Thinking Skills and Creativity 19 (2016) 279–289

Contents lists available at ScienceDirect

Thinking Skills and Creativity

journal homepage: http://www.elsevier.com/locate/tsc

Epistemological orientations and evidence evaluation in undergraduates

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ARTICLE INFO

Article history:
Received 18 December 2014
Received in revised form
23 November 2015
Accepted 4 January 2016
Available online 7 January 2016

Keywords:
Epistemology
Epistemic cognition
Personal epistemology
Critical thinking
Critical Thinking dispositions
Evidence evaluation

ABSTRACT

Epistemological orientations and evidence evaluation abilities influence processes related to critical thinking and conclusion justification across various reasoning domains. Participants ($N = 500$) were presented with the Justifying Conclusions Inventory (JCI) enabling the identification of epistemological orientation groups. Cluster analysis identified four groups: Absolutists, Multiplists, Evaluativists, and Low Evaluativists. Participants also read research vignettes and responded to Research Evaluation Inventory (REI) questions addressing evidence evaluation processes related to skepticism. REI responses were significantly affected by epistemological orientation group, with Evaluativists demonstrating the most skepticism. Participants with the most education and those who had taken a methodology course also demonstrated greater skepticism. These results suggest the JCI is a defensible assay of global and domain-specific epistemic cognition. In addition, the findings herein elucidate characteristics of a transitional epistemic cognitive state which could be common in undergraduates.

1. Introduction

Cognitive scientists studying how people approach knowledge and knowing use the terms epistemic cognition, epistemological understanding, personal epistemology, epistemological beliefs, and epistemological orientations to describe these processes (Hofer & Pintrich, 1997; 2002; King & Kitchener, 1994, 2002, 2004; Kuhn, Cheney, & Weinstock, 2000). Epistemic cognition and epistemological understanding refer to thinking processes related to knowledge acquisition in a general sense, whereas personal epistemology, epistemological beliefs, and epistemological orientations refer to the varieties of epistemological beliefs and processes in individuals (Hofer and Pintrich, 1997). Included in all of these theoretical frameworks are taxonomies of beliefs or orientations related to the nature of knowledge (e.g., certainty) and how knowledge is justified (e.g., use of evidence; the role of authorities) (King and Kitchener, 1994). In short, an individual's epistemological orientation reflects his or her belief system about the nature of and acquisition of knowledge (Hofer and Pintrich, 2002; King & Kitchener, 2004). For example, an individual may believe there is one correct answer (a truth) and that this answer is known by certain individuals (e.g., parents, church leaders, and/or teachers).

King and Kitchener (1994) obtained evidence that epistemological orientation (EO) typically reflects one of three levels: pre-reflective, quasi-reflective, or reflective, and refer to their framework as "Reflective Judgment." Kuhn et al. (2000) later referred to these orientations as absolutists, multiplists, and evaluativists, respectively (Kuhn et al., 2000; Kuhn & Weinstock,

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http://dx.doi.org/10.1016/j.tsc.2016.01.002
1871-1871/

2002)[1]. Individuals with an absolutist orientation focus on one conclusion and authority privilege to that conclusion (e.g., parents, teachers). Multiplists believe that there can be more than one conclusion; viewing various opinions as equally correct. Influencing the tendency to view all opinions as equally valid is the tendency to view different types of compelling evidence as equally valid. Of the three levels, evaluativists engage in the most sophisticated approach to evidence evaluation and logical analysis. Evaluativists have reasonably well-developed abilities pertaining to evidence evaluation (e.g., empirical evidence provides greater support for a conclusion than personal opinion). In addition, evaluativists embrace dispositions related to a more rigorous analysis of evidence and/or conclusions, including the willingness to revisit evidence and analytical processes at a later time even if that results in a revision of the conclusion. Cognitive scientists in this area have found empirical evidence suggesting that it is possible to identify the epistemological levels of individuals reliably, particularly within problem contexts (Hofer, 2004; Kuhn et al., 2000).

According to many theorists and scientists studying critical thinking, epistemic orientations and processes are crucial (Bromme, Pieschle, & Stahl, 2010; Dawson, 2008; Dwyer, Hogan & Stewart, 2014; King and Kitchener, 1994; Kuhn et al., 2000). Dwyer et al. (2014) proposed a framework integrating epistemological orientations, metacognition, and critical thinking, in which the inherent metacognitive nature of various processes related to critical thinking is clarified (also see Hogan, Dwyer, Harney, Noone, & Conway, 2015). In other words, attempts to produce a reasoned conclusion involves thinking about the nature of knowledge, evaluating potential justifications, and self-regulating one's thinking processes – all of which are metacognitive processes (also see: Bromme et al., 2010; Dawson, 2008; King and Kitchener, 1994; Kuhn et al., 2000). The metacognitive nature of epistemological processes related to critical thinking suggests that individuals may be aware of thinking propensities, thereby enabling researchers to use a variety of approaches to better understand what thinkers are doing mentally (Hofer, 2004).

The majority of studies addressing individual differences in epistemic cognition have used qualitative approaches, necessitating content analyses of responses to ill-defined problems (Baxter Magolda, 1992; King & Kitchener, 1994). Qualitative methodologies in this literature have met rigorous methodological standards resulting in empirical outcomes that can be highly regarded (Hofer and Pintrich, 1997). The development of inventories assessing epistemic cognition may contribute to empirical and theoretical progress that has already been demonstrated. DeBacker, Crowson, Beesley, Thoma and Hestevold (2008) examined the psychometric and content validity of three existing measures of epistemic beliefs and found problems with internal consistency and conceptual operationalization, suggesting that there is a need for instruments that are conceptually and psychometrically sound (also see Pintrich, 2002).

Greene, Torney-Purta and Azvedo (2010) developed a 13-item quantitative instrument that addresses epistemic cognition in two domains, math and history. Their instrument asks participants ($N = 740$; middle school to graduate school) to indicate their level of agreement with statements reflecting various forms of justification (authority, personal opinion, and facts that are certain and unchangeable), producing scores reflecting justification propensities. Greene et al. (2010) obtained evidence for the psychometric integrity of their questionnaire, demonstrating the utility of a quantitative approach when used in a specific content domain (also see Sosu, 2013).

The present study addresses the need for a quantitative instrument assessing global epistemological orientations. The inventory developed and tested herein, the Justifying Conclusions Inventory (JCI), was designed to address a range of epistemological tendencies characteristic of absolutism, multiplism, and evaluativism, such as the use (or non-use) of evidence, the relevance of evidence, the process of reasoning with evidence, and justification propensities. Scores on JCI subscales were used to categorize undergraduates as to epistemological orientation. It was hypothesized that third-year and fourth-year undergraduates would be more likely than first-year or second-year students to be classified into one of the more sophisticated epistemological orientation groups, although there should be undergraduates who are more or less sophisticated regardless of their academic standing. Using the JCI to group individuals into epistemological orientations facilitates the identification of individual differences in students at similar educational levels as well as across educational levels.

Post-secondary educational experiences, broadly speaking, may promote epistemological development, continuing cognitive development that begins in childhood and adolescence (Hofer, 2004; King & Kitchener, 1994; Kuhn, 1991; Perry, 1970; Valanides and Angeli, 2005). Post-secondary course content often showcases discipline-specific epistemologies, with an emphasis on why particular justifications are valued over others, potentially contributing to epistemological development. Furthermore, students who enroll in methodology courses are explicitly exposed to knowledge acquisition strategies that produce the most valued knowledge in a particular discipline which may promote development more specifically (Hofer, 2004; Angeli & Valanides, 2009). Dampening these conclusions somewhat is the evidence that epistemological development may be gradual or uneven for some proportion of students, suggesting that the overall linear relationship between epistemological orientations and education may be noisy (Greene et al., 2010; Hammer & Elby, 2002; Hofer, 2004; King and Kitchener, 2004; Kuhn et al., 2000; Rodriguez and Cano, 2006).

[1] Kuhn et al. (2000) also included a stage referred to as "realist" in which the knower perceives a one-to-one correspondence between the external world and knowledge. This overlaps the earliest stage of King & Kitchener (1994)King & Kitchener's (1994) framework (stage 1 of the pre-reflective level) and is most typical of children. This stage is less relevant herein because the current endeavor pertains to epistemic cognition in individuals over the age of 18. However, it should be noted that some researchers argue that naïve beliefs consistent with realist perspectives may be present in adults in particular contexts, (see for example Bromme et al., 2010).