PROFESSIONAL KNOWLEDGE CONSTRUCTION IN TEACHING THROUGH ONLINE QUESTIONS

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Abstract

This study investigated online activity aimed at promoting professional knowledge construction by first year students enrolled in an experimental track at a teacher education college. Content and discourse analysis methods were applied to analyze peer-initiated questions, the nature of the online process and environment, as well as, the role of the mentor in promoting the shift from intuitive to professional knowledge about teaching.

Research Context

The student's first year of study in a teacher education program is an important stage in the construction of professional knowledge about teaching. In this process the formulation and shaping of educational concepts, both theoretical and practical, shifts from intuitive perceptions to professional knowledge of teaching. The aim of the activity studied in the research project reported here sought to influence this process.

At the beginning of the 2005–06 academic year, first-year education students participating in a discussion group, which served as shared "public notebook," participated in an activity related to their personal teaching experiences. This activity developed over several ten day cycles. In each cycle, three students were asked to submit a description of one teaching incident, documented in their study diary, to their discussion group. Other participants read and then responded with questions about two of the three incidents. Ten days later the three authors submitted re-written reports of the incident in a manner that addressed questions raised previously by discussion group members.

The expectation was that the transition from the personal learning diary to the Internet "public notebook"" and the re-writing of the incident, following questions raised by peers, would advance the student-author's self-reflection: From initial, intuitive thinking in the personal-learning diary to more professional thinking and writing about the incident and herself as a teacher.

Theoretical Background

Construction of Professional Knowledge of Teaching

Teachers need to be enabled to construct, in an intelligent manner, appropriate professional knowledge and to develop their own beliefs and practical teaching and learning models the theory and practice of teaching and learning presented to them (Pintrich, 1990). Understanding the process involved in developing professional knowledge can be informed, primarily, by three bodies of research that developed in parallel over the last two decades:

- Teaching expertise: Research and theories that focus on differences between novice and expert teachers (Dreyfus & Dreyfus, 1986; Sheloni, 1992; Sternberg, 1997);

- Knowledge development as product of learning: Taxonomies of young adult developmental levels of learning production (Biggs & Collis, 1982; Biggs, 1996; Tynjala, 1999).

- Development of thinking in teaching and its presentation as knowledge: Theories dealing with the development of thinking in teaching, along with investigations of how it has been presented as knowledge (Korthagen & Lagerwerf, 1996).

Examining these theories and research studies reveals a shared developmental pattern that begins with an indiscriminative, holistic perception of external data, a context and internal processes and continues on to development of a clear image or personal model, simultaneously inclusive and open.

Participants in a teacher education program begin this process of constructing professional knowledge as pre-service students. While they differ in reflective capacities, developmental processes, and specialization throughout their program, they share development from a holistic perception (consisting of indiscriminative external data, context, and internal processes) to a more discriminative self-image.

Contributions of Asking Questions

Inquiry into the contribution of asking questions to the construction of knowledge dates back, at least, to the days of Socrates. More recent interest in the topic developed following claims by Dewey (1933) and Piaget (1962) about the importance of questioning for the learning process. Globman and Kula (1992) argued that questioning creates imbalance and sensitivity. According to Landau (2004), questions change pupils' confused view of the world, as one difficult to understand, to comprehension of order and relations between elements. Thus,

learners' capabilities for independent learning and research can be enhanced by asking questions and, in particular, by directing them to ask higher order questions — those directed to deeper, more comprehensive thinking about a topic or phenomenon.

Zellermeyer (1992) demonstrated that one way to advance writers' thinking was re-writing a text by taking into account questions asked by other capable writers, who present the audience's point of view; questions such as: "What else do you know about this matter?" Or, "how is this related to what was said previously?"

Also, Lotan (2007) found that questions in online discussion groups assisted writers, who were pre-service teachers, to discover elements missing or problems in their understanding about classroom incidents and to interpret problems from other points of view, presented by respondents.

Cognitive Growth via Participation in Online Discussion Group

Computer-mediated communication (CMC) has attained widespread use as a tool that facilitates the conduct of learning discourse via an online discussion group. In such a process, knowledge can be introduced at any point in time during the writer's learning process; interested persons can relate to the message, at anytime and from anyplace; and, participants are able to view all exchanges. Accordingly, we can define an online discussion group as mediated framework that allows a learning community to discuss a topic, to engage in peer learning, and to collaborate in knowledge production.

Discourse in online discussion groups has a number of characteristics that support participants' cognitive growth. Anderson and Garrison (1995) argued that the unique contribution to participants' cognitive development results from the combination of internal thinking with an external form of verbal engagement. The environment strengthens this combination since organizing, focusing, and development of the message are influenced by the capability of delaying or drafting a quick reply, along with the need to entitle the message. Birnbaum and Feldman (2002) added the element of documentation: Writers' thoughts and ways of formulating ideas are recorded and remain accessible. Hewitt (1997) argued that participants are able to engage in critical reading of previous ideas and to state a new idea more accurately. And Ackerman (1997) added that writing and re-writing about an incident allows gaining distance from it but also approaching the difference between the concrete and the abstract — both of which are required for cognitive growth.

The study reported here investigated the construction of personal knowledge as it developed in the discourse of online discussion group about events that took place in the field. The particular focus of this article is on the questions raised by peers

about the written accounts of these incidents. The findings reported relate to three research questions:

- What types of questions were posed in the online discussion group?
- What are the characteristics on the questions that advanced construction of professional knowledge?
- What conditions enabled these questions to advance the development of the student-authors' professional knowledge?

Methodology

The qualitative paradigm applied in this study made possible study of internal thinking in a complex work environment such as teaching and learning (Lincoln & Guba, 2000).

Participants: The research population included 21 teacher education students who were in their first year of study in a teacher education college in Israel. Participants were 22–27 years-of-age; all were females and secular, except for two religious students; and all were Jewish except for one student from the Arab sector.

Data-gathering tools: The computer logs of the online discussions of seven discussion groups were the basis for the research data. Each log had at least three threads that began with a description of events experienced by three students. 217 messages were found among these discussion group threads, including both presentations and responses.

Also included in the research data were entries recorded in the pedagogical mentor's field notebook.

Data analysis: Content analysis (Neueudorf, 2002; Titcher, 2000) of the discussion group logs was conducted along with a method of discourse analysis that assists in locating cognitive and emotive elements in a personal conversation (Kupferberg & Green, 2005). The analytical units of the group discussion included: (a) descriptive accounts of an incident in the field; (b) responsive questions that related to the account; and, (c) the author's rewritten account of the incident. In addition, content analysis of the pedagogical mentor's notebook for the course — Researching Field Experience 1 — was undertaken. These analyses were supported by the Atlas-ti 5 program that was devised for the purpose of analyzing qualitative data.

The analysis process: The research questions derive from one another and, accordingly, data analysis of a question is based on the findings from the previous question. In order to answer the first question — types of online questions — a content analysis was conducted for all of the questions asked in the discussion groups. Analysis of the second question — characteristics of the online questions, which precede construction of professional knowledge, involved content and discourse analyses of questions related to the incident descriptions and the rewritten texts.

In order to address the third question, the conditions under which these questions advanced participants' professional knowledge were analyzed in the following manner: The exchanges in which knowledge construction was identified were examined in terms of the respondents' reaction to the initial message/incident description and the reaction of the student-author to peer responses. This was followed by a comparison of questions asked in the discussion group in order to determine if there were changes in the types of questions over time. Finally, an analysis of the mentor's documentation was undertaken in order to examine the nature of mentor responses to the online discussions.

The researcher's interpretation was developed by combining the interpretations produced through content and discourse analyses of the logs. Following completion of her initial analysis, the researcher advanced a reliability check by asking one of the pedagogical mentors who participated in the college course to review selected threads, randomly. Discussion of the two analyses led to agreement about the analysis process and interpretations.

Ethical matters: Directions given to students about participation in the discussion groups included an explanation about the research and agreement was received from them to use the exchanges solely for research purposes without divulging participant identity. Upon the conclusion of their studies in the discussion groups, participants were re-asked to confirm permission to use documentation of the discussion for research purposes. One student rescinded her previous permission and her writing was excised from the data base.

Limitations of the research: The research data base consists of discussion group exchanges that were collected over a short period of three months. No additional studies were conducted following up on these findings.

Research Findings

The findings are presented following the order of the research questions:

1. What types of questions were posed in the online discussion group?
2. What characterizes the questions that advanced construction of professional knowledge?
3. What conditions enabled these questions to advance the development of the authors''professional knowledge?

1. What types of questions were posed in the online discussion group?
The collective exchanges in the discussion group were questions related to incident descriptions. Varied questions were asked that related to different aspects of experience. Three categories of these questions emerged in the content analysis:

a. Detailed, focused questions that sought clarification about a specific aspect, such as: technical matters (What is an "emotional diary"?); behavior (Were you able to involve her in an activity?); the emotive (How did you feel when entering the classroom?); a cognitive aspect (What was your rationale for selecting this child?).

b. Questions related to relations between several aspects of the incident: Questions about interaction between persons (How did the teacher involve you in the class?); inter-system relations (Why do you think the substitute teacher was unsuccessful in gaining control of the class?); or, attempts to understand the Other's point of view (Do you think the pupils view you as a kindergarten teacher?).

c. Questions that sought to advance reflection about hypothetical situations that began with but extended beyond the context of the experience related. For example, some questions sought to generalize or to have the respondent take a stand (Sometimes we speak "childishly" with children. Does this happen to you? Do think it is OK?); or, questions seeking to advance specific didactic thinking about future learning (Now that you understand that you need to develop a certain type of explanation, how do you plan to accomplish this?).

2. What characterizes questions that advanced construction of professional knowledge?
The chief characteristic of the online questions was the degree that they varied in points of view and intensity as well as in the uniqueness and difference in the personal sensitivity of respondents in regard to the text presented to her. Comparison of initial writing about the field experience with the rewritten text revealed that there were questions that created an encounter between the student-author and the respondent.

This encounter produced a separation between action, feeling, and thought, as well as, a different view of the other. They were able to reflect on the event from additional points of view; relations were examined between components that initially were presented in separation from one another; meaning was given to "transparent words" and the local context was extended to a more open context.

3. What were the conditions that enabled these questions to advance the development of the authors' professional knowledge?

Each of the three types of questions (see section 1 above) was found to have the potential to advance professional thinking. However, such advancement was dependent on four factors: Responses by respondents directed to the written account of the experience; author's responses to respondents' questions; type of media selected; and the guidance provided.

a. Responses directed to the written account of the experience:
Peer-respondents related to the author's text by means of their own or their shared conceptual world. The analysis revealed that the conditions that advanced authors development of new knowledge and their rewriting of the text were responses: written in an accessible language sensitive to the author; related to the text's contents and in particular to the author's primary view; and at the same time presented a different point of view.

b. Authors' response to the questions:
Authors who advanced their professional knowledge related to *all* the questions asked in their rewriting of the event awe well as to the **respondent's point of view**.

Three directions in students' initial professional development were identified:

- Initial signs of inter-personal development indicative of transition from ego-centric self-occupation with her place among others in the classroom to seeing the pupil's point of view;

- Initial signs of intra-personal development in which her self-perception shifted from student status to future teacher; and, from a naïve or idealistic perception of the classroom and her place in it to a more realistic conception and mature perception of her responsibility for what takes place in it.

- Initial signs of pedagogical development following growth of the students' awareness of her pedagogical role; and, from transition from accepting the classroom situation as given to one in which activity can be criticized and appropriate solutions for change posed.

c. Type of media selected:
The characteristics of the online discussion group medium supported participants' reflection during the entire process (e.g., documentation of diverse exchanges that includes varied responses written and read in a shared place at a time and pace appropriate to each of the participants], included the following:

- Responses to reactions to a text. The medium allowed respondents to react in writing to the author while engaging the message that appeared on the computer screen alongside their own evolving reaction, without time limitations. In this manner, the medium allowed response to the author's interpretation and language along with expansion of the respondent and other points of view. At the same time, the medium's a-synchronicity enabled some respondents to submit questions that belonged to their particularistic conceptual world and so leave unrealized the medium's potential.

- Author's response to questions. The medium enabled authors to return to the questions during their rewriting of the incident. Word processing assists rewriting as it can be undertaken as thinking develops. At the same time, the medium's a-synchronicity allowed some student-authors to relate selectively to questions and to do so solely from their own point of view.

- Facilitation. The environment allowed the students' pedagogical mentor and computer instructor to engage in diverse facilitation. While discussions took place during their instructional period, only the students managed the process. That is, the instructors were not "present" in the discussion, but the documentation produced enabled them to become familiar with the new students.

d. Facilitation:
Students were instructed in self-management of the activity. They constructed the rules for participation in the discussion group with the computer instructor. The pedagogical mentor and the computer instructor were not present during the discussion group meeting — they neither participated in it nor responded to messages. The mentor's analysis that was conducted throughout the course, documented in her notebook, revealed that she did not relate to the discussion group exchanges in face-to-face meetings that took place at the college.

Summary and Discussion

The aim of this research was to examine the potential of asking questions to advance construction of the professional knowledge of students in their first experience in the field through participation in a-synchronic, online discussion.

The great variance found to exist between students was the chief characteristic regarding the capability of online questions to advance professional knowledge. The students came from different points of view, from different conceptual worlds, and they responded to the text in unique ways and with varying sensitivities. The questions related to the contents in different ways: They focused on a particular detail in the text; to relations between aspects of the incident in the immediate context and in hypothetical situations derived from the incident but in an open context. The questions that contributed to advancement of professional knowledge were those that in addition to addressing content related to a peer's use of language, her feelings, the central message in her interpretation, and the different point of view shared regarding the incident.

The research found that rewriting that included responding to questions enabled some of the author-students who participated in the discussion group to change: Their self-perception as teachers responsible for classroom activity; their point of view about classroom events from a self-centered to the other's point of view and especially to the pupil's view; and, shift from passive reflection about an event to construction of proactive knowledge about future pedagogical actions.

The conditions that made possible realization of the potential of the questions to contribute to constructing new professional knowledge included: Organization of an online environment that included selecting a platform appropriate to the discussion group; selecting appropriate ways to facilitate the discussion; facilitation of students during the activity. The pedagogical mentor refrained from participating in the discussion groups and thus only the students were responsible for the discussion.

Accordingly, varied exchanges in discussion group formats that include a broad range of questions would appear to have high potential to advance construction of professional knowledge. Realization of the potential of questions that contribute to constructing knowledge occurs when the student-authors directed their rewriting to all of the readers' questions and when the questions posed to them enable the student-author to examine the initial description from the respondent's point of view.

These conditions assist student-authors to reflect on the initial intuitive description, to break it down into constituent parts, to examine it from different

points of view, to reconstruct it as a more professional interpretation that is based on a change in point of view, the need for explanation and support for claims, application of reasoning and thinking in planning future activities. When such conditions exist, the questions become tools that lead student-authors to higher order thinking about the event and to alternative action within the range of their immediate development

The research points to the critical roles of the pedagogical mentor in facilitating online group discussion in which the participants ask questions about incidents experienced in the field. First, through use of the documentary record of the students' exchanges, the mentor can identify the types of questions raised and follow those that have potential to advance reflection, as well as, psychological aspects, and lead to constructing professional knowledge. Later, the mentor can facilitate responses and the processes with which students are involved in the questioning and can include them in analyses of new incidents that take place in the face-to-face meetings in the college or in the field. Finally, this process can be very useful to the mentor, early in the study program, in locating first-year teacher education students who have difficulties in interpersonal communication in relating to questions originating in other person's points of view about teaching events and changes to make in the future.

In summary, it is important to note that, although the students were directed only to ask questions and though they had but brief acquaintance with one another prior to this activity, they added a social dimension to the discussion that included emotive support in the face of difficulties confronted by peers. Through these exchanges they constructed a social environment that supported their collaborative learning.

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