Summary

Petrich, Wilkinson, and Bevan (2013) explore three areas of design principles related to tinkering. The authors share their thinking related to the activity design, environmental design, and facilitation practices involved in creating and supporting rich tinkering experiences for museumgoers. They wrote a chapter on tinkering, which describes how the group initiated, cultivated, and facilitated a making and tinkering space on the floor of a museum. Specifically the chapter outlines principles for the activity design, the tinkering space, and the facilitation practices. The authors conclude by connecting these principles to conceptions of learning in general and engineering practices more specifically.

Research Design

Petrich et al. wrote a chapter on tinkering, which describes how the group initiated, cultivated, and facilitated a making and tinkering space on the floor of a museum. Specifically the chapter outlines principles for the activity design, the tinkering space, and the facilitation practices. The museum group spent four years conducting interviews and observations of museum attendees engaged in tinkering community and shared the general principles they used to design and facilitate the tinkering space.

Findings

The chapter explores three areas of design principles related to tinkering. The authors share their thinking related to the activity design,
environmental design, and facilitation practices involved in creating and supporting rich tinkering experiences for museumgoers. First the design of rich tinkering activities involves building on learners’ prior interests and knowledge, which included using found objects and materials that are recognizable from everyday life. An example includes dissecting mechanical clocks and then building on the theme of telling time in other available tinkering projects. Other elements important for designing tinkering activities include providing materials that are surprising, complex, and allow for people to observe, inquire, and make iterations as they play. In addition to materials, activity design should invite learners to explore multiple pathways for inquiry using tools and concepts from science as a means to greater discovery and play. For example light play activities learners use multiple light sources, objects, and distances to project light paintings on a screen. This activity requires learners that explore “relationships between the light source, the shadow maker (the object), and the screen (on which the shadow is projected)” (p. 60) in order to create the image they desire on the screen. As people tinker, they go deeper into inquiries and complexify their projects and their thinking as they design.

As the authors developed and adjusted the environmental design of tinkering space, they intended to help museumgoers “transition from the free-roaming browsing behaviors of the museum to the more focused activities of a workshop-like setting” (p. 61). Some important environmental design elements include displaying past projects to inspire new ideas, creating activity stations that enable people to talk to each other across stations, and putting all materials out in accessible ways so that as visitors ideas and needs change, they can also adjust materials without waiting for assistance. Finally the authors place tables with materials and supplies near the edges of the space to encourage people to look at other projects and share ideas with others as they gather more supplies for their own projects.

Facilitators play a critical role in the tinkering studio on the museum floor. They set the tone for hesitant visitors to encourage them to engage and feel welcomed to create in the workshop-like space. The facilitators help people get started by letting them know that the space is open to anyone, place some initial materials in front of them, and show them a few initial moves for the given activity to help museumgoers start a project. They allow people to follow their ideas, avoid trying to jump in and instruct or tell tinkers that they might get stuck if they try something, but respond when learners communicate that they feel stuck. Sometimes they will notice, reflect, and focus the participants’ attention on particular materials to guide them out of a challenge without solving problems for them. Finally facilitators play a role in reflecting on the tinkering process, the creations people had made, and clarifying participant’s thinking based on their inquiries and designs.

Theoretical Basis

The chapter draws heavily on Constructionism, which emphasizes the construction of artifacts as a “process of being, doing, knowing, and becoming” (p. 53). In addition to constructionism, the authors reference Vygotsky and his discussion of learning as an ever-expanding participation in the social world where people are continually making connections across places, kinds of skills, and ways of valuing the world.