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Education practitioners' epistemological beliefs and their understanding of evaluation: a preliminary study in Singapore

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ABSTRACT

In educational reform initiatives worldwide and in Singapore, educators are increasingly encouraged to take ownership of their work through involvement in practitioner inquiry and evaluation efforts to transform teaching and learning. Educators' epistemological beliefs – their view of knowledge and knowing – play a critical role as they learn to become critical, reflective actors in the knowledge construction endeavour. This mixed-methods study investigates whether and how educators' epistemological beliefs influence their understanding of programme evaluation as viewed through participants' journey of learning to design a real-world evaluation study in the context of Masters-level coursework. Findings suggest that participants' epistemological scale scores are associated with their learning outcomes as manifested in the quality of their evaluation plan. Specifically, participants with higher or lower scores show important differences in their view of evaluation and what a good evaluation requires, their relationship with knowledge about programme evaluation, the nature of challenges encountered in designing their evaluation plans, and how they navigate their challenges. Findings have implications for purposes and approaches of teacher professional learning and offer insights into the re-design of learning opportunities to transform educators' epistemological beliefs in general and in relation to discipline-specific learning.

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Introduction

Teachers play a significant role as change agents and decision-makers in educational reform initiatives proposed in response to the increasingly diverse, uncertain, and changing world (Akiba & LeTendre, 2018). Some argue that for teachers to be agents in educational reforms, teacher education and professional learning opportunities must transform their beliefs, perspectives, and assumptions, including their view of knowledge and the process of knowing. This involves them in critically investigating and constructing the knowledge of practice and identifying new ways of teaching (Deng, 2004; Deng & Gopinathan, 1999). In Singapore, reform policies (such as "Teach Less, Learn More" in 2005 and the development of the Singapore Teaching Practice in 2017) over the past two decades emphasize teachers' role in owning their work, building a knowledge base through practitioner inquiries, and exercising reflexivity regarding their practices (Goodwin & Low, 2021). Further, schools are offered more autonomy to explore and respond to diversity and innovation through various programmes (Ministry of Education, n.d.). Subsequently, teachers and leaders at all levels often adopt new evidence-based pedagogies, conduct inquiry projects, and/or design and

conduct the evaluation of school-based programmes. Therefore, teachers' capacity to not only know how to conduct a research and evaluation study but also become critical, reflective actors in knowledge construction is crucial.

Most studies on training in programme evaluation focus on models or coursework design preparing professional programme evaluators in the Global North – West contexts or the international development setting. The literature on training in programme evaluation rarely intersects with research on teacher learning and seldom focuses on preparing practitioners as evaluators and key stakeholders (e.g., users, decision-makers) in school accountability/evaluation systems. Given this lacuna in the evaluation literature and the need to prepare educators to become capable and critical knowledge producers, this study examines how the epistemological beliefs of educators might influence their understanding of programme evaluation, through the participants' journey of learning to design a real-world evaluation study during Masters-level coursework. The findings can provide insights into the need for evaluation training. Further, the study provides preliminary information about the kind of learning experience and pedagogical approaches that might facilitate the development of the epistemological beliefs and reflective judgement capacity of novice evaluators.

Literature review

In this section, I first discuss the theories of epistemological beliefs and research on teaching and teacher education that investigate the development of the epistemological beliefs of teachers and how these beliefs influence their professional identities, practices, and agency in professional learning. Considering the role of educators in adopting inquiry and evaluation initiatives in the education reform movement, I discuss relevant research on evaluation training, the pivotal role of epistemological beliefs in evaluation, and the context of the current study: one-semester coursework on programme and curriculum evaluation for educators.

Epistemological beliefs

Research investigating human cognitions related to epistemic matters often traces back to Perry's (1970) work on the intellectual and ethical development of college students and its influence on how college students interpret their learning experience and respond differentially to the pluralistic intellectual and social environment of universities. Multiple terms, such as epistemological belief (Schommer, 1990, 1998), personal epistemology (Hofer & Pintrich, 1997), epistemic cognition (Chinn et al., 2011), epistemic reflection (Baxter Magolda, 2004), and reflective judgement (Kitchener & King, 1981); definitions; and theories have been proposed to describe interrelated ideas. The ideas include one's perception of the nature of knowledge, reality, and truth; how knowledge is acquired and justified; and who can acquire knowledge.

For example, Kitchener and King (1981) propose a seven-stage reflective judgement model to describe adults' reasoning styles. Each of these stages includes a coherent set of assumptions about reality, knowledge, and means of justification. This model closely reflects Perry's (1970) nine-position model, with the most advanced stage being "reflective judgment", wherein adults critically inquire and evaluate knowledge and reflect on their thinking. The authors suggest that individuals move sequentially through stages, and dissonance between one's reasoning frame and learning experiences can push individuals to seek a defensible frame and move along the stages.

Rather than treating epistemological beliefs as one single but complex dimension in which individuals move through development-like stages, Schommer (1990) suggests that 'personal epistemology is a belief system that is composed of several more or less independent dimensions, including "the structure, certainty, and source of knowledge and the control and speed of knowledge acquisition" (p. 498). Based on the hypothesized multi-dimensional model, Schommer developed the 63-item self-report Likert-scale epistemological beliefs questionnaire [EBQ], which has been

widely adapted and/or used across contexts (e.g., Chai et al., 2006; Chan & Elliott, 2002; Conley et al., 2004). However, researchers have pointed out that the dimensions of control and speed of knowledge acquisition are about learning, thereby falling outside the construct of epistemological beliefs (Hofer & Pintrich, 1997). Subsequent validation studies have not consistently yielded the same results that confirm the four-factor structure (Clarebout et al., 2001; Conley et al., 2004; Schommer, 1993).

In their systematic review of the theories of epistemological beliefs, Hofer and Pintrich (1997) suggest that despite the varying definitions, nature, and labelling of the construct in different theories, there is agreement across the theories on two core sets of ideas: one's beliefs about the nature of knowledge and the process of knowing. They propose a four-dimensional framework wherein the concept of the nature of knowledge includes the dimensions of the *certainty* and *simplicity of knowledge* and the concept of the process of knowing includes the dimensions of the *source of knowledge* and *justification of knowing*. The "certainty of knowledge" dimension deals with the degree to which one views reality as absolute or constructed and knowledge as fixed or fluid and tentative. The dimension of the "simplicity of knowledge" deals with the degree to which one sees knowledge as an accumulation of discrete and concrete facts or highly interrelated and complex concepts. Regarding the dimension of the "source of knowledge", at the lower end, knowledge originates externally and resides in authorities; at the higher level, the concept of self as a knower who actively participates in the meaning-making process is developed. The dimension of the "justification of knowing" is related to how one evaluates knowledge claims. At the lower level, one justifies through authorities, individual observations, and what feels right or wrong. At the higher level, while acknowledging objective truth as unattainable and knowledge as fallible, one can use inquiry rules to evaluate the validity of knowledge claims and reflect on one's inquiry process. Hofer (2000) argues that "the dimensions are related to each other in coherent and internally consistent ways, make some important distinctions about knowledge, and may provide a causal-explanatory framework for thinking about knowledge" (p. 382).

Among the theories of epistemological beliefs, some define epistemological matters as a cognitive development structure and process (Kitchener & King, 1981), whereas others define epistemological matters as a set of personal theories or beliefs that affects cognitive processes (Hofer & Pintrich, 1997; Schommer, 1990). Following Hofer and Pintrich's work (Hofer, 2000; Hofer & Pintrich, 1997), I consider the construct of epistemological beliefs as personal theories that influence how individuals make sense, learn, respond, and inquire in the real world. Moreover, although these theories propose different labels and numbers of dimensions to delineate the construct, the four-dimension model proposed and evaluated by Hofer and colleagues (Hofer, 2000; Hofer & Pintrich, 1997) provides great conceptual clarity and is used to guide this study. Finally, within each epistemological belief dimension, there exists a continuum that reflects the positions or trajectories where individuals may move from a more naive to a more sophisticated level (King & Kitchener, 2004; Kitchener & King, 1981; Perry, 1970). The "naive" or "novice" level of the continuum refers to a belief that truth exists objectively and is absolute and knowledge about the truth is certain and known by the authority. The "sophisticated" or "complex" level of the continuum refers to the belief that true realities are contextually constructed by individuals, knowledge is uncertain and fallible, and yet both general and discipline-specific rules can be used to evaluate the validity of knowledge claims. These descriptors are commonly used in research on epistemological beliefs (Brownlee et al., 2001; Schommer, 1990; Sleeter, 2009) and are used throughout this study.

Epistemological beliefs, teaching, and teacher learning

Studies have shown that the epistemological beliefs of individuals predict their learning processes and outcomes (Hofer, 2000, 2001; Schraw & Sinatra, 2004) and influence how they make judgements on complex and ill-structured problems presented in the real world (King & Kitchener, 2004). Researchers have investigated how the epistemological beliefs of teachers influence their views of diverse student populations, their practices, and professional growth. Further, they have

investigated what instructional approaches can facilitate the development of the epistemological beliefs of teachers (Brownlee et al., 2001; Clayton, 2007; Gill et al., 2004; Jordan et al., 2007; Moser et al., 2021; Sleeter, 2009; White, 2000).

For instance, guided by Schommer's theory (Schommer, 1990, 1998), Sleeter (2009) and Brownlee et al. (2001) studied how pre-service teachers develop more complex and sophisticated epistemological beliefs about the curriculum from teacher education coursework or a one-year teacher education programme. Sleeter (2009) conducted a qualitative case study to understand how a novice teacher develops epistemological beliefs. It was observed that reading from multiple ideological perspectives, involving students in conducting normative examinations on readings and reflective writing, providing space and support for personal interactions that explore ideas and take risks, and encouraging peer sharing through guided inquiry are particularly helpful in facilitating the change in the epistemological belief of teachers. Similarly, using a pre- and post-design approach, Brownlee et al. (2001) found that having students explicitly reflect on their epistemological beliefs based on readings and guided inquiry, supports pre-service teachers' development of epistemological beliefs.

Others have investigated how the epistemological beliefs of teachers relate to their pedagogical practices. For instance, White (2000) investigated the epistemological beliefs of pre-service teachers through their perspectives on problematic classroom situations, concluding that the epistemological beliefs of teachers vary and different dimensions are interconnected. Moreover, teachers who believe knowledge is certain and predictable, and experts are the ones who possess knowledge, also view problematic classroom situations as "simple" and rely on few criteria or consider limited viewpoints when looking for approaches to address the problems. Conversely, teachers who see knowledge as tentative, uncertain, constructed through different viewpoints, and yet evaluable also demonstrate an in-depth understanding of the complexity of the classroom problem and consider multiple criteria, as well as trade-offs, when selecting an approach. Additionally, studies consistently show that teachers' views of the nature of knowledge and process of knowing are related to their assumptions about learners, conception of teaching and learning, instructional plan and delivery, pedagogical decisions and practices (e.g., engaging students in learning materials, promoting high-order thinking, and facilitating a learning environment), and teaching effectiveness (Jordan et al., 2007; Kagan, 1992).

With the theoretical and empirical research on epistemological beliefs being developed and conducted mostly in Global North – West contexts, little research has been conducted in Asia-Pacific contexts (Chai et al., 2006, 2009; Chan & Elliott, 2002, 2004). Chai et al. (2006) and Chan and Elliott (2002) studied the epistemological belief profiles of pre-service teachers in Singapore and Hong Kong, respectively. Adapting Schommer's (1990), pp. 63-item EBQ, both studies suggested that although the results generally replicated Schommer's four-dimension structure, the traditional Chinese Confucian culture might explain why most research participants believe that knowledge acquisition requires effort and learning processes are more important than obtaining facts. Additionally, pre-service teachers in Hong Kong believe that knowledge is uncertain, and experts are not necessarily the sources of knowledge, reflecting the British influence on its culture. Conversely, pre-service teachers in Singapore, though they believe knowledge is uncertain, believe that the authority's knowledge and assessment are correct. Moreover, while pre-service teachers in Hong Kong reflect a wide range of beliefs regarding the dimensions of the source of knowledge, those in Singapore demonstrate homogeneous epistemological beliefs. In the Singaporean context, Chai et al. (2009) used a survey research approach to investigate the change in the epistemological beliefs of 413 Singaporean pre-service teachers during a one-year teacher education programme. Like other studies (Brownlee et al., 2001; Moser et al., 2021), they found that the epistemological beliefs of pre-service teachers moved from a more absolutist stance towards a relativist stance and from a strong belief in experts' knowledge towards a position that takes up more epistemic agency.

A key underlying assumption in this body of research is that teachers are curriculum makers, designers, and decision-makers who participate in constructing knowledge of teaching and learning

through ongoing reflection and inquiry of their practice, rather than being merely doers or knowledge consumers (Clayton, 2007; Cochran-Smith & Lytle, 2009). In education reform initiatives around the world and in Singapore, educators are increasingly encouraged to take ownership of their work through involvement in practitioner inquiry and evaluation efforts to transform teaching and learning. Educators' epistemological belief – their view of knowledge and knowing – plays a critical role as they learn to become critical, reflective actors in the knowledge construction endeavour.

Programme/Curriculum evaluation training for educators

Programme/curriculum evaluators are often tasked with making credible judgements about the merit and worth of a programme based on systematically collected evidence while navigating multiple interests, goals, and values represented by multiple stakeholders in a cultural and institutional context (House & Howe, 1999; Schwandt & Gates, 2021). This requires a detailed understanding of and continuous reflexivity upon the nature of knowledge, how knowledge is constructed and by whom, and how knowledge is evaluated and justified. Epistemological belief is a critical dimension in learning to design and conduct evaluations. Numerous studies on training programme evaluators have focused on the essential competencies of evaluators and the coursework, field training, or preparation models for building evaluators' capacity (King & Stevahn, 2020) and enabling professional growth (Bakken et al., 2014; Christie et al., 2014; LaVelle & Donaldson, 2014). Additionally, most studies on programme evaluation training focus on preparing programme evaluators rather than teachers and education leaders who engage in the design and use of evaluation in school accountability/evaluation systems. Moreover, theories and research on evaluation have largely been developed outside of the Asia-Pacific context (except for Australia and New Zealand), and in Singapore, the study of programme evaluation is in its developing stage.

Against this backdrop, the micro-context of this study is a one-semester-long course on Programme and Curriculum Evaluation (i.e., MCT 912). MCT912 is an elective course offered by the Master of Education in Curriculum and Teaching (M.Ed. C & T) Programme at a teacher education institution in Singapore. The purpose of the course is twofold: first, it provides fundamental evaluation concepts, evaluation theories, and practical tools for students to understand and apply the knowledge to design an evaluation in their contexts. Second, it develops students' critical understanding of knowledge and knowledge construction in evaluation by recognizing the role of value and valuing in evaluation.

Regarding the course design, the 14-week course is divided into three themes: (a) fundamental concepts and ethical issues in evaluation, including values and valuing in evaluation, (b) evaluation theories/approaches from various philosophical roots (Christie & Alkin, 2012), and (c) practical tools and considerations in designing a real-world evaluation. Course assignments include semi-guided online reflection posts based on weekly readings, group-led seminar presentations on selected evaluation theories, and individual evaluation plans and planner notes. The evaluation plan with the planner notes is one major assignment in which individual students are to select an existing programme at the beginning of the semester and are guided by the instructor (the author) in designing an evaluation plan based on their programme contexts and needs. The course is designed for educators who have never received formal training in programme evaluation. The topics introduced throughout the course are intended to guide students towards the completion of their evaluation plan. The planner notes serve as an "evaluator's reflection journal" for each student to freely document the decision-making process, dilemmas, challenges, and/or considerations of trade-offs as they navigate the process of designing an evaluation plan.

Considering the relevant literature on epistemological beliefs, teaching and teacher learning, and evaluation training, I argue that epistemological belief is at the core of teachers' learning to become reflective, agentic, and critical knowledge consumers and actors in the ever-changing education landscape. Given the sparsity of research on evaluation and evaluation training in Singapore, this

study aims to understand if and how personal epistemological beliefs influence learning in a programme and curriculum evaluation course for educators. The research questions were as follows:

Quantitative: Is there an association between participants' personal epistemological beliefs and the outcomes of learning programme evaluation?

Qualitative: How do participants with diverging levels of epistemological beliefs (i.e., from naive to sophisticated) navigate the journey of learning and designing programme evaluation?

Methodology

This study used a mixed-methods explanatory sequential design (Creswell & Plano Clark, 2018). The quantitative strand used a self-report survey comprising items on participants' epistemological beliefs and evaluation-related experience and training. Participants' learning outcomes are measured by evaluation plan marks assigned by the instructor. The qualitative strand used a one-hour individual interview with a subset of survey participants. The interviews focused on participants' understanding of evaluation and their thinking and decision-making process as they encountered challenges in designing their evaluation plan. Additionally, participants' assignments, including their individual reflection portfolios and evaluation plans, were used to support the analysis. This research design was appropriate because the intent was to use qualitative interviews to explain the quantitative (i.e., the presence of correlations) results.

Data collection

Procedure

Legitimate participants were students enrolled in the MCT912 Programme and Curriculum Evaluation course in the January 2023 semester, which began in the second week of January and ended in the first week of April. As I was also the course instructor, a research member who is not involved in teaching conducted the recruitment and data collection activities during the semester and before the submission of final grades. Whether students consented to participate in the study and the data they provided were unknown to the researcher until the submission of grades. After the study was introduced to the students, they received an email invitation to participate. Interested students were invited to respond to a Qualtrics survey. Participants who consented to respond to the survey also provided consent for the researchers to use course assignments, including their reflection portfolios (i.e., collection of 12 online discussion posts over six weeks during the semester) and evaluation plans. Towards the end of the survey, participants were asked if they would like to participate in a follow-up interview in April. Interested participants were contacted by the research member to confirm the interview schedule and provide consent for the interview. All interviews were conducted and recorded via Zoom with the participants' consent.

Data collection tools

For the survey items capturing individuals' general epistemological beliefs, I adapted items from two existing scales (Chan & Elliott, 2002; Hofer, 2000) measuring the nature of knowledge (i.e., certainty/simplicity of knowledge; 11 items) and knowing (i.e., source and justification of knowledge; seven items) among students in higher education settings. Since the survey items were adapted, I also obtained a reliability estimate and conducted an exploratory factor analysis to check whether the modified items collectively measured the underlying constructs, as reported in the literature. I used the following to determine whether to omit or retain items: (a) corrected item-total correlations (i.e., omitting items with low or negative correlations with the remaining items), (b) a non-zero determinant (i.e., ensuring sufficient variability in item responses), (c) a significant Bartlett's Test of Sphericity (i.e., suggesting significant correlation coefficients among some items), (d) a Kaiser – Meyer – Olkin of equal to or larger than .7 (i.e., suggesting items measuring a common factor), (e) a scree plot with

a clear elbow shape, (f) at least 50% of variance explained by the first factor, and (g) Cronbach's alpha of larger than .7. Based on empirical evidence and theoretical understanding, six of the initial seven items were retained, measuring the nature of knowing (i.e., source and justification of knowledge); four of the initial seven items were retained, measuring simplicity of knowledge; and three of the initial four items were retained, measuring certainty of knowledge. For each of the three sub-scales, I calculated the summary scores for the subsequent analysis to address the quantitative research question. Given the response options and their corresponding values (i.e., *Strongly disagree* = 1, *Disagree* = 2, *Neutral* = 3, *Agree* = 4, *Strongly* = 5), a low score suggests a more sophisticated view of knowledge and knowing and vice versa.

For the qualitative interview, the questions focused on three areas: (1) participants' understanding of evaluation, what constitutes a "good" evaluation, and the role of evaluation in institutions and society; (2) the challenges participants encountered when designing their evaluation plans and how they made specific decisions to move forward; and (3) specific course elements (i.e., weekly readings, online and offline discussions, lectures) that change or challenge their understanding of evaluation.

Participants

Twenty students consented to participate in the study, and 19 completed the survey. Eight participated in the one-hour follow-up interviews. Seven indicated that they had some previous experience of being involved in designing and/or implementing programme evaluation-related activities. None of the participants reported having any programme evaluation-related training before the course.

Data analysis

Quantitative and qualitative data were analysed separately after the grades were submitted. For the quantitative data, the SPSS software (Version 28.0.0.0, IBM Corp, 2021) was employed. I obtained descriptive statistics (i.e., participants' mean scores for each of the three sub-scales, frequency distribution for each item) and the correlation coefficients among the three sub-scales capturing the different dimensions of epistemological beliefs and between each of the sub-scale scores and participants' evaluation plan marks.

The qualitative interview data were transcribed and analysed using ATLAS.ti (2022) software. The first round of codes was generated inductively to reflect participants' perspectives of evaluation, the nature of challenges encountered as they learned about and designed an evaluation study, how they overcame challenges and made decisions in the process, and how they came to learn about evaluation, using process codes, value codes, concept codes, and In Vivo codes (Miles et al., 2020). In the second round of coding, pattern codes were generated to categorize the initial codes that reflected a similar perspective or orientation towards evaluation, the nature of challenges, approaches to overcoming complex challenges, and one's way of developing an understanding of evaluation. These pattern codes facilitated the identification of relationships among the pattern codes, which became themes, and the comparison between participants with more simplistic and complex epistemological beliefs.

Findings

This section presents quantitative findings, including descriptive statistics by items, sub-scales, and correlations, followed by qualitative results.

Quantitative results

Table 1 presents the descriptive statistics of the participants' epistemological beliefs. Regarding the *simplicity of the knowledge* dimension, except for item 1, almost half of the participants disagree or

Table 1. Descriptive statistics by scales and items (*N* = 19).

Sub-Scale and Item		Response Option Frequency Distribution (Percentage)				
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Scale of Simplicity of Knowledge (Cronbach alpha = .78)						M (SD)
1. I will get confused if I try to relate new ideas in a textbook with knowledge I already have about a topic.		2 (10.5%)	10 (52.6%)	5 (26.3%)	2 (10.5%)	0 (0%)
2. Learning definitions word-for-word is often necessary to do well on tests.		1 (5.3%)	7 (36.8%)	2 (10.5%)	8 (42.1%)	1 (5.3%)
3. If I am ever going to be able to understand something, it will make sense to me the first time I hear it.		1 (5.3%)	9 (47.4%)	2 (10.5%)	7 (36.8%)	0 (0%)
4. If a person tries too hard to understand a problem, he or she will most likely end up being confused.		0 (0%)	7 (36.8%)	6 (31.6%)	6 (31.6%)	0 (0%)
Summary of Sub-Scale Score						2.37 (0.83)
						3.05 (1.12)
						2.79 (1.03)
						2.95 (0.84)
						11.16 (3.02)
Sub-Scale and Item		Response Option Frequency Distribution (Percentage)				
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Scale of Certainty of Knowledge (Cronbach's alpha = .73)						M (SD)
1. Educators should know by now which is the best method, lectures or small group discussions.		1 (5.3%)	3 (15.8%)	4 (21.1%)	8 (42.1%)	3 (15.8%)
2. Scientists can ultimately get to the truth.		1 (5.3%)	7 (36.8%)	9 (47.4%)	2 (10.5%)	0 (0.0%)
3. If teachers would stick more to the facts and talk less about ideas, one could get more out of college.		0 (0.0%)	7 (36.8%)	5 (26.3%)	5 (26.3%)	2 (10.5%)
Summary of Sub-Scale Score						3.47 (1.12)
						2.63 (0.76)
						3.11 (1.04)
						9.21 (2.39)
Sub-Scale and Item		Frequency Distribution (Percentage)				
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Scale of Source and Justification of Knowledge (Cronbach's alpha = .82)						M (SD)
1. If I read something in a textbook for a particular subject, I can be sure it's true.		2 (10.5%)	7 (36.8%)	3 (15.8%)	6 (31.6%)	1 (5.3%)
						2.84 (1.16)

(Continued)

Table 1. (Continued).

[illegible]

Table 2. Correlational results.

	Sum of Simplicity of Knowledge	Sum of Certainty of Knowledge	Sum of Source and Justification of Knowledge	Evaluation Plan Marks
Sum of Simplicity of Knowledge	1	.164	.603	-.344
Sum of Certainty of Knowledge	-	1	.295	-.353
Sum of Source and Justification of Knowledge	-	-	1	-.282
Evaluation Plan Marks	-	-	-	1

strongly disagree with items capturing the simplicity of knowledge, reflecting a view of knowledge as necessarily interrelated and complex. However, almost an equal number of participants agree or strongly agree with the items, indicating a view of knowledge as more of an accumulation of discrete and concrete facts. Regarding the *certainty of knowledge* dimension, except for item 2, participants believe knowledge is absolute and certain. Approximately 40% to 60% of participants selected *Agree* or *Strongly Agree* to items 1 and 3 on knowledge of teaching and learning. Interestingly, most participants chose *Disagree* or *Neutral* for the second item, reflecting a stance towards seeing knowledge as tentative. Since this course focused on research and evaluation as a way of constructing knowledge, participants' responses to this item might reflect the insights they gained and the discussions on truth, facts, and values during the course. However, the inconsistency suggests that the participants' understanding of knowledge through systematic inquiry does not transfer to their view of knowledge about teaching and learning. Descriptive statistics by scales and items ($N = 19$).

Response Option

Frequency Distribution (Percentage) Sub-Scale and Item Scale of Simplicity of Knowledge

(Cronbach alpha = .78) Strongly Disagree Disagree Neutral Agree Strongly Agree M (SD)

1. I will get confused if I try to relate new ideas in a textbook with knowledge I already have about a topic. 2

(10.5%) 10

(52.6%) 5

(26.3%) 2

(10.5%) 0

(0%) 2.37 (0.83) 2. Learning definitions word-for-word is often necessary to do well on tests. 1

(5.3%) 7

(36.8%) 2

(10.5%) 8

(42.1%) 1

(5.3%) 3.05 (1.12) 3. If I am ever going to be able to understand something, it will make sense to me the first time I hear it. 1

(5.3%) 9

(47.4%) 2

Table 3. Profiles of interview participants.

Participant ID	Sum of Simplicity of Knowledge	Sum of Certainty of Knowledge	Sum of Source & Justification of Knowledge	Evaluation Plan Marks
08	15	12	22	61
10	15	12	25	66
07	13	10	22	40
04	15	10	21	67
09	7	12	10	60
11	11	5	18	66
05	12	9	15	76
14	9	7	18	77

(10.5%)7

(36.8%)0

(0%)2.79 (1.03)4. If a person tries too hard to understand a problem, he or she will most likely end up being confused.0

(0%)7

(36.8%)6

(31.6%)6

(31.6%)0

(0%)2.95 (0.84)Summary of Sub-Scale Score11.16 (3.02)Response Option

Frequency Distribution (Percentage)Sub-Scale and ItemScale of Certainty of Knowledge

(Cronbach's alpha = .73)Strongly DisagreeDisagreeNeutralAgreeStrongly

AgreeM (SD)1. Educators should know by now which is the best method, lectures or small group discussions.1

(5.3%)3

(15.8%)4

(21.1%)8

(42.1%)3

(15.8%)3.47 (1.12)2. Scientists can ultimately get to the truth.1

(5.3%)7

(36.8%)9

(47.4%)2

(10.5%)0

(0.0%)2.63 (0.76)3. If teachers would stick more to the facts and talk less about ideas, one could get more out of college.0

(0.0%)7

(36.8%)5

(26.3%)5

(26.3%)2

(10.5%)3.11 (1.04)Summary of Sub-Scale Score9.21 (2.39)Frequency Distribution (Percentage)Sub-Scale and ItemScale of Source and Justification of Knowledge

(Cronbach's alpha = .82)Strongly DisagreeDisagreeNeutralAgreeStrongly AgreeM (SD)1. If I read something in a textbook for a particular subject, I can be sure it's true.2

(10.5%)7

(36.8%)3

(15.8%)6

(31.6%)1

(5.3%)2.84 (1.16)2. Sometimes I just have to accept answers or advice from the experts, even if I don't understand them.2

(10.5%)2

(10.5%)1

(5.3%)13

(68.4%)1

(5.3%)3.47 (1.12)3. I am very aware that teachers/lecturers know a lot more than I do and so I agree with what they say is important rather than rely on my own judgement.2

(10.5%)3

(15.8%)4

(21.1%)8

(42.1%)2

(10.5%)3.26 (1.19)4. I still believe in what the experts say even though it differs from what I know.1

(5.3%)5

(26.3%)5

(26.3%)7
 (36.8%)1
 (5.3%)3.11 (1.04)5. I have no doubts in whatever the experts say.3
 (15.8%)9
 (47.4%)3
 (15.8%)4
 (21.1%)0
 (0.0%)2.42 (1.01)6. If my personal experience conflicts with ideas in the textbook, the book is probably right.1
 (5.3%)7
 (36.8%)7
 (36.8%)3
 (15.8%)1
 (5.3%)2.79 (0.97)Summary Sub-Scale Score17.89 (4.76)

Regarding the *source and justification of knowledge* dimension, items 2, 3, and 4 have high means of 3.47, 3.26, and 3.11, respectively, with approximately half or more participants choosing *Agree* or *Strongly Agree*. This suggests that participants generally rely on experts or authorities as the source of knowledge, especially when they are unfamiliar with the subjects or their prior knowledge contradicts that of experts. For items 1, 5, and 6, participants' responses were more spread, and item 5 was the easiest for participants to disagree on. Overall, the participants' responses were divergent, which likely reflected the diverse graduate student profiles compared with the relative homogeneity among pre-service teachers in the previous studies conducted in Singapore.

Additionally, I also obtained correlations among the summary scores of each of the three sub-scales and numeric marks (100 as the total) of the participants' evaluation plan. As shown in [Table 2](#), the summary scores of the three sub-scales have positive correlations with each other, signifying that participants' views of the nature of knowledge and knowing are interrelated, as suggested by the literature (Hofer, 2000). Moreover, participants' scores on all three epistemological belief sub-scales have negative correlations with the marks on their evaluation plans. Thus, the results suggest that participants holding a more naive view of knowledge and knowing are more likely to perform unsatisfactorily in designing a real-world evaluation plan, a complex and multi-dimensional assignment without a fixed right or wrong answer. In the following section, qualitative interviews are employed to explain how participants with varying levels of epistemological beliefs describe their understanding of programme evaluation and decision-making processes as they design their evaluation plans.

Qualitative results

[Table 3](#) presents the epistemological belief scale scores and evaluation plan marks of the interview participants. The first four participants had high and above average scale scores and chose *Agree* to the belief statements, whereas the other four participants had lower and below average scale scores and tended to choose *Neutral* or *Disagree* to the belief statements. Participants with higher and lower scores showed important differences regarding two aspects: (a) their perspectives of evaluation as a knowledge-construction process and views on what a good evaluation is; and (b) the nature of challenges encountered in designing their programme evaluation plan and how they overcame such challenges.

Participants with a more naive view of knowledge and knowing

During the interview, participants were asked to define and elaborate on what evaluation is and what a "good" evaluation is from their perspectives. All participants in this group indicated that they did not have programme evaluation-related experience. However, when asked to elaborate on their understanding of evaluation, all participants shared experiences

or encounters, drawing from professional or personal contexts familiar to them. For example, Participant #04 shared that they were subject to bank audits, which felt like an evaluation. Participant #10 stated, “I think evaluation is like, systematic or scientific way to analyse a program whether it’s good or bad”. When pressed to elaborate on what the terms systematic or scientific mean, Participant #10 used an example to explain what is not systematic and scientific: “... in my past workplace, whether this program is good or bad really depends on the opinion of the leadership, whether they think it’s bad or good ... the hierarchical thing”.

Regarding what a good evaluation is, participants’ responses varied and touched on important aspects of guiding principles for evaluation or an evaluator. They included the importance of systematic inquiry, the evaluator’s competence, the utility of evaluation findings, the efficiency and practicality of the evaluation plan, and clear and accessible communication and collaboration with stakeholders. Additionally, participants in this group stated that a good evaluation demanded “objectivity”, “neutrality”, “impartiality”, “unbiasedness”, “being external”, or “from a third party” to a programme, which can lead to the identification of “truth” or “true picture” of the programme. Moreover, some participants suggested that scientific approaches, that is, using both quantitative and qualitative data collected from all stakeholders and following evaluation models or methodologies correctly, enable the pursuit of objectivity, neutrality, impartiality, authenticity, and truth. Overall, participants in this group perceived programme evaluation as an instrument or tool that gathers information in an objective, impartial, and unbiased manner from an external position for stakeholders to make decisions.

Participants were asked to share how they developed their understanding of programme evaluation. These participants frequently referred to course readings on evaluation theories and tools (e.g., logic model and data collection matrix), interactions with peers and instructors, and Internet searches. For example, Participant #04 shared the following:

I don’t have any experience about, like, directly related to evaluation ... So that’s why it’s something new to me. And that’s why all of my knowledge, it’s from the course, it’s from the readings I [am] assigned to. So also, there is something like I’m really interested in, then I will actually search Google or search a YouTube video to kind of like helping my understanding.

It is important to point out that participants in this group perceived the field of programme evaluation and the knowledge about programme evaluation as something important and valued, yet novel and discrete from their prior knowledge and experience. Therefore, participants largely referred to and sought external sources to develop their understanding of evaluation.

The participants’ perspectives of evaluation influenced the nature of the challenges they encountered and how they responded to them. The types of challenges shared by participants in this group included their lack of previous evaluation experience or knowledge. This led to further challenges, such as selecting a real programme to design the evaluation, choosing suitable evaluation approaches, using appropriate data collection methods, and a lack of time in designing the evaluation plan. The participants’ perspective of what a good evaluation should comprise, such as objectivity, neutrality, impartiality, and being “scientific” (i.e., using methods or models correctly), ultimately influenced their process of learning to design an evaluation plan. For instance, Participant #08 saw a good evaluation as being scientific and comprehensive: collecting quantitative and qualitative data from all stakeholders and using models and methods correctly. In discussing the challenges encountered, Participant #08 repeatedly struggled with whether the choices made were correct:

I would like to use observation but when writing the data analysis part, I’m really confused about how to analyse the data about the data collecting for an observation ... when I go through a lot of papers, I think it’s not correct. Actually, I don’t know the correct answer, how to analyse my observation data here in my program.

Similar to how participants develop their understanding of evaluation, when encountering the named challenges, participants in this group mostly sought external additional resources, such as reading more papers, “going back to the theories”, “Googling evaluation plan template”, and/or getting suggestions from peers and instructors.

Participants with a more sophisticated view of knowledge and knowing

When asked to define evaluation and elaborate on what a good evaluation is, responses from the participants in this group captured the fundamental elements of evaluation and the various focuses of programme evaluation. Additionally, participants emphasized the importance of identifying the purposes and uses of programme evaluation. For example, when asked what evaluation is and involves, Participant #14 elaborated, “I think evaluation firstly involves thinking about what is intended, what is its purpose, what is it used for?” Participant #11 also shared a renewed perspective through a reflective voice:

After the course I feel that a lot of understanding of actually, what exactly are we evaluating? What exactly are we doing? In terms of the objective and the aims?...based on previous experience, we were saying that evaluation is to get an outcome and then result. So, when evaluating it, oh, this is good, this is not good. But then ... do we really understand? What are we evaluating? Or what are we doing in terms of the processes?

Regarding what a good evaluation is, participants’ responses capture various aspects of guiding principles, such as the importance of systematic inquiry, the utility of evaluation findings, feasibility of evaluation plans, stakeholder engagement and buy-in, and teamwork. Additionally, rather than valuing objectivity, neutrality, impartiality, and unbiasedness, participants in this group emphasized the importance of obtaining reliable, valid, and credible data through justified data collection methods and support from stakeholders. This perspective can be observed in Participant #05, who shared the following when asked what evaluation involves and what a good evaluation is: “... we need full support from the admin team, which is very important. And also, we need to educate our stakeholders to ensure that the data we collected are credible, valid, and reliable as well”. The participant went on to discuss multiple factors that contribute to these qualities, including a conducive environment, stakeholders’ buy-in and understanding of evaluation purposes, stakeholders’ time, sense of security, answerable questions, and a belief that evaluation can produce meaningful change. In summary, participants in this group considered evaluation a more holistic process, in which the identification of purposes and uses, methodological choices and rigour, financial and political resources, and time together contributed to the quality of evaluation. As Participant #14 stated:

... the entire coherence, whether the, at the initial stage, whether the purpose of the vision is clear, then your design or the evaluation plan actually coheres with your intended purpose ... what I also look out for is how the evaluation team analyse the data obtained and use the data obtained then come up with the, I won’t say correct but a conclusion that is coherent with the findings from the data.

Regarding the challenges encountered and methods of navigating them in designing an evaluation plan, participants in this group shared more contextualized challenges. These included modifying sampling and data collection methods to ensure the quality and veracity of information obtained from stakeholders; navigating among stakeholders who have different demands, purposes, interests, and needs; building the common ground; and dealing with the multiple positions that educators adopt when they are involved in internal evaluation. For example, Participant #11 shared the following:

Talking about evaluation ... I guess it’s the hat I’m wearing, because you are evaluator, you’re also the teacher ... do I put my own perspective into this evaluation because I am the teacher ... and then we are also the evaluator. So, we have to try to bridge the gap between the two different work groups ... But then because I’m in both ... and trying to strike the balance between ... to meet whatever the other stakeholders’ needs. That was tough.

Furthermore, participants in this group talked about their previously held positionality or perspective of evaluation as obstacles at the initial stage of designing an evaluation. For example, Participant #09, a business manager at a private educator training centre, shared the following:

When I was designing this evaluation, I couldn't put myself in that evaluator position ... because I was to keep thinking, okay, what I focus previously ... I need to focus on the turnover, whether we meet the target ... but when I start this evaluation plan after ... I start to see the objective of the program, instead of my objective. [as business manager]

Similarly, Participant #14 talked about unlearning his "personal bias":

I think my first challenge was that because this was a school programme that I'm familiar with, I had certain preconceived ideas of what I wanted to do, going to evaluate, that was based on the mental model that I had even before I did this course so I have to slowly throw away some old ways of thinking.

Regarding the ways of navigating the challenges, participants in this group showed the ability to step back, reflect on their positionality or personal bias, clarify purposes and set boundaries, examine contextual factors, consolidate information, and make justified decisions based on multiple factors and evidence. Participant #09 shared how the planner note helped her "find out her problem" because she "positions herself as the manager instead of the evaluator". Participant #14 also talked about how he "digs a bit deeper about what purpose evaluation could serve and could be of greater value to the school" in the process of unlearning old ways of thinking. Participants #05 and #11 both showed reflective efforts and judgement-making based on evidence and contextual factors in their journey of designing an evaluation. Notably, these approaches are different from the approaches taken by participants in the first group, who primarily focused on searching for more external information, theories, and knowledge to verify their proposal.

Discussion and conclusion

Teachers play a key role as curriculum designers, decision-makers, and change agents. The emerging professional roles and responsibilities demand a sophisticated view of knowledge and knowledge construction when encountering dilemmas and making pedagogical decisions. This study examined whether and how educators' epistemological beliefs influenced their journey of learning about and designing a real-world programme evaluation plan.

Quantitative results suggest that participants' epistemological beliefs about the nature of knowledge and knowing are divergent, which likely reflects the diverse student population in terms of nationality, professions, and age among graduate students in this study. Additionally, the negative correlation between participants' responses to epistemological sub-scales and their evaluation plan marks suggests that the participants' epistemological views play a role in their journey of learning to design an evaluation. That is, participants with a more naive view of knowledge and knowing perform unsatisfactorily in designing the evaluation plan, and vice versa. Specifically, they perceive that neutrality, impartiality, and objectivity are important criteria for a good evaluation. Further, scientific approaches, using research methods correctly and collecting comprehensive data, enable the aforementioned qualities, and it is important to obtain the "truth" of a programme. These views of evaluation significantly reflect the nature of the challenges encountered by the participants in this group. While these participants recalled familiar cases or contexts to define evaluation, they were less aware of their previous experience with evaluation and how these prior experiences and knowledge were relevant to their new learning. Thus, participants in this group largely sought external sources to build their knowledge, inform their actions, and navigate the challenges encountered in designing their evaluation plan. Conversely, participants with a more sophisticated view of knowledge and knowing perceive evaluation as a holistic process that involves the clarification of purposes, alignment/coherence of multiple components, and working to enhance the validity, reliability, and

credibility of data while recognizing the role of value in every act of evaluation. Thus, participants in this group generally grappled with contextualized issues. Importantly, when encountering challenges in designing their evaluation, participants demonstrated the ability to reflect on their positionality or bias, analyse and clarify purposes and set boundaries, examine contextual factors, consolidate evidence, and make committed and justified decisions according to the evidence and context.

The findings of this study show the importance of transforming educators' epistemological beliefs and how educators' views of knowledge and knowing influence how they approach "new" knowledge (programme evaluation in this study). Further, the study shows how they view and assess their work and practice (i.e., criteria for a good evaluation) and how they take up the "new" knowledge in context. Considering the ongoing education reform movement, professional learning opportunities for new initiatives are constantly introduced to educators to initiate change on the ground. However, it may not be sufficient to simply introduce "new" knowledge without attending to how educators make sense of and interact with it.

Further, teacher educators need to be intentional in designing, sequencing, and guiding learning opportunities that can transform educators' epistemological beliefs in general and in relation to discipline-specific learning. The participants' responses point to the usefulness of the planner note in recognizing one's previous point of view. However, a review of the participants' planner notes suggests that participants mostly reflect on practical issues on the surface without delving into how their beliefs, prior knowledge, and cultural lenses may influence, filter, enable, or hinder the perspectives and choices made as novice evaluators. The planner note was designed to allow students to freely note their thinking, decision-making, and reflection processes as they constructed their evaluation plan. However, it can become merely an afterthought without intentional guidance and use. For instance, the planner note can be modified to play an integral role throughout the course, that is, for students to note their challenges at different milestones in the evaluation plan. Guided questions may be used to prompt students to explicitly reflect on the influence of their prior knowledge, experience, cultural lenses, and preconceived notions on their learning journey (Brownlee et al., 2001; Sleeter, 2009). Peer group sharing as a regular checkpoint for the planner note in a safe and supportive classroom environment may be used so that students can expand each other's perspectives and subsequent reflection processes.

Though limited in scope (e.g., context, sampling, time in the field), this study offers a detailed account of how epistemological beliefs influence educators' discipline-specific learning, providing insights into teachers' professional learning opportunities and training designs for novice programme evaluators.

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No potential conflict of interest was reported by the author(s).

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