11 Apprenticeship as a model for teaching and learning in formal education

Camilla Groth

Introduction

Apprenticeship is often referred to as the raw model for teaching and learning—a form of situated learning that is based on transmitting practical but also contextual knowledge. In the field of professional crafts, learning has traditionally been organised in guilds and apprenticeships. These are social and material learning contexts that take place in a workshop setting in which novices are guided by a master craftsperson and a group of other practitioners at different levels of expertise. Drawing on my own experiences of being a potter's apprentice for three years at the age of 17–20, I see many benefits to informal learning, such as the situatedness of the learning, the enculturation that comes with the setting, and the real-time feedback from a master. Through a case of online teaching of a craft practice during the COVID-19 pandemic, I discuss the role that imitating and mimicking actions have and the role of showing as part of telling in learning a body-based practice, such as throwing clay on a potter's wheel.

Apprenticeships of different kinds have existed in the past as sometimes undemocratic and suppressive forms of forced labour, tainting the idea of apprenticeship learning. However, when well organised, apprenticeships facilitate a learner's active participation in their own learning through working on real-world tasks and problems that are contextualised and meaningful, and build on the learner's previous knowledge and skills. Additionally, the learner is a member of a larger practice community that supports the enculturation of habits and mindsets of the field. This gives an extended purpose to the activity and an arena in which the learner can articulate and reflect on their learning. In this way, the learning is deep and grounded, both in a psychophysical and social dimension. All of this is echoed in the central themes of the learning sciences (Sawyer, 2014, p. 4), which claim that "students learn deeper knowledge when they engage in activities that are similar to the everyday activities of professionals who work in a discipline" and that "the natural progression of learning starts with more concrete information and gradually becomes more abstract" (Sawyer, 2014, p. 11).

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While being the natural way for teaching and learning crafts for centuries, such informal education has given way to more systematic formal education, away from the authentic context of the practice field, away from its expert practitioners, and into school buildings and classrooms. This is more effective in many ways—more equal, democratic, structured, and controlled—but might miss the grounding of concepts in real-life contexts (Abrahamson & Lindgren, 2014; Kiefer & Trumpp, 2012). The domain of craft practice will serve as an example for discussions on how to reconnect teaching and learning to more situated forms in this chapter. Here recorded video materials or even online contact with a practitioner might bring some of the contextual and embodied aspects to the classroom.

Apprenticeship learning as understood through 4E theory

4E's grounding of cognition in embodiment, enaction, and embeddedness, and the extended mind is realised very concretely in craft practice and in apprenticeship models of teaching and learning. The *embodiment* of skills and knowledge means that they become second nature to the practitioner, and there is no need to think separately from doing—making is a form of *thinking through actions*, tools, things, and materials—or *thinging* (Malafouris, 2014). Thinking and imagination are *extended* through tool use (Baber, 2015), and skills and knowledge are *enacted* and *embedded* in the social and material context of the studio and other practitioners (Lave & Wenger, 1991). In informal learning situations, much practical know-how is transmitted through being in a situation of practising with others, during which learning happens not only through verbal instruction but through immersion and enculturation. Through mimicking, students gain new habits and gestures that are embodied and become part of the learner's identity. The learner is also guided in their own exploration of material affordances and how to adjust to material resistances.

Human-environment coupling and material engagement

Human-environment coupling and especially Gibson's (1986) visual ecology and theory of information pick-up as *affordances* have influenced the formation of 4E theory. Instead of leaning on a passive intake of information, humans and other organisms actively engage with the world to gain information. Simultaneously, organisms learn of their own bodily abilities in relation to the environment and objects in it. A chair affords sit-ability for a human but climb-ability for an ant. Similarly, in craft practice, engagement with materials relies on the person's understanding of what the materials and situation afford in relation to the skill levels of the person. A novice, like the girl in Figure 11.1, may experience that the material offers resistance or is challenging to handle before she learns how to angle the knife purposefully.

Figure 11.1 Craft practitioner Linda Lindblad shows Greta Lindblad-Jönsson "how to do it". Photograph by Helena Åberg.

Material resistance is thus experienced when material properties or the skills of the practitioner are stretched to the borderline. At the same time, this is also the sweet spot for learning, as repeated interaction with materials in this way builds experiential and embodied knowledge.

An attempt to describe such active engagement in relation to materials has been made by Malafouris (2018, p. 755) in his material engagement theory (MET): "Material engagement is the basic process by which we discover the feel and functions of our senses and through them the capacities, limits, and boundaries of our bodies". Material engagement also suggests a shared situational becoming that involves the maker, material, and tools, and the extension of the mind into the environment. As the child in Figure 11.1 uses the knife, her intention to create a flute is extended from the hand and via the tool to the material, the wood. The knife extends the girl's cognition, but her skills in using the knife also limit the actions possible.

Situated learning, enculturation, and cognitive apprenticeship

Unlike the classroom setting, a craft studio seldom offers situations in which an event is separated from its context, other practitioners, or the habits and attitudes that have formed around the type of event. Bourdieu (1977, pp. 78–9) writes about the *habitus* of practitioners, and the social background for any practice. The context of the studio and the *community of practice* (Lave & Wenger, 1991), grounds the practitioner in the community and enculturates

the learner that enters it. This means that the cognition of the practitioner is embedded in the social and material environment where the practice takes place or has its roots (Brown et al., 1989). Learning from experts in the field is important in this context and allows scaffolding (Reiser & Tabak, 2014) by following those who are more advanced, and thus learning in the *Zone of Proximal Development* (Vygotsky, 1978). Collins and Kapur (2014, see also Brown et al., 1989) extends the notion of apprenticeship learning to a "cognitive apprenticeship" that includes the generalising of knowledge that may be applied in other contexts. The six teaching methods associated with cognitive apprenticeship learning are Modelling, Coaching, Scaffolding, Articulation, Reflection, and Exploration (Collins & Kapur, 2014, p. 113–114); however, I would also add mimicking to this list.

Studio pedagogy: Show and tell!

Embodied cognition and experiential knowledge form the base of craft practice, but such knowledge is largely automated and, therefore, mostly tacit and, to some extent, unconscious (Groth, 2022). This means that many of the skills and attitudes taught and learned are not explicable in linguistic form. Instead, gestures and "pointing" ground the "show and tell" type of instruction, modelling, and enculturation in the apprenticeship model of learning and in studio pedagogy (Sawyer, 2018).

Master craftspersons are not always aware of their knowledge or might think of details as mundane, thus such aspects of the practice might not surface in a lecture room or in writing. Often, the knowledge is contextual and may not pertain to "general" examples. However, craft processes are time- and space-contingent activities that often rely on a certain path or trajectory to succeed. In the situation of *acting* or performing the practice, the task's constraints surface and are more readily explained by showing what, how, and when to do certain acts. Showing and telling through demonstrations and side-by-side hands-on activities facilitates both the articulation of craft knowledge and students' learning through mimicking and modelling the actions. Even the similar position of bodies helps in understanding which direction a movement is done, as seen in the same-way positioning of the child and crafts person in Figure 11.1.

Mimicking, embodied simulation, and gestures

Craft actions are simulated and eventually embodied by mimicking hand positions, pace, pressure, gestures, and body positioning. This bodily communication of skills and learning has allowed traditional craft skills to be passed down through generations. When mimicking someone's actions, Gallese (2019) suggests that it is possible to understand the physical and emotional intentions of others by internally simulating them. Embodied simulation has to do with how we react and align with each other in a kind of kinaesthetic empathy (Lehmann, 2012, p. 14). This builds on automatic and

even unconscious bodily contagion of actions and is quite different from what is normally meant by empathy. For example, the careful and respectful handling of a knife can be sensed by observing a master's careful use. Practitioners may not always be able to articulate important aspects of their embodied practice, but a novice may be able to sense and imitate the actions without verbal instruction.

Gestures and the role of bodily habitus and ways of acting with a material play a large role in this context. Gestures are seen as the embodiment of thought (Härkki, 2018; Hostetter & Alibali, 2008). A teacher or a crafts expert who is invited into the classroom can silently show someone how to do something by concretely moving their hands and showing the correct movements as a visual gesture or in a direct physical "hands-on" showing (see also Groth et al., 2013). In the next section, I show an example of teaching a material skill, the art of throwing clay on a potter's wheel, in an online video setting. The example shows how visual gestures may help a student to mimic movements in real-time even through a screen, when real-life tactile guidance is not available. Through this, I wish to introduce the idea of bringing more contextualised content from the studio into the classroom through online communication with external experts.

Teaching and learning through bodily guidance

Visual gestures and active feedback

I will now show an example of how I taught higher education students clay throwing by showing craft gestures that the students could mimic via Zoom, as I was not able to visit the campus during the COVID-19 pandemic. As a teacher in arts and crafts in the spring of 2021, I was faced with the task of teaching a group of 13 bachelor students clay throwing on the potter's wheel at a campus in Norway. The campus had just re-opened for students after a lockdown, but travelling was still not recommended, and I was not able to get to the campus. The only way to engage with them was online, which I did through individual teaching sessions on Zoom. As a pre-task, I asked them to watch YouTube tutorials of clay throwing and a purpose-made video tutorial that I had prepared in my studio of how to throw a basic cylinder on the potter's wheel.

Each student was given a 45-minute session in a schedule over three days. The students were asked to use a computer or tablet that they could place in front of them by the throwing wheel in the clay studio so that they could have a Zoom meeting with me while they were throwing clay on the wheel in a synchronous teaching and learning situation. The Zoom sessions were also recorded. During the sessions, I noticed that I was gesturing a lot while talking, and I started collecting screenshots of the gestures I had made from the recorded videos (see Figure 11.2).

It surprised me how "embodied" the situation of guiding the students was, even though we engaged in the practice through a screen and not through

Figure 11.2 Screenshots from the recorded online teaching session by the author.

being physically present. The individual Zoom sessions with the students allowed me not only to follow their actions with the material in real-time and to give them direct feedback on their actions—it also allowed me to show the hand movements and procedures through gestures that they could mimic. The feedback from the students was that they were pleased with having such individual feedback on their actions for a longer time, and they felt that they had the possibility to ask questions and try out new techniques while being guided through insecure moments in the throwing practice. This shows that a sense of participatory guiding, including real-time and relevant feedback on actions, was possible even in a long-distance setting. As the sessions were recorded and sent individually to the students, they were able to return to the sessions and watch in slow motion to repeat important actions in their processes. While physical guiding in real materials is naturally preferred, and before the pandemic, I'd never recommended such a way for guiding students, I now think that this way of engaging external experts—either live or through pre-recorded media—can help bring in the context of learning situations into the classroom when real physical presence is not possible.

Facilitating apprenticeship learning in the classroom

While arguing for apprenticeship learning in formal learning settings, the reality is challenging in today's schools. Many more subjects are taught now than

when people were learning crafts in the home environment or the professional workshop, and few teachers are experts in all areas. This means that only a few specialised subjects or skills can be taught in an experiential manner. Large student group sizes are also problematic as apprenticeship requires close and attentive teaching through participatory instruction (Collins & Kapur, 2014). One way to expose students to authentic practitioners is to invite experts into the classroom to "show and tell" with the group. As this is an expensive way of exposing students to experts, a way to mitigate costs is to at least show audio-visual references and the context for crafts through video documentation of the practice and practitioners. The aspect of embodied simulation is also effective when mediated in audio-visual media (Gallese, 2019). As the use of video tutorials has grown rapidly due to the internet and YouTube, there is great potential in using videos for contextualising craft situations, even in school environments, utilising the effects of embodied simulation.

Nielsen (2009/2019) writes that *learning by doing*, as proposed by John Dewey in the 1930s, is important in the field, but that this can be combined with the concept of *learning by watching*. Nielsen suggests that schools can use digital learning resources such as videos when teaching students how to knit (Nielsen, 2009/2019, p. 37). She further writes that in this way, the video can be shown repeatedly, and the teacher's time can be spent with those students who need concrete help. As shown earlier (see Figure 11.1), mimicking relies on vision and the possibility of acting in real-time with the expert practitioner, modelling their actions. When hands-on contact teaching is not possible, the visual aspect of a craft action can be facilitated through forms of visual media. Audio-visual recordings capture and document aspects of craft practice in ways that are not possible through writing, such as sequences of activities, their order, pace, rhythm, or the sounds of the tools in contact with the material. Even the haptic dimension can be inferred by audio-visual connotations through our pseudo-haptic understanding (Pusch & Lécuyer, 2011); that is, the *imagined* sense of touch that we may recall from previous similar experiences.

Implications for education

While just viewing a video doesn't involve any actions on the student's part, it is possible to combine it with practical try-outs in material. In such cases real-life feedback on the students' actions still needs to be given by the teacher. However, bringing the master into the classroom—even in an audio-visual format—exposes the students to the habitus and culture of the practice and lets them study under the influence of those in a more situated way that is normally not possible in formal education.

Students can engage with the video of the practice repeatedly, rewinding and fast-forwarding—something that they wouldn't be able to do in a real-time session. They may also find the answer to their question faster than waiting for the assistance of their teachers in the classroom. Many schools have

invested in 1:1 touchscreen devices and tablets, and through these, the students may follow a master practitioner in video tutorials, individually and at their own pace.

Grounding students' learning experience in material engagement, as well as making meaningful connections to the culture and situation of that practice, gives new dimensions to the experiences and might help students' motivation and active initiatives. YouTube and other social media sites provide endless resources for tutorials; school-aged children already use these sites to seek quick answers on how to do something. As teachers, it is necessary to take this dimension of the students' personal learning environment into account—teachers are no longer the sole owners of knowledge or authorities of best practices (Dietrich et al., 2020). Multimodal learning experiences (Fors, 2013; Fors et al., 2013) and video pedagogy (Gedera & Zalipour, 2021; Pink et al., 2016) are already recognised means for bringing about an embodied dimension into otherwise static and disconnected study forms (see also Abrahamson & Lindgren, 2014, p. 365). Computer technology is advancing towards simulation environments that take the idea of situated learning into the realm of expanded realities, seen by many as the future of education.

Several researchers consider that audio-visual media will grow into the dominant teaching medium on the internet and will become a standard part of education (Laaser & Toloza, 2017). Video plays an important role, especially in Massive Open Online Courses (MOOCs), and is also used for practice-based demonstrations (tutorials) in both formal and informal contexts (Bétrancourt & Benetos, 2018). YouTube is the most used resource for instructional videos generally, and even very young students know how to access these. However, to align the content with the desired context, subject matter, and student level, the challenge is to create the right type of video tutorials (Guo et al., 2014). The right content should also be combined with a pedagogical process that advances the intended learning objectives. For example, in my own setting, I asked the students to first watch YouTube videos and then a purpose-made video, and after this, we had the online session that was recorded and sent to them for later reflection. While ideally, the environmental context of a studio setting could also have been conveyed better, this was not possible at the time of the pandemic but could be enhanced in the future. Utilising multimodal media for learning purposes can be applied to any physical practice, as they allow for modelling, coaching, and scaffolding, as well as making tacit dimensions visible and more readily analysed and articulated.

Conclusions

Apprentice learning facilitates active participation in learning through working on real-world tasks and problems that are contextualised and meaningful, and build on the learner's previous knowledge and skills. Facilitating informal learning models in formal settings is challenging due to numerous topics and

large group sizes. While visiting studios and experiencing practices and materials in their contexts would be preferable, bringing experts to the students in an audio-visual form may help convey the context and situatedness of the practice. Carefully selected videos bring the world into the classroom and give a multimodal dimension to the studied practice, even at a distance.

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