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## Learning of Older Adults in Makerspaces

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### Abstract

To address inclusion and equity issues related to older adults in makerspaces, we examine the void in current discussions of the maker movement and its intersection with adult learning theories.

*Keywords:* Makerspaces, maker movement, older adults, transformative learning, positive aging

### Purpose of the study

The maker movement has initiated promoting open education, information literacy, and lifelong learning by emphasizing creating products and knowledge, peer-to-peer skill sharing, collaborative learning, and hands-on practices (Batykefer, 2013). Even though this movement has gradually expanded its population to serve, concerns are still left that it is not welcoming all learners unfamiliar with this new type of learning environments, technologies, or people (Culpepper & Gauntlett, 2022; Melo & Nichols, 2020). One of those excluded—or less-attention-paid-to—groups is older adults. We aim to bring awareness about the questions of inclusion and equity issues in makerspaces, focusing on learning experiences of older adults. As its initial step, we examine the void in current discussions of the maker movement and review the basic components of learning in makerspaces as well as adult learning theories.

### Practical and theoretical lack in current discussions of the maker movement

The initial maker movement was centered on—so criticized because of its—White, middle-class, male-dominated practice in both research and practices (Halverson & Sheridan, 2014). Except for a few exceptions (e.g., Welliver, 2017), most efforts in the maker movement for adults were mainly driven by and for White males in their 30-40s rather than underrepresented adult populations. Also, the maker movement for adults has highlighted individual production, such as using 3D printers, rather than their collective learning processes. Besides, the learning aspect of the maker movement has been rapidly developed for children and youth, especially to support interest-driven and collaborative learning in the science, technology, engineering, and mathematics (STEM) pipeline (Bonnette & Crowley, 2020). Its theories and practices, however, can be applied to older adults only in very limited ways as they focus on disciplinary learning and STEM career development. Therefore, it is needed to establish theories and practical guidelines for older adults' lifelong learning in the maker movement.

### Makerspaces, adult learning theories, and older adults

To propose a new frame to understand older adults' learning phenomena in the realm of the maker movement, we examine the connections between the features of makerspaces and adult learning theories. The unique characteristics of the maker movement, such as design thinking, sense of community, and collaborative creation, could be understood from self-directed learning, transformative learning, and sociocultural theories of adult learning. According to Halverson and Sheridan (2014), the three components of the maker movement include (a) making as a set of activities, (b) makerspaces as communities of practice, and (c) makers as identities. The maker movement supports not only learning during **making activities** but also the

possibilities inherent in working with others (Culpepper & Gauntlett, 2020). Older adults' maker activities can be understood as a sociocultural learning mediated by symbolic and material tools and by modes of social participation (e.g., CoP, Activity Theory). Also, a **makerspace**, as a learning environment, can promote adults' learning through facilitation (Knowles, 1980; Willett, 2018) rather than pedagogy for formalized settings. Furthermore, as a **maker**, individual adults have the chance to channel creativity and build creative identities (Karwowski & Kaufman, 2017). This process is connected to a lens of transformative learning, which is the most significant form of learning in adulthood (Mezirow, 1995).

Also, these aspects of the maker movement can particularly help older adults who may demand more social and technological support, while at the same time promoting positive aging (Bar-Tur, 2021). Components to positive aging include having opportunities for social interaction as well as feeling as though one has purpose in life (Bar-Tur, 2021; Welliver, 2017). Seniors who engage in learning and creative activities experience less isolation and better mental and physical outcomes (Schull, 2013; Welliver, 2017).

### Significance

We integrated theories of adult learning, older adults, and makerspace into understanding older adults' maker movement and learning. This examination can contribute to developing a foundation of theoretical and empirical exploration of older adults' learning in makerspaces.

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