

Assessing Prospective Teachers' Prior views on Teaching as Knowledge Building Practice

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Abstract. In this exploratory study, we pre-assess prospective teachers' beliefs in teaching and conceptions about knowledge-building as an initial step to design a teacher-education course for cultivating future knowledge-building teachers. Preliminary findings based on surveys and interview indicate: (a) while prospective teachers' teaching beliefs were relatively constructivist, they did not seem to prepare these teachers to readily accept the knowledge-building concepts as applicable; and (b) the prospective teachers' prior knowledge and schooling experiences play an important role in influencing how they view knowledge-building concepts and practice. Implications for instructional design are discussed.

Keywords: Knowledge building principles, community knowledge, prospective teachers

Teaching has been viewed as a craft [1]. As commonly observed in classroom, teachers tend to pay more attention to how to teach according to theories, and less attention to how to go beyond "best practice" and assume the role of theory-building for their practice. Yet, recent literature has been emphasizing the importance of viewing teaching as a knowledge-building enterprise [2, 3]. Related concepts have been introduced to support this idea, for example, creative teaching [4], adventurous teaching [5], and teacher expertise as progressive problem solving [6, 7]. Yet, the idea of education as a progressive science and teaching as knowledge-building practice is still new to most teachers [8].

One way to help teachers to gain understanding of teaching as knowledge-building practice may be to have teachers be familiar with knowledge-building principles. Knowledge-building is a social process focused on the production and continual improvement of ideas of value to a community [9]. More than two decades of research have suggested that the integral use of knowledge-building pedagogy and Knowledge Forum technology has provided an effective means to support community knowledge-building [10, 11]. To facilitate the process of knowledge building, a set of knowledge-building principles has been conceptualized and propounded. These principles include Real Ideas, Authentic Problems; Improvable Ideas; Idea Diversity; Epistemic Agency; Community Knowledge, Collective Responsibility; Democratizing Knowledge; Symmetric Knowledge Advance; Pervasive Knowledge-building; Constructive Uses Of Authoritative Sources; Knowledge-building Discourse; Embedded, Concurrent and Transformative Assessment; and Rise Above (see [10] for more details of each principle). The principles represent important knowledge-building concepts that are crucial for teacher understanding.

Previous research has suggested that knowledge-building principles as design challenges are important for fostering teachers' reflective and creative teaching practice [3]. A deeper understanding of the related nature of principles is essential to help teachers to utilize the principles in a more integral and adaptive way for knowledge-building

practice [12, 13]. Despite their importance, the question of how to effectively incorporate these principles into a teacher education course remained an instructional design challenge. To address this challenge, it is posited that pre-assessment on prospective teachers' teaching beliefs and their conceptions about knowledge-building will be helpful for an effective design of such a course.

Method

The present research was conducted for a university course titled "Integrating Instructional Theory and Practice" in Taiwan. Participants in the present study are 49 prospective teachers (25 females) who will be teaching at high-school level after this course. Their ages range from 21 to 31 ($M=24.02$; $SD=2.47$).

This research employed a mixed-method design. The rationale is that "the quantitative data and results provide a general picture of the research problem; more analysis, specifically through qualitative data collection, is needed to refine, extend, or explain the general picture" [14, p.515]. Data mainly come from two surveys and an interview. The first survey was an adapted version of Schommer's Epistemological Beliefs Questionnaire [15]. It consists of six dimensions. The four epistemological belief dimensions were Innate/Fixed Ability (8 items), the Learning Effort/Process (11 items), Authority/Expert knowledge (5 items), and Certainty Knowledge (6 items). The two teaching belief dimensions were Traditional and Constructivist Conceptions (12 & 18 items each).

The second survey was self-designed to assess participants' conceptions about knowledge-building. It consists of two dimensions, importance and applicability. Both dimensions are comprised of the same 12 items and each item is presented by a key knowledge-building concept, i.e., a knowledge-building principle, and a detailed description of this principle (see Appendix 1). Using subjects ($N=22$) from another teacher education program of a comparable university, the Cronbach Alpha reliability estimates were calculated to be .87 (for the "importance" dimension) and .74 (for the "applicability" dimension). All items in both surveys used a 5-point Likert scale (1=strongly disagree; 5=strongly agree).

In addition to that a one-hour (or so) semi-structured, in-depth interview was conducted, as a follow-up investigation, to further explore the underlying factors that might affect how the prospective teachers perceive the usability of the knowledge-building concepts for their future teaching. Six participants (of the total 49 subjects) who were identified as relatively more active in class were intentionally singled out for the follow-up interview.

Results and Discussion

1. Belief in teaching

Table 1 summarizes the statistical information regarding prospective teachers' conceptions about teaching which was intentionally compared with previous research on Hong Kong and Singapore pre-service teachers' epistemological beliefs using the same instrument from Chan and Elliot [15]. The findings suggest that the epistemological beliefs the prospective teachers hold are similar to the teachers surveyed in Hong Kong and Singapore [15, 16], which are generally consistent with a constructivist epistemic view. In addition, in terms of the prospective teachers' pedagogical beliefs, they are also strongly

inclined towards constructivist teaching. This should be a logical stance given their inclination towards relativistic epistemological profile.

Table 1: Prospective teachers' beliefs

Dimension	Mean	SD
Epistemological beliefs		
Certainty Knowledge	2.70	0.77
Authority/Expert Knowledge	2.36	0.60
Innate Ability	2.68	0.59
Learning Effort/Process	3.94	0.43
Pedagogical beliefs		
Constructivist teaching	4.41	0.38
Traditional teaching	2.85	0.42

2. Conceptions about knowledge-building

The prospective teachers tend to consider the notion of knowledge-building as being highly important ($M=4.28$, $SD=0.67$), but relatively less applicable ($M=3.36$, $SD=0.87$). A repeated measures test also revealed a significant difference between participants' perceived importance and applicability of knowledge-building (Wilk's $\lambda=0.23$, $F=10.43$, $p=.000$, $\eta^2=.77$). Furthermore, specific correlations were computed to examine how each principle is related to one another. In terms of their *importance*, it was found that there are a large number of significant correlations between all principles, ranging from .305 to .617. Of all 66 possible correlations between all principles, there are 41 (62.12%) significant correlations. In terms of their *feasibility*, it was found that there are a relatively smaller number of significant correlations between the 12 principles, ranging from .284 to .495. Out of all 66 possible correlations between all principles, there are relatively fewer (only 21, 31.81%) significant correlations. It is explicitly evident from the findings that there exists a more consistent view of the prospective teachers on how they perceive the relationships between the principles in terms of the importance of the knowledge-building principles, but not in terms of the feasibility. The findings suggest that there exists a conceptual misalignment between the views of knowledge-building concepts and the actions they may take when prospective teachers are in practice.

3. Interpretation of the applicability of knowledge-building principles

Table 2 lists a few examples excerpted from the interviews to illustrate various reasons as to why some principles were especially considered as impractical. A content analysis was further employed to explore the possible challenges in relation to the implementation of the principles.

Pedagogical challenge. Prospective teachers have little confidence on children's capacity of creating new knowledge. The participants tend to strongly believe that children are too young to self-regulate or monitor their own learning. In a sense, such misconception in children's knowledge building capacity is in agreement with a conventionally held educational belief, that is, to learn first (e.g., through K-12 schooling), and to innovate later (e.g., during graduate study). Under this view, maximizing an individual's personal knowledge seems to be an important criterion in judging whether the instruction is effective, thus leaving little room for knowledge-building.

Epistemological challenge. Prospective teachers also greatly emphasize the importance of basic content knowledge and the need of authoritative knowledge source as essential for building correct knowledge. They tend to believe that knowledge-building will be possible

only after a broader knowledge base is established. They also maintain that the critical role of teachers, the necessity of curricular guidelines, as well as the knowledge pre-defined in textbook are required for students to construct correct knowledge. Such view appears to be highly aligned with what Popper [17] referred to as the Second-World view on the nature of knowledge, regarding reality as mental states created in the human mind. In other words, prospective teachers do not yet recognize that ideas can have a social life beyond the individual mind. Apparently, these findings are inconsistent with the results from belief survey data, which are more constructivist (e.g., they are not inclined to believe in experts as source of knowledge). One possible explanation may be that their beliefs towards constructivism are shallow, rather than deep constructivism. That is, when knowledge is viewed as constructed within Popper's Second-World (i.e., in one's mind), the prospective teachers were constructivist. Interestingly, when knowledge is being viewed, from a knowledge-building perspective, as object that has a public, social life within Popper's Third-World, their beliefs become less constructivist.

Socio-cultural challenge. Prospective teachers seem to strongly believe in group equity or social harmony. These ideas have great influence on the quality of collaborative knowledge-building. They don't seem to believe that to give knowledge is to get knowledge. Their previous schooling experiences suggested that group equity is hard to achieve. Arguably, it may have something to do with the school culture encouraging social harmony, rather than criticism towards others. In Taiwan, social value highlights individual knowledge growth, but not community knowledge advancement. Clearly, how to help teachers transform such individualistic epistemic view into a view that takes into consideration more social aspects of learning remains an important instructional design challenge.

Table 2. Prospective teachers' initial conceptions about knowledge-building

Principle	Some examples (translated from Chinese)
Epistemic Agency	"I think this principle is not feasible because of age differences. Age differences must be considered. This is especially true for young students. I believe that if they plan their own learning, they will focus on playing. They will not be capable of self-controlling and self-regulating their own learning."
Real Ideas, Authentic Problems	"It is infeasible because what is taught in school in order to help students pass exams is often not related to the real problems in life."
Idea Diversity	"It is not practical to teach more than one solution to a math problem. For example, in learning math, more than one solution may lead students to confusion, especially when the instructional goal is to help students pass the test."
Democratizing Knowledge	"I think people can work together in a group but there will never be equal contribution in a group."
Constructive Uses Of Authoritative Sources	"I think constructive uses of authoritative sources are too ideal. My personal experience in learning with professors makes me believe that experts like them have total authority in knowledge. You can not deny it."

Concluding remarks

The present research represents an initiative attempting to design a university teacher-education course whose instructional goal is to prepare prospective teachers to gradually

attain a deeper and more integral understanding of knowledge-building principles. As such, we have identified pedagogical, epistemological, and socio-cultural challenges that need to be addressed in order to accomplish an effective course. Our findings suggest that a promising way to introduce knowledge-building principles into a course is to engage prospective teachers in reflecting on their own teaching beliefs, while using knowledge building principles as contrasts. Accordingly, an instructional design would be laid out to engage prospective teachers to discuss their own conceptions about knowledge-building in the class. Further, to engage them in implementing these knowledge-building principles in the classroom activities. It is posited that this effort would be helpful to identify the disagreement between prospective teachers' beliefs in teaching and their concepts about knowledge-building. Gradually they can reach a better understanding of knowledge-building concepts. This claim, however, remains to be examined by future research.

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