Designing Courses as Sustainable Learning Communities: A STEM Teacher Candidate Course Extending into K-12 Teaching

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Abstract: This study investigates the design of effective and sustainable social media learning communities (here, an anonymous Subreddit) embedded in Teacher Candidates' (TCs) courses. In surveys, TCs discussed course design and discussing problems of practice in our LC, and our analysis showed that TCs initially valued: anonymity, voting, peer feedback, collaboration, support, and permanent access to resources. As the semester progressed, TCs found value in shared discussions, increased in collective efficacy and technology acceptance, and stated that if our community remained active, it would continue to add value to their professional practice.

Motivation and Research Question

The development of ongoing online communities was one of the promises of the early Internet (Glassman, 2016). Open virtual discussion forums where individuals share information and co-create knowledge (Kim et al., 2013) continue to hold great promise, particularly for education (e.g. shared exploration and problem solving; Krutka & Greenhalgh, 2021). Such communities could address the alienation that teacher candidates (TCs) often face, which has been intensified by COVID-19 (Mutton, 2020). Moreover, social media learning communities (SMLCs) could address another problem– that concepts and strategies taught in university courses are abstract, not transferable (Walton & Rusznyak, 2020) – by allowing TCs to connect and discuss problems of practice with peers and content experts. Active educational online communities are rare (an exception is #edchat on Twitter) and have had limited success in maintaining authentic problem-solving spaces (Krutka & Greenhalgh, 2021). In response, we designed a CSCL environment that includes a wide variety of artifacts (e.g., technological, instructional; Stahl et al., 2014) to stimulate collaborative learning. We used a Vygotskian theoretical framework to design the course, prioritizing opportunities for TCs to create and share artifacts while developing transferable professional skills (Stahl et al., 2014). This included TCs collaboratively creating technology tutorials, videos, lesson plans, and online learning modules with embedded technologies that they shared with their peers (Yoon et al., 2017). Activities that took place on Reddit, such as peer feedback (Yarovoy, 2020), positioned TCs as expert-like, because TCs collaborated on artifacts to advance their collective knowledge (Borge & Mercier, 2019). By sharing these artifacts in the learning community, we aimed to demonstrate that knowledge and artifacts should not be seen as the cognitive property of individuals, but as an outcome of group collaboration (Glassman et. al. 2021). In this paper, we analyze TCs' pre-surveys and mid-semester evaluations in order to answer: What principles or features can make an online learning community feel productive as a forum for teacher candidates to discuss problems of practice?

Method

The study comprises quantitative and qualitative data analysis from our STEM technology course, which used Reddit for course activities. The class consisted of 35 TCs (12 male, 23 female). The average age was 21.6 years (SD = 2.2), the majority were White (n = 30, 76.9%), and 33.4% had a bachelor's degree. 60% indicated that they interacted with technology often – they most frequently used Instagram (91.4%) and Twitter (68.6%). Reddit was new to more than half. To understand TCs' experiences with technology, the collective efficacy scale (Glassman et al., 2021), which measures how TCs collectively use technology, and the technology acceptance model (TAM; Venkatesh & Davis, 2000), which looks at comfort with SMLCs in classrooms, were administered. Mid-semester reflections were analyzed with inductive coding (Charmaz, 2006) to understand TCs' experiences with the SMLC.

Findings

Our pre-surveys and mid-semester evaluations helped to identify features that could make SMLCs effective. On the pre-survey, responses focused on collaboration and support; thirty-two teacher candidates expressed a desire to belong in a community. For example, TCs wrote that they wanted to "be a part of a community that I can learn from and contribute to." Within the community, some TCs mentioned a preference for anonymity to support meaningful interactions where they could have "free reign and ability to converse without required prompts so the interactions will be much more organic" in order to "bounce ideas back and forth and share experiences". TCs expected to embrace the "anonymity [which] helps a lot when sharing sensitive issues or giving feedback". Even

so, some TCs shared doubts about using SMLC to foster community – "a community for pre-service and in-service teachers alike. I'm not sure [how] necessary or realistic it is". From the quantitative data in our pre-survey, most TCs demonstrated an interest in developing collective efficacy through shared knowledge creation in our SMLC. TAM composite scores showed that TCs saw participation in the SMLC as relevant to their future teaching. The collective efficacy scale showed that TCs saw potential for engagement, collaboration, and augmentation of learning at both the community and individual levels. The Pearson correlation showed that TCs' gender (female) is significantly related to job relevance ($r = .341$, $p = .045$), suggesting that females are more likely to perceive the SMLC as relevant to teaching, and therefore productive in a teacher education course.

Our mid-semester evaluations demonstrate a shift in TC's perceptions of the SMLC; twenty-nine TCs appreciated the SMLC as a place to share resources. For example, one TC wrote, "It's nice to have all of the resource and reflections in one place." Nine TCs focused specially on benefits of Reddit, such as "it is organized and easy to use." Another TC wrote that they now "prefer using Reddit for discussions/posts over the [university canvas] discussion board." Thirty-three TCs described the anonymity of the platform as a strength as they were able to "give constructive criticism without fear," and participate in a way that "feels much more authentic." On the mid-semester evaluation, TCs also shared feedback for improving the SMLC. Twenty-seven TCs mentioned a need for more opened-ended discussions. For example, one TC wanted "more free and open conversations about different aspects of STEM education." TCs also described time constraints as limiting these types of conversations. Another shared, "TCs post things only when they are required and therefore building connections is difficult." To address this concern, we proposed an "access when needed" approach to sustainable learning communities in which users (TCs, and later, in-service teachers) can access the SMLC even after the semester ends. TC saw potential in this– eight TCs commented that "it becomes a very valuable resource going forward."

Conclusions and Implications

This study explores the value of supporting teacher learning by using a SMLC in STEM education teacher preparation courses. From the data collected, we determined that TCs found value in the shared discussions, participating in a sustainable community and the design features such as voting, anonymity, and peer reviews that can help to create an active and sustainable SMLC. The potential of SMLCs goes far beyond technology integration and STEM; for our full study, we intend to explore the impact of adding new cohorts to our current community and further research is needed to determine the impact of these types of sustained SMLCs across different platform and courses and how they can be applied to help all educators improve teaching and learning.

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