Developing Digital Clinical Simulations for Large-Scale Settings on Diversity, Equity, and Inclusion: Design Considerations for Effective Implementation at Scale

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Elizabeth Borneman
MIT
Cambridge, MA
borneman@mit.edu

Joshua Littenberg-Tobias
MIT
Cambridge, MA
jltobias@mit.edu

Justin Reich
MIT
Cambridge, MA
jreich@mit.edu

ABSTRACT

Digital clinical simulations (DCSs) are a promising tool for professional learning on diversity, equity, and inclusion (DEI) issues across a variety of fields. Although digital clinical simulations can be integrated into large-scale learning environments, less is known about how to design these types of simulations so they can scale effectively. We describe the results of two studies of a digital clinical simulation tool called *Jeremy's Journal*. In Study 1, we implemented this simulation in an in-person workshop with a human facilitator. We found that participants described their learning experiences positively and reported changes in attitudes. In Study 2, we used the simulation within an online course but replaced the human facilitator with an asynchronous, text-based adaptation of the facilitation script. Although learners in Study 2 described the experience in the simulation positively, we did not observe changes in attitudes. We discuss the implications of these findings for the design of DCSs at scale

Author Keywords

simulations; teaching; online learning; equity; inclusion

INTRODUCTION

Across diverse professional fields such as business, medicine, law enforcement, and education, there is a growing demand for professional training in diversity, equity, and inclusion (DEI) issues [2]. As the field of massive open online courses (MOOCs) move increasingly toward job-embedded professional skills [8], DEI-focused professional learning experiences increasingly important.

We propose digital clinical simulations as a potential solution to the challenge of teaching about DEI issues via large-scale learning environments such as MOOCs. Digital clinical simulations (DCSs) are digital approximations of real-life professional scenarios that enable professionals to engage in interactive cycles of practice, reflection and feedback [7]. In our work in teacher education, we have successfully built and implemented a number of DEI DCSs. Our simulations immerse teachers in challenging situations that help explore issues of racism, power, and privilege in order to gain greater insight into their teaching practice.

In this paper, we describe our process of designing and implementing a DCS called Jeremy's Journal. Using a mixed-methods approach, we implemented two sequential studies to understand the impact of this simulation in different settings. In Study 1, we describe the results of our initial pilot testing of the simulation within a human-faciliated in-person workshop for educators. In Study 2, we implemented the same DCS within a MOOC—this time with an asynchronous text-based facilitation—and studied its effects on learner attitudes using a randomized experiment. In both studies we address the following research questions:

1. How do participants describe their experiences within the DCSs?
2. To what extent does participating in the DCS change participants' attitudes?

BACKGROUND & CONTEXT

The Role of Digital Clinical Simulations (DCSs) in DEI-Focused Educator Professional Learning

Clinical simulations are a potentially promising approach to creating approximations of practice focused on diversity, equity, and inclusion concepts. For example, Self [10] used lived actor simulations to study how novice teachers responded to a student accusing them of racism. Building on this work, both Robinson, Jahanian Reich [9] and Thompson et al. [12] developed digital versions of clinical simulations for use in in-person settings which used text, audio, and video prompts implemented within a web application.

Integrating DCSs into in a large-scale online learning environment could allow them to spread the impact a wider audience of educators. For example, in a study of teachers, Okonofua, Paunesku Walton [6] created a set of short online modules on developing empathetic attitudes toward student misbehavior. The researchers found that the students of teachers who participated in the modules, from five different racially-diverse middle schools, had a 50% lower probability of being suspended the following school year.

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In the design of our DCS, we draw from Dr. H. Richard Milner IVe concept of "Educator Mindsets." [4, 5]. Milner describes educator mindset as a "heuristic to explain and shed light on situations in educational practices when teachers exhibit these behaviors, for instance, or when they do not" [5, p.689] Milner identifies five mindsets that lead to teaching practices that limit opportunities for students from marginalized groups: color blindness, cultural conflicts, meritocracy, deficit mindsets, and low expectations [4].

In this study, we developed a DCS aligned with the "meritocracy" mindset. Meritocracy is the concept that all success is "earned in society and that those who do not succeed fail as a result of their own bad choices and decisions [4]. However, this belief belies the many ways that educational opportunities are inequitably distributed. Minoritized groups, particularly Black, Latinx, and Indigenous students, have less access to these opportunities [3]. The meritocracy mindset can be represented as a belief spectrum: on one end, an educator with an "Equality" mindset would believe that schools are fully meritocratic while at the other, an educator with an "Equity" mindset would reject the notion that schools are meritocratic [1]. The imbalance in these mindsets leads to teaching practices that limit the opportunities for minoritized groups of student.

Methods for Developing and Scaling DCSs

Using the "Equality-Equity" mindset framework, we developed a DCS called *Jeremy's Journal*. In Jeremy's Journal, participants act as Jeremy's teacher for one week. Jeremy experiences moments of struggle in class, but also has times when he displays understanding. The prompts in the scenario intentionally used language from the research literature to align the simulation with this mindset [1, 4, 5]. The structure of the simulation has four phases- (1) Anticipate, (2) Enact, (3) Reflect and (4) Debrief.

1. **Anticipate** - Learners answer questions designed to elicit their beliefs outside of any specific scenario within the Enact section (e.g., what do you think a teacher's role is in helping students to be successful in school?)

2. **Enact** - Learners have a chance to respond to a scenario prompt that allows for options along the "Equality-Equity" spectrum. Enact sections allow learners space to practice enacting a certain mindset or another. We designed the scenario so that a learner would need to explain what was inequitable about and identify the best action to take to resolve the scenario equitably.

3. **Reflect** - Learners answer questions about their thoughts towards specific concepts covered in the framework, as applied specifically to the scenario contexts within the Enact phase (e.g., What role do you see yourself playing in Jeremy's academic achievement and success?

4. **Debrief** - Learners reflect on their responses to the individual reflection questions In the debrief, learners are invited to explore the "Equality-Equity" mindset recognizing that the two mindsets are imbalanced in schools. Here learners also take time to re-examine their own mindsets, considering the consequences for their decisions. The debrief includes concrete suggestions for learners to take action in their own contexts.

The first three phases of the DCS are the same in both the in-person (Study 1) and large-scale online settings (Study 2). However in the debrief phase the experiences diverge significantly. In the in-person setting in Study 1, learners experience a facilitator actively supporting and accelerating students' thinking. With this debrief design model, educators receive feedback on the beliefs they expressed in the first three phases of the simulation. Learners have the chance to identify their values and attitudes, consider new ways to put those into practice, and to assess whether they have acted in alignment with their attitudes and goals at the end. Learners can either assimilate or accommodate the new knowledge from the framework in order to improve their practice.

In the large-scale online setting in Study 2, we did not have the affordances of human, in-person, facilitation. The structure of the debrief needed to anticipate learners reactions while also being flexible enough to accommodate a wide range of potential perspectives. Expanding this work to large-scale online learning environments is complicated by the fact that teaching across cultural differences is complex. Educators' logics and behaviors towards achieving equitable outcomes for students are highly personal, nuanced, and embedded in systematic, social and structural barriers [11].

STUDY 1: DEVELOPING A DCS FOR AN IN-PERSON PROFESSIONAL LEARNING SETTING

In Study 1, we conducted a summer in-person professional development workshop that integrated the Jeremy's Journal DCS with N = 24 educators and administrators in K-12 schools in the United States. We invited participants who expressed interest in equity in education and who wanted to be equitable in their teaching practice.

Study Design

We orchestrated the workshop agenda and DCSs to help participants adopt refined terminology around an educator mindsets framework, concrete approaches of enacting these mindsets, and rationales that they could imagine applying these mindsets to their own work. In the the in-person debrief following the DCS, which lasted for 120 minutes, participants shared the decisions towards students that they made within the simulation and the rationales they used in making those decisions. We then provided models and rationales for approaching the simulated scenarios in accordance with one educator mindset, as well as consequences to approaches that aligned with the juxtaposed mindset.

Analysis Methods and Findings

We administered a pre- workshop and post-workshop survey to the participants to gauge their learning experience at the workshop and efficacy in having conversations about equity with students and colleagues.

In our analysis of the open text survey responses, we used open coding to thematically analyze participants' experiences. To answer *Research Question 1*, we analyzed the survey question: "What worked well for you across the workshop, and what

specific aspect or session of the workshop was most helpful to your learning?" The following five main themes emerged from at least three participants which indicated our participants found the experience useful/helpful:

1. Will apply learning to future equity practice
2. Authentic simulations/role-playing experience
3. Simulations with a framework was helpful
4. Sharing/Leading equity sessions with others was helpful
5. Shift in perspectives on equity mindsets and students

We also examined the post-survey question, "Broadly, what aspects of the workshop did you find worked well for you? Feel free to briefly explain why as needed." The following responses emerged which cover these main themes. Example responses to this question include

> I think this workshop had a great balance between theoretical (with that great Milner article) and very interesting and authentic practice exercises. I really enjoyed the principal practice and the diary of the student [Jeremy's Journal]. They both made me think differently around issues that I have had and feel familiar to, but haven't had the chance to think about it in detail.

To answer *Research Question 2*, we analyzed the open-text question : "I used to think X, now I think Y" We collected the responses which emerge from the same aforementioned themes:

> I used to think that it was mostly hard work that led to achievement, now I think that hard work does go into achievement, but you need to think about many other factors when thinking about student achievement and sometimes this takes more weight than hard work.

Another participant responded:

> I used to think I could empathize others' perspectives well. Now I think I can't actually empathize a perspective I can't contextualize, and that informs future action steps.

We also measured participants' self-efficacy on both the pre- and post-survey using quantitative measures on a scale of 1-5. On the post survey, participants reported significantly higher levels of self efficacy for having conversations about equity with their students (E.S. = 0.60 SD, $p < 0.05$) and higher, but not statistically significant, self-efficacy for having conversations about equity with their colleagues (ES = 0.40 SD, $p = 0.18$).

STUDY 2: EXPERIMENTING WITH DIGITAL SIMULATIONS WITHIN A MASSIVE OPEN ONLINE COURSE

Based on the promising results from our in-person pilot study, we implemented *Jeremy's Journal* within a massive open online courses (MOOC) for educational professionals. The focus of the MOOC was on competency-based education (CBE), an approach for organizing learning in schools which evaluates students on whether they have achieved proficiency rather than on factors such as effort or time in class.

We used an A/B functionality to randomly assign participants to receive the intervention and assess its impact. The first three phases of the simulations were kept the same as with the in-person version. For the debrief, we modified it so it could be employed within an asynchronous large-scale learning environment. We converted the debrief from the workshop into scripted text with explicit sequential references to the educator mindset framework and examples from previous in-person implementations.

Study Design

We created a two new sections within the CBE course entitled "More on Equity and CBE in Classroom." In the control condition, participants were given a short description of how CBE could make schools more equitable. In the intervention condition, participants were introduced to the concept of the "Equality-Equity" mindsets and then given the opportunity to play *Jeremy's Journal*. Participants were provided with a text-based debrief that laid out the connections between the "Equality-Equity" mindsets and potential responses in the simulation.

In total, 131 course participants accessed the section. Of those participants, 64 participants were randomly assigned to the control condition and 67 were assigned to the intervention condition. Among participants in the intervention condition, 69% (N = 46) responded to at least one prompt in within the intervention. Participants spent, on average, an estimated 1.7 minutes in the Anticipate section, 20.8 minutes in the Enact section, 5.7 minutes in the Reflect section, and 7.5 minutes in the Debrief section.

To assess participants' mindsets on "Equality-Equity" spectrum, we developed a 22-item survey instrument aligned with the description of the construct in previous research [4, 5, 1]. The response rate for the pre-survey was 60% and post-survey was 56%. On both the pre- and post survey scale had good level of internal consistency (pre $\alpha = 0.81$, post $\alpha = 0.82$). A feedback survey was included at the end of the section for participants in the intervention condition(53% RR).

Analysis Methods and Findings

For *Research Question 1*, we tabulated results from the intervention feedback survey and selected relevant quotes from the open-ended text box.. Participants who filled out the feedback survey largely viewed it positively. Most (86%) said it "very much" helped them understand the distinction between the equity and equality mindsets and 81% said it helped them understand the relationship between CBE and equity. In open text responses, participants noted that they found the simulation to be helpful for their learning process; "I really like it, for me this is how online courses should be, really interactive and allow us to put in practice what we have learned." Participants observed that the interactive nature of the simulation helped them reflect on real-life circumstances, as one participant observed "on the whole it is a useful exercise as it forces you to think carefully about how you would act in a given situation - you don't have that luxury in real-life."

For *Research Question 2*, we estimated the effect of the intervention on participants' attitudes using an ANCOVA model

with Type III Sum of Squares (Table 4.2). Overall, the intervention did not have any statistically significant effect on the "Equality-Equity mindset survey measure. Participants in the intervention slightly shifted toward an equity perspective, adjusting for pre-survey scores, but the overall effect size was small, 0.067 on a six point scale (ES = 0.12 SD, $p = 0.461$).

	Sum Sq	Df	F value	Pr(>F)
Intercept	0.028	1	0.288	0.594
Intervention	0.054	1	0.550	0.461
Pre-Survey	13.146	1	133.024	0.000
Residuals	5.238	53		

Table 1. ANCOVA results for "Equality-Equity" Mindsets

DISCUSSION

We propose the idea of DCSs as a technology-based tool for learning these skills on large-scale learning environments like MOOCs. In the study, we developed a DEI-focused DCS for teachers called *Jeremy's Journal* that was designed to help teachers re-examine their mindsets about the role of meritocracy in schools.

We were able to see evidence of identification and elicitation of "Equality-Equity" mindsets in both in-person workshops and in the MOOC, but we were only observed evidence of shifting mindsets in the in-person learning sessions. Our findings suggest that the in-person, facilitator lead debriefs following DCSs may be crucial for learners to not only identify, but to re-imagine their equity teaching mindsets and practices, such that they may apply these mindsets in future practice. One possibility is that learners in MOOC did not have the opportunity to explore the mindsets in depth since they did not have a chance to explain and receive feedback to a facilitator and peers about equitable teaching. Participants, on average, only spent 7 minutes in the debrief part of the simulation in the MOOC while they spent 120 minutes in the in-person facilitation.

In future implementations, we envision that our design will be most beneficial for learners in large-scale learning environments, when the debrief really builds on the factors that work well in the other phases of the simulation: authenticity, relevance to real life situations and common mindsets that shape equity teaching decisions. As a result, in future implementation of this DCS in MOOCs we plan to include videos of in-person debriefs and discussion forum prompts to more closely emulate the in-person facilitation. We also are exploring integrated AI-supported technologies which would be able to provide automatic feedback during and after the simulation.

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REFERENCES

[1] R. Filback and Alan G. Green. 2013. New Directions for Diversity at USC Rossier | USC Rossier School of Education. *Futures in Urban Ed, the Magazine of the USC Rossier School of Education* (2013). https://rossier.usc.edu/new-directions-for-diversity-at-usc-rossier/

[2] Monisha Kapila, Ericka Hines, and Martha Searby. 2016. Why Diversity, Equity, and Inclusion Matter — Independent Sector. (2016). https://independentsector.org/resource/why-diversity-equity-and-inclusion-matter/

[3] Gloria Ladson-Billings. 2006. From the Achievement Gap to the Education Debt: Understanding Achievement in U.S. Schools. *Educational Researcher* 35, 7 (oct 2006), 3–12. DOI: http://dx.doi.org/10.3102/0013189x035007003

[4] H. Richard Milner. 2010. *Start where you are, but don't stay there : understanding diversity, opportunity gaps, and teaching in today's classrooms*. Harvard Education Press, Cambridge, MA. 233 pages.

[5] H. Richard Milner. 2012. Beyond a Test Score. *Journal of Black Studies* 43, 6 (sep 2012), 693–718. DOI: http://dx.doi.org/10.1177/0021934712442539

[6] Jason A. Okonofua, David Paunesku, and Gregory M. Walton. 2016. Brief intervention to encourage empathic discipline cuts suspension rates in half among adolescents. *Proceedings of the National Academy of Sciences of the United States of America* (2016). DOI: http://dx.doi.org/10.1073/pnas.1523698113

[7] Justin Reich, Yoon Jeon Kim, Kevin Robinson, Dan Roy, and Meredith Thompson. 2018. Teacher Practice Spaces: Examples and Design Considerations. In *13th International Conference of the Learning Sciences*, Judy Kay and Rosemary Luckin (Eds.). London, UK, 648–655.

[8] Justin Reich and José A Ruipérez-Valiente. 2019. The MOOC Pivot. *Science* 363, 6423 (2019), 130–131. DOI: http://dx.doi.org/10.1145/3051457.3053980

[9] Kevin Robinson, Keyarash Jahanian, and Justin Reich. 2018. Using Online Practice Spaces to Investigate Challenges in Enacting Principles of Equitable Computer Science Teaching. In *Proceedings of the 49th ACM Technical Symposium on Computer Science Education - SIGCSE '18*. ACM Press, New York, New York, USA, 882–887. DOI: http://dx.doi.org/10.1145/3159450.3159503

[10] Elizabeth Self. 2016. *Designing and Using Clinical Simulations to Prepare Teachers for Culturally Responsive Teaching*. Ph.D. Dissertation. Vanderbuilt University. https://etd.library.vanderbilt.edu/available/etd-03022016-165211/unrestricted/Self.pdf

[11] Mariana Souto-Manning. 2011. Playing with power and privilege: Theatre games in teacher education. *Teaching and Teacher Education* 27, 6 (aug 2011), 997–1007. DOI:http://dx.doi.org/10.1016/j.tate.2011.04.005

[12] Meredith Thompson, Kesiena Owho-Ovuakporie, Kevin Robinson, Yoon Jeon Kim, Rachel Slama, and Justin Reich. 2019. Teacher Moments: A Digital Simulation for Preservice Teachers to Approximate Parent–Teacher Conversations. *Journal of Digital Learning in Teacher Education* (may 2019), 1–21. DOI: http://dx.doi.org/10.1080/21532974.2019.1587727