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Connected learning with media tools in kindergarten: An illustrative case

Henriikka Vartiainen, Teemu Leinonen & Saara Nissinen

Abstract

Connected learning is claimed to support children to connect their formal learning with wider social network and media tools in an interest-driven and inquiry-oriented manner. In a formal context there are few successful implementations of connected learning. This study explores how a kindergarten community of 8 adults and 42 children, equipped with digital media tools, organized connected learning as sociocultural phenomena and inquiry learning. With an ethnographic approach, unstructured interviews and multimedia portfolios provided data for deductive content analysis.

The results indicate that meaningful objects of inquiry were found through the children's own discoveries with media tools used in forest trips. The social capital and the children's own funds of knowledge were harnessed with iPads and a trail camera, installed to capture wildlife. Precisely, the trail camera use and the resulting images mediated connections with parents and grandparents, outside experts, and peers. Children were actively naming, classifying, and categorizing the trail camera data, and also searching, evaluating, and applying new information. Children were also creating, sharing, and openly publishing their own insights that drew on a unique mix of meaning-making resources and media tools. The results can be used in the learning design of early-childhood education and care.

Keywords: Sociocultural theory, participatory culture, connected learning, inquiry learning, media tool

1. Introduction

Over the past decade we have witnessed the emergence of extended learning networks

and online communities where people from various backgrounds can connect with each other and co-design artifacts and projects collaboratively (Kafai & Peppler, 2011).

These socio-technological developments point us toward a more participatory culture, one in which we have relatively low barriers to participation, strong support for creating and sharing one's ideas, and some type of mentorship in which what is known by the most experienced is passed along to novices (Jenkins, Clinton, Purushotma, Robison, & Weigel, 2008). The participatory culture as a phenomenon is affecting all areas of human life from society to politics, and from domestic life to economics.

Despite widespread optimism about the potential of digital technologies and social networking, only a small minority of children and youth take advantage of these opportunities (Barron, 2006; Ito et al., 2013). To overcome the risk of an emerging participation gap (Jenkins et al., 2008), Ito and her colleagues (2013) argue for the need for a *connected learning* approach that supports children and young people to link their formal learning with society, family, and community in an interest-driven and inquiry-oriented manner. Connected learning is realized when the learner finds peers who share interests, when academic institutions recognize and make interest-driven learning relevant to schools, and when expert communities and institutions provide support and resources for learning and participation (Ito et al., 2013). However, how connected learning activities and environments should be designed and carried out in formal contexts is yet to be established.

To take connected learning into use, there is a need to use media tools smartly. Viewing and creating recordings with media tools can foster dialogue, as the recording can later be shared and discussed within various communities from peers, to families, and with the public at large. Furthermore, knowing that others can see and listen to the recordings supports students' task focus (Leinonen, Keune, & Purma, 2012). Media

tools for recording (stills, video, and audio) are good at supporting dialogic, transformative, and critical reflection (Leinonen, Keune, Veermans, & Toikkanen, 2016).

In order to develop the mindsets and skills needed in the rapidly changing world, Mitchel Resnick (2017) suggests that people of all ages should be focusing more on imagining, creating, playing, sharing, and reflecting, just as children do in traditional kindergartens. Given this insight, we aim to study how the theories of connected learning as sociocultural phenomena and inquiry learning appear in a kindergarten that is equipped with digital media tools and teachers with a high level of pedagogical education.

1.1 Sociocultural framework

Jenkins, Ito, and Boyd (2015) emphasize that even if participatory culture is related to recently emerging technological platforms, it should be understood in sociocultural rather than in technological terms. Correspondingly, in this study, we draw from classical sociocultural and cultural–historical theorizing of learning and participation that originate from the intellectual work of Lev Vygotsky (1978) and his followers, rather than from the latest media/social media studies. This theoretical standpoint generally views learning and participation as systemic processes that connect the subjects (the actor or actors participating in the activity), the object or purpose of their activity, and the tools and resources that actors use as mediational means for acting on the object (Cole & Engeström, 1993; Vygotsky, 1978). Using this theoretical framework, connected learning can be viewed as participation in social practices (Wenger, 1998), in which the activities are bound to the context (Sfard, 1998), and mediated by different artifacts and tools (Cole & Engeström, 1993).

Vygotsky outlined that human contact with the world is indirect and mediated by the use of diverse physical or psychological tools (Wertsch, 2007). Tools as well as artifacts are the products of a sociocultural evolution that has modified how people regulate their interactions with the world and with each other (Jarvis & Pell, 2005). Through scaffolded activities with more competent peers and adults, children also gain an understanding of the tools, artifacts, and discourses that are integral to everyday family and community life (Paradise & Haan, 2009), and gradually appropriate these tools as a repertoire for their own activity (Wertsch, 1998).

Moll, Amanti, Neff, and Gonzalez (1992) argue for the need to develop a positive view with the kinds of expertise and affordance networks that children are already connected to when they enter into formal educational institutions. Their *funds of knowledge* approach refers to the knowledge, skills, and social networks children and their families sustain and develop in their everyday practices (Moll et al., 1992). Hedges and Cullen (2012) note that children's funds of knowledge not only influence their personal interests, goals, and identities, but the ways in which children engage in the activities within the walls of their educational institutions. As children's interests reflect on what they experience in their everyday lives, educators have to harness children's own perspectives and ideas when designing learning activities and environments that connect with the reality that they are living in.

1.2 Inquiry learning

In the context of the school, a number of previous studies have made significant contributions on ways to support students' active participation and collaboration in knowledge-building inquiries (e.g. Hakkarainen, Paavola, Kangas, & Seitamaa-Hakkarainen, 2013; Scardamalia & Bereiter, 2006). From the sociocultural and

cultural–historical standpoint, these studies highlight the role of multifaceted objects that organize the activities of a learning community around some shared project or venture (Paavola, Engeström, & Hakkarainen, 2012). According to Paavola et al. (2012), these objects could be epistemic entities (research problems, working theories, or pieces of knowledge), designed artifacts (prototypes, concrete products), joint events (e.g. exhibitions), or pursuits regarding societal challenges. Collective efforts at co-designing solutions to multifaceted problems is likely to prepare the learners for solving unanticipated problems that they may encounter in the future (Hakkarainen, 2010).

An essential aspect of collective inquiry is generating the participants' own perspectives and questions that contribute to the shared object (Hakkarainen, 2010). The generation of ideas and questions can be supported through an exploration of the context where the complex real-world problems are situated (Vartiainen, 2014; Vartiainen, Nissinen, Pöllänen, & Vanninen, 2018). Especially environments in the natural world (e.g. forests, lakes) offer unique encounters with dynamic, unstructured, and multisensory modes of information, and full-bodied primary experiences through which learners may create different kinds of interpretations and objects of activity (Chawla, 2007; Rajala & Akkerman, 2017).

One important dimension by which learning from and with objects in the natural world may be facilitated would be learners' interactions with others: with their peers and teachers in their school community, with their families and local community, and with communities of experts (Vartiainen et al, 2018; Nissinen, Vartiainen, Pöllänen, & Vanninen, 2019). Wells and Claxton (2002) note that our ability to carry out an activity effectively resides not only in abilities to work and collaborate; it is also distributed across the artifacts and tools that are to hand. The development of object-oriented ideas is inherently a tool-mediated action that involves the re-combination of multiple

resources for a specific purpose (Vartiainen, 2014). The children should be both minds on and hands on when materializing and sharing their evolving ideas, understandings, and the results of their inquiries through the creation of materially or digitally embodied artifacts (Seitamaa-Hakkarainen, Viilo, & Hakkarainen, 2010). Linking diverse intellectual resources and tools for the development of novel artifacts also expands the potential for production-centered learning and participation (Vartiainen et al., 2018).

1.3 Research questions

The nature of the study was explorative—to gain an understanding of activities using media tools in a real kindergarten. To frame the study, we defined some initial research questions that were then iterated and reformulated several times. At first, the research data collected in the study have been analyzed in the theoretical framework of connected and sociocultural learning and inquiry learning. In the second round of analysis, the initial research questions were specified and focused. With several iterations, we concluded with the following research questions:

- (1) How do teachers and children formulate connected objects of inquiry?
- (2) How do the media tools help the community to expand and include more actors in it?
- (3) What kinds of artifacts did the children create and what were the roles of these artifacts in their connected learning activities?

2. Research design

The present study is part of a larger design-based research project in which the aim is to iteratively develop and study connected learning networks and practices (Vartiainen et

al., 2018; Nissinen et al. 2019). The context of this study is an educational project for in-service teachers organized in the spring of 2015 at the University of Eastern Finland. The project aimed to support teachers and educators in co-designing forest-related learning projects together with their kindergarten children. The forest served as a joint, multifaceted phenomenon for the project, as it is present in the everyday lives of the children living in the area.

During the project, five joint network meetings with teachers and researchers were organized. In these joint meetings, the teachers were encouraged to reflect on their own project activities, and to share the emerging ideas, connections, and challenges. While working with the teachers participating in the in-service teaching development project, we noticed that many of the practices described in the research literature on connected learning, the sociocultural approach, and inquiry learning were already everyday practices in the kindergarten (Vartiainen et al., 2018). This setting attracted our interest to explore the teachers and their kindergarten's inquiry project combining storytelling, wildlife exploration in a forest, and the innovative use of media tools.

2.1 Participants

Twenty-seven kindergarten teachers and child care nurses or assistants (referred to herein as “educators”) participated in the whole in-service project. While an earlier publication has introduced the in-service project in more detail (Vartiainen et al., 2018), the analysis of the present study focuses on one illustrative case project of kindergarten teachers (N = 2) and child care nurses and assistants (N = 6) working with two groups: a group of 3–5-year-old children (N = 22) and a group of preschool children, 6–7 years old (N = 20). In Finland, kindergarten teachers are highly trained and are required to have a three-to-four-year bachelor's degree. Finnish early-childhood education (ECE)

professionals typically work in multi-professional teams with qualifications. This means that the child care nurses and assistants also have a professional degree from the field of social care or pedagogy.

Although the kindergarten children were part of the reported learning project, the main data for this study do not consist of the direct actions of the children but focus on teachers' descriptions and interpretations of their activities. No demographic details about the teachers or their kindergarten children were collected in any systematic manner.

2.2 Research data and analysis

The main data reported in this study are from the unstructured interviews conducted as joint discussions in five meetings with teachers, educators, and researchers. A total of 8 hours and 12 minutes of discussions with the participants were recorded. From this data, six teachers' and educators' stories were selected for more detailed content analysis.

Moreover, the project portfolios produced by the participating teachers and educators in the field were used as a secondary data source (e.g. when relevant to interpret the data from the unstructured interviews). The teachers' and educators' project portfolios were multimedia presentations that recounted the group's personal story of their learning process, complemented with photos, video clips, and recordings of the children's own questions, thoughts, and artifacts, as well as substance-specific knowledge discovered during the inquiries.

The analysis of the data employed qualitative content analysis that was performed in collaboration by two researchers. First, the audio-data from the collaborative discussions were transcribed in full for analysis purposes, consisting of 230 pages (Arial 12, spacing 1.5). Second, we proceeded to identify key episodes of the

selected project based on several readings of the transcripts. In this study, an episode was defined as a thematically meaningful unit that consisted of a connecting idea, thought, or suggestion (see Chi, 1997) grounded in group inquiry activities. An episode was considered to begin when the object of the teacher's discussion shifted and to end when it shifted again to something else (Kumpulainen & Rajala, 2017).

In the third analysis phase, we focused on selected episodes and used a deductive approach in identifying the mentioned 1) *subjects* (the group of children, their peers and teachers, family members, and experts); 2) *the objects of their inquiry* (learning task); and 3) *the tools, technologies, and information resources* used as mediational means (e.g. iPads, books). Then, we proceeded to explore the activities and environments that teachers associated with these main elements of the learning system. In particular, we focused on how the subjects, objects, and media tools were connected to the main environments and phases of inquiry learning (Vartiainen et al., 2018). This stage resulted in the merging and dividing of themes as follows: 1) *the creation of a shared object*, 2) *collecting and analyzing data*, and 3) *sharing the results*. In the next section, we present representative excerpts derived from each phase to de- and reconstruct teachers' insights into the emerging, connected learning process.

2.3 Limitations

The present study has limitations particularly as it focuses only on the activities of small groups of children and adults. Also, the interpretations of emerging learning activities were retrieved from teachers' descriptions of the project and not from the direct actions of the teachers and their kindergarten children. Accordingly, the results of this case study are context-bound and transforming them fully from this unique setting to other educational contexts might be challenging. To address these concerns, a deliberate effort was made to provide rich descriptions of the guiding aims and theory,

the design features of the intervention, and the impact that these features seemed to have on the emerged learning activities (Barab & Squire, 2004). As Edelson (2002) argues, the objective of this kind of research is different from traditional empirical research, and the same standards should not be used to judge it. Therefore, this study should be primarily approached by the two important evaluation metrics of design-based research: novelty and usefulness (Edelson, 2002).

3. Results

In this section, we provide more detailed descriptions of the connected learning and inquiry learning activities in the kindergarten under study. First, we show how the teachers and children formulated connected objects of inquiry. Second, we show how the community of inquiry expanded through the use of media tools. We also illuminate what kinds of media artifacts the children created during their inquiries and what the role of these artifacts was in their connected learning activities.

3.1 Formulation of connected objects of inquiry

The analysis of the data revealed that the shared object of the project was grounded in the children's real-world experiences and joint reflections of them. In excerpt 1, the preschool teacher depicts how the object of inquiry was transformed through imagination fueled by the forest.

Excerpt 1: So, in a way, our group started already before Christmas. We saw a weasel while we were looking for the traces of the elves. And we had a project on that. We also evaluated the project with the children. What was fun? And what was interesting? And we studied the weasel as well. The children were trying to figure out where to look for information. From dad, and grandpa, and the library, and the Internet, and so on. Then we used the Internet and books for information on the weasel. But we only saw it once. And then in the evaluation, it came out that it was

a little bit boring that we didn't see it again. And then this one child in fact, whose grandparents' property we're making the field trip to, said that if only we had a robotic camera that could be taken to the woods.

At first, the group went to the forest to search for traces of imaginary creatures such as elves. As the environment of the natural world offered unexpected encounters with wildlife, the object of inquiry turned from elves to weasels. Through the weasel, the object-oriented ideas of the children connected with information resources and expertise found from the Internet, the library, as well as from their own social networks, including their parents and grandparents. However, the children's own evaluation of project activities indicates that the children were losing their interest as the object under investigation was difficult to observe authentically. As a solution to the emergent problem, the children themselves suggested a media tool, a robot camera, to capture the life in the woods. The analysis further illustrated that the children's initiatives were not ignored by the teachers but further developed. The teacher elaborates on the children's idea of using a trail camera in the further inquiry.

The analysis of data revealed, further, that the local forest environment was produced differently by the peer group of children aged 3–5, who, later on, joined in with the preschoolers' inquiry. Our second example (excerpt 2), from the teacher of these 17 children aged 3–5, demonstrates how the meaningful object of inquiry was found through the children's own on-site observations and imagination:

Excerpt 2: We went looking for the traces of animals to the woods. Images were taken on the iPad and then, the kids themselves, found the hare's tracks. And then there were traces of other animals, and then they thought of which animals they could be. They strongly felt that there had been a wolf chasing a rabbit. And then one three-year-old said that no, it was Ms. Dragon. So, the dragon's traces were found there.

And now hopefully, when we go to the field trip and install the trail cameras, something new emerges. And this will be taken to arts, sports, and drama ...

In the example, the teacher aims to make children interested in traces of animals by taking the children to a nearby forest. The children are making on-site observations and the iPads were used as a tool for capturing the children's discoveries. The traces of animals engage children in the negotiation of meaning, and instead of providing the correct answer with respect to the identification of them, the teachers focus on different meanings that the children themselves gave to their own discoveries. The excerpt further illustrates how the children's interpretations and imagination were also used as a basis for designing future activities and the use of media tools in the project. Furthermore, the themes of animal traces, forest dragons, and other objects from the children's inquiry were planned to be taken into other activities such as arts, sports, and drama.

3.2 Connecting with families and experts with media tools

When designing the ways in which to implement the children's ideas of inquiring further about the wildlife, the teachers turned to the parents, as illustrated in the following excerpt from the teacher of the children aged 3–5 years:

Excerpt 3: So, it's this family's home state. And there's some kind of a small hut for shelter close by. We can use it for resting, eating our packed lunch, and such ... There are also logging sites close by. And this father said that there are animals, too. They have even seen bears.

As excerpt 3 illustrates, the children's, teachers', educators', and families' connections were strengthened on demand when they saw the opportunity to deepen and expand the inquiry. It was negotiated that the trail camera should be installed at the home area of a child living in the countryside. Here, the teacher depicts the uniqueness of the

environment, the affordances of the field, and positions a parent as an expert who has tacit knowledge about the habits of the animals such as deer living in that area.

Hereafter, the two groups of children and their teachers installed the “robot” camera in the field. The father and two university researchers (biologist, forest scientist) helped the children in the installation. The trail camera itself was borrowed from the university researchers. As these screen captures from the field trip video further show, the media technologies were used as a tool for observing the forest as well as for documenting the various activities of the children (figure 1).

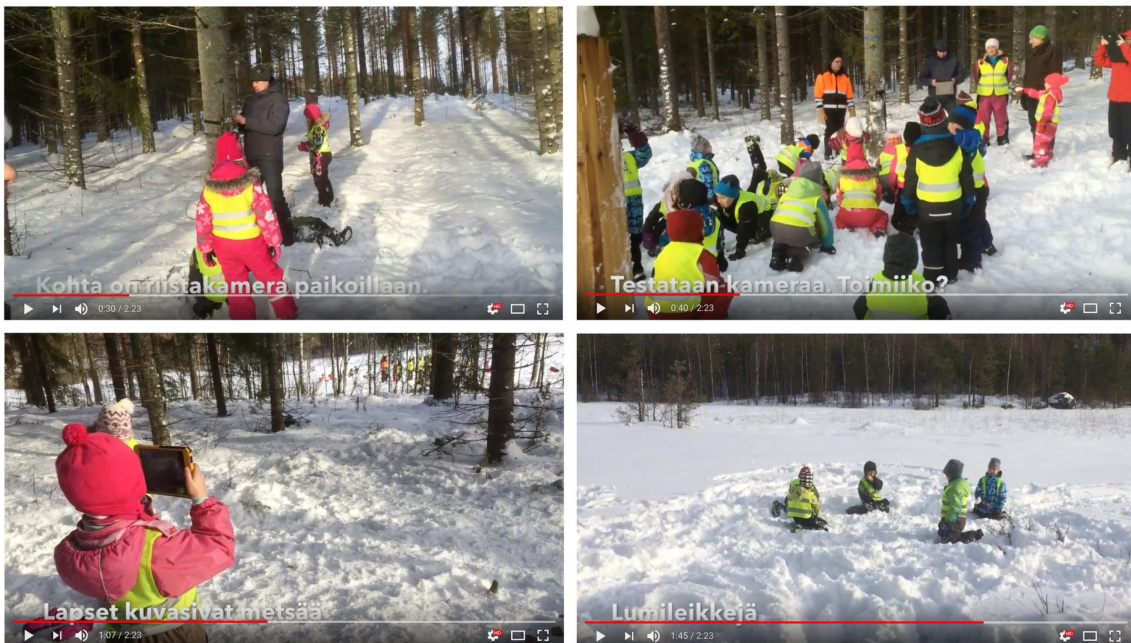


Figure 1. Technology-mediated data collection *in situ*.

The analyses revealed, further, that the interest-driven inquiry of the children also expanded to their homes, as illustrated in excerpt 4:

Excerpt 4: And families and grandparents have also joined our project. Many grandmothers and grandfathers have asked us for the link to the trail camera page, where you can watch those animals. And the father of one child is also involved. He brought this ... (shows a hare's paw to the others).

Everyone out loud: Oh!

The community of learning grew in an interest-driven manner as the children's families and grandparents began to follow the trail camera at their homes and together with their children. With respect to the funds of knowledge, the advancement of inquiries was further supported by the information resources brought by the parents. While taking part in such evolving activities, the children were likely to participate in various kinds of object-oriented discourses mediated by these diverse materially, digitally, and socially distributed resources.

3.3 Creation of connected artifacts

During the project activities, the teachers encouraged the children to materialize their evolving ideas through several kinds of activities such as by drawing, singing, storytelling, and by making material and digital artifacts. The creation of the artifacts was mediated and assisted by media technologies and various kinds of information resources. The teacher of the group of 3–5-year-old children explains how the tool-mediated data derived from the home area was analyzed at the kindergarten (excerpt 5):

Excerpt 5: Kids have learned to use non-fiction books. Every time we visited the trail camera page, the adults did not tell them which animals were in the pictures, but the kids themselves figured it out that we can look at the book. The boys went to search for some books on animals, and the whole bunch was searching what animal it is. And they found it ...

Excerpt 5, together with figure 2, illustrates that now the children were exploring their surroundings with the help of the trail camera and computers. The teacher guided the children in taking responsibility for the data analysis, explanation, and interpretation. When the children were identifying animals appearing in the real-time data from the

trail camera, they began to search authoritative resources, and the whole group engaged in collaborative problem solving.



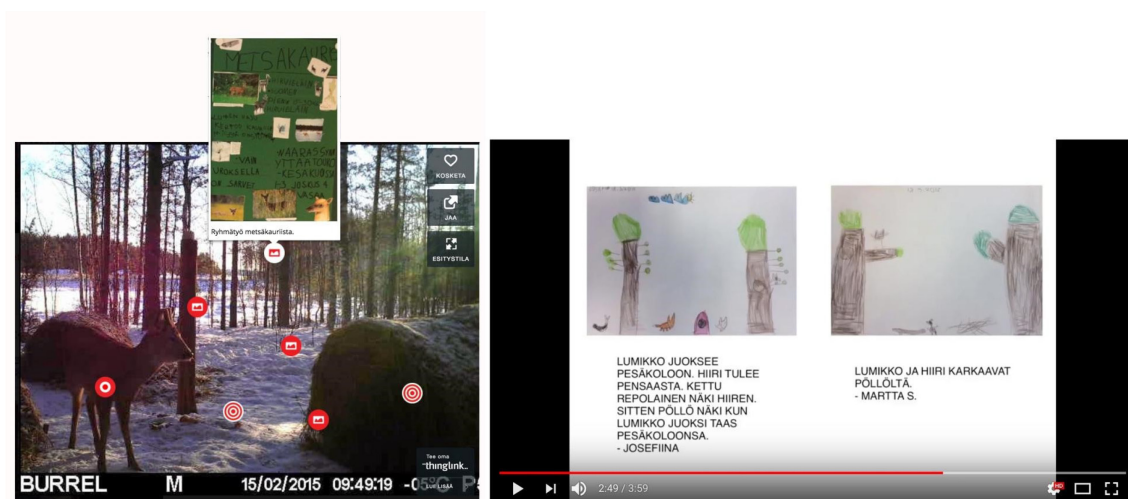
Figure 2. Children using computers and information resources in the analysis of trail camera data.

The preschoolers were guided to work with their peers and to create joint presentations about the animals appearing in the trail camera data. These posters included substance-specific information that the children had searched for from the Internet, books, and magazines, and wrote down by hand. As excerpt 6 illustrates, the children were also evaluating the relevance of information in terms of their object of inquiry.

Excerpt 6: But then, with preschoolers, as we were searching for information, also online. And they were already writing the word “wolf” or “deer” and then we Googled. Some of them would read out loud from Wikipedia. Then we were searching images, and that’s when media literacy and critical thinking came along. What is this? Well, what is this then? Not everything is relevant. That not everything you get for results with that word is related to this topic, so we reached a new dimension. We were working on the group work where we searched for animal pictures and cut pictures from papers, and we identified the different animals.

Later on, one of the cardboard posters was photographed and embedded in the ThingLink¹ service. To the ThingLink presentation, children included pictures from the field, information from primary sources, and facts found from secondary sources (figure 3). Accordingly, the children were working with their peers, practicing information searches, and using various kinds of media tools to build and share external artifacts that represented the objects of their interest.

While the ThingLink presentation represented more factual knowledge, the group of preschoolers was also engaged in collaborative storycrafting (Karlsson, 2013). The preschool group created a story so that children were continuing the story after each other. Each child also illustrated their part of the story with drawings. The final story is a 4-minute video with the story written by the children, the children's drawings, and the voice of one of the children reading the scripts (figure 3). Apparently, the story reflected the children's own experiences and interpretations of the interest-driven inquiry by depicting how weasels, deer's, hares, and other wildlife animals met each other, and they collaborated in problem-solving activities.



¹ ThingLink is an online service and tool that makes it easy to add clickable tags to any image. The tags can be links to text notes, other images, videos, and resources online.

Figure 3. Digital artifacts produced by the preschoolers.

The artifacts created during the inquiry were also used as mediating resources when reflecting on and evaluating the emergent activities together with the children. This was evidenced in the digital portfolio of the group of children aged 3–5. Here, the written and audio recordings of the children's reflections were attached to the project photos as well as in the children's own drawings about them. As the teacher had documented all the main the phases of the project through photos, videos, and audio recordings, the advancement of ideas and activities were also made visible for the children themselves as well as for their families.

4. Discussion and Conclusion

In this paper, we have depicted teachers' insights into the ways in which connected learning and inquiry learning were actualized in the kindergarten learning projects. While school learning is often depicted as disconnected from contexts where students find meaning and social connection (Ito et al., 2013), the results of the study revealed teachers' deliberate efforts to create connections between different spheres of learning in different stages of inquiry (see Table 1).

Table 1. Connected learning with media tools in kindergarten.

	Objects of inquiry	Community	Artifacts	Media tools
1. Creation of shared objects	On-site observation and interpretations of traces	Individual groups of children and their teachers	Images	Tablets with cameras
2. Collecting and analyzing data	Forest wildlife	Peer groups of children and their teachers, families, experts	Images, search results, notes	Trail camera, Internet searches, books
3. Sharing the results	Future plans	Public (Open Access)	Storycrafting, Presentations	ThingLink, YouTube, Web

In this project, the phenomena of the real world became meaningful objects of inquiry through the children's own discoveries and subjective interpretations of them. The teachers encouraged both groups of children to observe and discover their surroundings as well as to engage in collaborative meaning-making with their peers. The teachers purposely left room for the children's imagination and cultivated a generative mindset in which the object of inquiry was approached and negotiated from many perspectives (on-site observation and interpretations of traces). Such acts of imagination transformed the real-life environment into a space of play and experimentation (Thomas & Brown, 2011) in which experiences and interest stemming from multiple settings could be recreated (Hedges & Cooper, 2016). In this phase, use of the tablets with cameras were found to be useful as tools for capturing the children's own discoveries. The media tools made it possible for the teachers to empower children to be actors in the inquiry—to collect their own research data.

Connected learning also aspires to create rich social relationships in areas of interest, expertise, and opportunity (Ito et al., 2013). While the children participate in

various kinds of collaborative activities in educational settings, many prevailing pedagogies appear to ignore the expertise that families and local communities possess. In this kindergarten project, the social capital and the children's own funds of knowledge were harnessed when collecting data from the forest wildlife. The trail camera became the mediator of wide extending connections with peers, peers in other groups, parents and grandparents, and experts. Though such interest-driven connections, the inquiries may become meaningful for the whole community and have cultural significance that goes far beyond regular concerns and evaluations of individual children's achievements (Hakkarainen, 2010).

The results of the study also revealed how the teachers challenged children to conceptualize the real-life phenomena encountered in the forest. The children were actively naming, classifying, and categorizing the trail camera data, and also searching, evaluating, and applying new information in a meaningful context. Such a process of building connections to expert knowledge from the base of an area of deep interest is also at the core of connected learning (Ito et al., 2013). Furthermore, the children were confronted with different types of media content as they were applying these authoritative resources for the creation of their own material and digital artifacts including factual and fictional content. Rather than being consumers of media, the children were creating, sharing, and openly publishing their own insights that drew on a unique mix of meaning-making resources and media tools (Cope & Kalantzis, 2009; Jenkins et al., 2008). The artifacts created during the inquiry process were also used as mediating resources when reflecting on the emerging activities and making future plans.

In terms of promoting and studying connected learning (Ito et al., 2013) in the context of early childhood education, we recommend using participative modes of research in which children are positioned as active subjects rather than objects of

research. Whereas the present study focused on co-designing with educators and capturing their insights on the ways of promoting children's active participation, future research should explore the children's own perspectives in more detail. This could be implemented, e.g., through participatory design workshops where children are provided with opportunities for co-designing educational activities and products as well as ways to research them in the evolving process of inquiry learning (Leinonen & Durall-Gazulla, 2014).

For practitioners interested in applying connected learning in early-childhood education, the results highlight the need to trust children's agency, ideas, and efforts in creating knowledge around shared objects of interest. Moreover, teachers and caregivers are in a key role in when bridging child's ideas and funds of knowledge to reach new networks and tools of culture. At the heart of the idea is to invite children to participate in knowledge creation and to share their ideas, efforts, and contributions with their community for further knowledge building that is a legitimate part of civilization (Scardamalia & Bereiter, 2006).

Overall, the extended learning network, as reflected in this project example, involves an orientation similar to what Henry Jenkins et al. (2008) defined as a participatory culture. Instead of merely socializing within existing practices, the children were positioned as contributing members of a larger community of people interested in what they were learning about (Engle, 2006). While taking part in such networked activities, individual children could connect with expertise and resources that their peers and teachers and other involved actors had access to, and, thereby, they were able to expand their possibilities of action (Vartiainen et al., 2018). Use of the media tools also supported teachers and children to reflect on and think about future activities in various phases during the inquiry projects (Leinonen et al. 2016). Building

meaningful connections with tailored-to-the-need networks promoted children's epistemic authority (Barton & Tan, 2009), and likely, supported the children in seeing themselves as creators of public knowledge whose contribution is relevant to the community at large.

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