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Exploring the roles of education and Internet search experience in students' Internet-specific epistemic beliefs

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ABSTRACT

The main purpose of this study was to explore the role of education and Internet search experience in students' Internet-specific epistemic beliefs while searching for course-related information on the Internet. The Chinese version of the Internet-Specific Epistemic Questionnaire (C-ISEQ) was utilized to evaluate participants' epistemic beliefs regarding the uncertainty, complicity, and source of Internet-based knowledge as well as the justification of Internet-based knowing. A total of 1070 students with educational levels ranging from junior high school to undergraduate were surveyed. Hierarchical regression analyses were conducted to examine the relationships of education and Internet search experience with students' Internet-specific epistemic beliefs. In addition, the interaction effect between years of education and Internet search experience was recruited in the regression model to explore its correlations with Internet-specific epistemic beliefs. The results showed that years of education were positively correlated to uncertainty and source of Internet-based knowledge as well as justification of Internet-based knowing. Also, Internet search experience had negative relations with uncertainty, complexity and source of Internet-based knowledge; however, it was positively related to justification of Internet-based knowing. In addition, the interaction effect between years of education and Internet search experience was significantly linked to justification of Internet-based knowing. The results of this study highlight the importance of education in students' development of Internet-specific epistemic beliefs. Implications for further research and Internet-based instruction are discussed.

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1. Introduction

Epistemic beliefs, beliefs about the nature of knowledge and knowing, are regarded as predictors of students' comprehension and learning (Hofer & Pintrich, 1997; Schommer, 1990). The influences of epistemic beliefs on students' learning and academic achievement have been extensively discussed. It has been reported that students' epistemic beliefs have effects on knowledge acquisition and achievement (Mason, Boscolo, Tornatora, & Ronconi, 2013). Founded on the self-regulation model, it was revealed that epistemic beliefs can be embedded in the process of self-regulation and have influences on self-regulated learning activities (Bromme, Pieschl, & Stahl, 2010; Richter & Schmid, 2010). For example, the

findings of Richter and Schmid (2010) revealed the role of students' epistemic beliefs in their adoption of epistemic strategies including consistency checking and knowledge-based validation while reading a text for study purposes. In sum, previous research has identified the influential role of epistemic beliefs in students' learning activities and academic performance. Accordingly, one of the critical educational purposes is to activate or develop students' epistemic beliefs; in turn, advanced epistemic beliefs may help their learning activities and academic outcomes (Hofer, 2001; Ulyshen, Koehler, & Gao, 2015).

1.1. The role of education in epistemic beliefs

From a developmental viewpoint, researchers regard personal epistemology as a function of learning, and have focused on how the development of personal epistemology is influenced by education (Barzilai & Zohar, 2014; Kuhn, Cheney, & Weinstock, 2000; Schommer, 1998). Reviewing the past literature, a large body of research has indicated that education may play an important role in

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the development of individuals' epistemic beliefs, and has suggested that there is a need to assess epistemic development at different educational levels from middle school to high school and through to middle and late adulthood (Hofer, 2001; Hofer & Pintrich, 1997; Schommer, 1990). Based on the relations between educational variables (years in school and classes completed) and epistemic beliefs, Schommer (1990) spotlighted the significance of education in raising students' awareness of the nature of knowledge and learning, showing that students who have completed more classes and received more advanced knowledge in college are more likely to suspect the certainty of knowledge.

Examining students ranging from middle school through graduate school, it was indicated that students' personal epistemology has a significant relationship with their educational level. As an example, students regarded as realists (holding relatively strong beliefs regarding simple and certain knowledge, justification by authority, and personal justification) are more likely to have less educational experience than other participants (Greene, Torney-Purta, & Azevedo, 2010). Students in higher grade levels were reported to be more likely to hold sophisticated epistemic beliefs than their peers in lower grade levels (Chen & Pajares, 2010). King and Kitchener (2004) observed that there are striking differences in people's underlying epistemic assumptions (assumption about knowledge) across a wide range of educational levels, and indicated that there is an educational-level difference in their reflective judgment on their epistemic assumptions (reflections on assumptions about knowledge and how it is gained). In conclusion, a higher educational level may result in better epistemic development.

1.2. Epistemic beliefs in online information searching

With respect to the Internet-based learning context, the importance of epistemic beliefs in students' online learning has been evidenced and emphasized, indicating that personal epistemic beliefs are activated during online information searching (Hofer, 2004; Hofer & Sinatra, 2010; Mason, Boldrin, & Ariasi, 2010b). While searching for information for open-ended tasks consisting of less certain answers, students with more advanced epistemic beliefs relating to a constructivist-oriented view have been found to be more likely to have better search outcomes (Tu, Shih, & Tsai, 2008). It was revealed that epistemic metacognition, metacognitive thinking about the nature of knowledge and knowing, may significantly influence students' learning outcomes in the online search context (Mason et al., 2010b).

While undertaking ill-structured search activities on the Internet, learners with complex epistemic beliefs are more likely to engage in complex learning strategies such as building knowledge connections, building flexible understanding, and evaluating web information (Ulyshen et al., 2015). As the interplay between epistemic beliefs and evaluative standards of online information searching, students with the belief that effort and processes are requirements of learning are inclined to specifically check the authority of the literature and carefully read the content to justify the academic information retrieved from the Internet (Dong, Liang, Yu, Wu, & Tsai, 2015).

1.3. Internet-specific epistemic beliefs

Due to the context-sensitive nature of epistemic beliefs, it has been suggested that epistemic beliefs should be specifically considered in a given context such as online information searching, and should be evaluated with context-specific measurements (Mason, Boldrin, & Ariasi, 2010a). Compared with traditional contexts, the Internet-based learning environment provides new ways

of presenting and obtaining knowledge. Bråten and Strømsø (2005) argued that there should be a specific way to measure beliefs about the nature of knowledge and knowing in Internet-based environments. To evaluate students' epistemic beliefs in the Internet-based context, the Internet-specific epistemological questionnaire (ISEQ) was developed based on Hofer and Pintrich (1997) model of personal epistemology with four dimensions (Bråten, Strømsø, & Samuelstuen, 2005; Strømsø & Bråten, 2010). Through factor analysis, it was demonstrated that Internet-based epistemic beliefs can be identified as general Internet epistemology and justification for knowing, with relationships to Internet-search and Internet-communication activities (Bråten et al., 2005). In the work of Chiu, Liang, and Tsai (2013), the Chinese version of ISEQ was validated as a four-dimensional construct including certainty of Internet-based knowledge (if Internet-based knowledge is stable or uncertain), simplicity of Internet-based knowledge (if Internet-based knowledge is complex or simple), source of Internet-based knowledge (if the Internet is a good source containing sufficient knowledge), and justification for Internet-based knowing (if Internet-based knowledge should be adopted or justified). In addition, students' Internet-specific epistemic beliefs can be related to their online self-regulated learning and online help seeking activities while searching for course-related information on the Internet (Chiu et al., 2013; Lee, Chiu, Liang, & Tsai, 2014). Although the direction regarding the relationships between Internet-specific epistemic beliefs and online learning activities are still ambiguous and controversial, the importance of Internet-specific epistemic beliefs in Internet-based learning environments has been highlighted and cannot be ignored (Bråten et al., 2005; Chiu et al., 2013; Strømsø & Bråten, 2010).

1.4. The influences of Internet search experience

While exploring students' online learning and search activities, there is a need to discuss their experience of online searching or their use of the Internet. Various studies have indicated that search experience or Internet experience have significant influences on search behaviors, search strategies, Internet skills, and search outcomes (Lei, Lin, & Sun, 2013; Thatcher, 2008; M. J. Tsai, 2009; van Deursen, van Dijk, & Peters, 2011). For example, search experience may increase individuals' familiarity with the necessary search strategies which may help them know how to find accurate information in shorter searching time (Park & Black, 2007). Compared with individuals with less Internet experience, those with more Internet experience utilize more Internet search approaches (Slone, 2003). Among students with low reading ability, frequent Internet users tend to use more proper and skillful search means for locating keywords and handling search engines than their counterparts (Lei et al., 2013). However, van Deursen et al. (2011) indicated that Internet experience could make contributions to medium-related Internet skills such as operational Internet skills, but it could not contribute to content-related Internet skills such as information Internet skills (e.g., choosing websites, selecting and evaluating information) and strategic Internet skills (e.g., developing a particular goal, taking the right direction, and making the right decision to reach the goal). In addition, Internet search experience can raise students' behavioral or procedural searching skills rather than their metacognitive searching skills including purposeful thinking and selection strategies (M. J. Tsai, 2009).

Besides the influences on search behaviors and strategies, Internet experience may also have effects on students' perceptions regarding the use of the Internet. It has been reported that Internet experience plays an influential role in students' attitudes toward the Internet and their Internet self-efficacy, indicating that spending more time using the Internet may help students'

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