

Empowering Voices: Promoting Equitable Participation in Student-Inclusive Co-Design Research-Practice Partnerships

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Abstract: This study explored equitable participation and collaborative dynamics in a co-design workshop where students were introduced to an established research-practice partnership that focused on designing and refining a STEM-integrated bioinformatics high-school curriculum. We define equitable participation as partners' equal say in the decisions and balanced contributions to the co-design processes and outcomes. Accordingly, interviews with two teachers and three students who collaborated with researchers to revise the curriculum were analyzed to explore their perceived participation behaviors. The analysis revealed two primary themes: inclusive contributions through mediation and student-influenced teacher autonomy. Results showed that separate groups for students and teachers and mediation strategies facilitated inclusive contributions and influences on the design outcomes. In addition, strategies promoting psychological safety and balancing knowledge asymmetries were identified. The study contributes insights into achieving democratic and inclusive co-design practices, emphasizing the complexity of establishing equity in co-design partnerships.

Introduction

Codesign is a research-practice partnership (RPP) that involves sustained collaboration between researchers and various agents towards designing and refining educational innovations and artifacts (Penuel et al., 2007). By leveraging the expertise and perspectives of diverse agents and encouraging reflective and innovative practices (Bang & Vossoughi, 2016), co-design is increasingly recognized as an empowering context for often marginalized agents, such as students, to engage in educational innovation design (Bang & Vossoughi, 2016; Mawasi et al., 2023). Engaging students as co-design partners within RPPs fosters a sense of ownership and active engagement among students (Farrell et al., 2023). The lack of direct involvement of students in the design process and relying solely on teachers' intuition regarding students' needs and preferences may limit the scope of interests and challenges addressed by design (Penuel et al., 2022). To address these concerns, researchers have called for increased participation of students in co-design partnerships (Penuel et al., 2022). However, student integration is a challenge since power dynamics and asymmetrical role distribution in teacher-researcher collaboration (e.g., Gomoll et al., 2022) get even more complicated with the inclusion of students because of the added layers of age, expertise, and power asymmetries (Bang & Vossoughi, 2016; Iivari & Kinnula, 2016; Mawasi et al., 2023). Therefore, it is important to examine ways of cultivating equitable participation in co-design activities where all partners are positioned as collaborators with equal say in the decisions and balanced forms of contributions to the design processes and outcomes (Bang & Vossoughi, 2016; Yip et al., 2017). To address this goal, several strategies are proposed, such as value mapping to incorporate co-designers' values into the design process (Ryoo et al., 2015), activities focusing on eliciting diverse perspectives (Matuk et al., 2016), and providing varied participation opportunities (Yip et al., 2017). While strategies have been developed to support student inclusion in co-design, there remains a gap in understanding how these strategies affect power dynamics when students are introduced to an existing teacher-researcher partnership, particularly in scenarios where students and teachers have pre-existing classroom relationships. Understanding and addressing this gap is vital for developing sustainable co-design partnerships that involve teachers and students, which depend on iterative cycles of implementation and revision, requiring collaborative efforts from all parties, including researchers. Consequently, facilitating equitable participation emerges as a critical factor, not only for the immediate success of the partnership but also for its long-term sustainability.

In response, this study aimed to develop an understanding of how co-design partners interact and collaborate when students are introduced to an established RPP. This study is part of an NSF study that investigated how the topic of bioinformatics could be included in the standard biology curriculum and the professional development (PD) support needed for successful implementation (Yoon et al., 2022). After the project's fourth year, two teachers who had previously played an active role in the RPP were invited with their selected students to participate in a two-day co-design workshop to revise the curriculum further. By introducing the students as new partners to our sustained partnership, we aimed to explore ways to develop and facilitate co-design efforts inclusive of diverse voices, democratic, and empowering. With these goals in mind and given that

the sustainability of a co-design partnership depends on creating equitable participation in decision-making processes (Farrell et al., 2019), we explored whether partners perceived their participation as equitable and identified the factors that supported or hindered this equitable participation. Here, we define equitable participation as partners' equal say in the decisions and balanced contributions to the co-design processes and outcomes. We inductively analyzed workshop interviews with the participating teachers and students, where they reflected on their co-design experiences, to address the following two research questions:

1. During the co-design workshop, in what ways was equitable participation achieved, as perceived by the co-design partners (teachers and students)?
2. According to the participants, what design and facilitation factors cultivated or hindered their equitable participation? What were their suggestions to improve equitable participation?

Equitable participation in co-design partnership

Equity in RPPs is multifaceted, with interpretations ranging from relational dynamics and power asymmetries (Denner et al., 2019) to equitable outcomes addressing systemic transformations (Vetter et al., 2022). These diverse approaches lead to ambiguity around the practical realization of equity in RPPs, affecting participation and decision-making processes (Farrell et al., 2023). For instance, conceptualizing equity as equitable power distribution for marginalized youth may prioritize their voices in decision-making (Vetter et al., 2022), whereas viewing equity as shared authority in partnership dynamics may focus on balanced decision-making (Coburn et al., 2008). To address this, Farrell et al. (2023) suggest categorizing equity into equity-in-mission and equity-in-process, with our study focusing on the latter, emphasizing relational and interactional dynamics during co-design activities. Our interest is in operationalizing equity-in-process at the participation level, exploring equitable practices in co-design through a lens of shared decision-making and power dynamics (Brandt et al., 2012; Yip et al., 2017).

Our conceptualization of equitable participation in co-design aims for partners to have equal say and balanced contributions to the processes and outcomes. This involves addressing power imbalances and ensuring that all voices are respected and have equal opportunities to influence design decisions through moderating strategies such as guidance and scaffolding (Guha et al., 2013). Our theoretical framework is further informed by Yip et al. (2017), who emphasize recognizing and valuing the unique contributions of each participant in child-adult collaborations, and Brandt et al. (2012), who advocate for creating a 'third space' where hierarchical boundaries are blurred, fostering shared ownership and mutual respect. Integrating these concepts into our study, we aim to explore how these equitable and democratic principles manifest in the interactions and collaborations within co-design activities. By focusing on settings where students are introduced into established teacher-researcher partnerships, our study seeks to uncover how these theoretical principles are applied in practice and how they influence the dynamics of the partnership, especially in scenarios where pre-existing teacher-student relationships might impact the co-design process. Given that co-design partnerships hinge on effectively sharing authority and control and ensuring that partners perceive equity in their collaborative efforts (Denner et al., 2019), our research would ultimately lead to insights into establishing sustainable partnerships with researchers, teachers, and students.

Methods

Context

This project is part of a larger effort supported by the NSF to design, implement, and refine a STEM-integrated bioinformatics curriculum for high school students in environmental science and biology classes. Initially, the curriculum included 20 lessons guiding students through a hands-on learning process about air quality and asthma in cities, using a mobile app for data collection and various analytical tools for understanding asthma and related environmental factors (Yoon et al., 2022). Initially designed by university researchers, the curriculum was implemented and revised with the collaboration of teachers over three years. At the end of the third year, following three collaborative sessions, a select group of teachers was invited to redesign the curriculum, which was then taught by four teachers, including the one who co-designed the curriculum. After its implementation, a revision was planned based on feedback from the last round. For a two-day virtual workshop in June, among the four teachers, we invited two teachers who were notably active in sharing their class reflections. These teachers then invited students from their classes who were particularly vocal and engaged during lessons. Both teachers and students voluntarily participated.

The workshop's initial day was dedicated to setting up a collaborative and open atmosphere. The several key design features for the workshop included (1) recognizing teachers' contribution to the project at the

beginning of the workshop to honor their existing teaching practices and their expertise (Roschelle et al., 2006) while welcoming and positioning students as informants and design partners (Iivari & Kinnula, 2016; Thompson et al., 2022), (2) building norms to develop a common understanding of objectives of the workshop and curriculum redesign, (3) understanding research results to incorporate evidence-based practice into the curriculum revision process (Matuk et al., 2016), and (4) identifying problems through classroom videos and student projects to help their reflection of classroom experiences (Gaudin & Chaliès, 2015). During the first day of the workshop, to facilitate more focused reflection, (5) participants were split into two groups (teachers' group and students' group separately) (Mawasi et al., 2023), each led by a researcher. Continuing the second day, the partners tackled design goals finalized on the first day (e.g., designing activities for students' data interpretation competence). However, due to the students' hesitation to share their views in the larger group, the participants were again divided into two researcher-facilitated groups. Specifically, within the student group, a researcher encouraged them to express their opinions, saying, "As the person who took the class, you can share whatever you want, like this was good, this was bad, and why." To scaffold their sharing process, the researcher started with verbal brainstorming and tossed it to them, commenting, "While you guys are talking, I'll try to take notes as much as possible." The researcher intentionally documented students' reflections in a shared Google Document, allowing the students to view their comments. In addition, the researcher proposed selecting a spokesperson to present the revisions to the larger group and offered, "If you're not comfortable, I'm more than happy to present on your behalf."

Participants

The workshop had eight participants: two high-school teachers, three high-school students, and three researchers. The teacher duo comprised Heather (female), with 13 years of teaching experience, and Kyle (male), with 20 years of teaching experience. Both are seasoned educators from a high school in the northeastern United States, having taught biology and environmental science. Heather was wrapping up her third year, while Kyle was wrapping up his second year. Additionally, Kyle brought prior experience as a co-designer from the previous year's co-design workshops. The student participants, Ana, Ayana, and Amelia (all female)—all in their senior year—were selected by their teachers to participate in the co-design workshops due to their vocal and active participation in the class, as the workshop required students to share their experiences with the curriculum activities. On the research side, Sarah (female), the PI of the project, is a learning science professor at a university in the U.S. Ebru (female) was a postdoctoral researcher, and Eunsung (female) was a doctoral candidate in the same institution at the time. While all researchers interacted with the workshop participants, Ebru mainly engaged with the teachers while Eunsung with the students, acting as their respective facilitators.

Data collection and analysis

A week after the workshop, Ebru and Eunsung, who had built a connection with the participants during the co-design, carried out five semi-structured interviews individually with two teachers and three students. The interview questions were crafted to prompt reflection on their co-design experiences, including how they worked and interacted with each other and the researchers, the dynamics of their relationships, their initial expectations and goals compared to the outcomes, their perceived roles, and the design and facilitation elements that influenced their experience. These interviews, averaging 35-45 minutes each, were conducted via Zoom, recorded, and then transcribed with AI transcription software. The first author checked the transcriptions to ensure their accuracy before being used in the data analysis.

Our analysis is guided by our conceptualization of equitable participation as a fair and balanced opportunity for all participants to contribute and influence the design activity. We employed Saldaña's (2016) two-cycle coding method, beginning with open coding for thematic analysis to identify reflections on (1) each participant's contributions and their impact on the design process and its outcomes, (2) the nature of interactions and collaborations, and (3) the level of support provided to participants for active involvement in the design process and its results. Subsequently, focused coding was applied to refine these initial codes and align them with our research objectives and the existing literature. To ensure the validity of our analysis, the first and second authors conducted the thematic analysis with open coding independently for investigator triangulation (Patton, 2015). A series of brief debriefing sessions addressed discrepancies between the two coders, leading to a consensus on the findings (Saldaña, 2016).

Results

Perceived degree and nature of equitable participation

For the first research question, from the participants' reflections on their co-design experience, we identified two main themes delineating the level and the nature of equitable participation in the co-design workshop: (1) inclusive contributions through mediated power dynamics and (2) student-influenced teacher autonomy.

Inclusive contributions through mediated power dynamics

All participants highlighted the inclusive nature of the contributions. That is, all partners were able to share and articulate their opinions, consider alternative perspectives, and justify their positions as they actively engaged in collective decision-making processes, and everyone's perspective was equally valued and sought. For example, Amelia (student) described the group's participation dynamics as, "When everybody was willing to listen, everybody was willing to give out ideas. So, it was like a free space... I didn't feel awkward or anything... Nobody was being judged... I felt I was able to voice anything." Here, Amelia (student) highlighted the inclusive and non-judgmental nature of the dynamics among the partners, where everyone actively listened to each other and respected their input. This, as a result, created a safe space where she felt comfortable to 'voice anything' she wanted to share. Creating such a space that fosters inclusive contributions, however, was only made possible by separating students and teachers into different groups, where teachers and students collaborated with their peers first and then came together to combine their decisions and prototypes. Ana (student), for example, emphasized the value of the smaller group setting as she often engaged in joint idea-building with peers, noting, "I liked the smaller group better... I talked more because it was like a build on conversation. So, I was agreeing on someone else's point, and adding my perspective and opinions to it." The reason for students' preference in working for small groups was that they were not comfortable with criticizing teachers' perspectives and decisions in front of them. Describing her rationale for small group preference, Ana (student) noted, "I didn't really feel that comfortable in sharing ... I'm not gonna see them since I already graduated. It's still this respect kind of thing is there, and I don't want to hurt their feelings or be disrespectful." Her reflection suggests that the reason why she did not feel comfortable speaking up in the main room with teachers was because she thought it would be disrespectful to the teachers if she criticized them. Her rationale was also echoed by two other students, and further added on by Amelia (student), who posited their limited experience and knowledge of the curriculum was another reason why they were not able to talk in the main room, "It's just we didn't know what to say at times." Their reluctance to criticize teachers' perspectives and the challenge of catching up with the teachers was noticed and often pointed out by the teacher-partners as well. For example, Heather (teacher) shared, "I don't think that they shared enough with us. I know that when you took them out I'm sure that they felt a lot more comfortable... talking about it." She further reflected on the imbalanced power dynamics between teachers and students and pointed out that "the teachers and the students should not be together," suggesting the potential horizontalizing impact of separating students and teachers.

Further reflecting on how creating two groups, one with teachers and one with students, offered the partners a fair opportunity to contribute, the students noted that they were able to freely share their perspectives, articulate their ideas, consider alternative perspectives, and justify their positions while teachers were able to exchange their ideas more efficiently. For example, Ana's (student) and Kyle's (teacher) reflections on their collaborative interactions highlighted this different yet horizontalizing pattern in their contributions. Ana (student) shared her comfort with voicing and justifying her perspective and posing alternative perspectives, "I was able to give my perspectives... I was able to like, agree, or disagree on others' perspectives and then tell them why I felt the same way." Kyle (teacher), on the other hand, emphasized the efficiency and synergy in his interactions with Heather (teacher), "...having me and Heather, the two teachers... was really helpful. because we could go over things a lot faster...as you saw, we danced around when we started, like working on ideas." What made this difference horizontalizing was that regardless of the actual amount of contributions each side made, all participants felt that their ideas were equally welcomed and heard. Illustrating this shared sentiment, Ayana (student), for example, reflected on the inclusive nature of the co-design experience and noted that her contributions were equally valued, "I think my ideas were definitely valued...as much as the teachers...I think we all were speaking up."

Student-influenced teacher autonomy

The second theme, student-influenced teacher autonomy, was about participants' perceived influence on the design activity and decisions and described the balance between student input and teacher control on the decision-making process. The researchers, on the other hand, were positioned as facilitators who moderated the process while having limited authority in the design decisions. Illustrating this role distribution, for example, Heather highlighted the active control of teachers in the design decisions, importance of the student input, and the supportive role of researchers:

I think Kyle and I re-wrote those first couple of lessons that we were focused on, and I think between the 2 of us we were driving the entire session. Ebru [researcher] was just sitting there typing in the background and asking clarifying questions...the value of having students there was huge... listening to what the kids had to say. I feel like we were on the right track...We just needed to fix some of the bumps, fill in the potholes.

Here, Heather depicted a dynamic where the blend of students' participative input and teachers' decision-making power created a co-design experience that was responsive to the students' needs while being guided by the expertise and authority of the teachers and facilitated by the researchers. While emphasizing the significant impact of students' input on the outcome of decisions, she described teachers as the final decision-makers of which inputs were incorporated into the design. Aligning with Heather's reflection, Kyle further noted, "hearing their opinions, I think, weighed more on us than our own ideas and thoughts. Yes, we had our ideas, but... when we got the feedback, that is what I was looking for..." Kyle's remarks further suggest that students' needs, and perspectives were not just considered but were given a high priority in shaping the final decisions.

Students' reflections of their experiences offered a complementary story to the teachers' as they noted how their perspectives provided important insights to the design, e.g., "I said things that were important and made a difference, because it was like a point of view from the student side" (Ayana) and how their opinions were integrated in the teachers' design decisions, e.g., "last day teachers were able to edit their guide a little bit, and they also included my ideas." (Ana). What differed in the student narrative was that students felt their role occasionally extended beyond providing feedback, as they further brainstormed and made design decisions based on their critiques. Illustrating this perspective, Amelia reflected on her autonomous decision-making process, "I saw something wrong on the paper as on air... I wasn't afraid to get rid of some things and make some new revisions." Her note suggests that she took ownership of the process, and took action based on her experiences and perspectives. Further referring to their collaborative revisions on the first lesson, Ana described her experience, "I think we ended up revising the entire thing.... just rip it off with the lesson one and then turn it into entire new lessons, which is perfect. I liked it better." She described how their criticism of teachers' redesign and brainstorming led the students to redesign the whole lesson and emphasized her appreciation of the new version. However, as students further pointed out, they could only redesign the first lesson and their role in the redesign of other lessons was limited to providing feedback on the teachers' other revisions. This limitation was due to the teachers' swift progression through the lessons and the time required for students to become acquainted with the curriculum structure.

Strategies to cultivate equitable participation

For the second research question, Through the analysis of participants' interviews, we identified the design and facilitation factors that cultivated or hindered their equitable participation as well as the suggestions offered by the participants to cultivate it. We grouped these factors and suggestions under two main categories: creating and sustaining a psychologically safe environment and mediating asymmetrical knowledge and experience.

Creating and sustaining a psychologically safe environment

We have identified six primary strategies that were emphasized by the participants to create and sustain a psychologically safe space, where all partners would feel comfortable sharing their opinions. The first strategy, which was emphasized by all participants, involved separating student and teacher partners into two distinct groups. We covered this strategy in detail in the previous section.

The four facilitation strategies implemented by the teachers and researchers involved encouraging students to voice their opinions, highlighting the importance of student input for curriculum quality, focusing on a shared goal, and interacting on a first-name basis. For example, Kyle's encouragement of Amelia included the first three strategies: "I told her don't hold back. You're not hurting anybody's feelings. All you're doing is making it better for the next group of students. Be brutally out, I said. That's what I want you to be." His encouragement proved effective, as Amelia later reflected on the teachers' encouragement, "I liked how the teachers were trying to make us comfortable... I just felt like I was really good vocally..." as well as Kyle's emphasis on the shared goal, "to make the curriculum better for just for everybody, it was just trying to make it more fun" supported her to feel comfortable to share her perspectives. The other facilitation strategy that supported the creation of a psychologically safe space by attempting to close the gap between teachers and students was interacting on a first-name basis. Calling all partners by their first names helped horizontalize the power dynamics to some extent. Kyle commented, "I think the biggest thing was using our first names. That sets a tone in the beginning that you are equals...then we started using each other's names with them which broke down the barrier that separates teachers." Here, Kyle reflected on how calling each other by their first names helped break the boundary between

teachers and students rooted in their traditional asymmetrical roles and imbalanced power dynamics in the classroom.

The final strategy suggested was a design strategy to mediate the asymmetrical power dynamics between teachers and students to support a psychologically safe space: grouping teachers and students from different institutions. This suggestion arose after the realization that students felt uncomfortable criticizing their teachers' ideas. Creating dialogue spaces by matching students and teachers from different institutions might alleviate some of the discomfort caused by the previously developed traditional roles and power dynamics between students and teachers, e.g., "pairing a different teacher and different students... I think that's the only way that you're going to get the students to speak up when they, in the presence of teachers" (Heather).

Mediating asymmetrical knowledge and experience

Teachers' extensive experience with curriculum design and the lack of such background knowledge among students created asymmetrical knowledge and experience, negatively impacting the collaborative interactions between teachers and students. To address this issue, the participants reflected on one facilitation strategy implemented during the co-design process and further suggested another strategy to mediate the asymmetric knowledge and experience between students and teachers. In respective order, these strategies involved a real-time onboarding activity and a training session before the co-design workshop to familiarize students with the curriculum structure, lesson plan, and activities. In the main room with the teachers, as discussed by all the participants, the students were struggling to catch up with the teachers' brainstorming, e.g., "as teachers, we bull headed our ways through because that's what we used to... But between the kids, they were definitely playing catch up a lot" (Heather). Thus, after separating the groups, one facilitator, Eunsung, held a real-time onboarding session with students. Students further described the onboarding session, "We needed to remember what happened in the class... But after we had a chat between ourselves, we were kinda like, oh, I remember. We did that kind of thing to catch up" (Amelia). Amelia's reflection here suggests that the onboarding session helped students catch up with the curriculum to some extent. Moreover, the participants suggested a training session with the students prior to the co-design workshop to mediate the asymmetrical knowledge and experience, e.g., "I would pull them aside ahead of time and give them ... an hour, here's what this looks like from the teacher's side... because I feel like they came in with a little bit of a disadvantage" (Heather). Here, Heather points out students' limited background knowledge about the curriculum structure and suggests a one-hour training session with them before the co-design workshop.

Discussion

In this study, we introduced students as new partners to our established RPP through a two-day co-design workshop to develop an understanding of how co-design partners work together when a new group of members with different experiences and perspectives is introduced. By further exploring the formation of equitable participation in the co-design workshop, this study is an exploratory attempt to contribute to the emerging body of research efforts to foster equitable participation in RPPs (e.g., Gomoll et al., 2022) and the need for developing democratic and inclusive co-design partnerships with students (Penuel et al., 2022).

Our first research question was about the nature of equitable participation as perceived by the participants, and our analysis of the interviews yielded two primary themes: inclusive contributions through mediated power dynamics and student-influenced teacher autonomy. The first theme captured the participants' perceptions regarding whether their contributions were equally valued and sought, and whether they were provided with opportunities to contribute to the design process and revealed an agreed-upon perception among participants that their input was equally valued and sought as everyone actively listened to each other and respected their input without any judgment. However, teachers and students needed separate space to contribute to brainstorming, design, and decision-making processes, mediating the hierarchical power dynamics typical in intergenerational co-design teams (Yip et al., 2017) and due to participants' traditional student-teacher roles previously established. The second theme, student-influenced teacher autonomy, captured the participants' perceived influence on the design process and outcomes and yielded a balance between student input, teacher authority, and researcher facilitation during the co-design workshop. Due to teachers' expertise and traditional roles, consistent with existing literature on adult-child design partnerships (Druin, 2002; Guha et al., 2013), teachers maintained their authority while actively prioritizing student input into the design decisions.

On the workshop's second day, students exhibited newfound autonomy, transitioning from critiquing to actively redesigning a lesson. This change challenged the traditional view of students as mere informants and positioned them as co-constructors of knowledge. Despite their inexperience and the existing adult-child dynamics (Druin, 2002; Guha et al., 2013), students demonstrated co-design partner capabilities with equal decision-making power, suggesting teachers' and students' roles may not always complement each other as discussed in Yip et al.

(2017), but could yield contradicting results. This shift raises several questions: Whose perspective should hold more weight in the final design? How can we merge different perspectives and decisions into a product that caters to both parties' needs? How can we facilitate co-design practices for productive tension to harness these differences in a productive manner, as suggested by Tabak (2022)? While these questions remain to be further explored, we believe this study offers a preliminary exploration of the shifts in participation behaviors and how students, teachers, and researchers engage in joint work for a common goal. Moreover, the shift towards equitable participation, where the students and teachers expressed equal opportunities to influence the design process and outcomes (Yip et al., 2017), suggests that students could transcend knowledge barriers and contribute meaningfully to design processes.

Another notable finding was the evolving role of teachers. With students' inclusion, teachers began facilitating student empowerment and engaging as co-designers themselves, indicating a facilitative competence developed through our long-standing partnership with teachers (Zamenopoulos et al., 2019). Teachers positioning researchers as facilitators without decision-making power may reflect their sense of curriculum ownership and authority, influenced by our established partnership (Aldemir et al., under review).

The second research question concerned the factors cultivating or hindering equitable participation to identify strategies supporting student-inclusive co-design partnerships' sustainability. The participants reflected on six strategies to create and sustain a psychologically safe environment and two strategies to mediate the asymmetrical knowledge and experience between teachers and students. Encouragement from both teachers and researchers played an important role in empowering students to vocalize their thoughts, suggesting that group members' encouragement is a powerful strategy for empowerment within co-design processes. Moreover, teachers' integration of student ideas in their design decisions had an empowering effect on students, fostering students' perceived ownership and control over the outcomes. Creating a safe space where participants feel comfortable sharing their perspectives also aligns with the other findings about co-design processes (Mawasi et al., 2023; Vakil & McKinney de Royston, 2019). Moreover, many identified strategies have already been documented to cultivate the empowerment of children in adult-children participatory design efforts (Guha et al., 2013; Mawasi et al., 2023; Yip et al., 2017). However, our findings contribute to the literature by offering (1) a preliminary framing of equitable participation in a co-design activity where students are introduced to an established RPP with teachers and researchers, and (2) insights into the evolving roles of teachers as curriculum co-owners with the advent of student involvement.

Our study addressed the imbalances in influence and knowledge between students and teachers, aligning with Yip et al. (2017) in prioritizing equity over equality in co-design partnerships. Our approach, inspired by the literature (e.g., Mawasi et al., 2023), sought to value students' contributions as equally as those of teachers, recognizing the challenges inherent in this goal. While we endeavored to create a safe and inclusive idea-sharing environment, as Vakil and McKinney de Royston (2019) suggested, we recognize the complexities in achieving true equitable participation, which is an ongoing process requiring continuous adaptation and reflection.

Lastly, interpretations of our findings should be approached cautiously due to two limitations: the study's small scale and focus on participant perceptions and the limited participant pool of two teachers and three students. Future research should include a broader demographic of teacher-partners and their students for a more comprehensive understanding of actual participation behaviors.

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