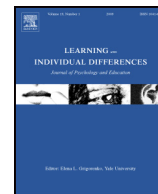




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Need for cognitive closure may impede the effectiveness of epistemic belief instruction

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ABSTRACT

The present article examines the effects of need for cognitive closure on epistemic belief instruction efficacy. Individual differences in need for closure were assumed to interfere with the mechanisms postulated in Bendixen's (2002) process model of epistemic change and thus impede intervention effectiveness. A short-term epistemic belief intervention drawing on both the presentation of diverging (i.e., controversial) information and on constructivist teaching approaches (i.e., moderated discussion) was developed. Instruction primarily aimed at reducing absolute and multiplicistic beliefs in psychology freshmen. In a pretest-posttest field-experimental study, 83 psychology freshmen were randomly assigned to the intervention group or one of two control groups (learning strategies instruction group or untreated control group). As expected, epistemic belief intervention reduced both absolute and multiplicistic beliefs. With regard to multiplicistic beliefs, high need for closure significantly reduced instruction efficacy. Our findings thus highlight the crucial importance of considering individual differences in epistemic belief instruction.

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1. Introduction

The present article investigates need for cognitive closure as a moderator of epistemic belief intervention effectiveness. Epistemic beliefs are defined as individual conceptions about the nature of knowledge and the process of knowing (Hofer, 2000, 2001). Research emphasizes that individual differences in epistemic beliefs are linked to information processing (Kardash & Howell, 2000), text comprehension (Bråten, Strømsø, & Ferguson, 2016), learning (Cano, 2005; Rosman et al., 2016), and academic achievement (Schommer, 1993). For example, students viewing scientific knowledge as “dynamic, interrelated, and more constructed rather than ‘found’” (Porsch & Bromme, 2011, p. 807) will likely put more emphasis on the breadth and depth of learning contents than students conceiving knowledge as an accumulation of absolute truths.

Even though there is a small literature base on how to promote more advanced beliefs (e.g., Muis & Duffy, 2013; Kienhues, Bromme, & Stahl, 2008), studies on individual factors that moderate epistemic belief instruction effectiveness are very rare.¹ Nevertheless, Kienhues, Ferguson, and Stahl (2016) point out that individual differences might influence how people benefit from epistemic belief interventions. This should especially apply to variables which are likely to influence

motivation for epistemic change (Kienhues et al., 2016), and might explain why many instructions seem to work out well for some individuals but not for others (Maggioni, Alexander, & van Sledright, 2004; Kienhues et al., 2008). Need for cognitive closure – defined as an individual's desire for “an answer on a given topic, any answer, ... compared to confusion and ambiguity” (Kruglanski, 1990, p. 337) – is particularly promising in this regard because it can easily be manipulated at the group-level, thus entailing important implications for classroom practice and epistemic belief instruction.

2. Background

Two main approaches can be identified in the epistemic beliefs literature. In the *dimensional approach*, epistemic thinking is conceptualized as a set of largely independent beliefs about, for example, the sources or justification of knowledge (Barzilai & Weinstock, 2015). The dimensional approach primarily uses quantitative measurements (i.e., Likert-type questionnaires). For example, agreement to statements like “Ideas in science sometimes change.” is deemed to reflect more advanced beliefs (Conley, Pintrich, Vekiri, & Harrison, 2004). The *developmental approach* conceives the development of epistemic beliefs as a sequence of (three) successive stages characterized by different, partly opposing conceptions of knowledge and knowing (Kuhn, 1991; Kuhn & Weinstock, 2002): *Absolutists* tend to view knowledge as an accumulation of certain and absolute “facts”: An ultimate truth exists and experts can ultimately get to it. In contrast, *multiplicists* view scientific knowledge as inherently subjective, up to the point where they interpret all viewpoints on a topic

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¹ As pointed out by an anonymous reviewer, one notable exception is a study by Ferguson and Bråten (2013) who investigated changes in epistemic beliefs (induced by confrontations with conflicting texts) as a function of individual topic knowledge.

as equally legitimate “opinions” (so-called *radical subjectivity*). Finally, individuals who reach the stage of *evaluativism* realize themselves to be part of the process of knowledge and knowing, and acknowledge that different positions might require weighting of evidence and evaluations of truthfulness (Hofer & Pintrich, 1997). Qualitative measurements (e.g., interviews) are more prominent in developmental approaches. These nevertheless may be enriched by quantitative measures. For example, Barzilai and Weinstock (2015) stress, with regard to developmental approaches, “a need to complement such methods with quantitative measures that enable assessment among larger and more diverse samples and in varied research settings” (p. 142). In line with this, the present article draws on a quantitative approach to investigate changes in epistemic beliefs using Kuhn's (1991) developmental model.

2.1. Epistemic beliefs in psychology

Knowledge in psychology is ill-defined (e.g., concepts are loosely structured and theories are inconsistent; Muis, Bendixen, & Haerle, 2006) and educational practices frequently emphasize the presence of multiple explanations for a phenomenon (Palmer & Marra, 2008). Moreover, differences in epistemic beliefs between various disciplines have been shown (e.g., higher multiplicism in psychology; Green & Hood, 2013; Muis, Trevors, Duffy, Ranellucci, & Foy, 2015). In line with this, the Theory of Integrated Domains in Epistemology (TIDE) suggests that domain-specific beliefs are shaped by students' instructional environment, which is why psychology freshmen might become even more multiplicistic during their first semesters. Believing that psychology solely reflects an accumulation of opinions, they might even develop a radically subjectivist (Hofer & Pintrich, 1997) stance towards psychological knowledge. Students with such *highly generalized* (i.e., generalized onto psychology in general and not attending to context) multiplicistic beliefs no longer see meaning in striving to understand and weigh different positions. This is in line with Hofer's (2001) concern that multiplicism might thwart students' intellectual commitment, which might also lead to rote learning, feelings of confusion, and decreased study satisfaction.

Support for a view that multiplicism impedes learning comes from research on multiple text comprehension (e.g., Bråten, Strømsø, & Samuelstuen, 2008; Bråten, Ferguson, Strømsø, & Anmarkrud, 2013). For example, after assessing students' epistemic beliefs, Bråten et al. (2013) had their participants read multiple documents on a controversial scientific issue (sun exposure and health) and subsequently answer three short essay-questions deemed to indicate students' understanding of the respective issue. When controlling for prior topic knowledge, they found a view of knowledge as inherently subjective (personal justification of knowledge) to negatively predict multiple-documents comprehension. In line with this, Elby and Hammer (2001) assume learners to be more persistent in trying to understand counter-intuitive learning content when they view the content as certain (in contrast to tentative). In light of these arguments, we see highly generalized multiplicistic beliefs as a grave obstacle for learning and achievement in psychology.

A contextually adaptive view of knowledge and knowing, on the other hand, might very well be helpful for learning. Students who recognize that depending on the issue in question, knowledge might be (un)certain to different degrees (i.e., students who are better at coordinating objective and subjective conceptions of knowledge; Kuhn & Weinstock, 2002), might, for example, put a stronger focus on the argumentative or methodological quality of psychological studies, thus entailing deeper processing and ultimately better learning. Therefore, we see evaluativism as the most sophisticated² form of epistemic beliefs,

² While it is beyond the scope of this paper, we agree with Bromme, Kienhues, and Porsch (2010) suggestion that a certain amount of domain-specific knowledge is required for evaluativistic judgments, and that relying on an expert (a component of absolutism) might be more functional for laypersons. We thus acknowledge that the “sophisticatedness” of epistemic beliefs strongly depends on context and that our distinction might be oversimplified.

whereas – at least in psychology – absolutism and multiplicism might be more unsophisticated.

2.2. Epistemic change and epistemic belief instruction

The *Process Model for Personal Epistemology Development* (Bendixen, 2002) specifies three central mechanisms for epistemic change: First, individuals have to recognize a dissonance between existing beliefs and new experiences (i.e., they have to question their existing beliefs). This mechanism is called *epistemic doubt*. In a next step, so-called *epistemic volition*, which implies the intention to devote sustained effort to changing one's beliefs (Ferguson, Bråten, & Strømsø, 2012), comes into play. The third mechanism focuses on so-called *resolution strategies* (e.g., reflection and social interaction) to solve the dissonance (Kienhues et al., 2008). Using think-aloud protocols, Ferguson et al. (2012) found evidence for the model's components, in particular for epistemic doubt and resolution strategies.

Consistent with a view of epistemic doubt as a catalyst for epistemic change, many (shorter) interventions aim at increasing students' awareness of the existence of differing positions towards issues, mainly through presenting diverging information in text form (e.g., Gill, Ashton, & Algina, 2004; Kienhues et al., 2008). According to Kienhues et al. (2016), diverging information refers “to all types of information that present different, apparently conflicting, viewpoints to the information consumer” (p. 3). Since multiple viewpoints on an issue are presented, diverging information might especially be suited (and has been shown) to reduce absolute beliefs and foster a view of scientific knowledge as tentative and evolving (Gill et al., 2004; Kienhues et al., 2008; Kienhues et al., 2016; Porsch & Bromme, 2011).

Since high multiplicism might be maladaptive in certain domains, it is nevertheless not only important to sensitize students for the existence of different opinions or positions. In line with Bendixen's (2002) model, we posit that especially in psychology, comprehensive epistemic belief instruction should consist of in-depth examinations of different positions to issues, allowing discussion and social interaction, and highlighting the active role of learners in knowledge construction. This has been adopted by some through focusing on the knowledge building process in more constructivist learning environments (Kienhues et al., 2016), usually aiming at changing epistemic beliefs in curricular courses over several months (e.g., Marra, Palmer, & Litzinger, 2000; Brownlee, Purdie, & Boulton-Lewis, 2001; Muis & Duffy, 2013). For example, Muis and Duffy (2013) used constructivist teaching techniques (i.e., discussion and reflection) to foster epistemic beliefs over one semester in a social sciences statistics class (e.g., discussing different statistical methods to approach a specific problem). Highly significant intervention effects were found on “constructivist” epistemic beliefs (i.e., a view of knowledge as complex, tentative, and personally constructed; Muis & Duffy, 2013).

Finally, some complement the above mentioned techniques by direct instruction on epistemic beliefs or critical thinking principles (e.g., Brownlee et al., 2001; Valanides & Angeli, 2005; Hefter et al., 2015). This might be especially fruitful in the domain of psychology since views of psychological knowledge as generally tentative should not be strengthened further. Instead, cautiously “guiding” students towards evaluativism (i.e., through moderated discussion and brief instruction) might be a helpful addition to confrontations with scientific controversies.

In an effort to reduce both absolutism and multiplicism, we thus designed an intervention aimed at increasing students' awareness of the existence of differing positions towards issues while at the same time – through both constructivist teaching techniques and direct instruction – conveying the ideas that in psychology, (1) existing theories might be challenged by further research, (2) inconsistencies and contradictions between different theories are central for research progress, and that, (3) due to varying empirical evidence and argumentative quality, context-dependent weighting of different theories is nevertheless possible.

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