53			
	Others	68	2.20	0.60			

** $p < 0.05$

Based on the deep approach learning, there is a significant difference between students from the four ethnic groups ($F=10.08, p < 0.05$). Post hoc Bonferroni test shows that students of the Chinese ethnic origin (Mean=2.57, SD=0.53) differ significantly with the Malay students (Mean=2.78, SD =0.45) and students of other ethnic origin (Mean=2.77, SD =0.53). Malay students were found to use more of the deep approach

compared to the Chinese, Indian and other ethnic students. For the surface learning approach, there is a significant difference among the four ethnic groups ($F=5.24$, $p<0.05$). Post hoc test revealed that the Malay students (Mean=2.09, SD=0.55) differ significantly with the Chinese students (Mean=2.26, SD = 0.58). The findings also suggest that Chinese students tend to use the surface learning approach compared to students of other ethnic groups. This finding relates to a study by Chan (2003) and Watkins and Biggs (1996) as explicated in the foregoing discussion of this paper.

DISCUSSION

The basic tenet of higher institutions is the transformation of students' learning experience to encourage deep and higher order thinking skills about learning and knowledge. Past studies on factors that contribute to relationships between students' of higher institutions of learning epistemological beliefs and their learning approaches had been carried out in different cultural and academic contexts (Perry, 1970, Chan, 2003). This study was conducted to find out the undergraduates' epistemological beliefs and their learning approaches in the context of the Malaysian higher education setting.

With regards to the students' programmes or knowledge specialization, findings of the study reveal the tendency amongst the social science students of the Malaysian higher institutions of education to use the deep approach in learning compared to their physical science counterparts. This is perhaps due to the subjective nature of the social science disciplines which for the most part, require reflection and interpretation of the subject matter learned. Contrary to this phenomena, a study by Watkins (2001) found that Biology students used the most rote-learning strategies which did not help them earn high grades in the course compared to their Physics counterparts whose focus on reasoning abilities and beliefs about the nature of Science fared better than their Biology counterparts.

On a similar note, Phan (2008) noted in his study that participants prefer the use of problem-solving in subject areas (like mathematics and physics) that involve solving 'quantitative' questions. This implies that students were engaged in problem solving at a surface level, repeating and memorising the procedures involved until they are able to recall them successfully. Strategies as such reflects surface learning which somehow is an indication of students' ability to demonstrate academic competency. In Malaysia, the tendency to adopt surface learning among the university students can be related to the continuity of the learning approach commonly practiced at the secondary school level which is predominantly characterized as memorizing and repeating procedures for the purpose of examinations. Malaysia as in most countries, places a lot of emphasis on academic qualification. (Md. Yunus *et al.* 2006)

Students' age appear to affect their learning experience as a significant difference was also established among students based on their year of study. The fourth year students were found to be more inclined using the surface learning approach compared to the first, second and third year students. The surface learning approach of the fourth year students can be attributed to a very tight schedule and curriculum of the senior year, severe time limits and other constraints that drove them to adopt less desirable

approach, that is, the surface approach (Gow, Balla, Kember & Stokes 1989). Perhaps, the fourth year students had already familiarized themselves with the questioning techniques in test, assignment and examinations, and as such did not feel the need to use the deep approach. On the other hand, students of year one, two and three who were overcome with the feeling of wanting to succeed in a new environment (higher institutions), thus, may lead them to adopt the favourable approach (deep approach). Gow & Kember (1990) also point out that students probably tend to use less desirable techniques (surface) when they are adapting to the new institutional demands such as heavy curriculum, work pressures and assessment procedures. Nist and Simpson (2000) on the other hand, noted that academic studying is a complex activity that is influenced by a number of variables including characteristics of the course and the environment, a variety of student characteristics e.g. prior knowledge, meta-cognitive ability, motivation, interest, students' beliefs and the application of adaptive learning strategies.

In general, this study had shown that the epistemological beliefs of students from the public higher institutions of learning were more complex than students of the private higher institutions. It has been a practice to select students for study in Malaysian higher institutions based solely on academic merit, a system known as meritocracy (Md. Yunus *et al.*, 2006) based on public examinations namely the *Sijil Pelajaran Malaysia* (SPM, equivalent to O Level) and the *Sijil Tinggi Persekolahan Malaysia* (STPM, equivalent to A Level) . However, some students do not undergo the STPM because they choose to enrol in other pre university programmes such as matriculation or diploma. (Md. Yunus *et al.*, 2006)

Hence, following this selection based on meritocracy into the public institutions, students who failed to secure places in these institutions would normally choose to enter the private institutions which for the most part are monetary based. Hence, this study does not totally disregard the fact that there is, to an extent, that selection of students based on meritocracy can be a possible factor for the complex epistemological beliefs among students of the public higher learning institutions.

Based on the ethnic variable, findings of study found that there is a significant difference between students from the four main ethnic groups in Malaysia which comprised 68% of Malay students, 17% Chinese students, 5% Indian students and 6% of other indigenous groups like Kadazan and Iban (from Sabah and Sarawak, East Malaysia). It was found that the Chinese students tend to use the surface learning approach compared to students of other ethnic groups while the Malay students were found to adopt more of the deep approach compared to other students. On the use of the surface learning approach amongst the Chinese students, the following study carried out by Chan (2003) on Chinese students in Hong Kong can be related to this context of the study. In Chan's study, it was revealed that there were cultural influences on epistemological beliefs in which the word "authority" has a unique meaning in Asian/Chinese culture. In a similar context, Watkins and Biggs (1996) argued that it is inappropriate to suggest that rote learning is synonymous with surface approach as often perceived by the Westerners. Instead, they claimed that rote learning as adopted by Chinese students might be an adaptive strategy in coping with assessments and in

enhancing understanding. This can be the possible stance taken by the Chinese students in higher learning institutions in Malaysia.

One of the variables that may influence change in university students learning approach is gender. Some researchers have obtained data that projects a certain stereotype pattern where woman tend to score higher on deep and achievement approaches, while men have higher surface approach scores (Richardson & King, 1991). In this study, female students of higher institutions of learning were more inclined to adopt the deep surface learning compared to the male counterparts. In Malaysia, female students form the majority of the student population in the public institutions of learning.

CONCLUSION

As a conclusion, this study had come up with findings that can be given the following implications. First, the fact that senior students are not adopting the deep learning approach when they should be doing so is an indication for a critical examination of several factors by the administration of higher learning institutions such as the constraints they are facing as mentioned earlier (methods of instruction by lecturers, assessment and examination procedures). The growing number of private higher learning institutions in the country provide the avenue for students who do not get placed in public higher institutions. An interesting ethnic related factor established from this research is that the Chinese students tend to use the surface learning approach compared to students of other ethnic groups. The Malay students comprising majority of the samples of this study were found to adopt more of the deep approach compared to other students. However, as had been pointed out earlier, the adoption of the surface approach by the Chinese in the cultural context (Chan, 2003), is a strategy used which probably fits very well into the assessment of the knowledge disciplines in the higher learning institutions in Malaysia. Hence, based on this, it would be interesting to further explore on the following aspects of epistemological beliefs and learning approach which focuses on the learning approach used by the students of higher learning institutions from various ethnic groups in the country. An aspect which is perhaps worth exploring is also the pattern of examination questions set in these higher institutions of learning and its relation to students' epistemological beliefs and learning approaches. Since findings of this study show that these students use more surface learning approach, further research on this aspect can be carried out in future to identify factors that cause the students to do so. Although higher institutions of learning in Malaysia are continuously developing new areas of knowledge, the epistemological principles underlying them need to be examined in the context of students learning approaches.

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