

Knowledge Building Approach to Teacher Professional Development

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Abstract: This paper describes a work-in-process research project aiming at examining the design of teacher professional development (PD) with knowledge building approach for promoting teachers' epistemology, conception of teaching and learning, and teaching practices. The participants are university teachers who attend the designed PD program. Multiples source data will be collected, including classroom videos and artefacts, online discussion, survey responses, and interview data. We will analyse participants' online discussions and artifacts to understand their knowledge building process. Quantitative analysis will be conducted to examine the change of participants' epistemic beliefs and conceptions about teaching and learning after the program. Correlation and regression analysis will be used to examine how teachers' knowledge building process predict their post epistemic beliefs and conceptions of teaching and learning. Finally, individual interviews will be conducted with teachers to understand how the PD program has influenced their teaching practices. This research will contribute to our understanding of the role of computer supported knowledge building in supporting teacher learning in higher education.

Keywords: Knowledge building; professional development; teacher learning; epistemic beliefs; conceptions of teaching and learning

1. Introduction

This paper describes a work-in-process research project aiming at examining the design of teacher professional development (PD) with knowledge building approach for promoting teachers' epistemology, conceptions of teaching and learning, and teaching practices.

Teacher PD refers to teacher learning after full-time working (Fishman, et al., 2014), and it plays an important role in enhancing teaching and learning in higher institutes. Effective PD can change teachers' beliefs and improve their practices, and ultimately foster students learning (Fishman et al., 2014). PD has been designed with different approaches: some are designed as single sessions; some focus on the social supports for teaching learning, such as building communities of practice (COP), and coaching and mentoring; and some focus on the situated nature of teacher learning within practices, such as using video and other representations of practice as a tools for supporting teacher learning (Fishman, et al., 2014). The current research takes a knowledge building approach to design PD for university teachers. Knowledge building is one of the computer-supported collaborative learning models in education (Bereiter, 2002; Scardamalia & Bereiter, 1994, 2006), focusing on knowledge creation (Paavola & Hakkarainen, 2005). It emphasizes learners working as a community and taking collective cognitive responsibility for idea improvement, much as do actual scientists (Scardamalia, 2002). In knowledge building, learners' collaborative discourse is supported by a computer-supported collaborative learning platform, Knowledge Forum (KF), through which learners pose questions, construct explanations, gather resources or evidence to support/rebut their initial ideas, revise and integrate ideas to improve explanations. We chose the knowledge building approach to PD for the following reasons: 1) Learning sciences research suggests that learning, including teacher learning, is a social and distributed process. knowledge building is a community-based approach, and it could provide teachers with opportunities to work collaboratively with each other (Laferrière, et al., 2007); 2) To level up teachers' capabilities in teaching, there needs to be fundamental changes in teachers' epistemologies and conceptions (Chan & van Aalst, 2006). Previous research suggests that knowledge building has the potential to change learners' epistemic views (Hong, et

al., 2016). We propose that knowledge building approach to PD might also improve teachers' epistemic beliefs; 3) Knowledge building focuses on knowledge creation. To better prepare students for this knowledge age where knowledge creation is essential and pervasive, teachers need to learn knowledge creation pedagogies and engage in knowledge creation activities. Designing PD with knowledge building approach could help teachers experience collective knowledge creation processes, so that they can also foster knowledge creation among students.

With knowledge building approach to PD, teachers will be treated as knowledge creators and designers rather than passive learners (O'Sullivan & Deglau, 2006). Different from other community-based approach (e.g., COP) where teachers mainly share their best practices, in knowledge building teachers need to go beyond sharing their best practice, and work collectively to improve their ideas associated with their existing practices and also develop new ones (Fishman, et al., 2014). Teachers will be encouraged to identify and discuss their challenges in teaching, to co-design classroom innovations, and to collaboratively improve the ideas, designs, and practices. This process is usually supported by collaborative KF discourse.

To iterate, the main purpose of this project is to examine the design of PD with a knowledge building approach and its impact on university teachers' epistemic beliefs, conceptions about teaching and learning, and teaching practices. Three research questions will be examined: 1) How do teachers engage in knowledge building during the designed PD program? 2) Do teachers improve their epistemic beliefs and conceptions about teaching and learning after attending the designed PD program? If so, how is their knowledge building process associated with the change? 3) What is the impact of the PD program on teachers' teaching practices?

2. Methods

2.1 Participants and context

We are currently at the stage of preparing data collection. Adopting a convenient sampling approach, we will recruit participants from the university instructors who register for the PD program on knowledge building.

This PD program consists of 3 continuous synchronous sessions (3 hours for each session) spread across one month (week 1, 2, and 4), as well as asynchronous learning between and after sessions. Session one aims to help participants develop an understanding of KB theory, principles, and technology. During the session, the theories and principles of KB will be introduced and discussed. The KF will be introduced to the participants through a learning by doing process, for instance, participants will be asked to post any questions they have about KB on KF, identify issues or challenges they experience during their teaching, and discuss how the KB approach and KF may help address the issues. After session one, participants will be asked to read their KF notes and continue deepening their discussions. Session two will focus on KB practice and design. Building upon what they will learn from session one and their asynchronous KF discussions, participants will be asked to work in groups to co-design KB practices. After session two, participants will continue their discussion on KF and plan for implementing and adapting KB design in their own classrooms. Session three will focus on practice and reflection. Participants will be asked to work in small groups to improve their group design artifacts and discuss how to adapt the design in their own classrooms. They will also be asked to reflect on their KB practices and KF discussion based on KB principles.

2.2 Data source and analysis

We are taking a case study approach (Yin, 2018) to examine the design of PD and its impact. Multiple data sources, including classroom process (e.g., classroom videos recorded by researchers, participants artefacts and KF notes) and pre- and post-tests data will be collected. Mixed methods will be used to unpack the phenomenon. To address the first research question, we will conduct discourse analysis to examine teachers' discourse on KF to understand how they co-construct understanding and build knowledge together. Coding schemes will be developed to capture the patterns of teachers' discourse moves. Examples of discourse moves include initiate inquiry, sustain inquiry, explanation, and cognitive conflict (Lin & Chan, 2018a). Then the frequency of different types of discourse moves for each teacher will be calculated (Chi, 1997). To address the second research question, paired sample t-test will be used to examine the change of teachers' epistemic beliefs (EBQ, Chan & Elliot, 2004) and conceptions about

teaching and learning (TLCQ, Chan & Elliot, 2004) before and after attending the PD program. Correlation and regression analysis will be used to examine how teachers' discourse moves predict their post epistemic beliefs and conceptions of teaching and learning. To address the third research question, we will conduct semi-structured individual interviews with teachers two months after the PD program to understand the impact of the PD on their teaching practices. The interview questions such as the changes they have made in their teaching after attending the PD workshop, and the extent to which they have applied the KB principles (e.g., idea diversity, improvable ideas) in their classroom will be asked. Qualitative analysis of individual interviews will be conducted for theme identification. Both top-down and bottom-up approaches will be employed, whereby priori codes and emerging codes will be used to capture the themes relating to teachers' teaching practices and the impact of the PD on their teaching practices. These interview results will also be triangulated with the survey and process data to explain the findings.

3. Conclusion

This paper describes a work-in-process project focusing on the design of PD with knowledge building approach for promoting university teachers' epistemology, conceptions, and practices. Many existing knowledge building research has been focusing on student learning (e.g., Lee, et al., 2006; Lin & Chan, 2018b; van Aalst & Chan, 2007; Zhang, et al., 2007), comparatively less is known about how knowledge building can be used to design PD among university teachers. This research could contribute to our understanding of the role of knowledge building in supporting teacher learning in higher education. It could also extend the current literature on teaching learning to understand how teachers learn collaboratively through a knowledge building community and how collaborative online discourse might contribute to the change of their epistemology, conception, and practices.

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