

DESIGNING PARTICIPATORY LEARNING

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ABSTRACT

The beginning of the twenty-first century has been described as a time of development for social innovations through which people use, share, and create knowledge in ways that differ fundamentally from those of previous eras. The topical and widely accepted focus of education should be toward twenty-first-century skills. However, there is no consensus regarding in which kind of environment these skills can be practiced and neither is there consensus on how to organize the instruction for learning these skills. To enhance our students' chances of becoming active agents in their own lives and learning in settings far beyond classrooms, a design-oriented learning system is proposed as a context for practicing twenty-first-century skills. A learning system is understood as a system that extends the network of resources, communities, and tools. Respectively, a design-oriented pedagogy has been developed for organizing the ways that diverse people, resources, and tools interact with each other, and for developing the best opportunities for learning from the system. The presented research-based design perspectives may help educators in different institutions to facilitate connected learning across spaces and communities.

KEYWORDS

Design-oriented pedagogy, participatory learning, collaborative designing, learning system

1. INTRODUCTION

At the beginning of the twenty-first century, we witnessed the emergence of the knowledge society, which is argued to have had profound effects on our health, educational, cultural, and financial institutions, and to have created an ever-increasing need for robust lifelong learning, innovation, and the knowledge and skills to solve the problems of the future (Scardamalia, Bransford, Kozma & Quellmalz, 2011). Rapid advancements in technology and socio-cultural developments have shifted the cultural logics and social practices that shape the ways we interact with people and with physical and conceptual artifacts. These changes point us toward a more participatory culture, one in which people have an expanded capacity to share and circulate their ideas, and one in which networked communities can shape our collective agendas (Clinton, Jenkins & McWilliams, 2013). Jenkins et al. (2008) define a culture of participation as “a culture with relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one’s creations, and some type of informal mentorship whereby what is known by the most experienced is passed along to novices.”

Fischer and Redmiles (2008) have argued that if the future of work and living is based on collaboration, creativity, problem identification, and framing, and if tolerance, change, and intelligence are spread over different cultures, disciplines, and tools, educational systems should promote trans-disciplinary competencies that will prepare learners for meaningful and productive lives. Similarly, Mizuko et al. (2013) argue that the function of schooling should be to prepare students for contributing to, and participating in social life, which includes economic activity, but also civil society, family, and community. Pursuing such forms of connected learning can lead to broader communal and societal outcomes such as high-quality culture and knowledge products, civically oriented collectives, and diverse and equitable pathways to opportunity (Mizuko et al., 2013).

At this point, many researchers prefer to discuss twenty-first-century skills, often emphasizing aspects such as being able to communicate and collaborate to solve complex problems, being able to adapt and innovate in response to new demands and changing circumstances, and being able to use technology to create new knowledge and expand human capacity and productivity (Binkley et al., 2011). However, it is widely recognized that the traditional ways in which schooling has been organized are no longer sustainable in

providing students with the knowledge and skills they will need for the future (Scardamalia & Bereiter, 2006; Thomas & Brown, 2011; Schank, 2011; Binkley et al., 2011). Recent discussions about disconnected learning, student disengagement in learning activities, and the non-relevance of learned skills and knowledge compared to the knowledge and skills demanded by the workplace and everyday life have emphasized problems in the existing learning ecosystems (Liljeström, Enkenberg & Pöllänen, 2014).

Rheingold (2013) argues that these changes in our society challenge educators to develop participatory pedagogy assisted by digital media and networked publics, which emphasizes catalyzing, inspiring, nourishing, and facilitating learning that is essential to individual and collective life in the twenty-first century. Joseph and Czarnecki (2013) note that we should no longer merely focus on questions pertaining to digital media access, but, increasingly, to inequalities in access regarding opportunities for participating in cultures supporting the development of these needed competencies and skills, such as working effectively and respectfully with diverse teams, exercising flexibility and having a willingness to make compromises to accomplish common goals, and assuming shared responsibility for joint efforts while valuing individual contributions. The participation perspective for learning and education is focused not on delivering predigested information to our students, but on providing opportunities and resources for them to engage in social activities, to create a shared understanding among diverse stakeholders, and to frame and solve authentic and personally meaningful problems (Fischer, 2013). It aims to support students so that they become active members who participate in culturally and personally relevant activities in which they appropriate various cultural resources that enable them to participate in and contribute to the larger society (Wells, 2010).

Creating learning opportunities that help students to prepare for the knowledge society and to participate in, contribute to, and benefit from knowledge-creating organizations must be informed by what we know about how people learn and the changes in learning environments that this implies (Scardamalia et al., 2011). If we want to develop these interactions in schools and create new kinds of learning spaces that people can change, design, experiment with, and use in a variety of ways, we have to intervene in the current practices in a purposeful way to change the relationships between people and resources (Loi & Dillon, 2006). Thus, this paper presents a design-oriented pedagogy (DOP) as an initiative for the creation of the new kinds of learning systems required in twenty-first-century societies.

2. DESIGN PERSPECTIVES

To enhance participatory activities situated in schools, out-of-school environments (especially natural and cultural environments), and in technological environments, our research group has developed a DOP (Vartiainen, Liljeström & Enkenberg, 2012). The DOP has been constructed on three pillars: participatory learning in extended and generative communities as a vital concept for learning; diverse technological resources and infrastructure as social and personal tools; and co-development, both as a pedagogical model, and as a powerful social innovation for solving the multidisciplinary and complex problems people face in their everyday lives (Vartiainen et al., 2012; Liljeström, Enkenberg & Pöllänen, 2013; 2014; Vartiainen, 2014). The DOP shares several similarities with inquiry-based pedagogies such as knowledge building (Scardamalia & Bereiter, 2006), progressive inquiry (Hakkarainen, 1998), project-based learning (Krajcik & Blumenfeld, 2006), and learning through collaborative design (Seitamaa-Hakkarainen, Viilo & Hakkarainen, 2010).

The DOP aims to transform learning by paying attention to the ways that diverse people, objects, artifacts, and tools interact with each other, and offers a pedagogical model and process, together with the underlying conceptual system embodied in the design. Figure 1 presents a design-oriented learning system of interconnected elements that derive their full meaning in relation to each other (Vartiainen, 2014).

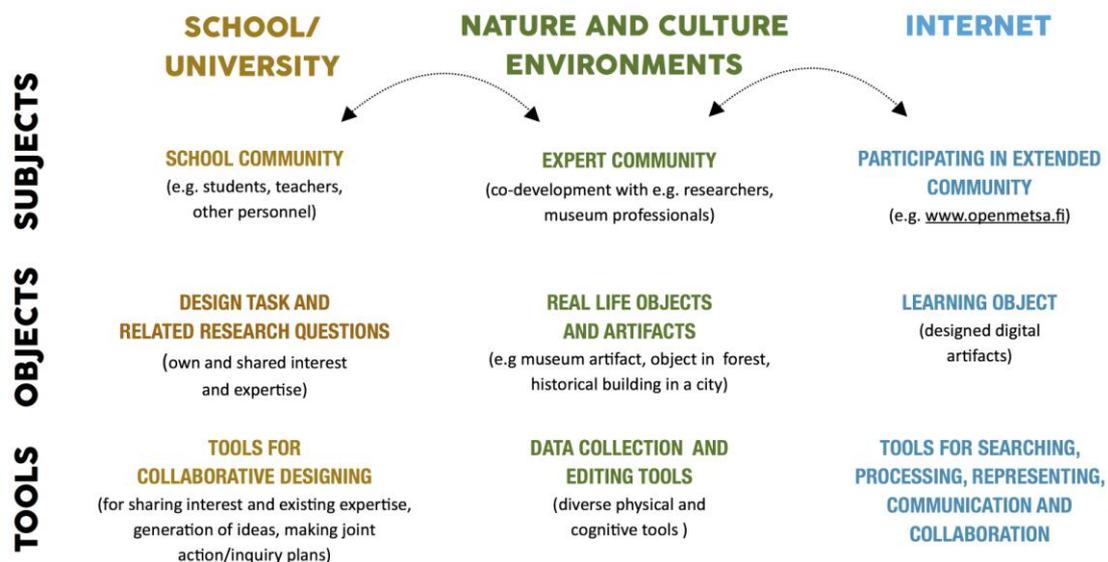


Figure 1. Design-oriented learning process, described as a system (Vartiainen, 2014).

2.1 Extending the Learning Community

While the overall goal of schooling is to prepare young people to be able to participate responsibly and productively in the wider society, the actual practices through which schooling takes place anchor learning mostly in classrooms (NETP, 2010; Wells, 2011). In the DOP, the participatory perspectives on learning are emphasized in situating the learning in extended environments and generative communities (Vartiainen et al., 2012). Classroom educators are encouraged to build learning communities consisting of students, fellow educators, and professional experts from museums, community centers, and other settings who can mediate and support the student's learning on demand (NETP, 2010) and enhance the activities in which students learn and work together by taking on different roles, perspectives, and responsibilities, and by applying their own expertise. Consequently, the learning environment is expanded beyond the walls of the school or university to authentic environments and related social networks, in which heterogeneous participants offer diverse ways of working together, mediating, and enhancing individual and communal expertise.

The important instructional feature of the learning system is the design task, which orients and structures the activities emerging in the network of the subject, objects, and tools. The design task aims to connect the heterogeneous interests, experiences, and expertise that learners bring to the school from other contexts (e.g., from home) with the affordances of the learning environment and for the use of the extended learning community. Complex design tasks and objects can be addressed from different perspectives (Seitamaa-Hakkarainen et al., 2010; Hakkarainen et al., 2013) and they intentionally bring into play multiple disciplines, multiple ways of working, and different habits of the mind and community (Lombardi, 2007). They also provide students with opportunities to design and perform inquiries (Krajcik & Blumenfeld, 2006), and to choose different kinds of perspectives and paths with which to engage in inquiry with the extended learning community (Liljeström et al., 2013a). Consequently, the participation in an expert community is driven by the students' own interests and research questions, where they work together in teams in pursuit of advancing their own understanding to be shared with the extended community (Vartiainen, 2014). The aim is to offer opportunities for the learner to join and be part of a larger social network, where people learn through their interactions and participation with others, in fluid relationships that are the result of shared interest (Thomas & Brown, 2011).

2.2 Extending the Learning Resources

In contrast to traditional "chalk and talk" classrooms in which knowledge is abstracted from real-life situations, the DOP involves collaborative work with conceptual and material artifacts that represent the

phenomenon in question. Furthermore, what distinguishes the design-oriented approach from the traditional school field trip to e.g. a museum is that the learners are encouraged to connect with the world around them through the objects and real-life artifacts they self-organize for their own action and thinking. The articulation of the shared task and the related research questions of the students themselves can be understood from one point of view as identifying, negotiating, and selecting the real-life artifacts that become part of the students' own learning resources in relation to their own interests, past experiences, and future intentions (Vartiainen, 2014). As noted by Kangas, Seitamaa-Hakkarainen, and Hakkarainen (2011), these intentions guide the design process, but may transform when the process advances. Thus, it includes the process of perceiving the function and meaning of the selected real-life artifacts and related information resources in terms of achieving a particular goal.

The artifacts in natural and cultural environments can be approached from different perspectives with various questions in mind and can take on different functions when the students select and embed them in their own activities (Vartiainen, 2014). A particular artifact and the related information resources (e.g., digital or printed media) can assume a different meaning for the different students, with the artifact and related information resources being a focus of inquiry for some, while, at the same time, being a background for others, for example (cf. Nicolini, Mengis & Swan, 2012). Furthermore, the human relationship with the real-life objects and related information resources is not considered as constant, but it may develop, as they are encountered differently in evolving design processes in which connections are established with other resources, tools, and subjects (Vygotsky, 1978).

In the DOP, the learners are deliberately provided with the possibility and means through which to share their ideas, thoughts, and their own designs related to real-life artifacts with the extended community in the form of a learning object (Vartiainen et al., 2012, see an example of a learning object: www.openmetsa.fi/dopvideo). The notion of the learning object in design-oriented learning is defined as “designed digital representations from real objects in context that are related to the phenomenon in question and to tools that mediate the process of the negotiation of meaning” (Vartiainen et al., 2012). The construction of learning objects shares the idea of dialogical inquiry by engaging students' learning in creative work with externalized ideas, and the objectification and materialization of thoughts in respect of creating their own (digital) artifacts in interaction with which the subsequent inquiry takes place (Hakkarainen et al., 2013; Seitamaa-Hakkarainen et al., 2012). As pointed out by Thomas and Brown (2011), promoting the opportunity for the students to share the outcomes of their inquiry activities with an extended collective structured around participation (e.g., www.openmetsa.fi) is very different to putting the outcome onto the school wall or into the public domain. By offering the students the chance to collaborate with their peers, to take part in face-to-face interactions with expert communities, and to be contributing members in an online community with a more dispersed population, the students are deliberately offered different forms of participation (Jenkins et al., 2008). Viewed through the lens of participatory culture, it offers the opportunities for and the means of participating in the practices of the social production of knowledge (Jenkins et al., 2008) in distributed networks of communities, resources, and tools.

2.3 Tools for Making, Thinking, and Sharing

The DOP also aims to enhance the opportunity to apply diverse physical, cognitive, and social tools and technologies in collecting, developing, and sharing information. The technologies that the students own provide tools to enhance learning across different contexts, and to collect various empirical data when implementing inquiries in authentic environments (Vartiainen & Enkenberg, 2013a). When working with expert communities, the learners are provided with the possibility of being able to use domain-specific tools that characterize such expertise (Vartiainen, 2014). Additionally, social media provides tools for learners to organize, develop, and share knowledge, and to collaborate within and outside the school community (Vartiainen et al., 2012).

However, rather than dealing with technology in isolation, the DOP takes a more systemic approach, by considering the interrelationship among tools, artifacts, and the communities, and the activities in which they are embedded. The tools derive their full meaning and functional role in relation to the other elements of the learning system in situated social practice: the subject(s) using the tools (e.g., students, experts, and teachers' agency); the object (e.g., shared tasks, students' own research questions); and the artifacts of their actions (e.g., material and conceptual); and the context of using the tools (e.g., designing, making inquiries, sharing

the results). Thus, the subject and real-life artifacts are not connected by the tool in a mechanical manner, but are dynamic interactions, and are grounded in particular activities. Different tools are needed during the process of collaborative designing and when implementing the inquiry activities in extended learning environments, and during this evolving process, the same tool may be used in different ways and may serve different purposes (Vartiainen, 2014). As Claxton (2002) argues, if the main thing we know about the future is that we do not know much about it, then the educators should not only provide young people with the tools of today, but should help them to become confident and competent designers and makers of their own tool environments when solving emergent problems.

3. SITUATED CONTEXT

Like activity systems (Engeström, 1987), the elements of the DOP system are not static but are continuously interacting with each other, through which they define the emerging learning system as a whole. This emergent form of the system ultimately shifts our focus to the situated context that these elements form, promoting the students' possibilities of shaping it. It proposes a clear transformation from a predetermined learning environment toward the creation of dynamic and extending learning networks (Vartiainen, 2014). Fischer (2013) argues that collaborative design and social creativity are necessities for the most complex and important problems in today's world. Rather than just emphasizing "what is already known," the "design" metaphor emphasizes the creative element in the interpretive activities of learners that goes beyond giving back what is already there (Säljö, 2010). Mäkitalo, Jakobsson, and Säljö (2009) note that we are now held accountable not just for what is in one particular artifact, text, or even in large numbers of information resources; the summarizing of what is known is not enough. Rather, it is our ability to make insightful and productive use of the collective resources in locally relevant ways that is of importance (Mäkitalo, Jakobsson & Säljö, 2009).

As argued by Liljeström et al. (2014), the focus is transformed in emerging learning ecosystems that offer the students the opportunity to self-organize and utilize the afforded community, technology, and information resources to construct their own interpretations of their chosen research tasks and related inquiries. This view overlaps with Barab and Roth's (2006) notion of affordance networks. They define this concept as the collection of facts, concepts, tools, methods, practices, agendas, commitments, and even people, with respect to an individual, that are distributed across time and space, and are viewed as necessary for the satisfaction of particular goal sets. According to Barab and Roth (2006), education should connect learners to an ecological system that stimulates an appreciation for, and a desire to be a part of contexts through which these networks take on meaning, as well as equipping students so that they can create new and useful affordance networks. From this perspective, learning and participation is about successfully participating as part of an ecosystem, which involves increasing the possibilities for action in the world (Barab & Roth, 2006).

The DOP utilizes the notion of self-organizing systems of participatory cultures by emphasizing that the process is not scripted in detail in advance, but has to be negotiated and actively designed by the learners themselves. It matters that various resources and more experienced community members (e.g., teachers, experts) are supporting and available for the use of the learners, but it is essential that the learners should be positioned in a key role when defining the specific network of artifacts, tools, and information resources in terms of their own intentions and negotiated research questions. Yet, the learners are supported by the instructional model and by joint activities with mature members of the community to design and build learning paths that mediate the practices of innovative professional or scientific communities (see Vartiainen et al., 2012).

As argued by Jenkins et al. (2008), schools, museums, and other public institutions have an essential role to play in creating more equitable opportunities for participating and contributing one's own expertise to a process that connects many intelligences and communities outside of the school. When the students participate in practices to address shared intentions beyond the school, the students become, at that moment, enculturated, participatory, contributing community members, and the students and the extended community's ecosystems may overlap (Barab et al., 1999). At the heart of the idea is to allow students to participate in knowledge-creating activities around shared objects and to share their efforts with the wider community for further knowledge building that is a legitimate part of civilization (Scardamalia & Bereiter, 2006).

4. FUTURE DIRECTIONS

Following the principles of design-based research, the perspectives and instructional model of the DOP have been tested and validated in several design experiments during the last seven years with groups of learners whose backgrounds differ from each other. Our research group has conducted several design experiments to develop the model and the related design principles to their present “state of the art.” Liljeström et al. (2013; 2014) have demonstrated how open-ended learning tasks and collaborative inquiry approaches can mediate the kind of authentic practices that scientists apply. Likewise, Vartiainen and Enkenberg (2013a; 2014) have examined the types of learning systems that emerge when different student groups collaboratively design their own specific network of museum artifacts, tools, and other resources in terms of the shared design task and their own specific research questions. Vartiainen and Enkenberg (2013b) have also assessed how applicable and acceptable the DOP is from an international perspective, and they found that the teachers saw the pedagogy as one way of being able to change and develop their current school practices toward more innovative ones. Furthermore, our research team, representing multidisciplinary expertise concerning educational and forest sciences, has constructed the OpenForest portal (<http://www.openmetsa.fi/>) for people to share, develop, and organize knowledge and to collaborate within and outside of the education community and institutions (Vanninen et al., 2013).

Summing up these design experiments and development work, there is evidence that the DOP can fruitfully be applied in diverse contexts for enhancing participatory learning situated across spaces and communities. However, the pedagogical design is not considered to be at a point of finality and perfection, but continues to be refined as part of an evolving design-based research process (Bielaczyc, 2013). While the DOP has been studied over eight years through several case studies in Finland, the next step in this longitudinal design-based research is the enlargement of these innovations. We are especially interested in developing international collaboration for future research on design-oriented knowledge creation and participatory learning in networked communities. This could provide us with interesting opportunities through which to approach global phenomena such as sustainable development as a shared design object for learning and crowdsourcing in an international network of students, teachers, researchers, experts, and interested others. At the same time, it would provide researchers with interesting opportunities to examine how and in what ways the participants from different backgrounds use and share their own interests, their own and afforded tools and technologies, and local physical and social environments as resources for learning driven by joint co-development. The promotion of inquiry activities that enable students to participate in the co-development process with local and international communities might be particularly important for learning in a world of constant change in which the use of diverse knowledge resources, tools, and network connections are essential aspects when solving complex, emergent problems and creating situation-based solutions. It also emphasizes the importance of *design* in twenty-first-century learning (Vartiainen, 2014).

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