Using a Research-Practitioner Partnership approach to developing a shared evaluation and research agenda for CSforALL: RPPforCS is a National Science Foundation funded project to create a connected community of practice for research practice partnerships (RPPs) to explore computer science education. This research-practice brief is the first in a series in which we highlight how members of the RPPforCS community are using a tool, wrestling with a particular question, or other way in which RPPs look in practice in CS education.


This material is based upon work supported by the National Science Foundation under Grant No. #1745199. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the NSF.

Culturally focused pedagogy is not a new concept; we have had the benefit of Gloria Ladson-Billings’ framework of culturally relevant pedagogy and its nexus with education research since the mid-1990s. What is new is its application to the burgeoning field of Computer Science Education. In 2013 Ron Eglash, Juan E. Gilbert, Ellen Foster note that this framework “has the potential to raise the achievement and interest of students from underrepresented ethnic groups. Culturally responsive education can be used to explore problems and solutions in any scientific or technical field, often using traditional knowledge or practices of the group being educated.” (emphasis mine)

Several years prior to the Eglash, Gilbert, and Foster piece that the Exploring Computer Science curriculum went live. Since then numerous other projects, including several within the RPPforCS community, have taken up the challenge to create curriculum, foster pedagogy and articulate theoretical frameworks that put cultural responsiveness at the heart. A review of the 27 proposals provided to the RPPforCS team found 6 projects with explicit research questions designed to better understand culturally relevant/responsive pedagogy. At the 2019 RPPforCS community meeting, colocated with the RESPECT conference, culturally responsive pedagogy in computing emerged as a topic among table discussions.

2 Django Paris introduced the term culturally sustaining pedagogy in 2012. This term signals the need for pedagogical practice to move beyond attending to a student's cultural context, but also how these practices can support, reinforce, and reinvigorate that cultural context. https://education.hunter.cuny.edu/wp-content/uploads/2018/10/Culturally-Sustaining-Pedagogy.pdf
3 Whose creators we are proud to call members of the RPPforCS community http://www.exploringcs.org/for-researchers-policymakers/reports/research-publications
Short interviews were held with representatives from 3 projects, selected because their proposal explicitly identified culturally responsive practices and pedagogy in computing as a central element to at least one research question. Representatives were asked:

- Why is your question important to your partnership as a problem of practice?
- How has your project defined cultural relevance/responsiveness?
  - What are some resources or bodies of literature that you referenced?
- Are there any measures you have identified that will help you answer these questions?
- Do you have any questions for the community?

The conversations with each of these three projects expanded to talk about establishing partner relationships and expectations with regard to equity (related by not synonymous with CRP), larger societal forces that impact pedagogy (and make culturally relevant/responsive approaches necessary), and the varying levels of importance with regard to the language that we use.

All of the projects are more complex and nuanced than can be presented in this brief, and we encourage readers to reach out directly to the PIs to learn more. If you are interested in leading an effort around culturally relevant/responsive/sustaining pedagogy within the RPPforCS community (such as a webinar, a meetup, a panel or paper submission), please reach out to ssexton@sagefoxgroup.com to coordinate a conversation.

Thank you to the following individuals who took the time to share their experience: Megan Che, Eileen Kraemer, Murali Sitaraman, Jean Ryoo, and Michael Horn

A Scalable RPP for Preparing and Supporting Teachers to Teach Culturally Responsive Computer Science Courses in South Carolina High Schools (CRōCS) is a large project which seeks to broaden participation in computing in South Carolina by preparing computer science (CS) teachers to effectively use culturally responsive, inclusive pedagogies and will develop an active community of high school CS teachers and researchers through professional development and academic year support activities.

The central goal of the project is to get computing into schools and districts with primarily underrepresented student populations. From the project website we learn that, "exceptional potential exists in the state to diversify access to computing because of our demographics—over 30% of the residents identify as Black or African American (27.9%), or Hispanic or LatinX (5.3%) and because a significant population is economically disadvantaged and rural." This local context points the project team toward critically minded approaches to computing, such as culturally responsive pedagogy.

4 https://computing.clemson.edu/crocs/
The project team agrees that there is some difference of terminology and definition even among the RPPforCS community. Preferring to use culturally responsive rather than relevant, Megan Che, CRōCS PI, pinpoints the difference between the two concepts on “who is bringing the funds of knowledge”. The team further reflects that with cultural relevance the teacher decides what the context of the task is based on their view of what their students would appreciate (perceived), whereas cultural responsiveness relies on the student to contribute the context by focusing on things that they find relevant or interesting (expressed).

When the team was constructing their first round of data collection they worked with their evaluator to find measures for culturally responsive computing and “we [the project team] just can’t find them.” They were able to find a few measures for culturally responsive pedagogy. To study this aspect of their program they will ask narrative, open response items, ask teachers to talk about “culturally responsive moments” on the end of year survey, collect rigorous and rich field notes, and use video observations, to attempt to analyze instructional implementation through a culturally responsive lens to reconstruct when, where, and how teachers are using culturally responsive computing.

For other projects looking to delve into scholarship in culturally responsive curriculum, pedagogy, and computing, the project team recommends work by Geneva Gay, a pioneering scholar shifting the narrative around relevant versus responsive, and Scott, Sheridan, Clark’s 2015 paper “Culturally Responsive Computing: A Theory Revisited”.

Researching Equity, Access, & Learning in CS Education (REAL-CS): Scaling and Sustainability in High School Computer Science is a large collaborative project between UCLA and the University of Oregon working to assure that equity remains central to the growing Exploring Computer Science (ECS) program and larger CSforAll movement.

It consists of three strands of work: (1) ECS Program Support, Outreach, and Research Nationwide (led by Joanna Goode and Gail Chapman); (2) Sustaining and Building Capacity for Computer Science Education Through Public Engagement (led by Julie Flapan); and (3) CS Educational Equity Research (research focused on student voice led by Jean Ryoo and Jane Margolis, and research on teacher professional development led by Joanna Goode). This Research-Practice Brief focused on the student research in the third strand of work involving both student surveys and qualitative research across a set of different educational CSforAll contexts in order to document students’ experiences and perspectives of recent CS reform efforts on broadening participation.

This third strand examines the learning and experiences of ECS and APCSP students through an ethnographic cross-case study, with a particular focus on student agency, identity, and engagement. I spoke with Jean Ryoo, the researcher leading this work, and she noted that there is a shared belief among the RPP team that “the education experiences of our youth aren’t going to be meaningful unless they’re inquiry based and culturally responsive” and further that we “can’t separate learning from the sociopolitical context in which our teachers, students, and communities exist.” Though the research team doesn’t always use the terms ‘culturally relevant’ or ‘culturally responsive’ when talking with practice partners about the learning goals for students and related research questions, the approach and focus of the work speaks to central tenets of culturally responsive pedagogy.

In fact, the RPP regularly discusses ways that students feel that their personal interests, sociopolitical contexts, and cultural practices relate to in-class CS learning without always using the term ‘culturally
responsive’ or ‘culturally relevant’ because educators “care most if you are attending to the issues,” and not just the language. Whether the research team uses the term culturally relevant versus responsive “isn’t really the question that brings us closer to the problem of practice.” For the purpose of the REAL-CS RPP team, the terms don’t mean different things; they are used interchangeably during meetings or conversation, any distinction only becoming relevant when the audience becomes other researchers and academics where clarifications are made about the need to address intersectional lines of oppression that youth confront on a daily basis in relation to cultural responsiveness vs. cultural relevance.

“what does all this add up to? Is it even there? Is it even a factor that people care about?”

It is difficult work thinking about how to study and measure culturally responsive pedagogy. The REAL-CS research team acknowledges that they don't have a specific tool that they use since their project isn't examining teacher practice alone, and a validated tool for their particular research questions does not yet exist. Because their work is deeply ethnographic, it is primarily interview and observation based. They are trying to capture social interactions within a classroom in light of the very specific sociopolitical context of the classroom; comparing this to what teachers and students say matters to their learning and engagement; triangulating these data sources to see “what does all this add up to? Is it even there? Is it even a factor that people care about?”

These social interactions become increasingly important if you take an expansive view of culturally responsive pedagogy. For the REAL-CS research team, culturally responsive pedagogy does not just come from the teacher. They are also looking at peer to peer learning and shared community as culturally responsive pedagogical practice and sites for learning.

The research team does have a few suggestions for teachers looking to make their classrooms and teaching more culturally relevant:

1. Acknowledge and respect students’ home cultures in ways that connect CS learning authentically to what students know and care about
2. Embed a degree of explicitness regarding power, access, oppression into your lessons
   a. Ex. When talking about big data and its uses, don’t shy away from issues such as policing and patterns of racial profiling
3. If you are able to engage with your students’ culture and history, do so
   a. Ex. Speak Spanish with your Spanish-speaking students in ways that show how you value students’ home languages or that you are trying to understand ways of communicating that you did not necessarily grow up with.

For researchers wanting to understand culturally responsive pedagogy and its application to computing, REAL-CS recommends these resources:

- Scott, Sheridan,
- Don Eglash—Culturally relevant computing
- Megan Bang—UW to Northwestern, indigenous STEM and learning; book “Who’s Asking?”, the importance of where are the questions coming from; lots of RPP work with indigenous communities in Chicago
- Practice-linked identity (Nasir and Hand, 2008)
- Be on the lookout this December for a piece being published in TOCE by Jean Ryoo about effective pedagogy for engaging diverse students, attending to the politics of power and culture.
Broadening Participation in Computer Science Through Programming and the Arts Across Learning Spaces is a medium-sized project which builds on an existing researcher-practitioner partnership between Northwestern University and Evanston/Skokie School District 65 in Illinois to develop a platform called TunePad that combines music, dance, and computer programming, as well as a professional development framework that supports computational learning across a network of schools, community centers, libraries, and homes. The current iteration of this partnership seeks to develop ways to curate and structure learning activities in and outside of schools in ways that engage youth in long-term projects, demonstrate both the personal and professional value of computer programming, and exemplify computation as a means to achieve creative and personally fulfilling goals.

“It’s easy to assume that everyone ‘gets it’; you need to have explicit conversations about the specific terminology, concepts, and outcomes that you are working toward.”

Culturally responsive pedagogy is important to this project for a number of reasons. One is demographic: Evanston (the city in which this project is implementing) is a microcosm of Chicago—a diverse but segregated city. The students that they seek to engage are underrepresented in CS. Employing a culturally responsive approach is a strategy for engaging these students. But the emphasis on cultural relevance imbues the research agenda as well. The project team views CS as “something that enriches the human experience, more like poetry, art, dance, literature; it makes your life more meaningful.” They seek to tap into the cultural framework of their local context to provide both in school and out of school programs that “engage youth in long-term projects, demonstrate both the personal and professional value of computer programming, and exemplify computation as a means to achieve creative and personally fulfilling goals” (abstract).

The project team has focused less of specific measures of cultural responsiveness, and instead has been thinking about what long-term outcomes they hope to see as a result of this work. For Michael Horn (Principal Investigator), “the measure of success is thriving youth-driven communities of learners, sharing and teaching with one another”. But he recognizes that this will take time to achieve, and can be made more difficult if the range of partners aren’t on the same page with the outcomes the project is working toward. Michael also notes a general lack of precision when it comes to terms us as “diversity”, “equity”, and “culturally responsive”. He related a story about interviewing youth workers to facilitate afterschool programs. The interviewers (which included a member of the research team), asked interviewees about “their views of equity and use of an equity lens in their programming activity”. The interviewees weren’t able to meet the definition and expectations of the interview team. Michael realized then that it’s “easy to assume that everyone ‘gets it’; you need to have explicit conversations about the specific terminology, concepts, and outcomes that you are working toward.

Doing culturally responsive work isn't easy, and it can be difficult to distinguish what makes a practice “responsive”. Michael noted a couple of other questions that the project will be wrestling with as they understand the impact of their work on the students:

- “If our partner orgs are targeting African American and Latino youth from the get go, how do we know if we’re being culturally responsive, or if we just happen to be working with the right partner organizations? Does being culturally responsive need more intentionality?”.
“What we know is that we can develop curriculum or activities, and we can tell whether or not it’s [the specific curriculum or activity] working. Is this cultural responsiveness or is it user testing and optimizing for a particular context?”

Community Takeaways

Even in this limited set of interviews the complexity of culturally relevant/responsive pedagogy is on full display. Below are a couple of key takeaways.

- Local context, demographics, and history play a role in cultural responsiveness
  - You have to know not only your students, but also the context in which your students are living
  - This context is both a driver of needing to be culturally responsive (identifying difference and diversity) AND an outcome of culturally responsive teaching (elevating and recognizing difference through teaching)

- Language matters, but not all the time
  - Culturally Responsive isn’t a term that the teams we interviewed are using regularly with teachers and other practice partners
  - Not having this shared language doesn’t always mean that there isn’t a shared understanding, but it can

As we work collectively to address issues of equity in CS Education, culturally relevant/responsive/sustaining pedagogy is one approach that we can use.

Next Steps

Understanding the array of issues that contribute to the experiences of girls and young women in CS is a complex undertaking. Members of the RPPforCS community posed some really tough questions. To be part of that dialogue, offer some insight, and share lessons learned through the projects, please join us on our Slack channel!

The Research-Practice Briefs are “living documents”. To include your story or to ask a question please email ssexton@sagefoxgroup.com.

Resources Mentioned

**Mentioned by projects:**
Scott, Sheridan, Clark (2015) [Culturally Responsive Computing: A Theory Revisited](https://doi.org/10.1037/0000-0000)
Nasir, NS., and Hand, V. (2008). [From the Court to the Classroom: Opportunities for Engagement, Learning, and Identity in Basketball and Classroom Mathematics](https://doi.org/10.1037/0000-0000).

**Found:**
Reading List: Equity in Computing
Elizabeth Patitsas © Creative Commons 4.0 --- December 2018 --- [https://tinyurl.com/criticalCS](https://tinyurl.com/criticalCS)
The purpose of this reading list is to provide a list of readings for one to understand the social context of computing education, with particular attention to how and why various groups are marginalized in computing (women, racial minorities, low-SES, Indigenous peoples, people with disabilities, etc).

**Culturally Responsive Teaching: A 50-State Survey of Teaching Standards**
Jenny Muñiz, New America Foundation, 2019

**Abstract:** New America analyzed professional teaching standards in all 50 states to better understand whether states’ expectations for teachers incorporate culturally responsive teaching. To support this analysis, we identify eight competencies that clarify what teachers should know and be able to do in light of research on culturally responsive teaching. Our research finds that while all states already incorporate some aspects of culturally responsive teaching within their professional teaching standards, the majority of states do not yet provide a description of culturally responsive teaching that is clear or comprehensive enough to support teachers in developing and strengthening their CRT practice throughout their careers. As an added resource, we have assembled excerpts from state standards in which CRT is already well articulated, as well as a data visualization that describes the prevalence of CRT competencies in teaching standards across states.

CS Equity Guide for Administrators: (Shared on ECEP call, by SCALE-CA)

Understanding Culturally Responsive Teaching
By Jennifer Gunn, 2018
https://education.cu-portland.edu/blog/leaders-link/culturally-responsive-teaching-strategies/

15 Culturally-Responsive Teaching Strategies and Examples
Marcus Guido, 2017
https://www.prodigygame.com/blog/culturally-responsive-teaching/

School district has a CRT certification program

Jefferson County Public Schools in Kentucky put out a video of a panel discussion on CRT. You can find the associated slides in the video description.
https://www.youtube.com/watch?v=pnHGlvYMPPU&feature=youtu.be

Culturally Responsive PD
https://www.culturallyresponsive.org/virtual-offerings
(sample online module for secondary educators: http://www.lausd.net/cdg/CLRPSec/story_html5.html)

Culturally Responsive-Sustaining Education Framework developed by the New York State Education Department
http://www.nysed.gov/crs/framework