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EDITED AND REVIEWED BY
Lianghuo Fan,
East China Normal University, China

*CORRESPONDENCE
Janette Michelle Hughes
janette.hughes@ontariotechu.ca

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Editorial: Maker education: opportunities and challenges, volume II

Janette Michelle Hughes[1]* and Kristiina Kumpulainen[2]

[1]Faculty of Education, Ontario Tech University, Oshawa, ON, Canada, [2]Faculty of Education, University of British Columbia, Vancouver, BC, Canada

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Editorial on the Research Topic
Maker education: opportunities and challenges, volume II

The concept of maker education has emerged as a dynamic and engaging pedagogical approach that empowers students to explore, tinker, create, and innovate. In recent years, maker education has surged in popularity, as educators recognize the potential of this approach to empower learners to become creators, innovators, problem solvers, and entrepreneurs by encouraging them to design, build, iterate and share their ideas. The articles in this Research Topic on Maker Education are written by a collective of researchers who have been involved in maker education over the past decade. The articles explore various facets of maker education, offering unique insights and perspectives that contribute to our understanding of making, makers, makerspaces, and maker pedagogies.

Hughes et al. in their article titled "*It feels like I have a camera in my eye*," introduce an innovative methodology for capturing students' learning experiences in maker-oriented classrooms. By employing first-person-perspective recording technology, such as "spyglasses," the researchers focus on the students' in-the-moment digital making processes. This unique vantage point provides alternate narratives that enrich our understanding of students' skills and competencies. The study not only underscores the technical and ethical considerations associated with such methodologies but also calls for future investigations that bridge the gap between researcher interpretation and the insider perspective.

In a context where disparities in scientific education persist, Avendano-Uribe et al. explore the potential of maker education to address inequalities in STEM education in rural and remote communities in Colombia. Their article, "*Resourcefulness, narratives, and identity in STEAM education*," explores the transformative power of makerspaces. Through narratives, resourcefulness, and a focus on student identities, the research project investigates how maker activities might empower students to create artifacts that resonate with their cultural values and local contexts. The authors advocate for a holistic approach that takes into account these three key elements, providing a roadmap for future research and policy development to foster maker education in underrepresented regions.

The significance of supportive relationships in maker education is underscored by Dahn et al. in their article, "'*This isn't me': navigating tensions and opportunities to translate interests toward entrepreneurial making*." This paper investigates the role of adult mentors in nurturing youth interests within out-of-school makerspaces. The authors highlight the importance of brokering connections and creating a supportive environment that transcends the boundaries of the makerspace itself. By integrating youth voice, cultural connections, and entrepreneurship opportunities, this study contributes to the expanding literature on entrepreneurship education within the context of makerspaces.

Peppler et al. explore the intersection of maker education and mathematics in "*Craftland is Mathland*." By weaving together traditionally female-dominated fiber crafting with mathematical engagement, the authors introduce the concept of "Mathland." This innovative approach envisions a space where mathematical insights are seamlessly integrated into creative endeavors, highlighting the participants' lifelong and "lifewide" engagement with mathematics. Their findings emphasize the importance of immersive math experiences and engagement in crafting communities, challenging educators to create more inclusive and holistic maker educational environments.

Shifting our focus to the realm of computational thinking, Veenman et al. present a pilot study that explores the relationship between computational thinking and logical thinking in "*The relationship between computational thinking and logical thinking in the context of robotics education*." Through a robotics course, the authors examine the potential impacts on 14-year-old Dutch students' logical and computational thinking skills. The study establishes a significant positive correlation between the two, while also raising questions about the effectiveness of robotics education in fostering these skills.

Finally, Leskinen et al. offer a sociocultural perspective on innovation practices in maker education in their article, "*Learning to innovate: students and teachers constructing collective innovative practices in a primary school's makerspace*". Drawing on ethnographic video data from a primary school makerspace in Finland, the authors explore students' and teachers' collective innovation practices that lead to innovation creation. These include taking joint action to innovate, navigating a network of resources, and sustaining innovation activities. Additionally, they highlight the role of teachers in facilitating open-ended projects and nurturing students' ownership over their work, uncovering mechanisms that promote students' learning to innovate. This important research provides a concrete understanding of how innovation happens in a makerspace.

These six articles collectively enrich our understanding of maker education from diverse perspectives. From first-person point of view recordings to the creation of "Mathlands" and fostering innovation, they point the way for a more holistic, inclusive, and impactful approach to education in an era of constant change and innovation. As we continue to explore the multifaceted realm of maker education, these articles serve to guide educators, researchers, and policymakers toward a more innovative and equitable future for learners.

Author contributions

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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