

A SoTL Inquiry: Effects of Teaching Mathematics with Multicultural Children's Literature on Pre-Service Teachers' Efficacy as Culturally-Responsive Teachers

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Research Question

How does using multicultural children's literature (MCL) in mathematics teaching and learning affect elementary preservice teachers' (PST) perceptions of their efficacy as effective equitable teachers?

Background

- The diversity of the public school (PS) student population in United States continues to increase (Riser-Kositsky, 2024).
- The diversity of PS teachers remains predominately white, and female.
- Almost a decade ago, the 2015-16 academic year where PS students identified as "minority" comprised the majority of the school population.
- Preparing PSTs to be culturally-responsive teachers is a way to address this (Larnell & Jett, 2016; Ladson-Billings, 1999; Siwatu, 2011).
- Culturally relevant pedagogy empowers students intellectually, emotionally, socially, and politically (Ladson-Billings, 2020).
- Culturally-responsive course content and teacher modeling supports PSTs' self-efficacy beliefs and pre-professional learning (Jett, 2011; Siwatu, 2011).
- PSTs teaching mathematics using children's literature increases their mathematics enthusiasm, self-efficacy, and innovative lesson design (Flevaris & Schiff, 2014; Jett, 2018).

"Math has always been a subject that I have been apprehensive towards, so creating a math lesson plan using multicultural children's literature was a great way to further support my learning beyond the class discussions we hold."

Research Methods

- In the EPP, this is the only course where MCL is integrates as pedagogy; therefore, researching the effects of this teaching practice is sound.
- Culturally Responsive Teacher Self-Efficacy (CRTSE) instrument (Siwatu, 2007) was used with the author's permission (Siwatu, email correspondence, 2023). Six of 41 CRTSE questions were eliminated as they did not pertain to this study; these six question topics included: science instruction, competition among students, standardized assessment, and using a learning preference inventory.
- Participation was optional. At most 18 PSTs completed the anonymized CRTSE survey instrument following all IRB-approved protocols.
- Participants completed the CRTSE survey the first day of the semester.
- PSTs engaged with content and instruction for using MCL in mathematics teaching and learning. The children's literature represented an array of cultures, including but not limited to African, Alaskan Indigenous, American First Nations, Asian, Latin American, and South American.
- During the semester, PSTs completed four mathematics teaching assignments: a read aloud for K and a lesson plan for K, 1st, and 2nd meeting these requirements: (a) based on a grade-level Wisconsin Department of Public Instruction Mathematics Standard (2022); (b) use a different MCL text; and (c) identify one or more purposes for teaching through their chosen text – hook (launch); predictions (Notice & Wonder); content context including vocabulary; connection to mathematics practices.
- Participant permissions and survey results remained sealed and locked with the department chair until final grades were submitted.
- Participants completed the CRTSE survey the last day of the semester.

Results

- PSTs' pre-survey results indicate
 - confidence in teaching using basic/ general practices which may not require cultural responsiveness: building relationships/ communities and assessing academic performance, and
 - lack of confidence integrating students' cultures
- PSTs' post-survey results show increased levels of efficacy as evidenced by the increase in their responses for every CRTSE question:
 - mean of average response increase, 22.35%
 - mean of median response increase, 27.55%

Table 1. Individual Participant CRTSE Summary Results Pre to Post Survey

Overall CRTSE survey results	Pre	Post	Change
Total Score Average (3,400)	2,455.67	2,965.71	+ 20.77%
Total Score Median (3,400)	2,355.00	3,040.00	+ 29.09%
Total Score Range (0-3,400)	1,860-3105	2,305-3,325	n/a
Strength Index Average (100)	61.39	74.14	+ 20.77%
Strength Index Median (100)	58.89	76.00	+ 29.09%
Strength Index Range (0-100)	46.5-77.63	57.63-83.13	n/a

Figure 1. Summary of all CRTSE Question Average Responses

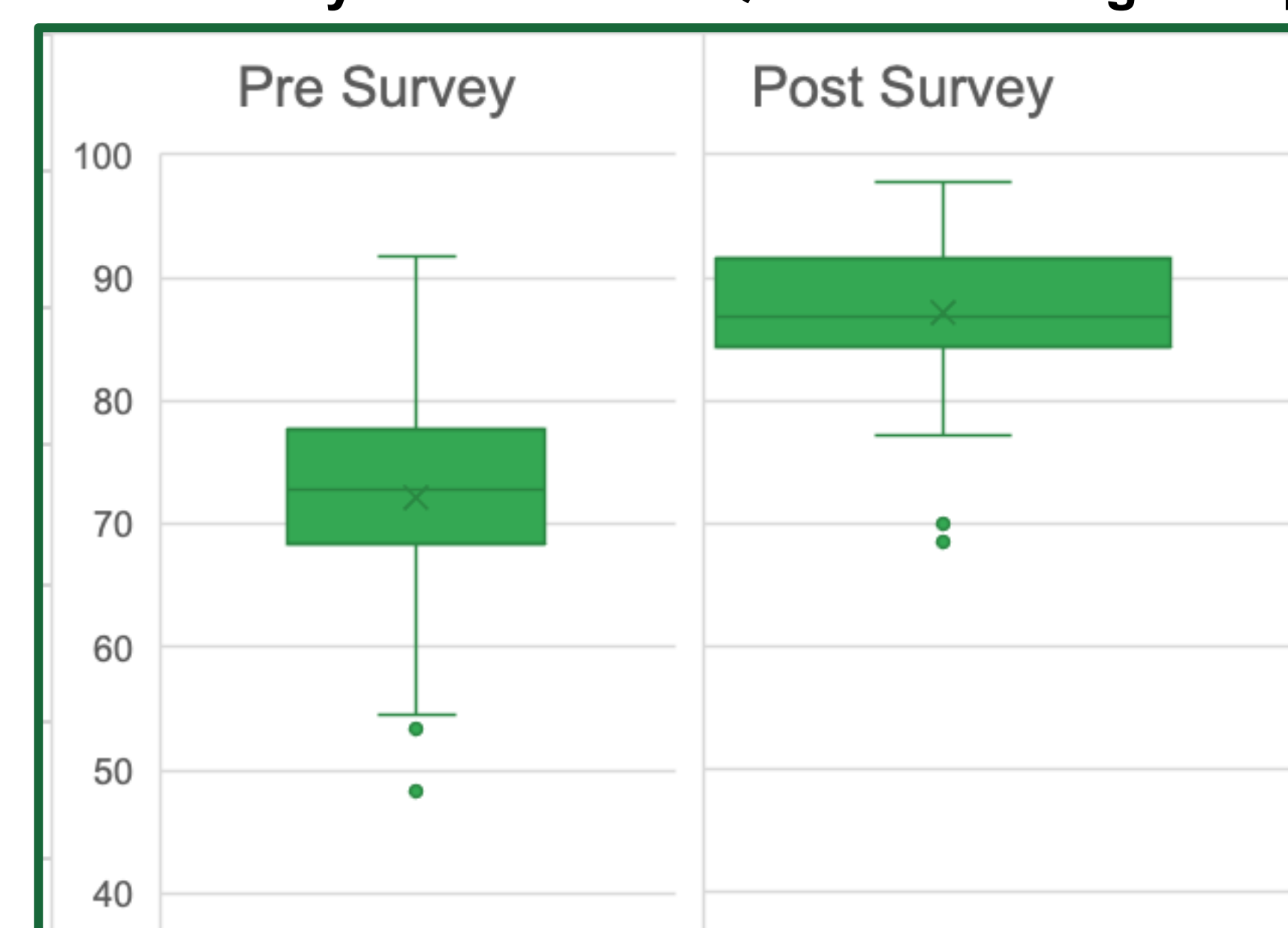


Table 2. CRTSE Questions with Highest Increase from Pre to Post Survey

CRTSE question	Pre Survey	Post Survey	Percent Change
- design a lesson that shows how other cultural groups have made use of mathematics.	53.33	84.29	58.04
- identify ways that the school culture (values, norms, practices, for example) is different from my students' home culture.	59.56	86.43	45.12
- greet English Language Learners with a phrase in their native or first language	48.33	70.00	44.83
- use examples that are familiar to students from diverse cultural backgrounds.	60.56	86.43	42.73
- implement strategies to minimize the effects of the mismatch between my students' home culture and the school culture.	54.44	77.14	41.69
- communicate with the parents of English Language Learners regarding their child's growth and achievements.	60.00	80.00	33.33
- model classroom tasks to support enhance English Language Learner's understanding.	69.44	92.14	32.69
- use a variety of instructional methods.	70.56	91.43	29.58

"I know the importance of being a culturally sustaining and responsive teacher and how great of an impact it can have on my future students. These opportunities to teach using MCL have influenced me to even further my knowledge of culturally sustaining practices and confirm that they will be part of my teaching..."

Conclusion

- Overall, participants' CRTSE quantitative and qualitative results indicate:
 - their efficacy as culturally responsive teachers increased following the integration of MCL in mathematics teaching and learning, and
 - they believe MCL is pedagogy.
- Participants' eight greatest CRTSE question increases identified their growth in knowledge and skills to integrate and support students' linguistic and cultural backgrounds.
- The consistency of the upper-quartile questions in the pre- and post-survey reflect the PSTs' existing self-efficacy in building student relationships and developing learning communities. This is attributable to the strengths of the EPP's clinical program.
- The limitations of this study include and are not limited to sample size, the inability to analyze individual participants' growth due to the anonymized results, the potential for clinical experiences to influence results.
- Consideration for future studies could include surveying students during their initial pre-admit course to eliminate any potential effect on their CRTSE from other courses or clinical placements as well as an interview component, conducted by a non-departmental colleague.

"Through selecting a high quality and culturally responsive book, I am better able to support all students within my classroom. It also showed me how easy incorporating something like this would be in my future classroom, which makes me even more eager to use it when I start teaching."

References

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"What the best and wisest parent wants for his own child, that must the community want for all its children. Any other ideal for our schools is narrow and unlovely, and acted upon, it destroys our democracy."

John Dewey