Using Reflection and Feedback in a Simulated Teaching Environment to Improve Instruction for Differentiated Learners

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Abstract: Improving teaching strategies through a simulated teaching environment has been shown to improve teacher self-efficacy, teaching skills, classroom management and multicultural awareness. The current study is using the simulation program to help educators recognize possible bias with the goal of recognizing, reflecting and remediating any biases that may exist. Both self-report survey data as well as simulation-captured data are used to understand the changes that occur as educators have the opportunity for many trials of teaching using feedback for improvement each time.

Keywords: simulation, teacher education, bias, professional development

Introduction

Classrooms are becoming more diverse as they reflect the society in which we live. Gender, ethnicity, socioeconomic status, and English language learning status have been linked to differences in teacher perceptions of students for whom they may hold implicit negative attitudes and stereotypes (McGinnis, 2017). To address the diversity of differences, educators need to actively recognize and counter patterns of bias in their teaching practices as well as classroom environments (Chen, Nimmo, & Fraser, 2009).

SimSchool is a dynamic, online classroom simulation program that allows preservice and inservice teachers the opportunity to practice teaching. SimSchool was designed to provide future and current teachers with a safe environment for experimenting and practicing techniques, especially methods of addressing different learning needs, and wide variations in academic and behavioral performance of students. Using student profiles, teachers need to be able to plan and deliver culturally relevant instructional challenges and supports that build on the strengths of students to address their learning needs (Sianjina, 2000).

Research on the use of simSchool has shown improved educator understanding in *teaching skills* (Christensen, Knezek, Tyler-Wood, & Gibson, 2011; Knezek, Hopper, Christensen, Tyler-Wood, & Gibson, 2015), *classroom management* (Christensen et al., 2007), *motivation* (Tyler-Wood, Estes, Christensen, Knezek, & Gibson, 2017), *multicultural awareness*, *literacy* (Collum, Christensen, Delicath, & Johnston, 2019), self-reported *educator bias* (Collum, Christensen, Delicath, & Knezek, 2020) and *instructional self-efficacy* (Knezek & Christensen, 2009). The key innovation of the program is that it provides teachers and teacher trainees many learning trials with simulated students, thereby increasing teacher confidence and competence, which in turn improves student learning. Repetition of many trials is important in changing habit complexes such as implicit bias (Malone, 2016).

As shown in Figure 1, simSchool users have options to review detailed student profiles before or during any session. Through the "Teach" button, users select which students to assign activities, either as individuals, groups, or as a whole class. The simSchool user can also make different types of comments through the "Talk" button in which they can encourage, redirect or discipline students. The "Progress" button allows the user to see how each student is performing in many dimensions including academics and emotions. The "Logs" button allows the user to see how the class and each individual student performed for each action the user selected including tasks and comments. These features provide a robust system that allows each user to "pause" the simulator to assess whether to make changes in the activities or comments. Users can also see the overall performance in the simulator after it is complete. Users are able to reflect and make corrections prior to beginning another module with the intention of improving their teaching performances.

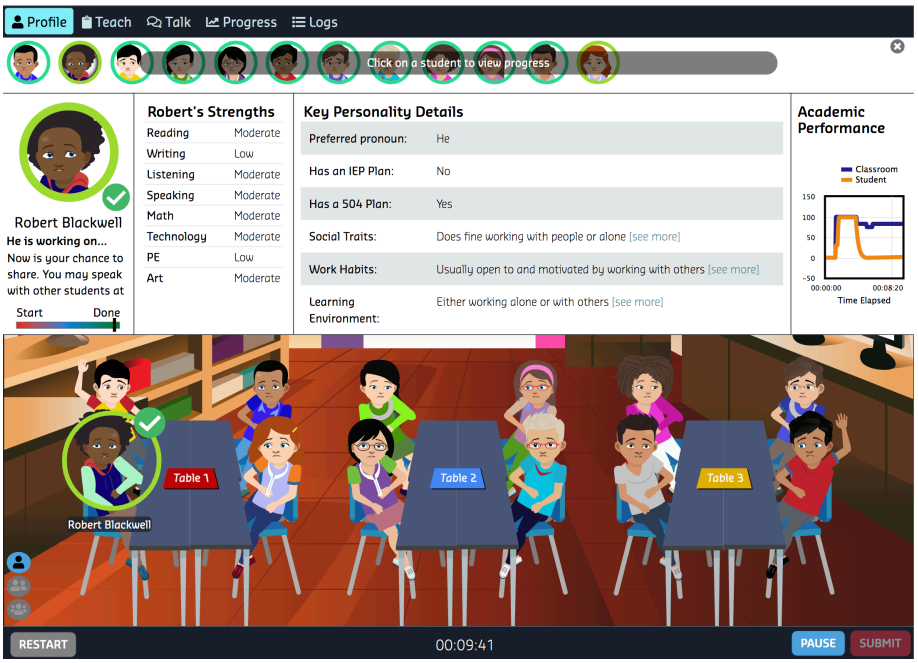

Figure 1. SimSchool classroom highlighting student profiles.

Current Study

While refining their own best practices in this "flight simulator for teachers," simSchool participants are encouraged to interact with this cognitive model over several sessions spanning several weeks, with micro-teaching interactions lasting from 15 to 30 minutes. The sessions are conducted within one of the selected or assigned modules. Each module focuses on a different aspect of teaching and ranges from classroom management to Pre-calculus. Prior to beginning the sessions, users review the student profiles that contain information on student strengths, preferences and academic performance so they can attempt to match instruction with learner needs. During the sessions, participants attempt to negotiate the simulated classroom environment while adapting their teaching to the diversity of students they encounter.

For the current project, classroom teachers in a large school district in California participated in one of two sets of modules depending on the grade level they teach. Each participant first completed an introductory module to understand how to navigate simSchool. The listing of the modules by grade level band is shown in Table 1.

Table 1. *Modules Completed by Classroom Teachers*

Elementary teacher modules
Cultural Intelligence and Inclusion 2.0
ELE 3-5 Bullying and Bias the First Coconut Tree
ELE 3-5 Gender and Identity Supermom Saves the Day Why Can't Girls Be Superheros
Middle School Modules
MS 6-8 Gender and Identity: The Misfits
MS 6-8 History Empowering Learners to Change the World
MS 6-8 (Race, Ethnicity, Class, Immigration) A Tale of Two Schools

At the end of each simulation session, participants receive graphical feedback displaying degree of success at promoting academic (learning) increase in the class overall, as well as feedback regarding the degree of suitability of the instructional activities selected for each individual simulated student in the class. Among the aspects of instructional activities that are documented for review are impacts on individual students of conversational stances, communication patterns, and attentional habits of the teacher. This feedback can reveal aspects of a teacher's implicit biases. Figures 2 and 3 illustrate examples of graphical feedback as well as an observation report that participants receive. Participants must view the feedback prior to completing another session in the module.

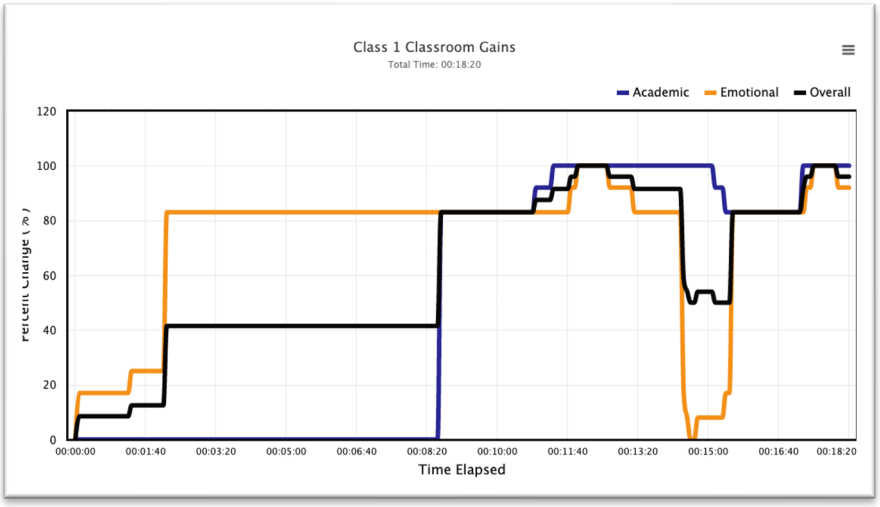

Figure 2. SimSchool graphical feedback based on interactions with students.

	Description	Recommended Practice	N/A	Needs Attention	Satisfactory	Good
1	Regularly assesses individual and group performance.	Checks the class progress tab at a regular interval.			✓	
2	Uses information of differing student strengths and needs to further each learner's development.	Clicks on each student's profile and views their traits or progress at least once throughout the simulation.				✓
3	Designs, adapts, and delivers instructions to address each student's diverse learning strengths and needs and creates opportunities for students to demonstrate their learning in different ways.	User uses a variety of tasks during the simulation.				✓
4	Makes appropriate and timely provisions for individual students with particular learning differences and needs.	Assigns tasks in a way that maximizes students' performance (academic and behavioral).		✓		
5	Understands students with exceptional needs, including those associated with disabilities and giftedness, and knows how to use strategies and resources to address these needs.	User chooses appropriate strategies when students with accommodations are present.	✓			
6	Gives students adequate time to transition between instructional activities.	Selects the appropriate strategy 'give break', before assigning a new task.		✓		
7	Pacing maintains student involvement and engagement.	Changes task or makes a comment when students become distressed.				✓
8	Uses proximity control.	Walks by students who have been disruptive.				✓
9	Uses praise and encourages positive behavior	Makes friendly conversation or the 'give praise' strategy for students who have moved up a behavior band				✓

Figure 3. SimSchool observation report based on participant actions in the simulated classroom.

Results

Data were collected both during the simulations and through pre-post surveys related to teacher efficacy and educator bias. As shown in Table 2, there were significant (p <.05) positive changes from pre to post for Efficacy for Instructional Strategies as well as Culturally Responsive Teaching Self-efficacy. Near to significance was the Educator Bias Inventory subscale of Pedagogical environment. The complete data set only included 10 teachers who completed pre-post as well as all the modules. Effect size is a meaningful indicator for small sample sizes. As shown in Table 2, the effect sizes were all educationally meaningful at .30 and above. Individual items that were significant are shown in Table 3.

Teaching behaviors are captured within the simSchool system that allow computation of academic gains, emotional gains, and equity gains while teaching within a module. Aggregated across teachers, equity gains by module ranged in magnitude from effect size = .22 to effect size = .87, the latter of which was individually

significant at the $p < .05$ level and would be considered large according to guidelines by Cohen (1988). The gain resulting from each module was positive.

Table 2.
Comparison of Pre and Post Teacher Means for Equity-Related Subscales

	Pretest			Post test			Signif.	ES
Subscale	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**(p <)**	
Efficacy for Instructional Strategies	10	4.90	.49	10	5.26	.38	.016*	.93
Efficacy for Classroom Management	10	4.75	.66	10	5.14	.48	.078	.63
Efficacy for Student Engagement	10	4.63	.61	10	5.18	.51	.071	.65
Culturally Responsive Teaching Self-Efficacy Survey	10	4.80	.50	10	5.25	.39	.040*	.76
Educator Bias Inventory: Self awareness	10	5.33	.40	10	5.40	.38	.279	.36
Educator Bias Inventory: Pedagogical environment	10	5.14	.51	10	5.36	.39	.055	.70
Educator Bias Inventory: Relationship with families and community	10	4.45	1.03	10	4.87	.43	.203	.43

Note: * Significant at the p = .05 level. Cohen's (1988) effect size guidelines .2 = small, .5 = moderate, .8 = large.

Table 3.
Individual Items that were Significant from the Subscales

Individual Items	**Mean**	**N**	**SD**	**Sig.**	**ES**
Pre_TE2I feel confident that I could provide an alternative explanation or example for students who are confused.	4.80	10	.789		
Post TE2	5.50	10	.527	.010	1.04
Pre_TE6 I feel confident that I could adjust lessons to the proper level for individual students.	4.90	10	.738		
Post TE6	5.60	10	.516	.045	.74
Pre_TE8 I feel confident that I could provide appropriate challenges for very capable students.	4.50	10	.527		
Post TE8	5.20	10	.422	.010	1.04
CR5Pre_If could minimize the mismatch between home culture and the school culture.	4.20	10	.632		
CR5Post	5.00	10	.943	.037	.78
CR7Pre_I could obtain information about my students' home life.	4.40	10	.843		
CR7Post	5.20	10	.632	.022	.87
CR20Pre_I could identify ways that standardized tests may be biased towards diverse students.	4.70	10	.823		
CR20Post	5.40	10	.516	.025	.85
CR24Pre_I feel confident that I could use the interests of my students to make learning meaningful for them.	4.70	10	.483		
CR24Post	5.60	10	.516	.001	1.59
EB18Pre_ I effectively provide opportunities for students to value and explore diversity in selves & others.	4.70	10	.823		
EBRF18Post	5.30	10	.675	.024	.86

Implications for Teacher Education

SimSchool is currently used as a practicing teaching platform in 10% of the largest urban K-12 districts in the U.S., 20% of the US educator preparation programs, and seven countries with a total of 200,000 users. Given the impact of COVID-19 on preservice and inservice programs, simSchool is likely to continue to expand to meet the demands of teacher development programs, with scalability facilitated by ease of access from any location with a computing device, web browser and Internet connection. The recognized importance of socio-emotional stability for the long-

term well-being of current teachers and future productive citizens of our society has spotlighted the urgency of research on programs such as simSchool with its focus on mitigation of implicit bias. Innovative solutions offer the prospect of finding a timely contribution to a significant problem in our schools.

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