WESTERN
NEW MEXICO UNIVERSITY

In Progress Research Update:

Engaging Communities to Develop Culturally Responsive Assessment

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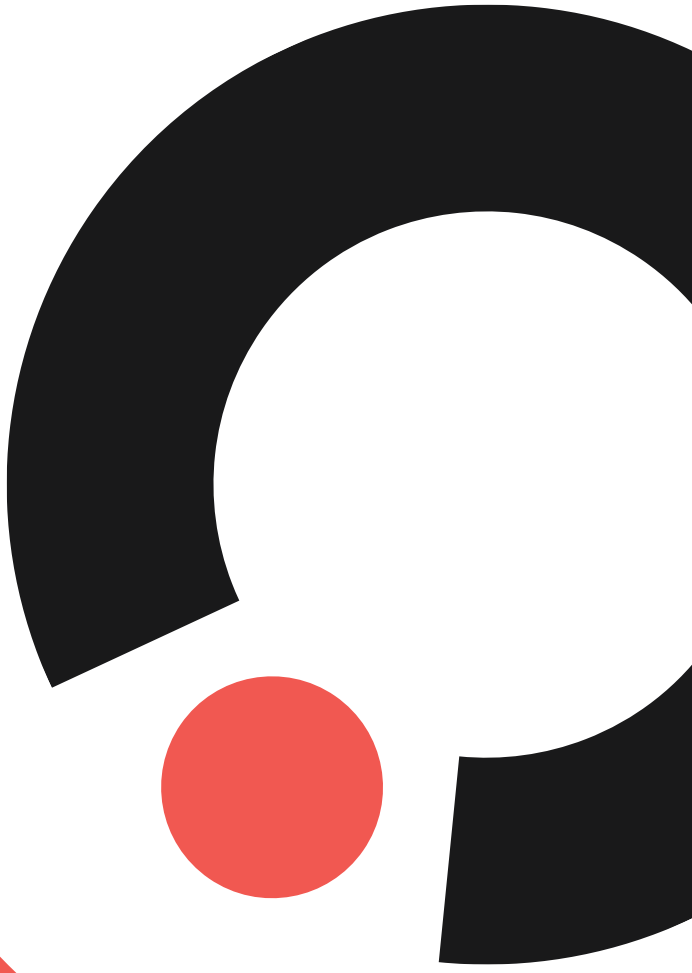

MAY 31, 2022

RESEARCH TEAM

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Executive Summary of Research Study

Phase 1

This study aims to explore new methods for partnering with community stakeholders to develop assessment items that are reflective of students' cultures and lived experiences. For the first phase of this study, researchers and content developers at Western New Mexico University, Cognia, and Lyons Assessment Consulting are convening a workshop with members of a school district in New Mexico to engage in deep conversation about the local culture and the sociocultural contexts of students' lives. The convening will consist of a two- to three-day institute that brings together community stakeholders and item writers to modify existing math items from a grade 6 math interim assessment form to reflect students' lived experiences and the contexts of their daily lives and culture.

Driving Research Question 1: Can we develop a process where content developers can successfully partner with community stakeholders to adapt math items to faithfully represent the contexts of students' lives?

Phase 2

Phase 2 of this study will involve an experimental design in which the culturally responsive assessment form and the parallel control assessment form are randomly assigned to participating students. Students in the treatment condition will be administered the assessment constructed at the developer/community workshop. Students in the control will take the existing assessment that covers the same standards as the culturally contextualized new assessment. Students will take the assessment as part of standard classroom activities and will then be asked to complete a short survey reflecting on their test-taking experience.

Driving Research Question 2: What is the impact of culturally relevant math item stimuli on student test-taking experiences and performance?

Research Study Description

Study Rationale

It has been argued that not attending to students' identities in large-scale item writing—focusing instead on "neutral" items—systematically marginalizes students of color and diminishes their opportunity to demonstrate what they know and can do (Randall, 2021). Each student brings their own cultural context to every testing experience, and when those contexts are systematically misaligned to the test, this threatens the validity of score interpretations (Mislevy, 2018).

The extent to which it is possible to attend to students' unique cultural backgrounds in large-scale assessment remains under-researched (Evans, 2021). The current proposed study aims to explore new methods for partnering with community stakeholder to develop assessment items that are reflective of students' cultures and lived experiences. Based upon the hypothesis that standardized test items may not be providing all students with equal opportunities to demonstrate what they know and can do, we propose this study to understand both the extent to which we can successfully reflect student culture within standardized math items and any subsequent effects this may have on student experiences and performance. This study has implications both for the development of standardized assessments and for the validity of year-end summative test score interpretation for making claims about students' knowledge and skills in mathematics.

Primary Research Questions

1. Can we develop a process where content developers can successfully partner with community stakeholders to adapt math items to faithfully represent the contexts of students' lives?
2. What is the impact of culturally relevant math item stimuli on student test-taking experiences and performance?

Design and Methodology

The proposed study will be conducted in two phases, each aligning with one of the two research questions, respectively: 1) partnering with community stakeholders in item development, and 2) evaluating the impact of a culturally responsive assessment. This is a mixed-methods study employing both qualitative and quantitative approaches within each phase.

Phase 1: Partnering with Community Stakeholders

For the first phase of this study, researchers and content developers at Western New Mexico University, Cognia, and Lyons Assessment Consulting are convening a workshop with members of a western New Mexico community to engage in deep conversation about the local culture and the sociocultural contexts of students' lives. The convening will consist of a two- to three-day institute that brings together community stakeholders (community members, math educators, students, and parents) and item writers to modify existing math items from a Cognia grade 6 math interim assessment form to reflect students' lived experiences and the contexts of their daily lives and culture.

The conversations will be structured to glean deep insight from the community representatives in the following five areas identified in by Drs. Solano-Flores and Nelson-Barber (2001) who have led the field of educational measurement in operationalizing the conception of cultural validity:

1. Student Epistemology (e.g., identifying sociocultural factors that influence how students construct knowledge)
2. Student Language Proficiency (e.g., identifying cultural influences that shape language and language use)
3. Cultural World Views (e.g., identifying connections between cultural content and academic content)
4. Cultural Communication and Socialization Styles (e.g., understanding the organization of discourse and writing structures)
5. Student Life Context and Values (e.g., identifying artifacts and ways of being that are commonplace to students' everyday lives and cultural identities).

There are two primary objectives for engaging with the community around the culture and contexts of students' lives. The first is to partner with the community to modify an existing assessment form to be culturally responsive and relevant for the intended student participants. The second objective is to test the proposed process for engaging with communities in a way that can be shared more broadly with the educational measurement community to improve culturally responsive practice in assessment development in other settings.

At the end of the convening, the researchers will conduct semistructured focus groups with participants. These focus groups will be centered on the extent to which the workshop was successful at meeting the goals stated above. Observation notes and transcripts from these focus groups will be coded for emergent themes relating to points of success or failure in the workshop, as well as perceptions of the success of the final product at cultural responsiveness for the target population of students. Additionally, a post-workshop evaluation survey will be distributed to workshop participants that asks about the degree to which the convening was successful at eliciting meaningful conversation and common understandings about the sociocultural contexts of student lives, and degree to which the adapted assessment items are able to accurately reflect those realities.

Phase 2: Evaluating the Impact of Culturally Responsive Assessment

Phase 2 of this study will involve an experimental design in which the culturally responsive assessment form and the parallel control assessment form are randomly assigned to participating students. Students in the treatment condition will be administered the assessment constructed during the Phase 1 workshop.[1] Students in the control will take the original version of the grade 6 math interim assessment form. Additionally, a small number of common control items will be used on both versions of the form. Students will take the assessment as part of standard classroom activities, then will be asked to complete a short survey once the assessment has been submitted. The short survey will ask students to qualitatively share their perceptions about the degree to which the assessment items were relevant to their everyday lived experiences and culture.

[1] It is anticipated that the Cognia content specialists will need to make editorial revisions to finalize the culturally responsive form after the workshop.

Quantitative analysis will follow two strands. The first is an analysis of variance (ANOVA) of survey responses, with faceting variables including assessment performance, student demographic variables, and control/treatment status. The second is an equivalent analysis, but with students' test scores as the outcome. Part of the workshop's goal is to create a test form that can be directly paralleled with an existing form in terms of content knowledge required and item complexity. The creation of such a form supports the direct comparison of sum scores as a way to understand the effect of cultural context in items on student performance. Still, we will conduct analyses of the common items' dimensionality and reliability of both versions of the form to ensure that our assumption of parallel forms is being met.

Student responses to the qualitative survey will be coded for emergent themes related to student perceptions of their assessment experiences.

Research In-Progress Update

District Engagement

We are currently in conversations with school districts in the state of New Mexico to discuss potential involvement with this study. Dr. Debra Dirksen, dean of the School of Education at Western New Mexico University and an adviser to Cognia, is serving as our liaison to connect us with potential communities for partnership. As we engage in these conversations, we are seeking district commitment for the following responsibilities:

1. Commitment to soliciting participation of 20-30 stakeholders in a 12-hour workshop (can be spread over two or three days based on preference of the district). Representation is needed from each of the following stakeholder groups:
   - Sixth grade students (with signed parental consent)
   - Sixth grade math educators
   - Parents/guardians of sixth grade students
   - District/school leadership
   - Community representatives at-large (e.g., religious leaders, business leaders, representatives from important community groups)
2. Providing space to host ~40 people for the duration of the workshop (Cognia will arrange and pay for catering)
3. Implementing a randomized control trial study in all sixth grade math classrooms in spring 2023 in which all students will take a short, 45-minute math assessment and a brief follow-up survey. Students will be randomly assigned to the culturally responsive form or the control form.
4. Facilitating the gathering of parental consent for study participation from all parents/guardians of sixth grade students. Students who do not have parental consent will either take the control form without the follow-up survey or engage in another educational activity (at the discretion of the district).

Benefits to Participation

- ✓ District will have a sixth grade math assessment form that is designed specifically to reflect the local culture and contexts for their students
- ✓ Opportunity to contribute to the science related to cultural relevance in standardized assessment
- ✓ Opportunity to co-present research at professional conferences
- ✓ Cognia will cover the costs of a pizza party (or other celebration) for all participating students
- ✓ Cognia will cover the costs of substitutes during the workshop and/or teacher stipends if outside of contract hours

Anticipated Timeline

Date	Event
May 2022	Discussions regarding district involvement, local context, and climate
June 2022	District commitment to involvement
Sept-Oct 2022	District-led communication to parents to obtain consent for participation in study (Cognia will provide IRB-approved consent forms)
Nov-Dec 2022	District-led stakeholder recruitment for participation in 12-hour workshop
Jan 2023	**Study Part 1: Workshop with stakeholders**
Feb 2023	District communication with all sixth grade math educators about logistics related to implementation of the research study assessment with their students; district opportunity to review assessment form
March 2023	**Study Part 2: Culturally responsive and control forms are administered to participating students**
June 2023	District receives full report detailing study methods and findings

Workshop Development

Over the past six months, members of the research team have been working closely with Cognia content specialists Eva Villagrana and Richard Sedillo to design a workshop that will meet the intended purposes and outcomes for the workshop as described in the table below.

Workshop	Outcomes
Purpose of Workshop	1. To better understand the community's experiences with cultural responsiveness in curriculum, instruction, and assessment. 2. To develop a common understanding of the planned research study. 3. To engage participants in sharing information about the local contexts of students' everyday lives so that students can relate to and see themselves in the assessment items we are writing.
Intended Outcomes of Workshop	1. Community engagement, input, and buy-in for the planned research study. 2. A culturally responsive assessment form that parallels a current grade 6 math interim assessment form. 3. A process for engaging with communities that can be replicated and refined with other school and community partners.

Our collaborative approach to workshop design began with in-depth reviews and discussion of relevant resources such as current item writing-workshop training materials, as well as external readings that would deepen our collective understanding of how this research fits within the broader landscape of the literature on culturally relevant assessment and math education. These readings included the following:

- Bennett, R. E. (2022). The good side of COVID-19. *Educational Measurement: Issues and Practice*, *41*(1), 61–63. https://doi.org/10.1111/emip.12496
- Gutiérrez, R. (2013). The sociopolitical turn in mathematics education. *Journal for Research in Mathematics Education*, *44*(1), 37–68. https://doi.org/10.5951/jresematheduc.44.1.0037

- Kūkea Shultz, P., & Englert, K. (2021, July). Cultural validity as foundational to assessment development: An indigenous example. In *Frontiers in Education* (Vol. 6, p. 244). Frontiers. https://doi.org/10.3389/feduc.2021.701973
- Matthews, L. E., Jones, S. M., & Parker, Y. A. (2022). *Engaging in Culturally Relevant Math Tasks: Fostering Hope in the Elementary Classroom*. Corwin Press.
- Randall, J. (2021). "Color-neutral" is not a thing: Redefining construct definition and representation through a justice-oriented critical antiracist lens. *Educational Measurement: Issues and Practice*, *40*(4), 82–90. https://doi.org/10.1111/emip.12429
- Randall, J., Slomp, D., Poe, M., & Oliveri, M. E. (2022). Disrupting white supremacy in assessment: Toward a justice-oriented, antiracist validity framework. *Educational Assessment*, 1–9. https://doi.org/10.1080/10627197.2022.2042682
- Solano-Flores, G., & Nelson-Barber, S. (2001). On the cultural validity of science assessments. *Journal of Research in Science Teaching*, *38*(5), 553–573. https://doi.org/10.1002/tea.1018

In many ways, this body of literature challenges our standard operating practices for item writing and, as a team, we grappled with reconciling how our work interacts with the ideas offered by these readings.

In addition to grounding ourselves in the current literature, we also recognized that one of the central challenges associated with workshop development and facilitation would be in establishing an environment of trust and openness with the stakeholders. We acknowledge our position as outsiders to New Mexico, and as people with perceived power due to our connections with the local university and Cognia (the provider of the state assessment in New Mexico). With this acknowledgement, we engaged in a series of conversations about how we could create an atmosphere of trust, a needed component if we were to engage deeply with people about their cultures, identities, and lived experiences. Part of this resulted in practical decisions about the structure of the workshop (e.g., low number of participants, arrangement of chairs in a circle, extended engagement over multiple days). Additionally, we worked together to explore ways we could foster trust among one another so that those trust-building exercises could be replicated as part of the content of our workshop. This collaboration resulted in the development of a culture-sharing exercise centered around the Iceberg Concept of Culture (see image on next page), in which we all shared aspects of our surface culture (e.g., food, music, celebrations) and our deep culture (e.g., rules of conduct, nature of kinship, concepts of time). A high-level overview of the resulting workshop agenda is shared in the following section.

(Image Source: pbslearningmedia.org)

Workshop Agenda

The following workshop agenda provides a high-level overview of what participants will experience throughout the course of this engagement. The workshop can be adapted to span two or three days, depending on the preference of the district. A facilitator's guide is in the process of being prepared.

Day 1 (9 a.m.-3:30 p.m.)

Time	Activity
9:00-9:20 a.m.	*Welcome and refreshments (coffee and pastry)*
9:20-9:30 a.m.	Brief overview of why we are here and who we are *(sitting in a circle)*
9:30-10:00 a.m.	Introductions of everybody in the room *(sitting in a circle)*
10:00-10:10 a.m.	Review of objectives for the workshop—what we hope to accomplish followed by a Q&A
10:10-11:00 a.m.	**Deep Culture Activity: Reflecting and Sharing on Ourselves** • Introduction (5 minutes): Facilitator will provide a model of the deep iceberg reflection to the large group • Small-Group Activity (35 minutes): Iceberg exercise in small groups – Consider the themes that emerge related to deep culture, and one participant from each group will share out to the larger group • Large-Group Discussion (10 minutes): Each group reflects on iceberg activity, reporting out on themes from each group, charted on large paper
11:00-11:15 a.m.	*Break*
11:15-12:00 p.m.	**Zeroing in on the Students** • Large-group orientation (10 minutes): Ask a district person to share the demographics of the students in the classrooms/school we will be working with: ages, gender, language, country of residence. Relevant contextual factors that not everyone might know (e.g., remote learning, bussing, free and reduced lunch) • Small-group activity (35 minutes): Opportunity for students to lead a discussion in the small group, center our conversation on the students and their experiences, identities, interests, and culture
12-12:45 p.m.	*Lunch*
12:45-1:10 p.m.	**Brainstorm Session: How Do You See and Use Math in Your Everyday Life** • Setting context (5 min): Facilitator introduces how we are intentionally tying this exercise to the culture activity (i.e., what are the connections to cultural activities or approaches, what is unique about how math is used in your community). For example, converting peso to dollars via the exchange rate. • Small group (10 min): Brainstorm in breakout teams • Large group (10 min): Share out all together
1:10-1:50 p.m.	**Introduction to the Work of Adapting Items** • Large-Group Activity (30 min): Facilitator will share the process and outcomes of the examples we have prepared in advance. This will introduce participants to the templates[2] we will be using as well as get them logged in and ready to jump into the work of item adaptation after the break. • Opportunity for Q&A (10 min)
1:50-2:00 p.m.	*Break*

[2] See Appendix A for a black copy of the item adaptation template.

Time	Activity
2:00-3:15 p.m.	**Working Session: Item Adaptation** • Small groups (75 minutes): Item adaptation in small groups, each led by a facilitator.
3:15-3:30 p.m.	Debrief and review of objectives for day 2

In between: *Facilitators reflect on day, revise agenda, re-shuffle the groups (if needed), review work, and provide feedback/comments*

Day 2 (9 a.m.-3:30 p.m.)

Time	Activity
9:00-9:20 a.m.	*Welcome and refreshments (coffee and pastry)*
9:20-9:35 a.m.	Comments, reflections, and questions from Day 1 *(sitting in a circle)* • Opportunity for participants to reflect and ask questions • Opportunity for facilitators to share any modifications we've made to the process as a result of yesterday
9:35-10:45 a.m.	**Peer Review** • Large Group (10 minutes): Overview of peer review purposes, process, and template • Small Groups (50 minutes): Reviewing the adapted items from another group and offering commentary and suggested revisions
10:45-11:00 a.m.	*Break*
11:00-11:15 a.m.	**Reviewing Feedback and Revising Items** Small groups (45 minutes): Reviewing and discussing the peer review feedback and making any revisions as agreed upon by the group
11:15-12:00 a.m.	**Working Session: Item Adaptation** Small group (45 minutes): Continuing the work of item adaptation
12-12:45 p.m.	*Lunch*
12:45-1:45 p.m.	**Working Session: Item Adaptation** Small group (60 minutes): continuing the work of item adaptation
1:45-2:15 p.m.	**Rapid-Fire Brainstorming on Any Remaining Items** Large groups (10 minutes): Example of popcorn style item brainstorm Small groups (20 minutes): Each group brainstorms multiple cultural touchpoints for as many of the remaining items as possible.
2:15-2:25 p.m.	*Break*
2:25-3:05 p.m.	Semi-structured focus group reflections on this experience
3:05-3:15 p.m.	Closing remarks, next steps, and thank you
3:15-3:30 p.m.	Participants complete evaluation survey

Anticipated Outcomes

We are anticipating that by the end of the workshop, we will have adapted the majority of items from the sixth-grade math interim assessment form (36 item form). To create examples of the kinds of outcomes we might expect, two of the Cognia content specialists adapted a small number of the items to reflect their distinct and localized Mexican- and Native-American cultures. Some of these examples are provided and discussed below.

Revising Item Context

The following example shows how the context of one item was adapted in two different ways by the two content developers. The first adaptation represents a more surface-level change, in which the context of waffles was changed to a more culturally specific example. However, upon reflection, the content specialist reflected on the inadequacy of this change, especially given that measuring ingredients (as referenced in the item) is not commonplace for meal preparation in her culture. The second adaptation reflects a more significant, deeper-level change in that not only was the context updated to reflect the students' lived experiences of taking the bus, but the numbers in the item were adapted to reflect the real cost of taking the bus. In this way, the item likely becomes more accessible to students who frequently ride the public bus and are familiar with the process of calculating bus fare. Of course, by altering the numbers in the item, we are also running the risk of changing the inherent difficulty associated with the calculations. Ultimately, the decisions to maintain comparability with the control form will need to be balanced with decisions to tap into deeper-level cultural responsiveness.

<table>
<tr><th>Original Item[3]</th><th>Adaptation #1</th><th>Adaptation #2</th></tr>
<tr>
<td>
The ratio table shows the number of waffles that can be made from different amounts of mix.

Waffles
<table>
<tr><td>Cups of Mix</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Number of Waffles</td><td>9</td><td></td><td>15</td><td>18</td></tr>
</table>
How many waffles can be made from 4 cups of mix?

A 10
B 11
C 12
D 16
</td>
<td>
Luisa is making caldo. The table shows the number of cups of water needed for the number of servings.

Caldo
<table>
<tr><td>Cups of Water</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Number of Servings</td><td>9</td><td></td><td>15</td><td>18</td></tr>
</table>
How many servings of caldo can be made using 4 cups of water?

A 10
B 11
C 12
D 16
</td>
<td>
Miguel and his siblings are going to visit their abuela on the other side of town. The table shows how much it costs to ride the bus for different numbers of children.

Children's Bus Fare
<table>
<tr><td>Number of Children</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Cost ($)</td><td>1.50</td><td></td><td>2.50</td><td>3.00</td></tr>
</table>
There are 4 children in Miguel's family. How much money will it cost for the children in Miguel's family to ride the bus?

A $1.25
B $1.75
C $2.00
D $2.75
</td>
</tr>
</table>

[3] This item has been modified from its original form to protect the security of Cognia's intellectual property.

Adding Item Context

In some cases, math items are presented without context, sometimes referred to as "naked" math items. Through this workshop, we will be experimenting with adding context to some of the "naked" items to test the potential impact this may have on the accessibility of these items. We will not be changing the underlying mathematics associated with these items, but instead contextualizing the mathematics in a way that may help bring students into the processes of solving the item.[4] An example of how the outcomes of this exercise might look is provided in the table below.

Original Item[5]	Adapted Item
Divide. 1.75 ÷ 0.25 A 3 B 5 C 7 D 12	Reynaldo has $1.75 and will buy bolillos that cost 25 cents each. He will use this equation to figure out the number of bolillos he can buy. 1.75 ÷ 0.25 = ? How many bolillos can Reynaldo buy? A 3 B 5 C 7 D 12

[4] See Matthews, Jones, & Parker (2022) for more on this idea.
[5] This item has been modified from its original form to protect the security of Cognia's intellectual property.

Implications for Practice

The results of this study have the potential to disrupt current standard operating procedures for test development. Not only will this study garner evidence related to student experiences and performance when engaging with a culturally responsive assessment form, the but the study is likely to advance knowledge within the field of educational measurement about how assessment developers can partner with the communities they serve to better represent the sociocultural contexts and lived realities of students' lives.

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Appendix A: Item Adaptation Template (Blank)

Question #	*The first four rows, indicated in gray, will be pre-populated in advance of the workshop to contain individual item information.*
Learning Target	
Standard	
Original Item	
Cultural Concept(s)	
Revised Item	
Comments	*Use this space to provide any additional questions, commentary, or notes on the revised item.*
Image Changes (if any)	*Please note image changes that are needed for the revised item.*
Peer Review Feedback	*Can you relate to this scenario?* *What might make this question more relatable for students?* *What additional ideas or suggestions do you have for this item?*