Measuring Changes in Educator Bias in a Simulated Learning Environment

David Collum
Missouri Baptist University, St. Louis MO, USA
David.collum@mobap.edu

Rhonda Christensen
Institute for the Integration of Technology into Teaching and Learning
University of North Texas, Denton TX, USA
Rhonda.christensen@unt.edu

Tim Delicath
Missouri Baptist University, St. Louis MO, USA
Tim.delicath@mobap.edu

Gerald Knezek
University of North Texas, Denton TX, USA
gknezek@gmail.com

Abstract: Data were collected from 45 preservice and inservice teachers during fall 2019 as part of a research study assessing the impact of simSchool on teachers' level of educator bias as measured through self-awareness, the physical environment, pedagogical environment and relationships with the family and community. The four measurement indices with Cronbach Alphas ranging from .95 to .99 were used to measure impact of participating in simulated modules that included diversity. Significant ($p < .05$) gains resulted for the scales of Physical Environment, Pedagogical Environment, and Relationship with Family and Community. Results suggest that simulations such as simSchool can play an important role in reducing educator bias in tomorrow's teachers.

Keywords: simSchool, educator bias, teacher preparation, multiculturalism, learning differences

Simulations are capable of modeling a wide range of student learning characteristics, and can be envisioned as having significant impacts on improvement in teaching. Included in teacher preparation programs are courses focused on multiculturalism and learning differences. Students at multiple universities are participating in the simulated teaching environment, simSchool, in order to experience teaching students they may or may not encounter in the typical classroom observations. In these courses these students completed modules in the simSchool program related to teaching in a diverse environment. A pre-post survey based on a previously published educator bias inventory (Chen, Nimmo, & Fraser, 2009) was given to teacher preparation students their who participated in the course focused on diverse learners.

simSchool

SimSchool is a dynamic, online simulated 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 styles, and wide variations in academic and behavioral performance of students. The expanded and updated simSchool 2.0 provides a wide variety of options to be used across the teacher education curriculum. Included in the options are the ability to create modules that focus on teacher improvement in areas such as multicultural awareness, differentiated instruction, literacy and classroom management. Research on the use of simSchool has shown improved student understanding in important teaching skills (Christensen, Knezek, Tyler-Wood, & Gibson, 2011; Collum, Christensen, Delicath, & Johnson, 2019). The key innovation of the program was that it provided teachers and teacher trainees many learning trials with simulated students, thereby increasing teacher confidence, competence, and retention.

SimSchool promotes pedagogical expertise by re-creating the complexities of classroom decisions through

mathematical representations of how people learn and what teachers do when teaching. The model includes research-based psychological, sensory and cognitive domains similar to Bloom's Taxonomy of Educational Objectives (Bloom, Mesia, & Krathwohl, 1964). However, in simSchool these domains are defined with underlying subcategory factors that reflect modern psychological, cognitive science and neuroscience concepts. For example, the Five-Factor Model of psychology (McCrae & Costa, 1996) serves as the foundation of the student personality spectrum. This model includes the following characteristics: extroversion, agreeableness, persistence, emotional stability, and intellectual openness to new experiences. For each of these five factors a continuum from negative one to positive one is used to situate the learner's specific emotional processing propensities, which can shift as the context of the classroom changes. A simplified sensory model with auditory, visual and kinesthetic perceptual preferences comprises the physical domain. Together the physical, emotional and academic factors are used to represent salient elements of classroom teaching and learning (Christensen et al., 2011; Gibson, 2007). Aspiring teachers are encouraged to interact with this cognitive model over several sessions spanning several weeks, with micro-teaching interactions lasting from 10 to 30 minutes. During these sessions participants attempt to negotiate the simulated classroom environment while adapting their teaching to the diversity of students they encounter.

Educator Bias

Classrooms are becoming more diverse as they reflect the society in which we live. Children begin to notice differences and similarities in their early years of development. It is often up to educators to actively recognize and counter patterns of bias that may exist in their classroom environments (Chen, Nimmo & Fraser, 2009). It is imperative that educators provide a culturally responsive environment in order for all students to be confident in their learning (Derman-Sparks & Ramsey 2006). Being a culturally responsive educator first requires recognition of existing or potential bias. It requires looking beyond their own beliefs, cultures, perspectives and practices to being able to understand where bias may exist and how it can be overcome.

Methods

Participants

Data were collected from 45 students in fall 2019 at a Midwestern university as part of a course on teaching in a diverse society. Included in the sample were 38 (84%) preservice students and 7 (16%) inservice teachers. The majority of the respondents were females (n = 40, 89%).

Intervention

Students in the course were required to meet face-to-face initially and then complete online simulated modules to earn course credit. The course, titled *Teaching in a Diverse Society Field Experience,* was an 8-week course. This class was designed to help students apply knowledge addressing the social inequalities and stratification as a primary lens for understanding the educational needs of diverse learners. The class is designed as a Credit or No Credit course and is a co-requisite for the lecture class, *Teaching in a Diverse Society* and the simulated hours are designated to be equivalent to 15 hours of observation.

The simModules were designed to create classrooms that simulated different diverse settings. The students completed five simModules where they taught each diverse class five times. They were required to clock 25-35 clock minutes per simulation session and complete 25 total simulations. Between each simSchool simulation they were asked to reflect on what they would do differently before they taught the class the next time. The diversities and number of simulated students that were represented in the simSchool sessions are shown in Table 1.

Table 1.
SimSchool Classroom Descriptions

Module Name	Simulated Diversity	# of SimStudents
Anywhere Early Childhood 1-5	English as Second Language	15
Anywhere High School 1- 5	Students with Exceptionalities	8
Anywhere Middle School 1 - 5	Students with Exceptionalities (Gifted)	12
Anywhere Elementary Classroom 1- 1-5	Low Socioeconomic Status and Ethnicity	12

Anywhere Elementary Classroom 2- 1-5	High Socioeconomic Status and Ethnicity	12

Instrumentation

A survey inventory based on a previously published educator bias inventory for reflection (Chen, Nimmo, & Fraser, 2009) was created using a 6-point Likert type survey. The survey included 36 items related to awareness and behaviors associated with bias toward students in the classroom. The four parts of the survey measuring different areas of assumed educator bias were related to self-awareness, the physical environment, pedagogical environment and relationships with the family and community. Cronbach's Alpha was computed for each of the four parts and each was found to be highly reliable. Reliabilities ranged from .95 to .99 as shown in Table 2.

Table 2.
Reliability of Four Educator Bias Scales

	N of Items	Alpha
Self Awareness	9	.964
Physical Environment	7	.978
Pedagogical Environment	14	.986
Relationships with Family and Community	6	.950

Results/Findings

An analysis of variance between pre and post test ratings on the four parts are shown in Table 3 and displayed graphically in Figure 1. Three of the four scales showed a significant gain ($p < .05$) from pre to post following completion of the course modules in simSchool. Effect sizes for each of the four scales were calculated and ranged from .31 to .61. These can be considered educationally meaningful increases according to guidelines by Bialo & Sivin-Kachala (1996).

Table 3.
Pre-Post Changes for Four Educator Bias Scales

		N	Mean	Std. Dev.	Sig.	Effect Size
Self Awareness	Pre	45	4.84	1.24		
	Post	45	5.24	1.27		
	Total	90	5.04	1.27	.128	.31
Physical Environment	Pre	45	4.53	1.47		
	Post	45	5.19	1.27		
	Total	90	4.86	1.40	.025	.47
Pedagogical Environment	Pre	45	4.90	1.34		
	Post	45	5.47	.96		
	Total	90	5.19	1.19	.023	.48
Relationship with Family and Community	Pre	45	4.60	1.29		
	Post	45	5.34	.99		
	Total	90	4.97	1.21	.003	.61

Figure 1. Pre-post measures on four educator bias areas.

Pre-post analysis of variance was also computed for each of the individual items. As shown in Table 4, while not significant at the $p = .05$ level, all of the nine items increased from pre to post, showing an increase in self-awareness related to educator bias that would have rarely occurred by chance (binomial p for 9/9 successes = .002) (GraphPad, 2018). For example, the item "I am aware I may have some biases" increased from 4.51 to 5.07 with an

effect size of .38. Five of the seven individual items related to the physical environment of the classroom increased significantly *(p <.05)* from pre to post test time (Table 5). As shown in Table 5, seven of the 14 items related to the pedagogical environment increased significantly *(p <.05)* from pre to post test time. All 6 items regarding relationships with family and community increased significantly *(p <.05)* from pre to post and are shown in Table 7.

Table 4.
Individual Items on the Self-Awareness Scale

Items		N	Mean	SD	Sig.	ES
I am aware of my own cultural identity and history.	Pre	45	4.69	1.51		
	Post	45	5.20	1.33		
	Total	90	4.94	1.43	.091	.36
I am comfortable about my identity.	Pre	45	4.80	1.55		
	Post	45	5.29	1.41		
	Total	90	5.04	1.49	.120	.33
I am aware I may have some biases.	Pre	45	4.51	1.46		
	Post	45	5.07	1.47		
	Total	90	4.79	1.48	.075	.38
I view diversity and exceptionalities as strengths.	Pre	45	4.84	1.45		
	Post	45	5.27	1.37		
	Total	90	5.06	1.42	.159	.30
I believe ALL children can succeed.	Pre	45	5.33	1.40		
	Post	45	5.49	1.33		
	Total	90	5.41	1.36	.589	.18
I am able to give honest answers to children's questions about differences.	Pre	45	5.00	1.41		
	Post	45	5.24	1.37		
	Total	90	5.12	1.39	.407	.17
I am comfortable admitting when I don't know the answer to a question.	Pre	45	4.91	1.55		
	Post	45	5.27	1.41		
	Total	90	5.09	1.48	.257	.24
I am able to intervene when I hear comments that exclude someone, show bias or are discriminatory.	Pre	45	4.87	1.46		
	Post	45	5.27	1.37		
	Total	90	5.07	1.42	.183	.28
I have a colleague who is a trusted ally to support and challenge any bias I may have in my thinking and actions.	Pre	45	4.58	1.52		
	Post	45	5.11	1.35		
	Total	90	4.84	1.45	.082	.37

Table 5.
Individual Items on the Physical Environment Scale

Items	Pre/Post	N	Mean	SD	Sig.	ES
The materials and equipment in my classroom are easily accessible to ALL.	Pre	45	4.73	1.37		
	Post	45	5.24	1.26		
	Total	90	4.99	1.34	.069	.38
All children have equitable opportunity to participate in all activities.	Pre	45	4.91	1.49		
	Post	45	5.42	1.25		
	Total	90	5.17	1.39	.082	.37
In my classroom I display pictures of the children that related to their backgrounds and experiences.	Pre	45	4.36	1.65		
	Post	45	5.20	1.27		
	Total	90	4.78	1.53	.008	.55
My classroom provides equal representation of images and materials reflecting different cultures and ethnicities.	Pre	45	4.42	1.70		
	Post	45	5.13	1.39		
	Total	90	4.78	1.59	.033	.45
My classroom provides equal representation of images and materials reflecting different family styles and	Pre	45	4.42	1.62		
	Post	45	5.09	1.40		

		N	Mean	SD	Sig.	ES
compositions.	Total	90	4.76	1.54	.039	.44
My classroom provides equal representation of images and materials reflecting different age groups across different lifestyles.	Pre	45	4.40	1.63		
	Post	45	5.09	1.40		
	Total	90	4.74	1.55	.034	.45
My classroom provides equal representation of images and materials reflecting different genders in non-stereotypical roles.	Pre	45	4.44	1.58		
	Post	45	5.13	1.39		
	Total	90	4.79	1.52	.030	.45

Table 6.
Individual Items on the Pedagogical Environment

Items	PrePost	N	Mean	SD	Sig.	ES
My verbal and non-verbal messages are free of stereotype and hidden biases.	Pre	45	4.67	1.49		
	Post	45	5.22	1.20		
	Total	90	4.94	1.38	.055	0.40
I effectively provide opportunities for students to value and explore diversity in themselves and others.	Pre	45	4.80	1.46		
	Post	45	5.38	1.03		
	Total	90	5.09	1.29	.032	0.45
The colors black and brown are equally valued as colors in my classroom.	Pre	45	5.02	1.53		
	Post	45	5.49	1.06		
	Total	90	5.26	1.33	.096	0.35
I actively encourage critical thinking about differences, stereotypes and biases.	Pre	45	4.93	1.42		
	Post	45	5.40	1.03		
	Total	90	5.17	1.26	.078	0.37
I teach about minority and non-minority groups who have devoted their lives to ending injustice.	Pre	45	4.62	1.48		
	Post	45	5.18	1.27		
	Total	90	4.90	1.40	.059	0.40
I equally respect and acknowledge all children on their efforts and accomplishments.	Pre	45	4.93	1.56		
	Post	45	5.53	1.01		
	Total	90	5.23	1.34	.033	0.45
I have high expectations for learning for all students.	Pre	45	5.16	1.38		
	Post	45	5.56	.99		
	Total	90	5.36	1.21	.118	0.33
I have high expectations for learning for all students.	Pre	45	4.93	1.36		
	Post	45	5.53	.99		
	Total	90	5.23	1.22	.019	0.49
I recognize and acknowledge that children may be cared for by various family members and/or have differing family compositions.	Pre	45	5.13	1.44		
	Post	45	5.58	.97		
	Total	90	5.36	1.24	.089	0.36
I differentiate instruction to reach diverse learning styles.	Pre	45	4.80	1.53		
	Post	45	5.58	.97		
	Total	90	5.19	1.33	.005	0.59
I integrate multiple methods of teaching to support children's learning (visual, auditory, kinesthetic, etc.)	Pre	45	4.87	1.56		
	Post	45	5.58	.97		
	Total	90	5.22	1.34	.011	0.53
I use a variety of methods to assess children's learning.	Pre	45	4.82	1.48		
	Post	45	5.60	.96		
	Total	90	5.21	1.30	.004	0.60
I promote cooperation between and among children from diverse groups through curriculum and classroom routines.	Pre	45	4.98	1.42		
	Post	45	5.47	1.01		
	Total	90	5.22	1.25	.064	0.39
I help children critically think about and problem solve fairness issues in classroom activities and routines.	Pre	45	4.98	1.44		
	Post	45	5.51	.99		
	Total	90	5.24	1.26	.043	0.42

Table 7.
Individual Items on the Relationships with Families and Community

Items	PrePost	N	Mean	SD	Sig.	ES
I initiate conversations in a culturally responsive way with all families.	Pre	45	4.67	1.33		
	Post	45	5.40	1.07		
	Total	90	5.03	1.26	.005	0.58
I provide the option translations of newsletters and at meetings for families who do not speak English.	Pre	45	4.51	1.49		
	Post	45	5.22	1.19		
	Total	90	4.87	1.38	.014	0.51
When food is provided at classroom functions, it is reflective of the community and families.	Pre	45	4.60	1.42		
	Post	45	5.27	1.23		
	Total	90	4.93	1.36	.020	0.49
I include families in creating the learning environment for children.	Pre	45	4.67	1.49		
	Post	45	5.38	1.05		
	Total	90	5.02	1.33	.011	0.53
I know enough about the local community to extend children's thinking beyond the classroom walls.	Pre	45	4.60	1.51		
	Post	45	5.44	1.04		
	Total	90	5.02	1.36	.003	0.62
I am able to effectively use resources and other community members to enhance children's learning about diversity and bias.	Pre	45	4.58	1.52		
	Post	45	5.33	1.17		
	Total	90	4.96	1.40	.010	0.54

Noteworthy when viewing this collection of individual items in Tables 4-7 as a whole, is that the group mean average for all 36 items became more positive, pre to post (likelihood by chance, binomial $p < .0001$). In addition, for 32 of the 36 items, the magnitude of the gain (effect size) was >= .30, the point at which impact is widely regarded as educationally meaningful (Bialo & Sivin-Kachala, 1996). These findings provide evidence that the simSchool treatment in this study had a broad, wide-reaching, impact on reducing teaching bias among preservice educators in this study.

Conclusions/Implications for Educators

Results of past and current research studies suggest that simulations such as simSchool can play an important role in preparing tomorrow's teachers. SimSchool was designed to provide preservice teachers with a safe environment for experimenting and practicing techniques, especially methods of addressing different learning styles, and wide variations in academic and behavioral performance of students. Findings from the current study provide evidence that educator bias is one newly-confirmed area in which simulated teaching activities can improve educator preparations. Future studies are planned to compare the reflections with the pre-post survey findings regarding educator bias.

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