



Co-Construction of Third Space of Joy and Playfulness Through Critical Transdisciplinarity: Land-Based STEM Learning With Refugee Children

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Abstract: People from non-dominant farming communities have rich engagement with STEM concepts, rooted in their families' everyday lives, intergenerational cultural practices, and environments. However, such culturally embedded knowledge and associated STEM literacy often remain separate from STEM learning at school. Particularly working with Yazidi and Syrian refugee families from rural regions, we co-designed land-based STEM learning opportunities that center embodied knowledge of traditional farming practices. In this paper, we present examples where facilitators and child participants co-created spaces to express their intergenerational and emerging understanding of land, farming, and STEM, with joy and pleasure. Particularly, we decenter damage-centered narratives associated with refugee children by centering their agency, creativity, and desire for joy in the learning spaces. Participants co-created a Third Space where they engaged in the learning activity on their own terms, while challenging and reimagining some underlying socio-political ideologies and power dynamics.

Disciplinary formation under the hegemonic institutionalized practice of knowledge production can be regulatory and constraining. In the disciplined spaces of learning, learners paradoxically become subjugated as docile bodies in hegemonic disciplinary practice, as they gain more “aptitude” or a “capacity” as a form of capital (Takeuchi et al., 2020). Critical transdisciplinary perspectives to STEM education acknowledge this hegemonic production of learners through the western capitalistic gazes and urge us to move toward reimagining disciplinary boundaries to center embodied and community-based knowing of historically marginalized communities (Strong et al., 2016; Takeuchi et al., 2020). In this reimagination, we need to understand disciplinary contexts that youth and children co-construct for their joy, pleasure and meanings *on their terms* (Alim, Paris & Wong, 2020). We draw on the concept of Third Space, where the formal and informal learning spaces intersect to create a space for emerging student-teacher interactions that are expansive, generative and historically profound (Gutiérrez et al., 1995). Third Space emerges when diversity, conflict or tensions within the learning space are directed towards rupturing, innovating, and reorganizing the official learning activity (Gutiérrez et al., 1995). Within Third Space where playfulness of children and youth are embraced, opportunities arise for challenging the traditional learning hierarchies, collectively redefining what counts as knowledge, and transforming pedagogical spaces into “a site where no cultural discourses are secondary” (Gutiérrez, 1995, p. 447). In this paper, we present examples where facilitators and child participants co-created spaces to express their intergenerational and emerging understanding of land, farming, and STEM, with joy and pleasure.

Methodology

We draw from participatory social design-based experiments research methodology (Gutiérrez & Jurow, 2016) that centers historicity, diversity, equity, and ecological resilience as design principles with aims to co-design just practices and futures in partnership with a range of communities. Our co-design was centered around a vision to design and study land-based learning through Soil Camp to amplify learning opportunities for refugee children and youth in STEM that are relevant and connected to intergenerational and community knowledge of soil, ecosystems, and farming on a regenerative farm (see Takeuchi et al., 2021). Our university team, composed of educational researchers, teacher candidates, and teachers who are mainly racialized multilinguals with diverse disciplinary expertise (e.g., mathematics, sciences, arts, and social sciences) designed and led activities to understand the soil and ecosystem better. In 2021, 65 youth and children (aged from 5 years old to 15 years old) and over 20 families joined our program. All attendees were refugees from Syria, Northern Iraq, Kurdistan, New Guinea, Pakistan, South Sudan, Ethiopia, and Eritrea who had resettled in Canada within the last five years. The activities during the two weeks of Soil Camp in July 2021 were documented using Go Pro and still cameras (total of 31.43 hours of video data) by both the participants and researchers, and

Handycam video cameras held by the researchers. In addition, each member of the research team has taken field notes right after each activity.

The analytic focus of this paper is one of the activities that participants engaged in where participants accepted and designated roles involved in a farming season and acted them out. The setting of the activity involved participants sitting in a circle on the land at the urban farm. The activity began with the facilitator prompting the question, “What is a farm?” and inviting participants to enact the events that happen during the growing season. Participants interacted with props made by the facilitator which included seeds, plants, farmers, worms, bees, weeds, butterflies, and vegetables, but they also spontaneously added additional props. Our analysis focuses on instances where the participants shared their knowledge about the soil, ecosystem, and community farming practices. Instances of intersection between the formal and informal script of the learning activity, co-creating a Third Space became our analytical focus (Gutiérrez et al., 1995). Through collective watching of these instances, we observed that the interactions during the activity were immersed in a sense of joy, humor, and playfulness among the participants. The sense of joy was evident both during planned pedagogical activities and unplanned moments through smiles, humorous interactions, and creative engagement with the activities, as the pedagogical approach supported and encouraged the identities, strengths and autonomy of the participants. Any interruptions to the planned activity were viewed as agentic and creative attempts by the participants to engage on their own terms. Participants not only showcased their intricate informal knowledge of farming, but also exercised their agency in choosing when and how to participate in the activity. Particularly, two representative episodes of activity were chosen to demonstrate children’s participation in the learning activity on their own terms.

Findings

Who wants to be a farmer?

This group was composed of six students and four facilitators. After acting out the roles of soil and worms, the discussion was directed towards including the role of farmers. When the facilitator asked for volunteers to become farmers, participants in the circle refused to take on the role and become physically disengaged (Figure 1a). As many of the participants were from farming backgrounds and had experience of farming on the land with their families, enacting the role of a farmer was assumed to be familiar and relevant to their life experiences. However, the refusal to take on the role of farmers could be related to multiple contextual powers and social hierarchy and social valorization (de Abreu & Cline, 2007). When all children refused the role of farmer, one of the facilitators accepted the role and was given a green paper hat. This hat caught the attention of some of the children who immediately became interested in taking up the farmer role (Figure 1b). In the context of the activity, the participant and facilitators overcame the hesitation to take on the role of the farmer by building on elements of joy and playfulness. In this interaction, this hat became a “pivot” (Vygotsky, 1978) that invited children to enter into a playful world, shifting the frame of the ideological world where the role of farmer and farming was valorized to one of playful engagement with farming.

Figure 1

(a) Participants become disengaged when asked to play the role of farmer, (b) when the green paper hat is associated with the role of the farmer, participants are enthusiastic to assume the role of farmer.



Once the role of the farmer was accepted, the facilitator invited the farmers to sow their seeds on the make-believe farm at the center of the circle. Lamiya took the role of the lead storyteller. When asked “how are you going to do it?”, Lamiya gave an embodied overview of the process with the help of Wassim and Farida as shown in Excerpt 1. For the next few minutes of the activity, the participants enacted the sowing of seeds and dynamically recreated a scenario where the worms, sun and water played a role in helping the seeds grow. The intricate knowledge of farming expressed by the students (excerpt 1) indicate that their initial hesitation to take the role of farmer was not due to a lack of knowledge or understanding. Instead their participation in the activity

was motivated and influenced by their desire for joy and playfulness (eg., wearing the hat). During the activity, the students used their unofficial understanding of farming and associated STEM literacy to negotiate and enact events in an official learning space, thus creating a collective Third Space (Gutiérrez et al., 1995).

Excerpt 1

- | | | |
|---|-------------|--|
| 1 | Lamiya: | We are going to dig over here ((removes some grass))
put a seed in it ((places the cardboard seed and covers it with grass))
then we plant some, we put some water in it ((enacting with fingers spread out))
then we wait for a long time ((Farida places her worm near the buried seed))
then the worms come in the soil and rub ((picks up the worm and moves around))
they go around everywhere |
| 2 | Farida: | [And they eat this ((taking out the buried seed)) |
| 3 | Wassim: | [What about the sun? |
| 4 | Lamiya: | And they eat ((takes the seed from Farida, but is interrupted)) |
| 5 | (F) Mahati: | What about the sun? |
| 6 | Lamiya: | The sun shines on the soil till (1.0) till it makes the plants grow |
| 7 | Farida: | This could be the sun ((brings a green ball and places it in the circle)) |
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Dinosaurs and Rabbits

This group was composed of nine students and four facilitators. In this episode, it was harvest season, towards the end of the activity. The facilitator introduced rabbits as animals that would visit the farm. There were only two props available to play the roles of rabbits. Instead of being passive observers of the events on the farm, the participants exercised their creativity and agency to take up active roles. Bringing in dinosaur toys from their ongoing games outside the context of the soil camp activities, the participants grouped dinosaur toys as ‘animals’ who were trying to eat the vegetables along with the rabbits. Participants initially navigated tensions around incorporating carnivorous dinosaurs into a farm where the only available food was vegetables. This created a temporary impasse, where the dinosaurs were unable to participate on the farm (utterances 1 to 4 in excerpt 2). However, when the facilitators prompted the participants to save the produce, they creatively distorted the behavior of carnivorous dinosaurs, who immediately proceeded to consume the vegetables. The act of resisting the collection of the produce from the farm was a source of humor and joy for the participants (utterances 6 and 7 in Excerpt 2).

Excerpt 2

- | | | |
|---|-------------|---|
| 1 | Usub: | I (.) eat(.) meat(.) ((holding a dinosaur toy with both his hands)) |
| 2 | Emine: | ((inhales deeply to show shock, then picks up a tomato and extends his hand towards Usub’s dinosaur toy)) Okay, here you go.
[You need to eat healthy now. Eat(.) eat a tomato ((waves the tomato near the dinosaur)) eat a tomato |
| 3 | (F) Mahati: | [let’s pick our vegetables so that we can eat it ourselves (,) oka:y? |
| 4 | Usub: | <I hate tomato> ((Emine takes back the tomato)) |
| 5 | Raneem: | Let’s protect all our toma:toes, all our ca:rrots, all our zucchinis |
| 6 | Usub: | ((places a tomato in the dinosaur’s mouth and turns towards Raneem)) they’re going to be protected in my stomach |
| 7 | (F) Mahati: | ((Hazim puts down a robot toy, picks up a dinosaur and slowly moves his dinosaur towards a zucchini in front of him to eat it))
No:: <I’m going to take it> ((Hazim looks at Mahati as she grabs the zucchini from him and smiles slightly)) |
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Participants introduced dinosaur toys from their informal games in the formal learning space to recreate a unique farming scenario. Altering the course of the activity by bringing in dinosaurs to the farm reenactment, students supported the emergence of a Third Space with renewed opportunities to participate and rewrite the script (Gutiérrez et al., 1995). With the conclusion of dinosaur rampage, one of the children who assumed the role of farmer turns his storyline back to the rabbits. Earlier in the activity, he described potential interactions with rabbits, “there is a rabbit that wants carrots or anything, if it can’t pull it out, the rabbit will be scared. When he goes away, you can pull some carrots out and leave it. They will come and eat it”. Building on the



same narrative, he created a physical separation from the rest of the farm where he placed a few carrots, a tomato, and a rabbit. Ignoring the facilitator's plea to pick up all the remaining produce from the farm, he offers to put on a show. Through the enactment of a compassionate farmer who allows a rabbit to eat his carrots and tomatoes, the participant challenges the facilitators' goal of saving all the produce for human consumption. Instead, he draws on his understanding of the values of farming and depicts care for more than humans. Throughout this episode, participants constructed a layered and complex learning space not only based on their intergenerational knowledge and values of farming but also based on their everyday games and toys. Through their unique interactions with dinosaurs and rabbits on the farm, participants demonstrated that their ways of knowing and being "both remains rooted and continues to shift in the ways culture always has" (Alim, Paris, & Wong, 2020, p.267).

Discussion

In the context of STEM education where the formal curriculum is deeply rooted in Eurocentric knowledge systems, we presented co-constructed interactions where non-dominant ways of STEM knowing and doing can be made visible. Specifically, we draw attention to the emergence of a Third Space (Gutiérrez et al., 1995) driven by participants' desire for joy and playfulness. In this space, interruptions to the planned learning activity through play and humor were not acts of disruption, but agentic and creative attempts by the children to bridge formal and informal knowledge of farming and embedded STEM literacy. Our paper highlights how participants and facilitators co-constructed ways of challenging prominent socio-political ideologies around the discipline of STEM through moment-to-moment interactions that center joy and pleasure. This research builds on critical transdisciplinary approaches to STEM teaching and learning that aims to decenter the western capitalistic discourse and center knowledge and experiences of historically marginalized communities (Strong et al., 2016; Takeuchi et al., 2020). Through this study, we learned that making STEM discipline relevant to *fixed* cultural knowledge around farming, building on refugee families' farming background, is not sustaining or transforming (Alim et al., 2020). The findings highlighted how children exercised their agency to participate and bring in relevant knowledge around farming *on their terms* and co-determine the trajectory of the learning activity. While being cognizant of relevant STEM knowledge, participants created unique narratives to humorously and playfully engage with their peers and facilitators. These observations advance critical transdisciplinary approaches to STEM education towards accounting for complexity of non-dominant learners, dynamically shifting relationships with their communities and evolving cultural practices (Alim et al., 2020). Particularly, to effectively advocate for the interests of non-dominant communities, our work advocates for adoption of desire-based pedagogical approaches (Tuck, 2009) that build on learner creativity, agency, and joy.

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