Reflecting on Epistemic Ideals and Processes: Designing Opportunities for Teachers' Epistemic Growth

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Abstract: This paper reports on a design experiment that explored designs for supporting teachers' epistemic growth. Specifically, the study examined how reflective activities contribute to growth in understanding and caring about epistemic ideals and processes. The context of the study was an online course on digital information literacy. Teacher participants engaged in two types of reflective activities designed to promote epistemic growth: reflective experience tasks and reflective journals. Analysis of the journals revealed that participants experienced growth in understanding of epistemic ideals and processes, in pedagogical knowledge about teaching epistemic ideals and processes, and in appreciation of the importance and value of using and teaching epistemic ideals and processes. Participants described the course readings and the reflective experience tasks as the main contributors to growth. These activities jointly enabled them to significantly expand their understandings of epistemic ideals and processes in ways that were personally and professionally meaningful.

Introduction

The increasingly complex epistemic environments that await learners out of school make it ever more important to seek better ways of promoting learners' epistemic growth, that is, growth in learners' ways of knowing and their understandings of how people know (Barzilai & Chinn, 2018). Teachers are central to this project because the ways in which they engage in instruction and dialog have a formative impact on learners' epistemologies. An important current challenge of epistemic cognition research is, therefore, to clarify the ways in which teachers' epistemic growth can be supported. Teachers' epistemic growth has the dual nature of involving growth of oneself and of one's capacity to promote the growth of others (Buehl & Fives, 2016). Many researchers argue that reflection is key to supporting teachers' epistemic growth (e.g., Feucht, Lunn Brownlee & Schraw, 2017). However, there is scant empirical evidence of whether reflection can indeed effectively promote teachers' epistemic growth and, relatedly, little understanding of how to design meaningful reflective activities.

Our conceptualization of epistemic cognition is grounded in the AIR model of epistemic cognition (Chinn, Rinehart, & Buckland, 2014). In brief, this model describes epistemic cognition as comprised of: (a) *Epistemic aims and value* - the epistemic goals actors set and the perceived importance of these goals; (b) *Epistemic ideals* – standards or criteria that can be used to evaluate whether epistemic aims have been achieved and the quality of epistemic products; and (c) *Reliable epistemic processes* - procedures or strategies that can successfully achieve epistemic aims and create epistemic products.

Recently, Barzilai and Chinn (2018) argued that the goal of epistemic education should be to promote learners' apt epistemic performance, defined as performance that achieves valuable epistemic aims through competence. They further identified five aspects of epistemic performance that are important to achieving this goal: (a) engaging in reliable cognitive processes that can lead to achievement of epistemic aims; (b) adapting epistemic performance to diverse situations; (c) metacognitively regulating and understanding epistemic performance; (d) caring about and enjoying epistemic performance; and (e) achieving epistemic aims together with others. Each of these aspects involves competent engagement with epistemic aims and value, ideals, and processes. In the present study, we use this framework, called the Apt-AIR framework, to conceptualize the goals of teachers' epistemic growth. We focus on growth in two specific aspects of Apt-AIR—*understanding epistemic performance* and *caring about epistemic performance*. Briefly, growth in understanding of epistemic performance is defined as increase in metacognitive understanding of epistemic aims, ideals, and processes. Growth in caring about epistemic performance is defined as valuing epistemic aims, ideals, and processes and aspiring to achieve or apply them (Barzilai & Chinn, 2018).

The potential contribution of reflection in education has been emphasized and described by numerous researchers and theorists (e.g., Dewey, 1933; Schön, 1983). For instance, Schön (1983) argued that a "reflective practitioner" reflects on her aims, tacit norms, and performance as part of her practice, with the intention of putting into action what she realized or learned. In this study, we adopt Boud, Keogh, & Walker's (1985, p. 19) definition of reflection as "those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations." Yet, we specifically focus on experiences related to

achieving epistemic aims. Thus, our working definition for reflection on epistemic cognition is those intellectual and affective activities in which individuals engage to explore their epistemic aims, ideals, and processes in order to lead to new (or to change in) understandings, appreciations, and performance. Because epistemic aims, ideals, and processes are cognitive constructs, reflection on them is a metacognitive activity.

In this report, we focus on examining teachers' reflections on epistemic ideals and processes because these were the main foci of their reflections. Thus, the questions we explore are: (1) How do teachers reflect on changes in understanding and caring about epistemic ideals and processes? (2) How do teachers perceive the contribution of the reflective activities in an academic course, and the manner in which they interplay with other course components, to changes in understanding and caring about epistemic ideals and processes?

Method

The context of the study was an intensive 7 week summer MA course on digital information literacy that was fully online. Participants were 17 teachers with diverse teaching experience in several age bands and subjects. The course included four components that were jointly intended to promote epistemic growth along the five aspects of the Apt-AIR framework. The first two components involved two different types of reflective activities:

(a) Reflective experience tasks – These tasks posed information problems that required engagement in *cognitive epistemic performance.* The tasks involved searching, evaluating, and integrating online information sources about various current topics (e.g., organic food, cellular radiation, and Brexit). These topics are appropriate for teaching digital literacy because they are richly and diversely represented online. Two tasks included questions from different domains to prompt *adaptive epistemic performance*. Participants were also asked to describe the criteria and strategies they used and to evaluate their effectiveness, in order to foster *understanding and regulation of epistemic performance*. One week later, participants met online in groups to create a shared list of epistemic criteria and strategies for addressing the challenge. This feature was designed to encourage *participation in epistemic performance with others* and to enhance *caring about epistemic performance* by developing a commitment to shared ideals and processes (Chinn, Duncan, & Rinehart, 2017).

(b) Reflective journals - Participants were asked to write four journal entries in which they considered their beliefs regarding issues such as what is valuable knowledge, what are good sources of knowledge, and how is knowledge justified. This activity fostered *understanding and regulation of epistemic performance*, albeit in a more open-ended way that encouraged participants to form connections between their learning experiences and their personal and professional experiences. The last journal entry invited participants to look back to their first entry and to consider if there were any differences in the entries and why. In the last entry, participants were also asked if there is anything that they would like to "take" from the course into their professional practice.

(c) Readings and discussions – Students read articles on digital literacy, which discussed strategies such as searching, evaluation, and integration. Following reading, students participated in weekly discussions. This activity fostered *understanding of epistemic performance* and engaged students in *participation in epistemic performance* through critical discussions that created opportunities for developing shared understandings.

(d) Design tasks – Participants also engaged in collaborative design of instructional units for fostering digital information literacy. These created additional opportunities for *participating in epistemic performance.*

The present findings are based on analysis of participants' reflective journals and on retrospective interviews with four of the participants. These were analyzed using codes that were inductively inferred over several rounds of coding and refining. Interrater reliability by two independent judges was Kappa 0.79 to 1.00.

Results

Growth in understanding of epistemic ideals and processes

Participants described two interrelated planes of growth in understanding of epistemic ideals and processes:

Growth in understanding of epistemic ideals and processes for knowing online (70.6% of the participants) – Participants reflected on gaining better understanding of valuable ideals and processes. For example, Bella described growth in understanding of epistemic criteria: "I understand that there are criteria that help evaluating information and how much these criteria are prioritized differently by different people." When reflecting on their own ideals and processes, some participants (41.2%) were surprised to discover that their strategies and standards for knowing online fall short. For example, Monica discovered that she often relies on inadequate criteria: "I find myself often searching for information… in the same way that my students search for information and according to the same criteria – ease of use, website design, the order of the results, etc."

Growth in pedagogical knowledge about teaching epistemic ideals and processes for knowing online (64.7%) - Increase in understanding of their own and others' epistemic ideals and processes was a gateway to increase in pedagogical knowledge about teaching epistemic ideals and processes. Experiencing the challenges of

aptly employing epistemic ideals and processes gave participants new appreciation of the difficulties that students can experience. This led to growth in pedagogical understanding:

> My personal experiences revealed the fact that although the Internet is an inseparable part of my life, I don't really know how to use it effectively and even find it hard to analyze the actions that I make in order to evaluate or locate information sources. The difficulty that I describe also surfaced in the articles that we read in the course, and it helps me understand more deeply the pedagogical rationale and challenge that face us when we talk about digital literacy. (Monica)

Gaining better understanding of valuable ideals and processes led the participants to reconsider their instruction and to set new teaching goals. Carmen reflected: "Following the course… I think I can say that the principle of critique… is the focus of knowledge acquisition, especially good knowledge. The ability to select ideas according to criteria that are adapted to the content and situation will enable me to critically examine new ideas." When reflecting about her teaching, Carmen described a change in her beliefs about what it means to teach digital literacy: "I understand now that throughout my work as a teacher, I did this partially and did not deepen the need for and the meaning of thinking critically during evaluation processes."

Growth in caring about epistemic ideals and processes

Teachers described several aspects of growth in caring about epistemic ideals and processes:

Growth in appreciation of the importance and value of using epistemic ideals and processes (52.9% of the participants) - Participants described greater appreciation of the importance of using epistemic ideals and processes to achieve epistemic aims. For example, Dana reflected that she understood that "it is very important to check source trustworthiness and reliability in all stages because not all of the information in certain."

*Growth in appreciation of the importance and value of teaching epistemic ideals and processes (*52.9%) - Participants also expressed greater appreciation of the importance of teaching epistemic ideals and processes for knowing online. For example, Rose described how: "My awareness of the process of integrating texts and the many difficulties during this process, after learning about it and experiencing it myself, strengthened in me the feeling of how important and critical it is to teach digital literacy today."

Expressions of explicit intent to teach epistemic ideals and processes (94.1%) - Perhaps the strongest expressions of caring were participants' expressions of intent to foster their students' capacities to use epistemic ideals and processes. Nearly all of the participants made such statements, e.g., "I am certain that during the year I will teach the students various criteria for evaluating information sources" (Ginna).

Reflections on reasons for growth

The prompts in the last journal entry invited participants to consider possible reasons for change in their epistemic cognition. Participants most frequently attributed change to the course papers and reading discussions (58.8%), followed by the reflective experience tasks (41.2%), and to a lesser degree the reflective journals (11.8%). Only one student mentioned the design tasks as a reason for change. Participants' explanations of how these elements contributed to change suggested five main mechanisms at play that jointly enabled growth:

(a) *Practically engaging with epistemic ideals and processes.* The reflective experience tasks contributed to growth by expanding participants' practical experiences with ideals and processes. This was important for grasping these ideals and processes and refining understandings of them. For example, Bella wrote that she learned from the experiential tasks "that there can be different conditions and different approaches to the same strategy, depending on the specific information that we try to seek and evaluate."

(b) *Expanding knowledge of epistemic ideals and processes.* In tandem with these tasks, the course readings helped participants gain new knowledge about valuable ideals and reliable processes for online problem solving and helped them understand why these are important and reliable. Noah wrote in his journal:

> One of the most meaningful points of the course for me was the paper by Rouet (2006) and the study by Wineburg [(1991)] that was described in that paper. I discovered that my condition today is in between the novices and the experts [in Wineburg's study], with a considerable leaning towards the novices… The ways in which the experts looked at the information, even information that seemed trustworthy, made me ask how much I activate my critical sense when I read information online.

(c) *Critically reflecting on own epistemic ideals and processes.* Noah's quote demonstrates another mechanism at play. In the reflective writing tasks, participants used their growing knowledge of epistemic ideals and processes to reconsider their own ideals and processes. Thus, the theoretical and empirical readings enabled

the participants to gain a new perspective on their epistemic performance, as learners and as teachers. For example, Anna wrote that the readings led her to: "gradually start doubting myself and thinking before I act."

(d) *Collaboratively understanding and reflecting on epistemic ideals and processes.* When participants pooled together the knowledge they gained from performing the reflective experience tasks and from the readings, they achieved a better grasp of ideals and processes. Ronna described the collaborative sessions: "We tried to clarify the concepts together. We often argued.… We talked about the issues in order to go deeper."

(e) *Making the connections between course experiences and epistemic performance.* Although only two students referred to the reflective journals as instigators of growth, we believe that these journals had a subtle yet important contribution. The journals prompted participants to consider the connections between their course experiences and their epistemic performance, that is, they encouraged higher-order reflection on processes of epistemic change. For example, David wrote in his journal: "I think that one of the things that I learned about myself and about digital literacy is to metacognitively observe how I investigate and construct knowledge."

Conclusions and implications

Promoting teachers' epistemic growth, and their capacity to promote the epistemic growth of their students, is a critical educational challenge in the digital age. Current research emphasizes reflection on practice as a central mechanism of promoting teachers' epistemic growth (e.g., Feucht et al., 2017). However, little is known about how to productively engage teachers in reflection on their epistemic performance. In this study, we used the Apt-Air framework (Barzilai & Chinn, 2018) to design activities that integrated reflection on epistemic performance in teachers' learning experiences. Analysis of participants' reflections indicated that they experienced growth in understanding and caring about epistemic performance and that this growth was enabled by the combined effects of engaging in epistemic performance, in adaptive and collaborative ways, along with an increase in metacognitive understanding of epistemic ideals and processes, and ongoing reflection.

The findings suggest that simply prompting teachers to reflect on their epistemic cognition might not be sufficient to foster meaningful epistemic growth. Expanding teachers' awareness of appropriate epistemic ideals and process, how these can be employed, and conditions on their use, may be critical for helping teachers gain a new perspective on their epistemic cognition. In addition, gaining new practical experiences in applying epistemic ideals and processes may be an important foundation for growth. The reflective experience tasks, a new format of reflective activity designed for this course, enabled teachers to closely examine in situ how they engage in epistemic performance and to compare their epistemic performance to that of their peers and to that of the novices and experts described in the literature they read. The interconnections that participants formed between their personal and collaborative experiences and the literature enabled them to gain new insights into their own epistemic performance and into their students' performance. The reflective experience tasks and, to a lesser degree, the reflective journals, also helped teachers learn to metacognitively reflect on their performance. In turn, growth in understanding of epistemic performance led teachers to appreciate the value of epistemic ideals and processes and to care more deeply about their instruction. However, teachers minimally engaged in reflection on epistemic aims and value. Thus, more work is needed to examine how to better foster refection on these facets.

References

Barzilai, S., & Chinn, C. A. (2018). On the goals of epistemic education: Promoting apt epistemic performance. *Journal of the Learning Sciences*. doi:10.1080/10508406.2017.1392968

Boud, D., Keogh, R., & Walker, D. (1985). *Reflection: Turning experience into learning*. London: Kogan.

Buehl, M. M., & Fives, H. (2016). The role of epistemic cognition in teacher learning and praxis. In J. A. Greene, W. A. Sandoval & I. Bråten (Eds.), *Handbook of epistemic cognition* (pp. 247-264). New York, NY: Routledge.

Chinn, C. A., Duncan, R. G., & Rinehart, R. W. (2017). Epistemic design: Design to promote transferable epistemic growth in the PRACCIS project. In E. Manalo, Y. Uesaka & C. A. Chinn (Eds.), *Promoting spontaneous use of learning and reasoning strategies: Theory, research, and practice for effective transfer*. New York, NY: Routledge.

Chinn, C. A., Rinehart, R. W., & Buckland, L. A. (2014). Epistemic cognition and evaluating information: Applying the AIR model of epistemic cognition. In D. Rapp & J. Braasch (Eds.), *Processing inaccurate information* (pp. 425-454). Cambridge, MA: MIT Press.

Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process*. Boston, D.C.: Heath and Co.

Feucht, F. C., Lunn Brownlee, J., & Schraw, G. (2017). Changing epistemic cognition in teaching and teacher education: A focus on reflection and reflexivity [special issue]. *Educational Psychologist, 52*(4).

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.