

Rethinking Technology-based Educational Studies in the Evolving Classroom Environment: An Interview Study with US Teachers

Tomohiro Nagashima, Gautam Yadav, Vincent Alevan
tnagashi@cs.cmu.edu, gyadav@andrew.cmu.edu, alevan@cs.cmu.edu
Carnegie Mellon University

Abstract: Despite the prevalence of conducting classroom studies using educational technology, it is underexplored what practical benefits classroom studies with educational technology offer to teachers and students, and what concerns or challenges they perceive. Our interviews found that teachers view study participation as a meaningful learning opportunity but also shared challenges and concerns, some of which are related to remote learning during the COVID-19 pandemic. We offer strategies that researchers can employ when conducting classroom studies.

Introduction

For decades, researchers of educational technologies have studied the effectiveness and use of educational technologies in the school classroom context (e.g., “in vivo” experiments, by Koedinger et al., 2009) to advance the science of learning. From a pragmatic viewpoint, however, it is essential that not only researchers benefit from classroom data collection but also that practitioners (i.e., teachers and students) find practical benefits in participating in research studies with educational technology (Coburn & Penuel, 2016), which has not been explored thoroughly in the literature.

Understanding practical benefits and associated challenges and concerns in participating in classroom research is even more important in times of crisis. In the year 2020, due to the spread of the coronavirus disease (COVID-19), a vast number of schools have been forced to make a transition to remote instruction to continue teaching and learning. It has significantly affected teachers and students in various ways, resulting in problems such as teachers’ increased workload (Reich et al., 2020). Under such a drastic change to school environments, conducting classroom studies may cause additional stress and workload for teachers and students, who are already struggling with adjusting their practices. To explore how educational technology researchers can ensure that practitioners benefit from participating in classroom studies especially during the pandemic, we conducted interviews with US teachers, exploring *what practical benefits, challenges, and concerns teachers perceive for participating in classroom research in general and specific to the remote teaching setting.*

Method

We remotely interviewed seven middle- and high-school mathematics teachers in the US. We targeted teachers who either had expressed an interest in participating in classroom studies or had participated in a classroom study with us during the pandemic. Two graduate students analyzed approximately 11 hours of video-recorded data following an Affinity Diagramming approach. They generated a total of 179 codes and clustered into 70 mid-level themes, which were then grouped into eight major themes.

Results

Our analysis revealed eight major themes across two categories: perceived benefits and concerns/challenges in participating in classroom studies (Table 1). We discuss one theme from each category due to the page limit.

Table 1: Perceived benefits and concerns/challenges in participating in classroom studies

Benefits	Concerns/challenges
Teachers consider that students will benefit by meeting researchers <i>in the wild</i>	Teachers find it hard to know what level of interventions and facilitation is appropriate during studies
Teachers consider that students will be motivated to contribute to science	Teachers prefer customizability and flexibility regarding research participation and content to-be-covered
Teachers will have an opportunity to understand their students from a different perspective	Teachers are concerned with lack of synchronous, immediate support for remote students
Teachers view participating in educational research as professional development opportunity	Teachers are concerned with students’ various learning environments during a pandemic

One benefit: students will benefit by meeting researchers *in the wild*

Teachers strongly emphasized the importance of connecting their students with researchers. Teachers view welcoming researchers in the classroom as an opportunity for students to learn about research as a real job (e.g., knowing what researchers do) and about opportunities that exist outside the classroom. One teacher stated that their students had had very limited exposure to the outside world even before the COVID-19 pandemic: “[we] are a very small community, so a lot of kids don’t know what’s out there. They haven’t been out in the real world. A lot of them haven’t even traveled beyond our edge of our city.” They indicated that the need for real-world connections to material presented in classrooms has become more important due to the pandemic because students have fewer opportunities to interact with the world outside the classroom and their home.

One concern/challenge: lack of synchronous, immediate support for remote students

All teachers expressed concern regarding what to do if a student would face technical trouble or struggle with the content in the educational technology used in a study in which they might participate (e.g., students might have trouble when they log into the system). Supporting students remotely during such an event would be challenging, compared to doing so in the in-person regular classroom, especially struggling students who “do not reach out to [the teacher] or to their friends and they wind up being stuck or they just give up because they’re frustrated.”

Discussion: recommendations for researchers

The interviews revealed findings regarding teachers’ motivations for participating in research. First, study participation itself can and should be conceptualized as a learning opportunity for practitioners. Second, by participating in classroom research with educational technology, whether during a pandemic or not, teachers and students can not only learn about the learning materials used in the research but could also learn about aspects of educational research and a researcher’s job. The interviews also uncovered concerns and challenges they perceive regarding participating in research, many of which are related to and may be unique to the remote teaching setting. We believe that conducting classroom studies virtually will remain important as schools may consider a virtual learning environment as one of the several possible teaching modes for the next several years. Based on the findings and recommendations from teachers, we provide three practical strategies that researchers can consider when conducting remote classroom studies during and after the COVID-19 pandemic:

First, we suggest that *researchers collect data about individual students’ learning environment*. Under the remote learning setting, it is critical to understand and document that students may have different learning environments and that the amount and quality of support they get from parents and peers may be highly variable. Such differences could impact their participation, engagement, and learning during a classroom study.

Second, we suggest that *researchers make study participation simple and allow for flexibility*. Teachers are concerned about not being able to provide immediate support to students during the study, especially during remote instruction. This support pertains not only to content support but also to technical aspects such as logging in to the technology and streamlining the task procedure. Also, researchers should discuss with teachers what activities are most meaningful for their students to ensure that the study aligns with their classroom practice.

Lastly, it is important that *researchers make themselves present in classrooms and communicate with students appropriately*. Teachers reported that researchers’ presence would motivate students. We recommend that researchers make themselves available virtually or in other ways, and offer an opportunity for students to interact with researchers whenever possible (e.g., by creating dedicated time for students to ask questions during a study session).

References

- Coburn, C. E., & Penuel, W. R. (2016). Research–practice partnerships in education: Outcomes, dynamics, and open questions. *Educational Researcher*, 45(1), 48-54.
- Koedinger, K. R., Aleven, V., Roll, I., & Baker, R. (2009). In vivo experiments on whether supporting metacognition in intelligent tutoring systems yields robust learning. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of metacognition in education*, 897-964.
- Reich, J., Buttimer, C. J., Coleman, D., Colwell, R. D., Faruqi, F., & Larke, L. R. (2020). What’s lost, what’s left, what’s next: Lessons learned from the lived experiences of teachers during the 2020 novel coronavirus pandemic. <https://doi.org/10.35542/osf.io/8exp9>

Acknowledgments

The research reported here was supported by NSF Award #1760922. The opinions expressed are those of the authors and do not represent views of NSF. We thank all participating teachers.