Teachers' practices to support student work in digital storytelling: A study on Finnish and Chinese school teachers' experiences

Marianna Vivitsou,
Faculty of Educational Sciences
University of Helsinki

Hannele Niemi,
Faculty of Educational Sciences
University of Helsinki

Ge Wei,
College of Elementary Education
Capital Normal University

Veera Kallunki,
Faculty of Educational Sciences
University of Helsinki

Rong Miao
Graduate School of Education
Peking University

E-mail: marianna.vivitsou@gmail.com (corresponding author)

Abstract

This study aims to discuss and analyze Finnish and Chinese primary school teachers' practices when digital storytelling is the teaching method, aiming for student-generated stories in video format. To meet this end, teachers introduce digital storytelling in their practices and guide and support students into building and sharing digital stories in video format with peers in the classroom and online. In addition, they introduce the use of web-based environments and digital technologies, adapt their teaching plan accordingly, and enrich existing instructional material. As a result, teacher's practices of organizing and facilitating student work and development change.

In order to investigate how teaching practices change, this study draws from Chinese and Finnish teachers' interviews and observation data and uses inductive analysis and constant comparison for more abstract themes and categories. The findings show that the teachers use formal and informal, natural and technological environments to organize student work and aim for freer learning in digital storytelling activities. Also, different aspects of collaborative work are used to facilitate and, mainly, structure student work and development.

Keywords: *digital storytelling, teachers' practices, organizing student work & development, facilitating student work & development*

Introduction

Technological advancement not only has accelerated the way in which we live and learn; it has also enabled the advent of digital technologies in our daily lives and into the school everydayness as well. This is putting pressure on teachers to introduce an array of technological hardware and software into the classroom and, thus, rethink the ways they practice teaching using web-based environments, and mobile devices and applications along with traditional pen and paper. As knowledge creation takes place during social interaction at the intersection of dialogical encounters among people, substances and artifacts (e.g., Vygotsky, 1978), it is essential nowadays to investigate the ways the use of digital technology influences teachers' professional practices.

One pedagogical method, in which modern information technology, knowledge creation and narrative are mixed, is digital storytelling (Duveskog, Tedre, Sedano, & Sutinen, 2012; Lambert, 2013; McGee, 2015; Niemi et al., 2014; Niemi & Multisilta, 2015; Page & Thomas, 2011; Robi, 2008; Rossiter & Garcia, 2010). The use of digital storytelling is combined with learner-centered approaches that aim to enable participatory learning through the use of connective technologies, digital mobile devices and language, while the goal is the production of meaningful stories (McGee, 2015). A salient feature of digital storytelling is that it increases engagement in the topic, is collaborative, and encourages active participation as well as shared learning and creativity (Lambert, 2013; McGee, 2015; Niemi et al., 2014; Sadik, 2008; Shelby-Caffey, Úbéda & Jenkins, 2014; Sukovic, 2014; Woodhouse, 2008). It also blurs the roles of student and instructor by positioning them both as learners.

Traditionally, a story needs a beginning, a middle and an end. Nowadays, however, more avant-garde views question the triple feature and allow for less fixed definitions. A story, then, can also be any recount of events that presents a minimal emplotment. Stories therefore can recount a single event or an array of events. Given this, and taking into consideration that telling a story is not attached to one mode of expression (e.g., oral or written speech only), we can say that the use of the term is rather metaphorical. Although 'storytelling' used to be associated with oral expression, it now refers to a variety of modes of fixation and inscription (e.g., writing, acting out a role, filming etc.). Following this, 'digital storytelling' is a 21st century metaphor that signifies the use of multiple modes of expression and literacies in order to bring forward the viewpoints of storytellers by recounting series of events with digital and connective technologies (Vivitsou et al., 2016).

This study is part of a wider research project on digital storytelling. Earlier phases have given out findings concerning the contribution of the method to increase student engagement in learning (Niemi & Multisilta, 2016, Niemi et al., 2014), as support to inquiry-based learning (Penttilä et al., 2016) and as a way to tell different types of stories for different purposes (Vivitsou et al., 2016)[1].

Overall, findings resulting from previous studies (Niemi & Multisilta, 2016,

Niemi et al., 2014, Penttilä et al., 2016, Vivitsou et al., 2016) indicate that digital storytelling is a method that engages students in dynamic and spiral learning experiences where commitment and hard work is needed for student-driven video stories with mobile technologies and web-based platforms. Student-generated stories are produced in on- and off-school settings and are subject-based and interdisciplinary, while topic selections can be student-initiated. As digital storytelling allows for the development of multiliteracies and multimodalities, it requires holistic and integrative approaches to teaching and learning.

Considering these, this study introduces a joint research project in two schools in Beijing and two in Helsinki. During project implementation, Chinese and Finnish teachers introduce digital storytelling as a technology-enhanced method into their practices aiming to guide and support their students into building and sharing digital stories with peers in the classroom and online. In the Finnish case the teachers choose to work on environmental themes, while in the Chinese teachers focus on themes from natural sciences and comprehensive study, and everyday life and traditions in China. The study seeks responses to the following research questions:

1. In what ways do teachers organize their practices in digital storytelling in Finland and China?
2. What scaffolding practices do teachers use in digital storytelling?
3. What opportunities and challenges arise for the future from the use of tools and teaching practices in digital storytelling?

Theoretical background

Global Sharing Pedagogy and Digital Storytelling
Nowadays, teachers need to organize their professional practices in such ways that support student work and mediate development in terms of social interaction in the classroom and interaction through the use of digital technologies. In this study we examine how teachers organize and scaffold student work in digital storytelling activities. The theoretical framework of the study builds on the Global Sharing Pedagogy (GSP) model (Niemi and Multisilta, 2016, Niemi et al., 2014) that draws from the socio-cultural approach (e.g., Vygotsky, 1978).

In the GSP, the focus is placed on learners and the main aim is to understand what factors interact for student engagement in learning with digital storytelling. According to sociocultural theories, learning is the result of dialogical interactions between people, substances, and artifacts (e.g., Säljö, 2012; Hakkarainen, Paavola, Kangas, & Seitamaa-Hakkarainen, 2013). The primary objective, therefore, is to strengthen student engagement in learning by opening up opportunities for active participation and student-generated knowledge creation. In this way, young people will be able to deal with the changes they are facing already, and will be facing in their lives. Within this framework, engagement, rather than only an end, is also means for further learning. In order to offer a dynamic representation of the current situation in formal schooling, the GSP brings together the elements that shape the teaching and learning needs of the digital era. It does so on the basis of Vygotsky's (1978

p. 67) idea that tools, and symbolic and social mediators enable the learner to select, change, amplify, and interpret objects and, thus, activate the learning process. As figure 1 below shows, the model includes four interrelated goals: 1) *Learner-driven knowledge and skills creation*; 2) *collaboration*; 3) *networking*; and 4) *digital media competencies and literacies*.

Fig. 1. The Global Sharing Pedagogy framework (Niemi & Multisilta, 2015)
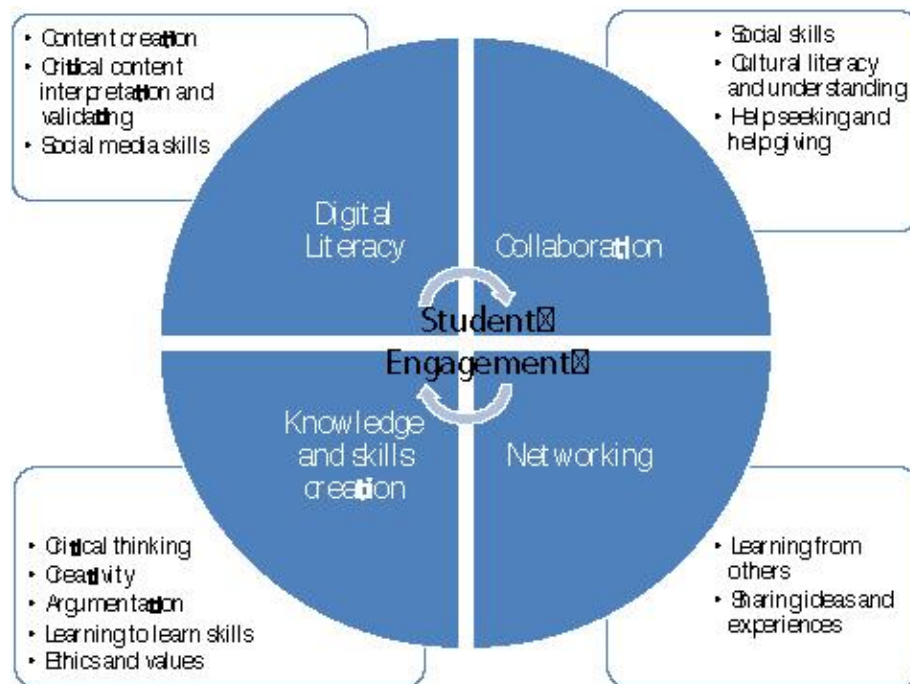
On the one hand, the aims are interconnected and can act as both means and ends (Niemi & Multisilta, 2016). Digital technologies, for example, both enrich the learning experience and contribute to the continuum of learning (Multisilta and Perttula, 2013). On the other hand, symbolic and social mediators are involved (Niemi & Multisilta, 2016). *Knowledge and skills creation*, for instance, provide learners with the symbolic tools necessary to develop an active approach to learning as well as metacognitive skills. This is a dynamic process where learners build critical thinking, creativity, argumentation, and 'learning to learn' skills, ethics and values. Learners construct knowledge by working together, through interaction and collaboration. *Collaboration* is a social mediator that allows for the development of competences that go beyond the purely cognitive and enable learners to deal with the requirements of the global world in a holistic way. Social skills, cultural literacy and understanding, help-seeking, and help-giving strategies are such competences. As learning happens in interaction, knowledge building benefits from the synergy and expertise of people in diverse environments. *Networking* is the social mediator catering for intercultural exchanges and sharing ideas and experiences in face-to-face and online encounters. Networking, therefore, brings people from a variety of contexts together to learn from one another. As exchanges take place through digital and mobile technologies and web-based platforms nowadays, learners need to develop *digital media competences and literacies*. Developing literacies does not concern technology only; it also requires social and symbolic mediators. In this way, learners can develop as content producers and consumers, able to navigate digital environments with a critical eye, by assessing and validating the knowledge they find and create.

Within this framework, technology is a tool that can promote motivation and allow for student-generated scenarios and artifacts to occur within formal and

informal settings. Museums, libraries, natural surroundings or the home are examples of informal settings of learning. By organizing activities in off-school settings, or informal environments, the school becomes a learning hub within the community, while classroom boundaries extend toward knowledge building that serves authentic needs, and aims to solve problems and make people's lives better (Leadbeater 2000, pp. 111-112). According to findings of studies in science education, there is consensus that learning benefits from out-of-school settings (Anderson, Lucas, & Ginns, 2003; Bell, Lewenstein, Shouse, & Feder, 2009; Braund, M., & Reiss, M. 2006; Martin, 2004). In this way, students transcend boundaries within enriched learning spaces that involve the students' wider cultural and linguistic background. As Ntelioglou et al. (2014, p. 4) argue, building practices upon the students' cultural and linguistic capital, or funds of knowledge, helps the young people develop a positive sense of who they are and how they relate to their teachers, their peers and the world.

In this study, we view digital storytelling as a technology-enhanced teaching method aiming for student engagement and development as a holistic process by building knowledge and artifacts in both in-school and informal settings. This combination brings a real-life element into schooling and learning and, therefore, pedagogical purposes become authentic purposes. This type of digital storytelling sets off to seek ways to achieve student purposefulness by drawing from content toward narratives the students develop collaboratively in groups. Having defined the purpose and the overall topic, digital storytelling involves filming with cameras, smartphones or tablets and putting the scenes together in groups, aiming for a coherent and consistent whole. Following from this, the digital stories are video-based and products of edits and remixes in collaboration and, as such, support the participatory culture through multiple (digital) media convergence.

In addition to other media and devices, students use web-based technologies to share digital stories. Web-based environments and platforms, therefore, are 21st century informal settings of learning. Findings from earlier studies indicate that students both work hard and enjoy the digital storytelling activities. Engagement, therefore, increases (Niemi & Multisilta, 2016) through the use of digital and online technologies (Niemi et al., 2014). Therefore, digital storytelling can open up the space for holistic learning experiences.

Considering these, it is important to understand what teaching practices underlie digital storytelling activities and how these relate to Global Sharing Pedagogy. Toward this end, in this study we will examine the practices teachers use in order to guide and support the students' efforts for knowledge building and development through digital storytelling in two schools in China and two in Finland.

Teachers' Supporting Practices in Digital Storytelling
Young people's development has been theorized by Lev Vygotsky (1978) as a process occurring in collaboration between the child (or student) and an adult (or teacher) within the zone of proximal development (ZPD). As far as school learning is concerned, the ZPD does not only apply to a subject-specific area but is an aggregate of factors intersecting at a 'point' of difficulty (Zaretskii, 2009). The ZPD, then, is a complex area that involves cognitive, emotional and other

forms of challenges. For a meaningful development, teachers need to come up with practices that support or scaffold the process. Scaffolding therefore is a complex phenomenon and needs to be further discussed so that we gain a deeper insight into the role it plays in teaching practices.

The construct of 'scaffolding' (Bruner, 1975; Wood, Bruner and Ross, 1976) extends the Vygotskian concept while it allows ZPD to remain relevant. In order to be meaningful for a specific learning situation, scaffolding needs to take place within a particular ZPD and, as such, is mediational practice. The term draws from the analogy of a building under construction. Similarly to this situation, the teacher removes the scaffold when the movement in the ZPD has been achieved. However, as Wass et al. (2011) argue, scaffolding is a complex concept. In their 3-year-long study examining ways supporting the development of critical thinking abilities in University students, Wass et al. (2011) argue that scaffolding can be conventional (e.g. textbooks or other material) or informal. In this sense, peer evaluation can be a way to scaffold learning. Also, it can have a material (e.g. a book) form, or not (e.g. it can take place through speech). This view of scaffolding is relevant to digital storytelling, as students use multiple ways (e.g., devices, software, pens, paper, books, group discussions etc.) to build up their stories. Scaffolding, therefore, can be socio-material and symbolic.

In accordance with this view, Tharp and Gallimore (1988) propose that assisted performance is a form of scaffolding. Also, Moll and Whitmore (1993) suggest that ZPD should be seen as a space for reciprocal meaning-making interaction between the student, the teacher and the peers. These views extend the notion of scaffolding as introduced by Bruner (1975). Thompson (2013) and Meira and Lerman (2001) argue that Bruner's view of scaffolding promotes teacher control at the expense of student autonomy and, thus, is closer to behaviorism than to socioculturalism. On the other hand, these approaches are in agreement with the Vygotskian idea of the developmental process where other capable peers can provide assistance (e.g., Macy 2016, Zaretskii 2009).

Although Vygotsky did not elaborate on who can be a capable peer, Wells (1994, 2000) suggests that this person should be part of a given learning environment (e.g., in class, a group, a community) and assist the learners to achieve what they are yet unable to do alone. Similarly, in their studies on building pedagogies through drama and process writing, Macy (2016) and Thompson (2013) view all involved teachers and young students as knowledgeable individuals who interact for knowledge construction within settings of participation and engagement. In his study, Thompson (2013) found that peer collaboration assisted his young students to internalize cultural and psychological tools. Therefore, peer interaction can be scaffolding practice when it assists performance and leads to development (Wass & Golding, 2014). Scaffolding then should aim to lead to task performance independently from assistance and scaffolds.

This positioning in favor of a peer interaction-oriented scaffolding draws from Vygotsky's own research. According to Ageyev (2003), Vygotsky's view of the developmental phase is actually a recursive loop that involves the use of signs, mediated memories and play. Practically, this means that a capable other can be any person who assists in the developmental transition. Instead of being

removed, then, scaffolding should be adapted according to the needs of a particular ZPD system. Moreover, scaffolding is situated practice and, thus, is recursive and constructivist, rather than exclusively materialistic in nature. Within this framework, knowledge building happens as part of collaborative interaction of 'others' with a mix of skills, backgrounds and perspectives shared in a community of learners engaged in common practices (Macy, 2016). This dynamic view of scaffolding implies that any meaningful activity that advances student interaction with peers or artifacts for pedagogical purposes can be a scaffolding device. Again, this view is relevant to digital storytelling where student work is based on collaboration and can take place in formal and informal settings. Within this context, background knowledge, skills and expertise of teachers, students and other individuals (e.g., museum curators, researchers, parents etc.) blend, aiming to assist young people's development.

As teachers need to be constantly searching for tools that allow them to rid of the outdated concept of knowledge transmission, digital storytelling can be a dynamic tool to assist toward this direction. Digital storytelling itself is a method that entails multiple activities, as the use of technologies should not only lead to the creation of videos; it should serve pedagogical purposes as well. As digital storytelling allows for interaction in both group work (e.g., in a role play activity) and on individual basis (e.g., when learning how to edit with a software), the opportunity opens up for teachers to use different types of scaffolding for different purposes.

It is important therefore to examine how teachers organize their practices and how they support student work when digital storytelling is the pedagogical method. In this way, we will be able to identify the types of scaffolding that Finnish and Chinese teachers use when they integrate digital technologies into their classrooms.

The context of the study

This study draws on the experiences of four Finnish and ten Chinese teachers in two primary schools in Helsinki and two in Beijing during the implementation of a digital storytelling project. The data of the study result from field notes, observations and interviews.

For project implementation, the Finnish researchers met the Chinese teachers in November 2015 and agreed to implement digital storytelling activities for about a one month-long teaching period. To this end, they designed activities aiming for more student-centered teaching to take place through the use of smart phones, digital cameras, tablets and a web-based digital environment. Storytelling activities took place late November 2015-February 2016, following two workshops, presentations and discussions with teachers and principals in Beijing in November. As that was the first time Chinese schools became acquainted with digital storytelling, the situation was to a certain extent different from the Finnish context where the method, following its introduction in schools in 2012, there had seen the implementation of projects, training workshops and studies where teachers had already participated.

The current project used that research experience (e.g., Niemi et al., 2014, Niemi

& Multisilta, 2016) as a basis and emerged as part of the large-scale Sino-Finnish collaboration. Overall, this time one goal was to create bridges for joint research in the field of educational technology between Beijing University and Helsinki University.

The study participants

The Finnish teachers in the project

The study participants are three female and one male, experienced teachers who teach in two comprehensive schools in Helsinki and choose to introduce digital technologies for pedagogical purposes into their everyday practices. Two female teachers teach 5th graders, the third is a 7th grade subject teacher and the male teacher teaches 4th grade students.

The three female teachers are 'newbies' in the 'learning with technologies' field, while the male teacher had previously worked with digital storytelling projects. His current participation is based on reflections on the previous project experience and driven by the desire to allocate more classroom time to project activities. In this way, he believes that the students would have an opportunity to work together and tell science-related stories with technologies. In addition, as he mentioned during the pre-project phase, making digital stories would instigate the students' interest for science learning.

For digital storytelling, the Finnish teachers chose informal settings for students to film the stories in groups, and introduced digital devices and a web-based platform to upload and share with peers.

The Chinese teachers in the project

In the Chinese context, there were two teams of 4–5 Chinese teachers who worked with digital storytelling, each coordinated by a male (School 1) and a female (School 2) teacher. The teachers in both schools teach 4th, 5th and 6th grade students in Beijing. The selection of the Chinese schools was made by colleagues in Beijing University and was based on the schools' expressed interest in educational technology, the international profile of School 1 and an orientation to science learning of School 2.

Interviewing in China took place in public, in the sense that discussions were attended by the school principal and the colleague from Beijing University responsible for the project, while they were facilitated by an English teacher or Master's students who acted as language translators. The basic idea here was to share experiences and views and, as such, constituted a learning opportunity at the collective level. Given the situation, as they were the main contributors during discussions with the Finnish researchers, we consider that the project coordinators' perspectives played a pivotal role in the study with the rest of the teachers' contributions supporting and further illustrating the situation.

For digital storytelling, the Chinese teachers introduced the topic in class and assigned tasks to groups of students. The students organized and filmed their digital stories at home or other off-school settings. Later, they presented their work to their peers and the teacher in class.

Methods

Collecting Data

In order to get an insight into the four Finnish teachers' experiences we conducted three interviews following the completion of project activities in May 2016. There were two interview sessions in English lasting between 45-50 minutes each. One interview involved one male teacher answering questions about his experiences during digital storytelling. The second interview involved two female teachers and two English-speaking researchers. These teachers worked in the same school at the time, collaborated during the project and chose to be interviewed together. The third interview was conducted by a Finnish-speaking researcher.

The Finnish research team's first effort to touch base with the Chinese context included two visits in Beijing. One aimed to introduce the technology-enhanced teaching method (November 2015) and the second to gather data (April 2016) following the implementation in both schools.

In the interim phase of the visits there were internet-based exchanges between researchers in both Universities and web-conferences with the Chinese teachers to coordinate the project. In addition, one Chinese scholar, member of the team of authors lived in Helsinki at the time, while on a doctoral exchange program. As there was a multiplicity of actors involved, ranging from primary schools to research units, to Faculties, and Universities, the project had an international profile in many respects.

The interview questions aimed for responses concerning teaching practices, the benefits and the difficulties that arose during the digital storytelling project. Following are the questions used to guide the Finnish teachers' interviews:

- Overall, have you enjoyed the digital storytelling experience? Why/Why not?
- What kind of changes took place during the implementation of the digital storytelling project?
- So far, which part of the digital storytelling project has been the most memorable? Why?
- What problems have come up during digital storytelling classroom integration?
- In what ways have you solved these problems?
- Have there been any dilemmas (i.e., situations involving difficult choices) that needed to be dealt with? If yes, what kind of dilemmas these have been?
- In what ways have you resolved these situations? Why?

We used these questions also in China as a guiding framework that we adapted according to the needs arising in each situation. For instance, some teachers said that networking and using English were problems they were met with during digital storytelling implementation. To resolve this, we focused our questions on problems arising from making and improving the stories, and the benefits and aspects of collaborative work instead. Also, as mentioned previously, we used the questions as a map to make our way around, as the goal was to understand the ways teachers used and integrated technology and how

this influenced their professional practices. Developing, therefore, the interview questions according to the needs arising in each context was part of the research process.

Analyzing data

For the interviews, we used inductive thematic analysis and moved by constantly comparing the data to more abstract categories (Glaser and Strauss, 1995). We used observations and field notes as complementary information source to understand contextual conditions and factors influencing the teachers' professional practices. Also, we used the guiding questions discussed above as a map to make our way around. During interviews, we adapted the guiding questions so that we can reach a better understanding of themes that emerged during the interviews. The overall goal of our research was to look into manifestations of the same phenomenon by examining the views of Finnish and Chinese teachers and how they handled the situation, rather than create replicable settings or apply a comparative design in the strict sense of the term.

Although there was a set of questions used in both the Chinese and the Finnish context, we used more targeted questions to form a clearer picture of emergent themes. When, for instance, the male Finnish teacher brought up the issue of 'free-learning program' as example of a different approach to teaching during the project, we asked further questions. We did so in order to understand how students handled the situation, if any amendments were needed, what these were, and so on. For the analysis, the researchers listened to the recordings, made notes separately and compared them in order to ensure mutual understanding of the data and match with emergent thematic areas. The interviews were transcribed for thematic analysis.

For the analysis, we moved iteratively from the more general to the more specific, by examining utterances in teacher talk, coding and assigning them to key and recurrent themes (table 1):

Table 1. Key and recurrent themes in the teachers' interviews

Subject	Utterance	Subtheme	Key theme	Recurrent theme
mT1	*'To make more time I have to take it away from some other subjects and say now we are going to do only this topic.'*	Making time by conflating the curriculum	Organizing teaching and student work	Informal learning environments (natural & technological)
	'It's very interesting to look where the beach is and what the pothole is (like)… I have to find where the right places are…'	Choosing and finding the right place		

As table 1 above shows, the male teacher's (mT1) utterance about the natural

spot to study the Ice Age is both about the importance of getting students in touch with the place and the difficulties of getting there. The whole thing mounts to the subtheme of 'making time', as the teacher further explains what actions he took to achieve the goal (i.e., by minimizing the distance and conflating the curriculum). This first cycle of analysis (Saldana 2009) reveals that convergence in teachers' talk leads to recurrent themes but, then, the underlying notions can be quite divergent. For instance, the female teacher's (fT2) utterance about getting students prepared to start shooting the digital stories points to the same recurrent theme (i.e., informal learning setting).

On the other hand, recurrent themes were not clear cut or distinct. Informal learning environments, for example, can be one type of resource. Therefore, the two recurrent themes, 'informal learning environments' and 'available resources' are overlapping. Moreover, expanding available resources can entail subthemes, such as digital and other multimodal material that precede or follow the digital story making. The analysis therefore was a complex process with focused and axial coding. (Saldana 2009, 151).

Findings

The findings indicate that setting up digital storytelling activities involves different approaches to teaching and learning that frame the whole endeavor and the teachers' practices. Digital storytelling activities take place in informal settings, in natural surroundings and online, and aim to expand human and material resources of learning. Teaching practices employ teacher-student and peer-to-peer collaborative work as scaffolding devices to mediate the process of student development. As table 2 shows, thematic analysis resulted in the following main categories and subthemes:

Table 2. Main categories and subthemes.

Setting up digital storytelling	Informal learning environments (natural)	Informal learning environments (technological)	Expanding resources	Collaborative work for development
A free way to learning Making connections with reality (a constructivist approach) Need for a concrete plan, a grasp of the scientific method & asking questions	Digital storytelling in natural settings requires making time : at the periphery of the curriculum (integrated, after-hours sports clubs) : within the core curriculum	Using digital and mobile devices Teaching how to edit digital stories Working with a web-based platform Sharing on a web-based platform with international peers	Developing multimodal material before, during & after shooting the stories Reusing digital stories Sharing digital stories with local & international peers Sharing expertise with researchers	*Teacher works with individual student* *with groups of students* *with researchers* *with peers* *Students work individually* *with peers*

Setting up digital storytelling
Overall, the Chinese and the Finnish teachers in this study use three main

approaches to set up the digital storytelling activities. According to these, students should be given the opportunity to learn in a freer way and to make connections with reality, while activities should be based on a concrete plan. More particularly:

A free way to learning
As the male Finnish teacher (HM) explains, he organizes activities in natural settings, while students choose who to work with, what aspect of the topic is important and how to build knowledge on it. In this way, as HM says, '*They learn not because they have to, but because they are free to learn'*. As the teacher argues, this way respects the students' own pace of growth. When studying the Ice Age, the teacher intervenes when needed and mainly offers guidance concerning aspects of the topic. Digital storytelling is a good reason to go to places, and is making students happier, he argues. It also allows students to get an understanding of how the 'pothole' has developed through time. To this end, students take photos or short videos of the area in order to compare with the textbook or other material, and discuss in groups and reflect on how ice has influenced the formation of the landscape. In this way, science becomes a contextualized learning experience.

Making connections with reality (a constructivist approach)
In addition, P, one of the Finnish female teachers in School 2, uses a myth as tool to facilitate student understanding of climatic change. When the interview starts, P explains how the story of the 'giant' helped address the cognitive load her 5th grade students face when engaged with difficult concepts. The notion of 'millions of years' is one example. As P argues, the myth assisted students to draw connections with reality and kick off activities in a creative way. Making connections with reality is a principle consistent with P's theoretical background in constructivism where the teacher strongly positions herself. Then, the students visit natural settings or the school yard and take photos or videos to edit the scenes into stories when they return to the classroom. For story improvement, the teacher interacts with individual students and asks questions to lead the students' thinking deeper into the content.

Need for a concrete plan, a grasp of the scientific method & asking questions
As the male Chinese coordinator in School 1 argues, digital storytelling expands the formal teaching content, while the method should fit in the 'design-implement-discuss' framework that this school applies. In agreement with their colleagues in School 1, the teachers in School 2 state that a concrete plan is needed, along with a good grasp of the scientific method, ideas, collaboration, argumentation, and asking questions. To this end, the students work in groups and perform tasks to respond to topic-related questions posed by group members or the teacher.

In this way, digital storytelling helps students think deeper into the content, the teachers in School 2 argue. In relation to what normally happens in the classroom, in storytelling activities the students are deeply engaged and have more freedom, as, for instance, they can choose their work partners or what theme to focus on. Like with School 1, teachers here teach the phenomenon under study in class and set storytelling activities in informal settings, as homework. The Chinese teachers acknowledge the need for practices that blend

knowledge from different areas and are willing to experiment with inquiry-focused, project-based and learner-centered methods. For them, digital storytelling is one such method.

As the female coordinator in School 2 argues, digital storytelling is a creative experience that opens up the possibility for students to do work beyond the core curriculum. It is a new 'adventure', and a complex process that requires effort and commitment. In this way, digital storytelling adds a new dimension to technology. Again, the students work with digital storytelling activities assigned as homework to consolidate content taught in class, while they make digital stories about New Year's festivities during the holidays.

Digital storytelling in informal settings
As digital storytelling is not part of the school timetable to date, the teachers need to **make time** in order to accommodate storytelling activities organized **in natural settings** by, for example, conflating the curriculum (e.g., in the male Finnish teacher's case by using the time allocated to Arts, Biology and Physical Education). However, in both China and Finland project activities also take place as part of the integrated program and after school hours (i.e., at the periphery of the core curriculum).

At the periphery of the curriculum
As we mentioned above, in China, student digital storytelling activities mainly take place at home where small groups of students meet and build up stories together. In School 1, teachers design digital storytelling based on the needs of the project-based integrated curriculum. To this end, the activities are interdisciplinary, in the sense that, while the topics draw from the natural sciences, the students also need to consider aspects such as making measurements to construct a specific artifact. In this way, they also develop skills in math.

One example of the interdisciplinary dimension is the 'Building a bridge' project in School 2. In order to build a miniature bridge, the students in each group need to reflect on the length of the artifact, its weight and balance, and so on. To meet this end, the female Chinese teacher presents the topic and assigns digital storytelling work in small groups of 3-4 students. Once the digital story is filmed, the students present their work to peers and the teacher. Filming and editing the stories takes place at home for this project, while peer and teacher feedback is given in class. During feedback, the teacher observes that the students' sense of achievement has developed with digital storytelling. Despite the fact that the process requires multiple sets of problem solving (e.g., scenes need to be shot again, storymaking from different angles and camera position adjusted, background music to be added etc.), the teacher argues that managing with difficulties is rewarding. Her students have learned from each other, feel proud for building strong bridges, and their friendships get strengthened.

In addition to the central environmental theme, other topics are presented in the Chinese students' digital stories. These involve traditions and painting, home life, student self-introductions and so on. In all cases, 4th to 6th graders are motivated, get engaged with the multidimensional digital storytelling tasks, and collaborate with peers and parents for and during the production. Student-

teacher interaction about digital storytelling takes place mainly at the post-production stage, when students share the digital stories with peers and the teacher. During interviews with 4th, 5th and 6th graders in both schools, the young people also expressed the view that digital storytelling was a constructive experience in terms of building knowledge and relations. In both schools in China, the parents play a role and assist their children's effort. In one case, the parents play the characters in a digital story. According to this student-storyteller's teacher, digital storytelling activities opened up the opportunity for him to communicate with a wider audience than usual. This is a 12-year old introvert male student, and the digital story is one way for him to share in a creative way how important it is to care for and help other people.

Within the core curriculum
In the Finnish context, digital storytelling activities mainly take place as part of school everydayness. However, S, one of the female teachers in School 2 in Helsinki, argues that homework would make more time for storytelling activities. Upgrading digital devices would help toward that direction. As S states, '… *I couldn't give them* (i.e., the school's Ipads) *to the students for the evening… And then, when I thought that they could also use their cell phones they told me 'my cell phone doesn't work' and 'I don't have this or that in my phone'.*

Technologies and web-based settings for digital storytelling
Using digital and mobile devices
The technological part covers two main phases in Finland and China. One phase concerns how to use mobile devices and applications toward production. Teaching students how to use mobile devices and software to add music and sound effects, and how to insert photos and record the videos is easy, as HM argues. In addition, the Finnish male teacher finds a correlation between digital storytelling and the students' needs in the digital era. As HM argues, '… *(T)hey are very interested because they have their own phones where they could do that*' (i.e. telling and editing stories etc.).' Overall, the participating teachers agree that using digital and mobile technologies is already part of the students' daily lives.

Teaching how to edit digital stories
In addition, integrating technologies in teaching practices for digital storytelling involves the use of a web-based platform where the students upload video stories, share with peers and edit at the post-production phase.

Working with a web-based platform
To manage work on the online environment for digital storytelling, teachers set up accounts and groups for students to share stories. For improvement of the digital stories, teachers need to support student work toward, for example, further editing the scenes to achieve a tighter narrative. Also, the story metadata need to be taken care of. To this end, the students need to add a description and tags to sustain searchability and visibility of their stories.

Sharing on a web-based platform with international peers
Finally, when it comes to exchanges with international peers, teachers need to think of the common language to be used for asynchronous communication with comments or instant messaging. Overall, the teachers acknowledge the dynamic

character and significance of using web-based technologies for exchange and communication. As P argues, *'I want to … not to limit (the story) but to make it as (communicable as possible), (by adding, for instance) speech'*.

Expanding resources
Developing multimodal material before, during & after shooting the stories
When the students return to the classroom, having completed the recording and the initial editing of the videos, they are invited to go back to pens and paper and commit to assignments, such as painting pictures or essay writing in the Finnish schools. In this way, student understanding of the topic can be enhanced through multiple modes of expression, the Finnish teachers argue.

The storytelling activities, therefore, involve a variety of physical artefacts ranging from devices (e.g., computers, mobile phones) and software (e.g., for editing and sharing online), to pens and paper, and result to different modes of topic-related, student-driven knowledge representations, such as paintings, assignments and digital stories. This influences the material circumstances of the school in several ways (e.g., it requires equipment and connectivity) and enriches the learning environment. As the male Finnish teacher argues, it is all about growth. The more student work and material circumstances of learning expand, the more students' developmental zone grows. Similarly, multimodal ways of expression are supported in the Chinese schools.

Reusing digital stories
In addition to multimodal student-generated artifacts, the Finnish teacher 2 teaches her students to use the Internet in order to retrieve authentic texts and further elaborate on topic-related concepts. Using topic-related sources will enable the students to edit the stories and therefore expand their knowledge of the topic even further. In this way, the students can re-use the digital story for different purposes. According to a Chinese teacher, the students can edit and use the stories again for different purposes. In this way, digital stories become a sort of dynamic textbook that the students develop by, for instance, accessing and adapting authentic material that they work upon and adapt; by changing the order of scenes; or by blending own stories with *stories shared with international peers*.

The use of authentic material does not come without a price though. Both the Finnish teacher and her students realize that, reading, for instance, Wikipedia requires a more advanced level of text understanding. To resolve this, they make dictionary lists with explanations and paraphrases of lexical items. However, this seems to be an effective solution, since the teacher can trace some changes in the students' understanding of the topic and topic-related vocabulary. Using the internet in this learning environment seems to lead to digging deeper into the topic. Understanding what this resource is about is an essential part of this teacher's practices. This whole process benefits the students, as it increases their motivation to get involved more actively in the school learning process. As S argues,

'One of my students who normally doesn't do anything in the classroom was the master with EdVisto (i.e., the web-based platform). *He was making the videos work better, helping everyone and that was good… Also… I have many*

boys that are not interested in studying at school at all. When we were making those videos they were so motivated and they were helping each other.'

Expanding resources, however, does not concern the material circumstances of the school only. It is also about working with researchers to familiarize with the use of technologies to set up and organize digital storytelling as well as ***sharing expertise*** with regard to classroom experience and insights into the teaching and learning process.

Collaborative work for development
Overall, collaboration during the digital storytelling project happens at two levels:

- when teachers work *with individual students and with groups of students, with researchers* and *peers, and*
- when students work *individually and with peers*.

More particularly, in both Chinese and Finnish schools, group work gives space to students to develop by, for instance, asking questions, taking initiatives, and putting hypotheses to the test while shooting the stories, editing the scenes and giving feedback to one another. However, implementation poses considerations. One example is when the Finnish male teacher realizes that more time is required for guidance on the basis of what the needs of different groups are. In a similar way, S and J (Finnish teacher 3and 4) find that teacher presence was more required than they had initially thought. This realization challenges S's and J's beliefs that they wouldn't have to be involved that much.

Nevertheless, the collaborative mode was one of the main ways to scaffold student individual and group work. Collaborative work was performed during classroom time in the male (HM) and female Finnish teacher's (S) class, as after school activity (J) or, as P explains, at the edge of school learning, when finishing other tasks made room for digital storytelling activities. In P's classroom, digital storytelling was a '*peaceful'* activity aiming to help students make connections with the real world. In addition, P argues that, as the students were filming the stories on their own, they had to be more responsible for their work. The Chinese teachers seem to align with the Finnish peers about the contribution of collaborative work to student growth and development and, similarly, express the view that younger students need support and guidance in the process of conceptualizing what real life needs are.

Discussion

Organizing digital storytelling practices
In all the four schools in Beijing and Helsinki, the teachers set up digital storytelling activities in informal settings. As discussed above, these include topic-related places such as a museum, the local open market, the school yard, an island to study a natural phenomenon, as well as the home. In terms of *knowledge creation and skill development*, therefore, student background knowledge is a significant aspect of organizing digital storytelling work. In addition to informal settings, the teachers introduce a range of social (e.g., group work), symbolic (e.g., a myth) and material (e.g., mobile devices, software) tools. Such practices reflect the view of proximal development as

dynamic space of reciprocal meaning-making interaction (Macy, 2016, Moll and Whitmore, 1993, Thomson, 2013, Zaretskii, 2009) where development is achieved recursively as assisted performance aiming for artifact construction. As Mariotti (2009) argues, constructing artifacts enables students to both build shared meanings and relate with personal understandings. In this way, development is reciprocal and takes place at the inter- and the intra-personal level.

Organizing digital storytelling activities in informal (natural and technological) environments allows students to investigate the phenomenon in situ, to do research with internet-based sources, to decide what aspects of the topic to study, what pictures to take, how to put them together and so on. In this learning environment, students have choice, as they work with tasks that open up opportunities for making decisions and solving problems in interaction with peers. According to Wass and Golding (2014), these are complex tasks that allow students to problematize learning during the multiple stages of the process. As they evaluate own and peers' digital stories in groups, the students develop oral, written and digital literacies while they exchange with peers, solve problems together, give and get feeback about their strategies and adapt them when needed. In this way, students engage actively with learning within a broad ZPD for deeper learning.

As development happens even at the outer limits of student capacity in the ZPD, students need support to manage hard learning with tasks that both structure and problematize the process. The former aim to reduce complexity by, for instance, distributing the work to groups, asking students leading questions, teaching how to edit a video and so on. In terms of *developing digital literacies and skills*, digital storytelling allows teachers to combine a wide range of tasks and activities. For instance, material devices (i.e., hardware and applications) are used for digital story creation, while both a 'bring your own' and a 'use the school's' approach (Clark, 2013) are applied. Overall, in both China and Finland teachers handle technical requirements and perform a seamless introduction of digital tools into the classroom with a balanced use of older and newer technologies.

Scaffolding digital storytelling work
The use of devices and applications is characteristic of a stage-one digital storytelling classroom integration and activities assign students to shoot photos and videos, and edit them with mobile cameras, cell phones and tablets. The main underlying purpose here is to provide structure toward storytelling. While keeping the learning going, however, the focus of these tasks is rather to provide assistance than cater for development, as they allow a narrow ZPD space (Wass and Golding, 2014). More tasks aiming to problematize the process are needed.

In addition, the teachers introduce the use of a web-based platform to connect students across classrooms. This indicates an orientation to practices that favor opportunities for blended learning through interaction and participation in online communities, which we consider a second stage of digital storytelling. As this is a dynamic, newly-introduced experience in schools, it does not require proper connectivity and infrastructure only. It also takes a comprehensive approach to learning with digital technologies and entails time and effort on

different types of management.

For instance, web-based environment management requires setting up accounts and considering terms of use. In addition, the digital story needs to be further edited. Also, for student communication with peers online, a common language is needed as well as awareness of netiquette principles. When it comes to digital storytelling per se, it is not only the story that matters. It is also the 'about the story' or meta-story that should be taken into account. Attributing meta-features contextualizes the story and extends the digital narrative. In addition, requirements of the digital era, such as searchability and visibility, should be taken into consideration for connected learning.

Using web-based platforms for learning, therefore, opens up a whole array for activities that require collaborative work with activities that aim to both structure and problematize digital storytelling. *Collaborative work* can be used to reduce task complexity and get the activity going, as well as for development through peer interaction for evaluation, negotiation of the content of the story, its structure and so on. It is therefore a mediator that can both assist and scaffold. Considering these, it would benefit the whole process to further scaffold collaboration in group work. This can happen, by, for instance, introducing interactive diaries for students to share and evaluate the learning experience individually and in groups. In this way, teachers will be able to keep track with student development as well as offer further advice. During the project, teachers mainly touch base with student progress in feedback sessions (in the Chinese case) or activity implementation (in the Finnish case). Constructing professional knowledge in-action is evidence that digital storytelling is a learning experience for teachers as well, and allows for emergent and, thus, recursive (Kvale & Brinkmann, 2009), rather than pre-defined, practices. Recursive practices match the current needs for flexible and adaptive teaching and the complexities of the digital era. However, keeping a record of the digital storytelling process would bring to the surface aspects that were not made visible and would contribute to both teachers' and students' work and development. *Networking* would also help toward this direction. While expanding resources was a major area of development during the project, it concerned mainly the material circumstances of learning. However, teacher collaboration on a systematic basis and exchanges with international peers would enrich and strengthen teaching and learning within a Global Sharing Pedagogy context.

Conclusions

Through this digital storytelling project experience, it becomes evident that it is not enough to use an application to edit a video. It is also important to understand how editing changes the narrative in the video and how this influences the pedagogical purposes. Such insights could contribute and augment the producer culture in schools, as it would open up opportunities for students to, for instance, generate new digital storytelling genres for science and language learning. To this end, the overall knowledge construction process needs to be strengthened so that students can become producers of digital culture than simply remain consumers of tools and applications.

Overall, the application of digital storytelling in Chinese and Finnish classrooms echoes the current needs for enriched zones of development supported by dynamic, adaptive teaching practices. As breaking boundaries with digital technologies makes education more and more global, practices will get more and more diversified in order to cater for these needs. Therefore, it will become even more evident that traditional ways of teaching are obsolete and that there is no one solution to fit each and every classroom situation. There can, however, be common principles underlying teaching practices for knowledge building in a manner that takes the students' needs into consideration. Toward this goal, a Global Sharing Pedagogy setting is required.

Wrapping up, teachers' practices in this project cover all the four areas of the GSP and aim to both structure and problematize the learning process in order to allow students learn in a freer way, draw connections with reality and use a concrete plan as a basis. In this way, the students get actively engaged in informal (natural and technological) environments for knowledge creation and skill development. In this context, group work aims to both reduce task complexity and open up the space for students to think deeper through collaboration and working together. Collaborative tasks in digital storytelling increase student engagement. However, when it comes to digital skills and literacies, activities aim for structure rather than development. Therefore, more scaffolding is needed so that students gradually become independent learners. Structural changes would help toward this direction and curricula that allocate more time for interdisciplinary learning with digital connective technologies. Then teachers will have flexibility to deal with multidimensional 21st century methods, such as digital storytelling. Also, teacher education and training with updated curricula to support the integration of digital technologies as well as consider the current need to improve the digital narrative could be part of the solution. To this direction, networks of teachers, students, researchers, parents and other knowledgeable individuals working together for student-centered methodologies in enriched learning environments would also help.

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1   The first project, 'Digital Storytelling in the Boundless Classroom' (2012-2014), aimed to seek new ways to connect formal and informal learning environments and encourage students' active learning and knowledge creation with video stories. One of the goals was to promote tools for knowledge sharing and to advance 21st century skills, especially problem solving and creativity. This phase involved diverse school environments in primary and secondary education in Finland, Greece and California. Findings of the research studies showed that the web-based environment (MoViE) where students uploaded and remixed their stories was a strong predictor of engagement (Niemi et al. 2014). The second, 'Video Inquiry Project: STEM Learning and Teaching with Mobile Video Inquiries and Communities', (2013-2015) (http://www.innovationsforlearning.net/savi-44.html#) was part of a joint Finnish-American project. The aim was to create innovative tools and provide research findings supporting new pedagogical models that foster learners' and teachers' interests in science and math. Project activities took place in primary schools in Finland and California, where students created and shared video stories with peers online. In this project phase, research findings showed that storytelling based on structured inquiry can support novice learners' development in science (Penttilä et al. 2016). The third occasion is the Sino-Finnish collaboration project (2015-2017) aiming to build bridges of collaboration between Finnish and Chinese researchers and teachers.