Significance of Epistemological Beliefs for Teaching and Learning Psychology:

A Review

Heather J. Green and Michelle Hood

Behavioural Basis of Health Program, Griffith Health Institute and School of Applied Psychology

Griffith University, Gold Coast, Australia

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Correspondence should be addressed to: Dr Heather Green, School of Applied Psychology, Gold Coast campus, Griffith University Qld 4222, Australia
Email: H.Green@griffith.edu.au; Phone +61 7 5552 9086; Fax: +61 7 5552 8291
Author Biographies

Heather J. Green PhD is a Lecturer in the School of Applied Psychology, Griffith University, Gold Coast, Australia. A registered psychologist, she teaches clinical and health psychology. Her main disciplinary research interest is psycho-oncology and her main teaching interest is self-knowledge and skills development in students of professional training programs.

Michelle Hood PhD is a Senior Lecturer in the School of Applied Psychology, Griffith University, Gold Coast, Australia. A registered psychologist, she teaches educational and developmental psychology. Her main disciplinary research interest is literacy and numeracy development and achievement motivation and her main teaching interest is in developing research methodology and statistics skills and knowledge of developmental psychology in undergraduate psychology.

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Abstract

Beliefs about the nature of knowledge, termed “epistemological beliefs”, are relevant to understanding educational strategies of both learners and teachers. Epistemological beliefs arguably have particular relevance in the discipline and profession of psychology, due to an emphasis on integration of knowledge from multiple theoretical perspectives. This article provides an overview of peer-reviewed literature in this area and suggests implications and directions for teaching and learning of psychology, with particular reference to the higher education context.

**Key Words:** Epistemology, Learning, Professional Education, Psychology, Review, Teaching
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Psychology: A Review

Beliefs about the nature of knowledge influence learning and teaching (Bendixen & Rule, 2004). These “epistemological beliefs” (EB) can vary across individuals and disciplines (Hofer, 2001; Kaartinen-Koutaniemi & Lindblom-Ylänne, 2008). Despite their importance, to our knowledge, there is no previous published review of EB specific to teaching and learning psychology.

EB are arguably important to both academic and applied psychology. Development of scientific reasoning skills has been recommended as a central goal of psychology education (Cranney et al., 2008; Halonen et al., 2003). Similarly, codes of ethics state that applying psychological knowledge requires awareness of the need for ongoing learning and limitations of existing knowledge (Australian Psychological Society, 2007). A critical perspective regarding new knowledge requires relatively sophisticated EB (Halonen et al., 2003). Therefore, for graduates to apply psychological knowledge ethically, technical skills need to be accompanied by skills for discovering, interpreting, and integrating relevant evidence, which involves well-developed EB.

Other terms for EB and related concepts include “personal epistemologies”, “epistemic beliefs”, “epistemic cognition”, and “epistemological resources”, among others (Elby & Hammer, 2001; Murphy, Alexander, Greene, & Hennessey, 2012). The present review uses the term EB, for consistency. Concepts and measurement of EB will be discussed, followed by findings and recommendations regarding learning and teaching.
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**Concepts**

Perry’s pioneering research in the 1950s and 1960s (e.g., Perry, 1968) used annual interviews to show that university students’ conceptions of the nature of knowledge develop over time. Less experienced tertiary students are more likely to demonstrate *dualist* beliefs, whereby knowledge is viewed as absolute and the teacher’s role is to communicate that knowledge. In the next stage, *multiplism*, there is acknowledgement of multiple perspectives, but still the idea that there is a specific, yet undiscovered, truth. Later, *relativism* acknowledges that some viewpoints are better than others. The most sophisticated beliefs, *commitment within relativism*, involve making and evaluating flexibly held commitments to beliefs that incorporate personal values (Brownlee, Boulton-Lewis, & Purdie, 2002; Hofer, 2001). Later EB research, including children’s and adults’ education, has identified similar developmental stages, termed *realist, absolutist, multiplist* and *evaluativist* by Kuhn (2005; 2009).

For example, a student with dualist (or absolutist) EB might explain IQ score as “the way you measure intelligence”. Differing responses would be expected with multiplist EB, e.g., “one of the ways to measure intelligence”; relativist EB, e.g., “a measure of performance on a standardised test that is believed to reflect the construct of intelligence”, or commitment within relativism (evaluativist) EB, e.g., “a measure of performance on a standardised test that is believed to reflect current understanding of the construct of intelligence”. (A single response is not sufficient to identify EB; these examples are offered as illustrations only.)

Relatively few students reach the “highest” stages (Entwistle & Peterson, 2004; Kuhn, Cheney, & Weinstock, 2000). Also, students may return to “earlier”, less sophisticated EB, particularly during transitions, such as from school to university...
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(Hofer & Pintrich, 1997; Weinstock, Neuman, & Glassner, 2006). Affect, particularly anxiety, potentially plays a role in this regression (Hofer & Pintrich, 1997) as well as in other aspects of shifts in EB (Bendixen & Rule, 2004).

Perry’s higher categories overlap with “constructivist epistemology”. Constructivism posits that individuals learn through experience, deriving meanings that are influenced by context and by their previous knowledge and viewpoints (Lea, Stephenson, & Troy, 2003; Muis, 2007). A constructivist approach to learning aligns with EB at the relativism or commitment within relativism stages, due to its emphasis on the importance of students’ experiences and perspectives in developing their knowledge. More generally, EB can be viewed as a “psychological approach to the philosophical field of epistemology” (Hofer, 2008, p. 5).

Alternative developmental models to Perry’s include Women’s Ways of Knowing, the Epistemological Reflection Model, and Reflective Judgment (Hofer, 2001). Despite a lack of consensus on one model (Bendixen & Rule, 2004), longitudinal research supports the usefulness of developmental models. For example, a review of longitudinal research on Reflective Judgment found that most individuals either maintained or progressed EB, with at most 16% displaying regressions (King & Kitchener, 2004). However, regressions are likely to be more frequent if students shift learning contexts (Hofer & Pintrich, 1997).

Developmental models of EB are complemented by models that address other aspects, such as motivation, affect, and dimensionality of beliefs. Regarding dimensions, reviewers have suggested that beliefs about what knowledge is (certainty and simplicity of knowledge) are distinct from beliefs about processes of knowing (source and justification of knowledge; Bendixen & Rule, 2004; Hofer & Pintrich, 1997). For example, beliefs that scientific knowledge is tentative rather than certain,
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and complex rather than simple, would generally be viewed as more sophisticated EB (although see Elby & Hammer, 2001, for critique of “consensus” views of EB sophistication). Similarly, viewing the source of knowledge as “experts” would be considered less sophisticated than viewing the source as an array of evidence potentially varying in quality, support for or against a proposition, and replicability. Structure of EB and boundaries with other constructs continue to be debated (Chinn, Buckland, & Samarapungavan, 2011), but reviews have consistently supported utility of EB for understanding and improving teaching and learning, due to associations between EB and both learning and motivation (Bendixen & Rule, 2004; Greene, Muis, & Pieschl, 2010; Hofer, 2001; Hofer & Pintrich, 1997; King & Kitchener, 2004; Schommer-Aikins, 2004). Potential cultural differences in EB have also been explored (Braten, Gil, Stromso, & Vidal-Abarca, 2009; Khine, 2008).

Measurement

EB measures vary with different models (e.g., see reviews by Braten et al., 2009; Buehl, 2008; Hofer, 2006; Limón, 2006). Many studies have used the Schommer Epistemological Questionnaire (EQ; Schommer, 1990) or have adapted it (Jehng, Johnson, & Anderson, 1993; Kardash & Wood, 2000; Schraw, Bendixen, & Dunkle, 2002). EQ factors of Simple Knowledge, Certain Knowledge, Innate Ability, and Quick Learning have fair internal consistency (e.g., Cronbach alphas between .54 to .76, Schommer-Aikins, 2004). Unfortunately, concerns about the theoretical basis, poor replicability of factors, and reliability of the EQ and related measures limit their usefulness (DeBacker, Crowson, Beesley, Thoma, & Hestevold, 2008). More recent written measures include the Connotative Aspects of EB (Stahl & Bromme, 2007) and the Topic Specific EB Questionnaire (Braten et al., 2009).
Perry (1968) used interviews. A widely used format is the semi-structured Reflective Judgment Interview (King & Kitchener, 2004). The student is questioned about several controversial topics (e.g., the accuracy of news reporting). Questions include the student’s beliefs, their certainty about those beliefs, and how people including experts may disagree on this topic. Internal consistency is high (median Cronbach’s alphas around .80; King & Kitchener, 2004). A written adaptation of the Reflective Judgment Interview also has acceptable pre-post test reliability (Valanides & Angeli, 2005). There is to date no consensus on EB measurement and it is recommended to consider relevance for the intended purpose, as well as psychometric properties when selecting measures.

**Domain Specificity: EB in Psychology versus Other Disciplines**

EB may be domain- or discipline-specific (Hofer, 2001; Kaartinen-Koutaniemi & Lindblom-Ylänne, 2008), although domain-general EB may co-exist (Muis, Bendixen, & Haerle, 2006). Domain-specificity has been examined by comparing students of different disciplines and by comparing students’ EB regarding knowledge domains. Paulsen and Wells (1998) assessed EB among 290 university students majoring in disciplines that were hard-soft (“hard” emphasising one specific paradigm; Biglan, 1973a) or pure-applied (“applied” emphasising applying subject matter to practical problems). Psychology is “soft” and “pure” (Biglan, 1973a, 1973b). As predicted, students from “soft” and “pure” disciplines had significantly more sophisticated EB than did students from “hard” or “applied” disciplines. For example, social sciences and humanities (soft and pure) students were less likely to have naïve beliefs in simple or certain knowledge than were engineering (hard and applied) or business (soft and applied) students. Karseth and Solbrekke (2006) interviewed Norwegians studying law or psychology. They found that law students
were more likely to view their task as learning a single, “correct” legal method, whereas psychology students emphasised the importance of understanding multiple theoretical perspectives.

Longitudinal German research measured EB in final year high school \((N=2,854)\) and second year university \((N=1,495; \text{Trautwein} \& \text{Lüdtke}, 2007)\). EB predicted students’ choice of discipline (self-selection hypothesis of EB-discipline associations) and changed in different ways depending on the discipline the student studied (socialisation hypothesis; Trautwein \& Lüdtke, 2007). Specifically, high school certainty beliefs were highest among students who chose business at university and lowest among students who chose social science. By second year university, certainty beliefs declined further in social science and humanities students, but increased in engineering students.

Examining individuals’ discipline-specific EB, Hofer (2000) found that psychology students’ EB about science and psychology differed. They believed that in psychology, knowledge was less certain, truth was less attainable, personal experience was more important as a source of knowledge, and knowledge from experts was less important compared with science. Similarly, Estes, Chandler, Horvath, and Backus (2003) found that undergraduate students who had studied psychology believed that psychological phenomena were less knowable through scientific methods than were biological phenomena, and that psychological phenomena could be understood via common sense and personal experience. These data imply increased readiness to develop sophisticated EB regarding psychology than some other topics, although alternative explanations such as lack of understanding of scientific methods in psychology are also possible. More sophisticated EB regarding psychology than other fields have been found among students from a range of disciplines, with the most
pronounced difference found among students at higher year levels (unpublished data from Wood, Kitchener & Jensen, cited by King & Kitchener, 2004).

Students’ EB change with time in psychology programs. Focus groups conducted with beginning, second and third-year psychology students in the United Kingdom (UK) showed that beginning students viewed psychology as being open-ended and creative (suggesting relativist and constructivist epistemologies), but also as constituting a body of knowledge (suggesting a dualist epistemology; Wallwork, Mahoney, & Mason, 2006). Second and third-year students referred to the discipline’s complexity, with this being viewed more positively by third years. This implied greater acceptance of relativism by advanced students.

Despite changes over time, Kaartinen-Koutaniemi and Lindblom-Ylänne (2008) found that EB still varied between masters students of psychology, pharmacy or theology in Finland (N=52). Psychology students placed more emphasis on research methods and quantitative analysis in evaluating knowledge, whereas theology students were more likely to value intuition. Emphasis on scientific method and its applicability to understanding psychological phenomena was more evident among these psychology Masters students than the undergraduate students in Estes et al.’s (2003) study. Thus, experience in psychology fosters appreciation that psychological phenomena are knowable by scientific methods.

Lonka and Lindblom-Yläinne (1996) assessed EB in first- and fifth-year psychology and medicine students. Among psychology students, fifth-years reported lower mean scores than first-years on a factor that combined high interest in applied knowledge with low interest in theoretical knowledge. In contrast, these factor scores increased in advanced medical students, even though both programs qualified students for professional practice. Knight and Mattick (2006) found that EB of UK medical
students changed in complex ways that varied among different areas of knowledge and practice. They concluded that development of professional identity should be considered in conjunction with EB. This may also pertain to psychology students who are in professional streams of study.

In summary, studies within and across disciplines suggest that students are likely to have more sophisticated EB regarding psychology than many other disciplines. Why might psychology foster sophisticated EB? Psychology focuses on critical thinking, through emphasis on research methods and integrating knowledge from multiple theoretical perspectives (Reddy, Hammond, Lewandowska, Trapp, & Marques, 2011). Psychology students are encouraged to develop scepticism to understand and justify sources of evidence and know how to distinguish between different strength evidence. Psychology also emphasises writing more than some other disciplines, which requires students to compare and integrate competing knowledge. This may encourage constructivist approaches.

If sophisticated EB are fostered by studying psychology, how might this benefit students? One way is via associations between EB and students’ learning approaches and the other is via associations between EB and academic achievement.

**Relationship with Learning Approaches**

EB may influence learning through a link with learning approaches (Entwistle & Peterson, 2004; Hofer & Pintrich, 1997). “Surface” learning focuses on outcome goals such as obtaining a qualification, whereas a “deep” approach involves intrinsic motivation and abstract meaning. A third “strategic” approach involves striving to achieve highly while organising one’s time efficiently (Cassidy & Eachus, 2000). Naive EB have been associated with surface learning approaches whereas sophisticated beliefs have been associated with deeper approaches (Schreiber &
Shinn, 2003). Entwistle and Peterson (2004) noted that students who viewed learning as being about transforming or constructing knowledge focused on understanding and displayed intrinsic academic orientation and a self-regulated approach to learning. Students who viewed learning as being about memorising fact-based fragments of knowledge were more likely to use surface-level rehearsal and memorising strategies. More generally, Muis (2007) reviewed ways that EB relate to self-regulated learning.

A longitudinal study of Dutch social science, economics, law and arts students found that surface learning frequency was stable from the first to third semester of study, whereas deep learning strategies increased (Vermetten, Vermunt, & Lodewijks, 1999). Students who viewed knowledge as something for “intake” were less likely to report deep learning, whereas students who viewed knowledge as “constructive” were more likely to. Phan (2008) also found that EB affected students’ deep versus surface learning approaches, but that learning approaches did not affect students’ later EB.

Lonka and Lindblom-Ylänne (1996) found that surface learning was significantly lower and constructivist epistemology significantly higher among psychology than medical students, and among fifth- than first-year students. However, there was no interaction between discipline and year level. Regardless of discipline, students endorsing constructivist epistemology reported using surface strategies less often and deep strategies more often than did dualist students.

**Relationship with Academic Achievement**

Sophisticated EB have been associated with better performance on both experimental tasks and course grades. Schommer (1990) asked undergraduate psychology students to write conclusions for and demonstrate mastery of passages from psychology or nutrition. Higher certainty of knowledge beliefs were associated with absolute (oversimplified) conclusions, whereas completion of more university
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courses was associated with more tentative conclusions, reflecting more sophisticated EB. Higher quick learning beliefs were also associated with oversimplified conclusions and poorer mastery on the psychology passage as well as overestimation of understanding. There was no influence on nutrition passage mastery, but floor and ceiling effects appeared to be a problem with that passage. Similarly, Schommer-Aikins and Easter (2006) found that business students who believed in quick learning had worse reading comprehension and poorer course grades, whereas other EB did not correlate with academic outcomes. However, Hofer and Pintrich (1997) criticised “quick learning” on methodological and conceptual grounds as beliefs about learning rather than beliefs about knowledge.

Trautwein and Lüdtke (2007) found that higher certainty of knowledge beliefs in final year high school students were associated with lower grades, after controlling for cognitive ability and socioeconomic status. Similarly, Phan (2008) found that both EB and learning approaches predicted academic performance of university mathematics students, and that learning approaches mediated effects of EB on academic performance. University physics students who showed higher gains in conceptual knowledge during first year described their learning in ways that implied more sophisticated EB (May & Etkina, 2002).

Among students in introductory educational psychology, 90% of whom were studying to become teachers, more sophisticated EB were associated with higher course grade and this relationship was mediated by both achievement goals and learning strategies (Muis & Franco, 2009). Consistent with findings from non-psychology students, Hofer (2000) found that certainty and simplicity of knowledge beliefs among 326 psychology undergraduates significantly negatively correlated with psychology grade ($r = -0.31$) and overall grade point average ($r = -0.22$). Thus, in
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psychology and other disciplines, more sophisticated EB are associated with higher academic achievement.

**Teaching**

Students prefer teaching approaches to be aligned with their present EB, yet learning is enhanced when students’ existing conceptions are challenged (Entwistle & Peterson, 2004). Student-centred approaches to learning and teaching naturally align with a constructivist epistemology (Lea et al., 2003). However, student-centred approaches are more often claimed than realised in practice (Lea et al., 2003).

Lonka and Ahola (1995) found that “activating” classes in psychology, intended to be student-centred and, therefore, involving constructivist epistemology, were associated with improved student understanding, study skills, academic results and final year thesis grades compared with “traditional” teacher-centred classes. Similarly, UK psychology students viewed student-centred learning as being more motivating and effective than teacher-centred learning, but also expressed the need for sufficient support rather than being left to learn by themselves (Lea et al., 2003).

Focus groups conducted with beginning, second and third year UK psychology students showed a shift in third-year students who emphasised the importance of personally experiencing the discipline’s complexity (Wallwork et al., 2006). The authors suggested that aiding psychology students’ development of independent learning and critical thinking might require educators to avoid providing increasing structure and support, because this may maintain information acquisition (dualist) models of learning. Furthermore, they stated that students who view psychological knowledge as requiring information acquisition may feel unsupported and threatened by teaching strategies that encourage independent activities and consideration of multiple perspectives.
EB may also affect assessment. Lea and Street (1998) noted that academic writing may be viewed differently by educators and students as well as by different individuals. They suggested an “academic literacies” approach that acknowledges epistemological variability among writing contexts. Interviews revealed that academics’ ideas about “good” writing were based in the meaning of knowledge, often discipline-specific. However, academics were often unable to identify explicitly what would improve poor student writing from an epistemological basis and instead more frequently described surface features such as structure and form. More attention by teachers to the epistemological basis of their expectations would help them communicate clearer expectations and give students feedback on core rather than surface issues. Madigan, Johnson, and Linton (1995) noted the epistemological nature of psychology’s key writing guide, the Publication Manual of the American Psychological Association (APA). They argued that more than teach students to write like psychologists, the Manual teaches them to “reason empirically about human behaviour” (p. 434) and to embrace the discipline’s intellectual values; that is, to think like psychologists. Interestingly, critiques of Madigan et al.’s paper included the suggestion that the epistemology implied by the APA Manual is not shared by all psychologists (Josselson & Lieblich, 1996).

Assessment may also affect students’ beliefs and approaches. Among first- and second-year university students studying research methods in health, social work or counselling, higher use of strategic learning was related to both higher academic achievement and perceived proficiency at course completion (Cassidy & Eachus, 2000). Deep learning did not correlate with achievement or perceived proficiency. The authors suggested that this might reflect that performance rather than learning is emphasised and rewarded in higher education. Certainly French psychology students
reported perceiving universities to provide strongest encouragement and incentives for strategic goals, even though both educators and students more strongly endorsed deep learning goals (Darnon, Dompnier, Delmas, Pulfrey, & Butera, 2009). Knowledge of EB may help psychology educators to use assessment to facilitate deep as well as strategic learning.

**Explicit versus Implicit Teaching**

The extent to which it is beneficial to explicitly teach students about EB, compared with using strategies that implicitly foster more sophisticated beliefs, is unclear. Explicit teaching regarding EB involves strategies such as students completing and then discussing an EB measure, as used in some educational psychology courses (Hofer, 2001). Explicit EB instructional studies have been concentrated in education. For example, EB of pre-service early childhood teachers increased in sophistication when both explicit and implicit teaching of EB was included in their university program (Brownlee, Petriwsky, Thorpe, Stacey, & Gibson, 2011). Explicit instruction regarding EB during teacher training was endorsed in a comprehensive review of teachers’ EB (Schraw & Olafson, 2003). These reviewers suggested that explicit instruction may help teachers to develop pedagogically helpful EB and to use classroom practices that are consistent with these EB (Schraw & Olafson, 2003).

Hammer and Elby (2002) demonstrated that teaching strategies can implicitly encourage students to use epistemological resources that will aid learning. Examples given include encouraging student debate, using design and construction activities, and using bridging analogies. They cited work by Harel and Papert (1991, cited in Hammer & Elby, 2002), showing that students demonstrated more sophisticated
epistemological resources when asked to design and construct physical or virtual objects than in traditional classroom tasks.

Kienhues, Bromme, and Stahl (2008) randomly assigned second year German university students to an instructional condition presenting a unitary viewpoint that was not expected to change EB, or one presenting contrasting viewpoints that was expected to develop more sophisticated beliefs. Neither condition included explicit EB instruction. Approximately 55% of the sample was psychology students. Results were mixed. Some students with naïve beliefs who received refutational instruction developed more sophisticated beliefs. However, some students with more sophisticated EB showed more naïve beliefs following either type of instruction. Regression to the mean might partly explain this but it also suggests potential for some types of teaching to affect EB development adversely. Overall, this study demonstrated that EB could be changed by the instructional context, consistent with Hammer and Elby’s (2002) suggestions.

A review of EB in mathematics found that instructional strategies could change children’s and adults’ beliefs about mathematics in ways that improved understanding and performance (Muis, 2004). Similarly, in an intervention study with graduate students studying introductory statistics for social sciences, Muis and Duffy (2012) found that a class assigned to a semester of constructivist teaching strategies including teacher modelling of critical thinking, use of multiple approaches to solving problems, and making connections to prior knowledge, developed more sophisticated EB, used more constructivist learning strategies, and achieved higher course grades, compared to a control class. Muis (2004) speculated that including explicit instruction about EB as well as using teaching and learning strategies that support implicit EB
development might protect students from “regressing” in EB if they receive such an intervention and then change instructional contexts.

**Recommendations for Psychology Education**

Based on evidence above regarding advantages of sophisticated EB for psychology students and potential for fostering helpful EB, we recommend that all psychology teachers acquire knowledge of educational implications of EB. Evidence seems clear that using learning and teaching strategies that *implicitly* promote sophisticated EB will benefit psychology students. A number of authors have provided relevant suggestions for teaching practice (e.g., Bendixen & Rule, 2004; King & Kitchener, 2004; Muis, 2007). Strategies such as encouraging students to structure knowledge themselves via optimally supportive learning environments (Wallwork et al., 2006), reviewing historical development of an area (Hofer, 2001), attending to individual student variability and potential anxiety about constructivist approaches (Lea et al., 2003), and giving assessment feedback that emphasises core understanding rather than surface issues (Lea & Street, 1998) are demonstrated or likely to be helpful in psychology.

It is unclear whether *explicitly* teaching psychology students about EB would add benefit. If taught explicitly, it is recommended that the concept be revisited, so that students have an opportunity to review development of their beliefs over time (Brownlee et al., 2011). A recent report recommended explicit teaching of epistemology from first year psychology onwards (Cranney et al., 2008). Optimal times for explicit instruction might include transition periods such as first year psychology, “capstone” courses, and entry to Honours or postgraduate training, because students are believed to be vulnerable to returning to less sophisticated EB at such transitions (Hofer, 2001; Weinstock et al., 2006). Explicit teaching may help
protect students from regressing in EB when changing learning contexts and would also help to develop psychology educators.

**Recommendations for Research**

Future research should continue to strive for clarity in concepts and measurement. Important intervention questions regarding psychology education include (a) optimal ways to foster sophisticated EB among students, (b) mechanisms by which this occurs, and (c) whether it adds benefit to explicitly teach students about EB.
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