Facilitating the Process of Knowledge Construction among Preservice Teachers through Computer-Mediated Communications

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Abstract
This paper highlights a segment of a larger study that examined the potential for CMC tools to foster reflective thinking among preservice teachers. Using a mixed-methods research design, the extent to which the CMC among six groups of preservice teachers was influenced by (a) the focus and structure of the CMC context, and (b) the interactions and social dialogue among peers was examined. Highlighted in this discussion are the patterns of interactions and social dialogue that were made apparent within cognitively in-depth CMC.

Introduction
Engaging preservice teachers in activities that foster reflective thinking has become an integral facet of teacher education programs. Although this integral facet is well-supported, not a lot is known about how it can be prompted or how it is achieved. While scholars maintain that strategies such as journaling and group discussions facilitate reflective thinking [e.g., 1;2], minimal evidence exists to support such claims [e.g., 3;4]. Furthermore, while students may show evidence of reflective thinking, such illustrations may be only temporary or merely superficial procedural displays [e.g., 5;6].

Computer-mediated communication (CMC) tools are emerging as a promising new means to prompt reflective thinking through computer-mediated social discourse. Unlike journaling and discussion types of activities, CMC tools prompt reflective thinking as individual reasoning and multiple perspectives are made explicitly visible to oneself, as well as to one's peers. When reasoning and thinking are open for public examination through CMC, students may become more motivated to engage in reflective practices.

This paper highlights a segment of a larger study that examined this potential of CMC tools 1. Forming the basis of this study were the levels of cognitive processing (CP) demonstrated within six teams of 5-6 preservice teachers as they participated in a CMC-based supplement to the 16-week semester course Elementary Science Teaching.

Methods. Utilizing a mixed-methods research design, quantitative profile analysis procedures were first used to examine the extent to which CP levels varied with respect to (a) time, (b) group dynamics, and (c) CMC topics / structures. Qualitative measures were then used to examine the dynamics that contributed toward CP levels within each of those contexts that were found to be of statistical significance. The focus of this discussion is on the extent and manner in which CP levels varied over the course of the semester (i.e., time) - within the specific context of those teams that demonstrated (statistically) significantly high levels in CP.

Cognitive Processing: Profile Analysis

Quantitative profile analysis procedures revealed a statistically significant variation in CP levels over the course of the semester. This variation in CP suggested that students began to think about teaching and learning in an increasingly complex manner as they engaged in CMC. Examining this variation within the context of each of the six teams of preservice teachers (using profile analysis procedures) revealed those teams who contributed toward this trend - Team 1 and Team 2. In particular, the CP levels that were demonstrated within each of these two teams throughout the course of the semester were (statistically) significantly higher than that of the remaining four teams.

Cognitive Processing: Group Dynamics

Of particular interest to this study were the factors that contributed toward cognitively in-depth levels of CMC. Toward this end, qualitative measures were used to examine the extent and manner in which (a) peer interactions, and (b) social dialogue (SD) contributed toward the CP levels demonstrated within Team 1 and Team 2, respectively.

Team 1: Peer Interactions

The dynamics displayed in the written dialogue exchanged within Team 1 illustrated the extent and manner in which peer interactions can facilitate the process of knowledge construction via CMC. The highly interactive nature of the CMC within this team seemed to facilitate

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1 Full study can be accessed through authors homepage: http://lewinson1.com/Site/home.htm

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high levels of CP through informal peer mentoring and scaffolding. One member of this team, Kay, played a key role in these processes as she modeled in-depth levels of CP in her written dialogue throughout the course of the semester. Overlapping with this factor, Kay seemed to take on the role of an informal mentor as she prompted highly interactive discussions, guiding her peers toward more complex levels of thinking.

While the level of CP displayed by Kay provided a scaffold for higher levels of learning, only two students within Team 1, Ema and Ashley showed evidence of this. The written dialogue exchanged by the other members of this team showed little evidence of progressing toward higher levels of CP. Further examination of the CMC suggested that the capacity to think about one’s own thinking (i.e., metacognition) contributed toward this distinction. Unlike the CMC of those students who displayed low levels of CP throughout the semester, Ema and Ashley seemed to be more aware of the limitations in their own thinking with statements such as “I don’t know, that’s just what I think”, “Maybe it’s just me, but I don’t get the purpose of this”, and “I’m just not used to this”.

Team 2: Social Dialogue

Throughout the course of the semester, students displayed a steady increase in SD. Notably congruent to this trend were increasingly higher levels in CP. Interestingly, Team 2 exemplified this trend as the discussions that took place within this team not only displayed notably high levels in CP, but also the greatest extent of SD. This was of particular interest in that it conflicted with the assumptions to which several researchers have alluded concerning the relationship between SD and CP. In particular, a number of researchers have addressed SD as a trade-off with higher levels of CP, implying it to be an impediment toward learning. Juxtaposing the extent of SD with the levels of CP, that were displayed within Team 2, as well as the overall trend displayed by each of the other teams throughout the course of the semester, contradicts this assumption. That is, the social dialogue did not impede displayed levels of CP.

It is important to note that this congruency between CP and SD was not indicative of a causal relationship. That is, SD did not foster higher levels of CP, nor did higher levels of CP necessarily facilitate SD. Rather, the findings from this study seemed to merely indicate that the capacity to process information at a more complex level allowed for students to be more social in their discussions. Parallel to the dynamics within a classroom setting, these students were simply capable of multitasking.

Conclusions

The findings highlighted in this discussion have important implications toward the potential that CMC tools have to offer teacher education programs. First, as the dynamics within Team 1 illustrated, a strength of this medium lies in its potential to facilitate reflective thinking through peer mentoring and scaffolding. Recognizing this potential calls for teacher educators to group students heterogeneously - with respect to CP levels. CMC transcripts can be used at the start of the semester to gauge students levels of CP. Using this information, teacher educators can then form small CMC groups in which a range of CP levels are made explicitly visible.

As the dynamics within Team 2 suggested, SD neither facilitates, nor impedes in-depth levels of CP. This is of particular interest in that this is not necessarily the case within a traditional classroom setting. In particular, given the time and location constraints of the classroom setting, SD can act as an impediment toward learning as it is often a trade-off with on-task behavior. Given the time and location flexibility inherent to (asynchronous) CMC, SD within a CMC context does not necessarily take place in lieu of meaningful learning. Rather, within a CMC context, students are given the opportunity to engage in SD as a supplement to their own learning. This clear distinction between SD within a traditional classroom setting and a CMC context highlights a salient point for both teacher educators and researchers to recognize: Learning/teaching within a CMC context calls for more than merely transferring existing classroom practices into a CMC context. Learning/teaching within a CMC context calls for the transformation of existing practices into new pedagogies that maximize the potential that CMC tools offer teacher education.


For a more detailed discussion of findings/implications please see full study:  http://lewinson1.com/Site/table.htm