Harmonizing Scratch Encore: Scaffolding K-8 Teachers in Customizing Culturally Responsive Computing Materials

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ABSTRACT

The past decade has seen a growing number of culturally relevant K-8 computer science curricula. However, as teachers are the experts on their own classrooms, empowering them to customize instructional materials that draw on the cultural identities and personal experiences of their students can be a powerful strategy. Unfortunately, this process can be challenging and time-consuming.

Through a series of co-design sessions with 5th-8th grade teachers, we identified challenges teachers face in customizing instructional materials. Our qualitative analysis of these design sessions reveals three primary challenges: (1) completing the customization process in a timely way, (2) preserving the learning objectives of the original curriculum, and (3) meeting personalized culturally responsive teaching goals. In response, we collaboratively and iteratively designed practical and cognitive scaffolds to support teachers in brainstorming and integrating culturally responsive themes specific to their students and classrooms into an existing structured computer science curriculum. This paper presents both the challenges and the scaffolds, contributing a model for supporting teachers in creating customized computing instructional materials for their particular classrooms.

CCS CONCEPTS

• **Social and professional topics** → **Computing education**; *K-12 education.*

KEYWORDS

K-8, culturally responsive computing, culturally relevant pedagogy, teacher development, scaffolding

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1 INTRODUCTION

As computing education gets introduced in more schools that serve diverse student populations, exploring how to better incorporate culturally responsive pedagogical elements is of increasing importance. Culturally responsive computing (CRC) centers on the resonance of computing instructional materials with the interests, identities, and values of students from a broad range of cultures [5]. It helps increase student engagement by connecting learning content to their lived experiences, allowing students to see themselves in the field of computer science (CS) and encouraging them to leverage technology to contribute to their communities [15]. Our study focuses on one aspect of CRC: cultural competence [3].

There are two widespread approaches to CRC. One centers on *open-ended activities* that allow individual personalization (e.g. Creative Computing Curriculum [2]). The other is at a classroom level, integrating culturally relevant themes into *structured activities* (e.g., Code.org [12], CS First [9] and Scratch Encore [6]). A limitation of the classroom-level approach is that even with several choices, curricula are created without knowledge of the individual classroom, so the themes might not resonate with a particular student population. Many culturally responsive teaching (CRT) practices heavily rely on teachers who are intimately familiar with their students and thus are ideally positioned to lead the effort [7]. However, the process of creating CRT materials that resonate with a specific classroom can be daunting and time-consuming for teachers, especially when they teach multiple CS classes across the entire school, interacting with a large student population.

The ultimate goal of our work is to create a set of scaffolds to support teachers in creating high-quality CRC materials in a way that fits within teachers' busy schedules. In order to understand teachers' challenges and successful strategies for creating culturally responsive CS lessons, we ran a study consisting of co-design

sessions with a national cohort of elementary and middle school CS teachers. Participating teachers engaged in activities to customize Scratch programming lessons for their classrooms, based on an existing Scratch curriculum for upper-elementary and middle school students (5th-8th grade). We worked together with the teachers to identify the challenges they faced, and iteratively designed scaffolds to support them to overcome those challenges. This study represents initial steps toward developing a national professional development experience for teachers to customize CS instructional materials that reflect the interests, cultural resources, and prior knowledge of their students.

Our specific research questions are as follows:

RQ1: What are the challenges teachers encounter when aligning their personalized culturally responsive teaching goals with a highly structured CS curriculum?

RQ2: How might co-designed scaffolding address challenges and support teachers in this process?

2 THEORETICAL FRAMING AND RELATED WORK

2.1 Instructional Pedagogy

Constructionism recognizes that students will learn most effectively if they enjoy or care about what they are learning [10, 16]. This hands-on learning approach promotes self-directed learning and exploration, allowing learners to create personally-meaningful artifacts that are public and shareable [11, 17]. However, curricula designed from a constructionist perspective can leave gaps in student knowledge [1]. With such curricula, academic performance can correlate strongly with school-level performance [19], engendering the need for additional academic scaffolding.

The **Use→Modify→Create** (UMC) pedagogical approach [14] introduces new concepts through a structured UM project and reinforces those concepts through an open-ended Create project. Our work focuses on the structured UM project which is situated in multiple themes and pre-populated with a wide range of visual elements representing different cultures. We aim to support teachers in selecting from an existing curriculum the UM activity they want to customize and redesigning select portions of it to draw on the prior knowledge and cultural resources of their students.

2.2 Culturally Responsive Computing

There are several definitions of CRC curricula. The Raspberry Pi Foundation defines CRC curricula as those built on students' cultural knowledge and individual experiences [3], allowing students to choose personally meaningful projects and express their cultural identities through learning activities, as well as to explore issues of bias and social justice. The Kapor Center states that a CRC curriculum must draw on learners' interests, identities, and cultures. It includes three primary principles: (1) academic achievement, (2) cultural competence, and (3) critical consciousness [4]. Our work focuses on addressing one aspect of CRC: cultural competence.

Cultural competence refers to the ability to assist students in valuing and embracing their cultures while acquiring knowledge and gain fluency in at least one other culture [13]. CRT practices grounded in cultural competence must draw on learners' cultural backgrounds and experiences to shape curriculum and instruction. Over the last decade, there has been an increasing number of CRC curricula that rooted in cultural competence, including Code.org curriculum [12], Scratch Encore[6], and Creative Computing curriculum [2]. These curricula have served as helpful resources for teachers to deliver equitable learning experiences. However, a fixed set of culturally responsive instructional materials will not remain relevant across time, geographic locations, and student populations.

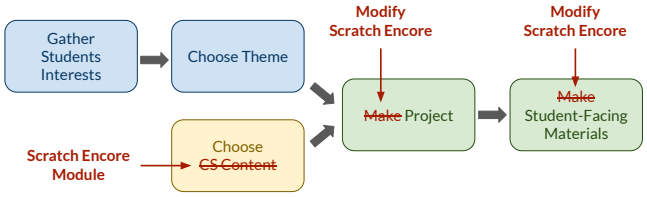

Figure 1: The process to Harmonize a culturally responsive Scratch lesson based on an existing Scratch Encore lesson

As experts on their own classrooms, teachers are best positioned to provide a more resonant culturally responsive learning experience by customizing existing instructional materials to respond to community events, school-wide initiatives, students' cultural identities and their family traditions. However, this task can be intimidating and time-consuming, as it requires teachers to align structured learning activities and clearly defined learning objectives with their desired themes. A commonly used approach to support teachers in this dynamic process is to offer culturally responsive professional development opportunities that scaffold both technical and pedagogical content knowledge for teachers [8, 18].

3 METHODS

3.1 Lesson Development Process

Our process for customizing culturally responsive Scratch lessons involves a number of steps, shown in Figure 1. Teachers first need to gather student interests in some way. They then, in parallel, choose a theme they want to use for their lesson, and decide on what CS content they want the lesson to cover. They create a Scratch project that uses those concepts at an appropriate level, and create associated student-facing materials. Every step of this process is potentially time-consuming, especially for teachers who may teach 500 students per week in grades K-8, only seeing each class for 45 minutes per week. However, using a base curriculum and merely customizing, or Harmonizing, an existing project can help reduce the amount of effort necessary.

3.2 Scratch Encore

Our study leveraged the Scratch Encore curriculum [6] as a starting point. Scratch Encore consists of 14 learning modules, following the UMC pedagogical approach [14]. Each module includes one or two structured UM Scratch projects followed by one open-ended project. The first six modules offer three choices for the UM projects, designed using culturally responsive pedagogy (CRP) approaches.

Figure 1 illustrates the simplification that occurs when using an existing curriculum to Harmonize a Scratch lesson. Instead of deciding what CS concepts to cover, teachers can choose which

Scratch Encore module to Harmonize, using that module's CS content. They can then start with any of the three existing projects (whichever is closest to their desired project idea) and choose or create new sprites and backdrop images. Many times, there are no, or minimal code changes needed. Finally, teachers can modify the student-facing materials by changing the sprite images to match with the sprites used in their Harmonized project and slightly changing the wording.

3.3 Co-Design Sessions

In Spring 2023, we ran ten synchronous co-design sessions with four experienced teachers who had taught Scratch Encore lessons in their classrooms. The sessions occurred twice a month. Each lasted 60 minutes and was held virtually on Zoom. During the ten sessions, teachers engaged with the four-step Harmonizing process using iteratively designed scaffolds, reflected on the utility of the scaffolding materials, provided feedback on potential improvements, and gave suggestions for presenting them in a future nationwide professional development experience on Harmonizing Scratch Encore lessons to meet local culturally responsive goals.

The teacher co-designers were recruited from twelve teachers who participated in a series of participatory design sessions held in Fall 2022. The twelve participants were a subset of all teachers who downloaded Scratch Encore and opted in to receiving updates. We selected the four teachers, whom we called lead teachers, because they were very engaged, and represented geographically diverse locations. Our lead teachers were affiliated with four different public school districts located in the Midwest and the Mid-Atlantic regions of the U.S. They had 4-8 years of CS teaching experience. Three teachers were White, one was Asian. Two teachers self-identified as male, one self-identified as female, and one self-identified as non-binary. Our study was conducted with IRB approval. Participating teachers were compensated $1,500.00 for their time and expertise.

3.4 Data Analysis

Ten hours of transcribed recordings representing the ten co-design sessions were cleaned and then qualitatively analyzed. To develop the codebook, two of the authors independently coded the transcripts of the first two sessions, using inductive coding. They then reconciled any differences until reaching 100% agreement. The same two coders repeated this process for each of the following sessions, reconciling any coding differences and adjusting the codebook four more times, once for each of the months of the sessions.

At the conclusion of this coding cycle, the two coders gathered themes across codes through a series of analytic memos. Identified teacher challenges were categorized into six groups, corresponding to challenges in (1) brainstorming themes for a Harmonized project, (2) coding the project, (3) making student-facing materials, (4) time management, (5) meeting personalized CRP goals, and (6) polishing visual elements in Scratch. Axial coding was used to identify dominant themes [20]. The themes were then presented to the entire research team for further refinement and agreement.

3.5 Positionality

The first author is a Southeast Asian woman, approaching this study as a PhD student in CS. She holds Bachelor's degrees in CS and Psychology from a large, public, research-grant university in the U.S. As a member of several marginalized groups in computing and coming from a different culture, her motivation to participate in this project is driven by a lack of culturally relevant learning experiences before and during college. She played a significant role in planning and executing the participatory design sessions and co-design sessions, and leading the coding process.

The second author is a white woman, approaching this study as a PhD student in Technology, Learning, and Leadership. She holds a Master's degree in Biology from a private research university, and was serving as a faculty member in the Biology Department at a public community college. She joined the project in Spring 2023, and significantly contributed to the planning and execution of the co-design sessions. She played a substantial role in the coding process, supporting the first author on data analysis and interpretation.

The remaining three authors, include two professors and one curriculum developer, are the original developers of Scratch Encore. They spent the past five years working closely with district administrators and teachers to design, develop, teach, and study CS curricular materials in classrooms across Chicago and Maryland. They approached this study with the aspiration to empower Scratch Encore teachers to tailor the existing materials to their specific classrooms. They were positioned in this project as advisors, providing guidance on teacher session planning, research discussions, and data interpretation, but not directly engaged in data analysis.

4 RESULTS

Our analysis reveals three challenges the lead teachers encountered when Harmonizing Scratch Encore lessons. In this section, we present the challenges and our co-designed scaffolds to support teachers in overcoming those challenges.

4.1 Challenge 1: Completing the customization process in a timely way

Given the many demands on teachers' time, we set an internal design goal of providing enough support for teachers to Harmonize a complete Scratch Encore lesson within a two-hour timeframe. However, from the very first month of the co-design sessions, our lead teachers shared that the Harmonizing process was quite time-consuming; none of them were able to complete the first Harmonizing attempt within the time constraint.

4.1.1 Finding, creating, and editing sprite costumes. Teachers were initially concerned about how long it took them to create sprite and backdrop images to support their new culturally responsive project ideas. Sandy[1] spent almost two hours on sprite development:

> *I did a hard stop at the 2-hour because I needed to, but I would be happy to go back and finish the documentation that I didn't get to because I spent too much time fiddling with sprites... Around the two hour mark, I finally had some sprites I could live with and I was making modifications to the project, but I hadn't begun the student sheets yet.*

Philip also shared that his pain point was finding appropriate sprites for his Harmonized project:

[1]All teacher names are pseudonyms

A lot of the graphics [in Scratch] are not user friendly to high schoolers. So I was really intent on trying to find [sprites] that look like high school students or something that was older. It took a lot of time to do that.

Tutorial on editing sprite costumes: Unfortunately, available graphics in Scratch's sprite library did not fully support teachers' Harmonized project ideas, and the teachers did not know how to efficiently create their own sprites. Therefore, we created a tutorial with multiple tips, tricks and step-by-step instructions to edit sprite costumes in Scratch's vector editor. Teachers found the tutorial simple and useful. After engaging with the tutorial, Philip and Colin discussed how practical this scaffold would be for teachers new to Harmonizing. Colin shared:

When [Philip] was talking about the costumes, I even thought, "Okay, if [beginner teachers] don't know how to separate the leg and make the leg move, how can I add movement with adding another costume?" And I simply just added the other costume, but all I did was just use the little rotation tool, which a lot of [teachers] know how to do when they rotate pictures and all the things that they do well elsewhere. I just made the little guy [the sprite] rotate a little bit to make it look like it was moving.

4.1.2 Editing companion student-facing materials. Teachers also faced challenged in creating companion student-facing materials because it required them to edit many small parts in the original student worksheets to match with their Harmonized projects. We anticipated this challenge, providing teachers with editable samples of each worksheet. However, this support was still insufficient. After Philip shared how long he spent on each step of the Harmonizing process, Michelle commented:

I just want to chime in on the time that it took, like for the TIPP&SEE [worksheet] part... To me, that was the part that was just so time consuming. And I didn't even know after… Once I hit the two hour mark... I didn't have time to review all of that... the TIPP&SEE and Modify worksheets to know if my project would even kind of match up… So just like Philip too, all the TIPP&SEE [editing] work was too much.

Student-facing material editing guide: Our research team responded to this challenge by providing the teachers with a guide for editing companion student-facing materials. We redesigned the sample worksheets, highlighting all parts that might need updating. Teachers found that the highlighted templates saved them a huge amount of time. Colin shared:

It was a lot better. As I said, the Modify worksheet, I don't even think that took me 10 minutes to get through the entire thing. And the TIPP&SEE [worksheet], I flew through the ones that you could edit.

4.2 Challenge 2: Preserving the learning objectives of the original curriculum

This challenge is very unique to the Harmonizing process (customizing an existing project rather than creating a new one), as it requires teachers to remix a lesson in ways that amplify their students' lived experiences and cultural identities *while adhering to the technical attributes of the base project.* There are three technical considerations teachers must keep in mind:

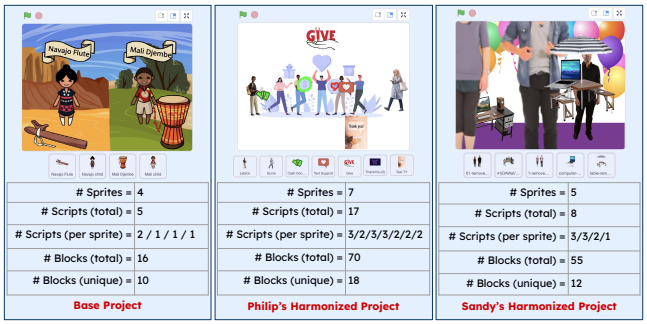

Figure 2: Comparison between a base project and teacher Harmonized projects

- If the project's technical attributes are not followed, when students encounter the next non-Harmonized project within the base curriculum, they may not have the knowledge necessary to complete it.
- If additional, advanced concepts are introduced, students may be overwhelmed. Introducing too many concepts at the same time can lead to a negative learning experience, affecting not only the Harmonized but subsequent modules.
- If the project contains the same concepts but in a substantially more complex form (more sprites, longer scripts, more scripts, more blocks), students will take longer getting familiarized with the project. This may prevent them from completing the learning activities during the class period, cause fatigue prior to them starting to code, or take time away from their open-ended create project.

After the first Harmonizing attempt, Philip expressed that he would like to get feedback on his project. In response, we reviewed all teachers' Harmonized projects and found a number of complexity issues. Figure 2 compares two teacher projects with the base project for the One-Way Synchronization module. Both teacher projects are substantially complicated than the base project. The base project contains 4 sprites, 5 scripts and 16 blocks in total. Philip's project has 7 sprites, 17 scripts, and 70 blocks, while Sandy's has 5 sprites, 8 scripts and 55 blocks.

"Keeping it Simple" strategy: In order to discourage teachers from making substantial code changes that may increase the project complexity, prior to the next Harmonizing attempt, we introduced the "Keeping it Simple" motto. Teachers were challenged to Harmonize a project with minimum code changes, focusing instead on replacing the sprites and backdrop. Our lead teachers found the "Keeping it Simple" strategy illuminating. Colin expressed:

I just realized I didn't have to have all this stuff going on or spend an hour and a half time to make it [the project] do exactly what I wanted to do... I think it might have taken me 30 min to just copy the code and make sure I switched a couple of words, and it just obviously simplified it tremendously, and I still kind of got my same point across.

However, teachers continued to wrestle with the tension between showing what they could technically do and keeping the project as simple as a student learning exercise, Sandy brought up:

> *I tend to get in the weeds pretty quickly when I start to modify [the base project], because I want to do fancy things, but need to keep it simple, not distract [students] with tips and tricks they haven't learned yet or that we don't want them to focus on in that particular lesson.*

Colin went on to add:

> *I also don't want my project to be so simple that [students] look at it like this is way below me... When Sandy said that, that also triggered my head. I don't want it to be overly simplified, either.*

Technical review worksheet: To help teachers overcome this tension, we introduced a technical review worksheet to more clearly expose their project's technical attributes. This compared the teacher's code to the base project in terms of the number of sprites, scripts, and blocks used. Teachers found the technical review worksheet very easy to fill out, and seeing the differences between their HARMONIZED project and the base project eye-opening. Colin shared: *"It pointed out that we were kind of getting lost in the weeds, and kind of going above and beyond"*. He continued:

> *I think the thing that stood out for me the most was the unique blocks... To actually pay attention to the fact that I used three [blocks] that weren't in the original project and I left out five that were in the original project, without even thinking about it. I completely went a different way of my movement versus... I just looked at the original project. It was more just... switching the costume was an easy way to [HARMONIZE], while I had more movement and gliding [blocks].*

Sandy also expressed its usefulness:

> *It helps people like me [who want to do fancy things in their projects], sort of bring themselves in a little. Because I was again making it more complicated than it needed to be. So I had included a couple of blocks that weren't [in the base projects], and then I didn't include a couple of blocks that were there.*

4.3 Challenge 3: Meeting personalized culturally responsive teaching goals

4.3.1 Ideating Scratch projects. We anticipated that teachers might struggle when ideating a culturally responsive Scratch project that aligns with existing structured learning objectives and pedagogical constraints. As expected, from the first month of the sessions, participating lead teachers expressed concerns. Colin shared:

> *I think it took me longer to think of what I wanted to do for the project than it did to actually make the project. But you know, I thought about "Well, we don't really want to give the teachers too many ideas" because you want them to kind of pull from their own experiences. So I didn't mind that little bit of productive struggle at the beginning, coming up with my own ideas.*

Theme hierarchy: Given the technical requirements of the base projects, scaffolding was necessary to support teachers in efficiently brainstorming themes that met those requirements. To help teachers move from high-level themes to specific and implementable topics, we developed a theme hierarchy as shown in Figure 3. This scaffold guided teachers in brainstorming in multiple levels, including sprite and backdrop ideas.

Figure 3: Theme hierarchy for brainstorming culturally responsive Scratch projects

4.3.2 Drawing out students' personal experiences and cultural identities. Although our scaffolds, thus far, had supported teachers in creating a complete set of HARMONIZED Scratch activities, teachers remained concerned about truly hitting their personalized culturally responsive goals. Sandy expressed their uncertainty:

> *I found it easy to make a new project following that model, following that format. But I don't know how well HARMONIZED it is because I was sticking with sprites and audio that were already available [in Scratch]. So it wasn't as personalized as I would like.*

Michelle and Philip also discussed this challenge:

> *You know, Philip, your statement about like... you didn't feel like you hit the cultural elements that well? I don't either... That was the challenge for me - was finding sprites that were meaningful.*

"About Me" activity: While teachers *want* to create projects that resonate with their students, it can be challenging for them to draw out students' interests, cultural backgrounds, family traditions, and identities. Thus, we designed an "About Me" activity to replace an existing activity in the first module of Scratch Encore. It includes questions for students such as *"What are events, holidays, or traditions that you especially enjoy and/or are important to your family?"* and asks students to customize Scratch sprites to represent themselves and their hobbies or interests. Teachers can then use these students' sprites to HARMONIZE Scratch projects. Colin expressed his enthusiasm for this idea:

> *I definitely like the idea of [students] being able to input their own sprites, because, like, your idea of being able to check in. Just have their sprites in the background when you're doing an example project. The kids would absolutely go crazy if they saw their own sprites, you know, as part of the teacher's project.*

We also provided teachers with a repository to record and keep track of their students' "About Me" information and artifacts. Michelle, who taught approximately 500 students over the course of the current year, shared:

> *I think [the repository] is worthwhile, because otherwise, as I said before, I'm just guessing, because I cannot know those hundreds of children. So yes, it is worth it, for me, to find out what they're interested in. So I think some form of this would be really beneficial.*

5 DISCUSSION

Throughout the study, we observed that teachers encountered "Rabbit Hole" moments - moments when they invested excessive time in particular Harmonizing tasks. These rabbit holes revealed a tension: *Teachers struggled with the dual roles as a **project creator** (creating an impressive project) and a **teacher** (efficiently creating projects to serve as a learning exercise for students).* This tension can be seen in each of the challenges reported above, and was addressed by a set scaffolds that we co-designed with our lead teachers.

In *Challenge 1*, the tension manifested through perfectionism, particularly in finding, creating, and editing sprite images. Several lead teachers wanted "perfect sprites" - sprites that visually and aesthetically match with their personal preferences. To approach this challenge, we introduced practical scaffolds involving tutorials on editing sprites and a guide to editing student-facing materials.

In *Challenge 2*, the tension manifested most starkly in teachers creating complicated projects that were in direct conflict with students' learning goals. From a student learning perspective, complicated projects are intimidating and confusing, and the code blocks associated with the learning goals are harder to find. Lead teachers who had this challenge expressed the sentiment that they needed to impress students with their programming skills and uphold a certain professional image. To meet this challenge, we introduced the technical review worksheet as a practical scaffold that assists teachers in reviewing the code of their Harmonized project, emphasizing both what blocks or code snippets need to be present, and also the level of complexity of the original project (e.g., number of sprites, blocks, and scripts).

In *Challenge 3*, the tension manifested through teachers' theme-related decisions. Lead teachers questioned if the theme and sprites they had chosen were robust enough to meet their individual culturally responsive goals. As Philip shared, he was wondering if his Harmonized project was *"really culturally relevant"*. To address this challenge, we developed a theme hierarchy to support teachers in brainstorming a Scratch project. The hierarchy encourages teachers to think through the scope of three broad strands (i.e., family culture, kid culture, and local community culture), then choose a general theme (e.g., food, sports, school celebrations) and extract a specific topic that can be extended to a project idea and implemented in Scratch (e.g., cultural food parade, soccer at school recess, color run fundraiser). We further designed an "About Me" activity as a pre-lesson that teachers could incorporate into their classrooms to help them learn about students' interests, cultural backgrounds, family traditions, and self-defined identities.

However, we acknowledged that practical scaffolds alone would not keep teachers from spending too much time on the Harmonizing process. As Colin shared, *"I think, no matter what scaffolds you do, you're going to have those people that want to go down that rabbit hole. And it might be that they have a certain project in mind, and they're going to search until they find exactly what they want"*. Accordingly, we encouraged teachers to embrace the "Keeping it Simple" and "No Rabbit Hole" mottos throughout the co-design sessions. These mottos were successfully adopted by the participating teachers, and, as Sandy shared, they *"put up a sign when I started - No Rabbit Holes"* as a reminder for themselves when they Harmonized their final Scratch Encore lesson.

6 LIMITATIONS AND FUTURE WORK

Our study was limited by the number of participants. With only four teachers, we have an admittedly limited picture of the full breadth of teachers, schools, students, communities, and geographic regions where CS instruction occurs. Thus, it is possible that some challenges teachers will face when customizing instructional materials were not raised during our co-design sessions. Furthermore, the participating teachers were all experienced CS teachers; thus, additional challenges may be encountered by teachers with less experience. This second limitation will be the focus of future work.

In addition, this study includes teachers but not students; it focused on the steps involved for teachers creating customized learning activities and materials, not the student roles. Therefore, important questions remain unanswered, such as whether our initial idea for gathering student information (i.e., "About Me" activity) is useful, whether teacher-selected topics reflect their students' identities, and what effect Harmonized Scratch Encore lessons have on the classroom environment. To answer these questions, our next steps are to follow teachers into their Harmonized Scratch Encore classrooms.

7 CONCLUSION

This study navigated the challenges CS teachers face when customizing, or Harmonizing, structured instructional materials to include culturally relevant elements that are specific to their own classrooms while preserving the learning objectives of the original curriculum. Through a series of co-design sessions with elementary and middle school teachers, we identified three main challenges: (1) completing the customization process in a timely way, (2) preserving the learning objectives of the original curriculum, and (3) meeting personalized CRT goals. In response to these challenges, we developed several practical scaffolds to guide teachers through the Harmonizing process. However, our study revealed that practical scaffolds were not enough - it is also the mindset of teachers that is important. It was only after engaging with a combined set of practical and cognitive scaffolds that teachers were supported to successfully Harmonize a complete lesson. Our findings represent initial steps towards developing a strategic framework for supporting teachers in creating CRC instructional materials that meet both academic standards and the needs of their students. In doing so, we contribute new resources and strategies to advance the goal of addressing longstanding issues of inequity in computing and constructing nuanced, culturally relevant educational opportunities.

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