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Personal epistemology of Thai university students: Cultural influence on the development of beliefs about knowledge and knowing

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Abstract: The objective of this study is: (a) to investigate the structure of personal epistemology of Thai university students, and (b) to examine whether there is a significant difference in their personal epistemology between groups of students with different secondary educational backgrounds. A questionnaire, asking participants to indicate how they agree or disagree to statements on knowledge and knowing, was administered to first-year students at a university in Thailand. Through factor analysis, three dimensions were identified: Fixed Ability, Stable Knowledge, and Simple Knowledge. However, the factor structure was complex, and the items representing different conceptual dimensions were merged into the same factors. This finding appears to confirm a dimensional structure of the Thai university students' personal epistemology, yet it requires further investigations to clarify the nature of relatively independent dimensions. Significant differences were identified among groups of students differing in educational backgrounds. The students graduated from schools abroad and international schools were significantly more epistemologically developed than those graduated from local Thai schools. Similarly the students intending to major in science had significantly more epistemologically developed beliefs than the prospective arts and business majors. These results suggest that culture through education influences the development of perspectives toward knowledge and knowing.

Key words: Beliefs about knowledge and knowing, cultural and educational influence, student development

Introduction

Research on personal epistemology

Over the last decades, increasing numbers of researchers from various fields have been interested in investigating students' beliefs about knowledge and knowing. However the scope of each study seems to be somewhat different and there were numerous labels used to categorize this area of research (e.g., Baxtor Magolda, 1992; Belenky et al., 1986; Hofer, 2000; King & Kitchener, 1994; Kuhn, 1991; Schommer, 1990). Hofer and Pintrich (1997, 2002) are attempts to address this chaotic situation, trying to integrate what was identified in the studies to date into the area of "personal epistemology." They were most recently followed by Hofer (2004) and Schraw and Sinatra (2004).

Schommer (1990, 1993a, 1993b; Schommer et al., 1992) is acknowledged as one of the pioneers in studies of personal epistemology, but there are issues raised about her methodology and conceptualization of personal epistemology (Chan & Elliot, 2004; Hofer, 2001; Hofer & Pintrich, 1997). She conceptualized the personal epistemology as system with five distinct independent dimensional factors: (a) structure of knowledge, (b) certainty of knowledge, (c) sources of knowledge, (d) control of knowledge acquisition, and (e) speed of knowledge acquisition. In her empirical studies, however, she has not yet been successful in identifying all the five proposed factors (Schommer, 1990, 1993b; Schommer et al., 1992).

Nevertheless, this conceptualization marked a departure from the developmental approach dominant at that time (Hofer, 2001). Schommer made another major contribution; she developed the first questionnaire for personal epistemology that has been both the most widely recognized and used in research (Hofer & Pintrich, 2002).

Empirical studies of cultural variation of personal epistemology

Although there are numerous studies of personal epistemology in the United States, the research that examined cultural variations still remains very scarce (Chan & Elliot, 2000, 2002; Hofer & Pintrich, 1997). Chan and Elliot (2000) is one of the first published studies investigating this aspect. They compared the dimensional structure reported by Schommer (1990) to that of Chinese students in Hong Kong. Using Schommer's original 63-item questionnaire and following her methodology, they examined 352 Hong Kong students studying at a post-secondary 2-year teacher training program. The dimension of Omniscient Authority, not clearly extracted in Schommer's studies, was very distinctive for these Chinese students. They were unable to duplicate Schommer's (1990) results in their later research, and Chan and Elliot (2002) indicated that "culture is an important variable in the study of epistemological beliefs (p.410)." Clarebout et al. (2001) also used Schommer's 63-item questionnaire to investigate students of higher education institutes in Belgium and the Netherlands. The factor structure identified was different from that of Schommer's (1990).

Empirical investigation of non-Western population's epistemological beliefs is still very limited, and only few studies examining Korean and Taiwanese students were reported (Chan & Elliot, 2004). Most recently Karabenick and Moosa (2005) investigated Omani students in West Asia. These studies identified some different characteristics of Asian students, but the cultural influence on personal epistemology is not yet empirically examined. It is essential to measure groups of individuals differing only culturally, with the other major potential variables kept equal, so that we can empirically confirm the cultural influence on personal epistemological development.

Purpose of the study

The objective of this study is: (a) to investigate the dimensional structure of personal epistemology of Thai university students, and (b) to examine whether there is a significant difference in their personal epistemology between groups of Thai students with different secondary educational backgrounds. Thai students educated in different types of secondary schools will be compared, with other major variables being equal. Culture is likely to be reflected in education through daily instructional interactions in schools. Consequently being educated in a different system could be considered as one of different cultural backgrounds.

Methodology

Participants

The questionnaire was completed by 266 Thai students that had just been accepted at an international undergraduate program using English as the language of instruction in a large research university in the greater Bangkok metropolitan area in Thailand. The age was between 15 and 24 years old, the mean being 18.4. Slightly over 57 percent were female. Fifty two percent of the students were majoring in business administration. The rest included students majoring in travel industry, biological science, computer science, and social science.

These students had four different types of secondary educational backgrounds. The largest group, 44.4 percent, graduated from a local Thai school, followed by the 28.6 percent graduating from a high school abroad in mainly English-speaking countries, and 23.3 percent

graduating from an international school in Thailand. The fourth and smallest group (3.4 %) is composed of students graduated from a bilingual school in Thailand, where both English and Thai languages are used as a means of instruction.

Materials

A 28-item questionnaire was developed based on Schommer's middle school version (Schommer-Aikins et al., 2000) that included 29 statements about four dimensions: (a) ability to learn, (b) speed of learning, (c) stability of knowledge, and (d) structure of knowledge.

Schommer's middle school version was chosen for several reasons, the main being that the language was simpler than in Schommer's 63-item original. Although the participants had a minimum of a 550 TOEFL score, they still lacked the comprehensive understanding of vocabulary and idioms that a native English speaker would naturally have. The other reason is that it has fewer questions than the original Schommer. In general, Thailand has more of an oral tradition and has less of a developed reading culture. The majority of students was also not native English speakers and could have considered filling out of a questionnaire in English hard work. By using the middle school version, we aimed to achieve a balance of asking enough questions to measure each dimension and not overloading the students.

After the item expressions were further revised by the authors, the order of the 28 items was randomized. Seventeen items were written so that less epistemologically developed students would agree, while the remaining was written so that these students would disagree. This measurement instrument used a five-point Likert scale, ranging from 5 (strongly agree) to 1 (strongly disagree). In the second part, demographic questions were also included.

Procedure

The questionnaire was distributed to the students during a freshman orientation session in three separate occasions, to survey all the new intake students accepted during an academic year. In the first two administrations, students were asked to fill in the questionnaire and return it to the session supervisor during the session. Whereas in the third occasion, students were given two weeks before they were to return the questionnaire.

Results

Dimensional structure

Factor analysis was used to investigate the dimensional structure of personal epistemology. A total of 12 questions were eliminated because they were either not normally distributed or the results from the first exploratory factor analysis showed a negative loading when it should have been positive.

In exploratory factor analysis (principal component analysis, Valimax rotation) with the remaining 16 items, three factors were extracted. These three factors explained 35.6 percent of the total variance. Cronbach's coefficient alpha for each factor were .606, .492, and .355, respectively. Although the 4th and 5th factors both had an eigenvalue higher than 1, they were not included in the result because of their relatively small contribution to improve the explaining rate of the total variance. An inspection of screen-plot also confirmed this decision. Table 1 below represents the three identified factors and items constituting each of the three factors. The numbers represent the factor loadings of the items.

The first two factors had a complex combination of items, representing three different categories. This made it difficult to label them. However, these three factors were named as

described below, giving more importance to items with higher loadings than those with lower loadings.

Table 1: Dimensional structure of Thai students' personal epistemology

Items	Factor loadings		
	Factor 1 Fixed Ability	Factor 2 Stable Knowledge	Factor 3 Simple Knowledge
24. Students who are average in school will remain average for the rest of their life. (ABI+)	.661		
16. Working hard on a difficult problem only helps the really smart students. (ABI+)	.615		
2. I can rely on the facts in my school textbooks for the rest of my life. (STA+)	.613		
12. You will get confused if you try to combine new ideas in a textbook with what you already know. (STR+)	.478		
19. An expert is someone who is born smart in something. (ABI+)	.460		
6. The best thing about a science course is that most problems have only one right answer. (STR+)	.416		
18. If scientists try hard enough, they can find the truth to almost everything. (STA+)		.779	
8. Scientist can get to the truth if they keep looking for it. (STA+)		.776	
27. Good students memorize facts. (STR+)		.433	
22. If I am going to understand something, I will understand it the first time I read it. (SPE+)		.386	
14. I really do not like listening to teachers who cannot make up their minds about what they believe. (STR+)			.720
9. Most words have one clear meaning. (STR+)			.650

Factor 1 was named “Fixed Ability” because of the two prominent items of ability to learn (ABI), although the third item in the structure of knowledge (STR) category also had a loading higher than .60. Factor 2 was labeled as “Stable Knowledge” because the first two items of stability of knowledge (STA) had a much higher weight than the last two. For Factor 3, as both items represented structure of knowledge (STR), it was readily called “Simple Knowledge.”

Personal epistemology and education

The mean scores of each identified factor were compared among the three groups of students having different secondary educational background. These mean scores were calculated after recoding the responses in the 17 items that less epistemologically developed students would agree. Through this process, all the responses became to represent its meaning in a same manner; the higher the score, the more epistemologically developed the respondent. In this analysis, the smallest group of bilingual school graduates was not included due to its small sample size. Additionally, the analysis didn't include participants who missed to rate any of the 12 statements covered by the three factors, or who did not indicate his/her secondary school type. The mean scores are represented in Table 2 below, together with standard deviations.

One-way ANOVA indicated a significant difference between the groups in terms of Fixed Ability factor, $F(2, 236) = 6.09$, $p = .003$, but not Simple Knowledge factor, $F(2, 236) = .031$, $p = .970$. As for Stable Knowledge dimension, a Levene test of the assumption of equal

variance showed that the assumption was violated ($p = .014$), thus no significant difference was identified.

Table 2: Factor variations of students with different high school type

Types of high school graduated	Factor 1 Fixed Ability		Factor 2 Stable Knowledge		Factor 3 Simple Knowledge	
	Mean score	Standard deviation	Mean score	Standard deviation	Mean score	Standard deviation
Local Thai school (N = 111)	3.48	.506	2.70	.490	3.12	.748
International school in Thailand (N = 55)	3.72	.484	2.86	.640	3.14	.760
School abroad (N = 73)	3.71	.544	2.93	.590	3.10	.821
Total (N = 239)	3.60	.524	2.80	.566	3.12	.771

Turkey HSD identified that the local Thai school category had a significantly different mean score from both international school and school abroad categories ($p = .015$ and $p = .010$). In Fixed Ability dimension, students graduated from international schools in Thailand and schools abroad had significantly higher mean score (3.72 and 3.71) than those graduated from local Thai schools (3.48). This indicates that international school graduates and school abroad graduates had more personally epistemologically developed views toward knowledge and knowing. Factorial ANOVA identified no significant interaction between the age and secondary school type, $F(9, 222) = .615$, $p = .784$, and between the sex and secondary school type, $F(2, 233) = .209$, $p = .811$, for the Fixed Ability factor.

Similar comparisons were made among students with different intended major or specialty. This analysis included participants that both rated all the 12 statements covered by the three factors and indicated his/her intended major. The mean scores of the three groups of students (science, arts, and business majors) are represented in Table 3 below.

Table 3: Factor variations of students with different intended major field of study

Intended major	Factor 1 Fixed Ability		Factor 2 Stable Knowledge		Factor 3 Simple Knowledge	
	Mean score	Standard deviation	Mean score	Standard deviation	Mean score	Standard deviation
Science (N = 59)	3.78	.529	2.93	.626	3.40	.712
Arts (N = 65)	3.52	.465	2.64	.532	2.87	.792
Business (N = 123)	3.54	.553	2.79	.540	3.08	.766
Total (N = 247)	3.59	.534	2.79	.567	3.10	.780

One-way ANOVA indicated a significant difference between the groups in terms of all the three factors: Fixed Ability, $F(2, 244) = 4.96$, $p = .008$, Stable Knowledge, $F(2, 244) = 4.17$, $p = .017$, and Simple Knowledge, $F(2, 244) = 7.59$, $p = .001$.

Turkey HSD identified that the science majors had a significantly different mean score from the arts majors in all the three factors ($p = .020$, $p = .012$, and $p = .000$), and from the business majors in the two factors of Fixed Ability ($p = .011$) and Simple Knowledge ($p = .022$). The prospective science students had significantly higher mean scores (3.78, 2.93, and 3.40) than their arts classmates (3.52, 2.64, and 2.87) in all the three factors. The science majors' mean scores of Fixed Ability (3.78) and Simple Knowledge (3.40) were also significantly higher than those of their business classmates (3.54 and 3.08). This indicates that the students

planning to major in science had more epistemologically developed views toward knowledge and knowing than those planning to major in arts and business.

Factorial ANOVA identified no significant interaction between the age and the major in all the three factors, $F(10, 229) = .418, p = .937$, $F(10, 229) = .556, p = .848$, $F(10, 229) = .897, p = .536$. Similarly, no significant interaction was identified between the sex and the major in all the three factors, $F(2, 241) = .202, p = .817$, $F(2, 241) = .087, p = .916$, $F(2, 241) = 2.643, p = .073$.

Discussion and conclusion

First, three factors were identified in the personal epistemological structure of the Thai students: Fixed Ability, Stable Knowledge, and Simple Knowledge. As for the Fixed Ability factor, both students that studied abroad and students that studied at an international school scored significantly higher along the epistemological developmental scale than those that were educated at a local Thai school. As to the other two factors, no significant difference was identified between these three students groups. In terms of students' intended major, the science students had a more developed epistemological view than did the arts students in all three factors. These science freshmen also had a more developed epistemological view than did their business peers in two of the three factors.

Our finding on the dimensional structure of Thai university freshmen appears to support Schommer's conceptual framework of a multidimensional system of independent beliefs. However, the factors identified in this research are not clearly structured, and the composition of each factor is rather complicated to interpret. Within one factor, items representing three different conceptual categories loaded together. Nevertheless, this identified dimensional structure provides a global picture of personal epistemology held by Thai first-year university students.

These identified factors are somewhat different in nature from what has been reported by the previous studies. Speed of learning or Quick Learning, one of the Schommer's proposed factors, was not extracted as a distinct factor. The composition of the factors also differs from Schommer-Aikins et al. (2000) in which a similar questionnaire was used. More importantly as noted earlier, the problem that Chan and Elliot (2000) encountered in identifying the factors was also found in this study in spite of methodological differences. There was some convergence of the items or subscales representing different hypothetical dimensions into the same factors. This would imply inter-related rather than independent nature of the dimensions of personal epistemology. This result is also likely to strengthen Chan and Elliot's (2002) claim that Schommer's questionnaire is not appropriate to measure participants in another cultural context.

We also encountered other methodological problems in identifying the dimensional structure. The items that remained utilizable in the analysis all had statements worded from a less epistemologically developed points of view. All the items with the opposite perspective were eliminated because they showed positive loadings. One interpretation could be that some 44 percent of the participants who had never studied in English had some difficulty in understanding the expressions of these items. Alternatively, the measurement instrument might have some deficiencies in itself. Hofer and Pintrich (1997) claimed that expressions in some items in Schommer's questionnaire are ambiguous and not clear about what they measure.

As with the second finding, this paper is the first case where a significant difference was identified in terms of personal epistemology between three groups with different educational experience with all other major variables held equal. It is likely that different types of educational experiences lead to different levels of epistemological development. All the participants are of Thai nationality, and the three groups differ only in terms of secondary school type. No significant interaction was identified between age and school type, as well as sex and school type. The results tend to indicate that culture through education has an effect on personal epistemology.

One of the major differences between Thai and Western education is in the Thai teacher-student interaction. In general, the Thai education system integrates Buddhist beliefs and ethics into the curriculum. Students at all levels are also taught to highly respect all teachers. This can most symbolically be seen once a year when every Thai educational institute holds the Wai Kru Ceremony, when students outwardly show their respect and teachers remember their old mentors. In addition, Thai students traditionally don't ask questions because it is considered impolite.

The identified differences between groups of students intending to major in different subjects seem to indicate that personal epistemology may be domain specific, rather than domain general. This characteristic of domain specificity has been demonstrated by King and Kitchener (1994), Jehng, Johnson, and Anderson (1993), and Paulsen and Wells (1998) in North American university students. However, in this study epistemological views were measured just as the participants started their university life. Therefore, these differences can not be attributable to the university education but their previous experiences. Students' selection of major is very likely to be influenced by many factors, but possibly their secondary education might play an important role. Different educational experiences might lead to students selecting different majors that may also relate to their level of epistemological development.

The research results confirm that there is a dimensional structure of personal epistemology and there is a cultural influence on epistemological development. Still, many issues remain unsolved. It is very crucial for further empirical investigations to develop a measurement instrument with satisfactory psychometric properties, such as Chan and Elliot's (2002) questionnaire for Hong Kong students. The questionnaire should be developed with considering cultural contexts of the participants of the research. This is the first study that looked at the personal epistemology of South East Asian university students, and it is the first that was able to compare clearly between students at the same age and ability but with three different educational backgrounds. Our next research will be a cross-sectional study comparing the personal epistemological views between entering freshmen and graduating seniors at the same university. This will also be the start of a longitudinal study, following epistemological development of the freshmen students during the four-year period of the university education until the time of their graduation. Although we are mainly focusing on the domain general epistemology, we would also be interested into pursuing the domain specific branch of the personal epistemological body of research.

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