

Teachers' Pedagogical Role as Mediators in Leading and Guiding Students' Learning in Digital Storytelling (DST)

Jenny Niu and Hannele Niemi

Faculty of Educational Sciences

University of Helsinki

E-mail: jenny.niu@helsinki.fi and hannele.niemi@helsinki.fi

Abstract

The aim of this study is to find out how the teachers act as mediators to lead and guide students' learning in digital storytelling (DST). The research framework is based on Vygotsky's mediation theory. The research project was carried out in the 2016-2017 school year. Four classes at Grade 5 from China and two classes at Grade 4 and Grade 5 from Finland participated in the study. We mainly focus on qualitative data from semi-structured interviews of teachers, researchers' classroom observations, group discussions, and teachers' course-planning documents. The main findings are that in DST, the main activities in teachers' pedagogical role as mediators are facilitating, coaching, and scaffolding when they are doing pedagogical decisions. This study illustrates what teachers did in a DST project and how they have led and guided students' learning when using the DST pedagogical method.

Keywords: teachers' pedagogical role, digital storytelling (DST), student-centered knowledge creation, mediation theory

Introduction

In the twenty-first century, there have been enormous changes in technology and society. The fast development in information and communication technology (ICT) has created a lot of new opportunities as well as new demands in education. Throughout the world, countries are setting twenty-first-century competences as the aims of schools (Kennedy,

©2019 (author name/s). This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license.

2008), which also places new requirements on the teacher's pedagogical role. Lee and Tan (2018) describes that a twenty-first-century teacher is interactive with the students, who are also interactive among students themselves. They propose (McWilliam, 2009; Lee and Tan, 2018) that because of the contextual change of learning, the teacher's role has gradually changed from "Sage-on-the-Stage" to "Guide-on-the-Side" and "Meddler-in-the-Middle." Teachers are gradually taking up the role of facilitators. Instead of being traditionally didactic for the transmission of knowledge in the class, teachers in the new learning context gradually become knowledge brokers and weave the bits and pieces of knowledge generated by students in the classroom during the learning activities. In our study, we applied digital storytelling (DST) as a pedagogical method that supports both students' collaboration and their active knowledge creation with digital competences. The major task of our study is to investigate how teachers see their role in this student-centered learning approach.

Theoretical Framework and Concepts

Digital Storytelling (DST) as a Pedagogical Method

DST can be defined from several different perspectives. It can describe the practices of everyday people who use digital tools to tell their stories. Ohler (2008) defined DST as a creative process in which traditional storytelling is combined with modern digital technology. From an educational perspective, DST is often defined as a reflective learning activity (Nelson & Hull, 2008) and as a self-representation of its creators (Kulla-Abbott & Polman, 2008). According to Robin (2008), DST is a process of creating short stories that allows students and educators to enhance their information gathering; it cultivates students' higher-order thinking, such as problem-solving skills and critical thinking, and it also facilitate their ability to work in collaborative teams. According to Jenkins et al. (2009), DST is a twenty-first century learning mode. Stewart and Ivala (2017) found that a DST praxis can lead to both reflective and critical engagement with one's own writing practices, and it can strengthen the synergy between the spoken word, process-based writing and digital formats for composing.

DST is student-centered learning approach; it aims to give students a chance to create knowledge from their own starting points about the topic under discussion (Lambert, 2013; McGee, 2015; Robin, 2008; Rossiter & Garcia, 2010). There is evidence suggesting that the method 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). Niemi et al. (2014) and Niemi & Multisilta (2016) applied DST in three countries in order to promote twenty-first century

competences focusing on collaboration, active participation, and shared learning. They found that DST greatly affects student engagement.

Many of the above-mentioned DST studies focus on students' actions or learning processes. Research (Vivitsou et al. 2017) has also focused on the teachers' practices in supporting student work in DST. The teachers' practices in their project (Vivitsou et al. 2017) covered four areas – digital literacy, knowledge and skill creation, collaboration and networking – as part of a global sharing pedagogy (Niemi & Multisilta, 2016). Teachers structured and problematized the learning process in order to allow the students to learn in a freer way and helped them to draw connections with reality. In this way, the students actively engaged in informal (natural and technological) environments for knowledge creation and skill development. In our study, we want to find out more about how teachers mediate students' learning when using DST. DST is like a project-based learning; it can be done in groups or individually. In our research design, we applied the DST pedagogical method to be carried out in groups so that the students could also learn how to work with others in order to develop their communication and collaboration skills.

A Theory of Mediation from a Vygotskian Perspective in DST

According to Vygotsky (1978), learning is a mediated activity using tools, symbols, and social interaction, and he strongly emphasizes the role of sociocultural mediation in human development. Mediation takes place via three major classes of mediators: material tools, psychological tools, and other human beings (Vygotsky, 1978; Vygotsky & Luria, 1994, pp. 99–174; Kozulin, 1990, pp. 111–121; Kozulin, 1997, pp. 62–64). The importance of mediation in learning is evidenced in many research studies. Feuerstein (1991) suggests that a child's learning is shaped by the intervention of significant adults, which are referred to as mediators. In the mediated learning situation, adults, or more competent peers, place themselves between the environment and the learner, thus radically changing the conditions for learning. The mediator selects, changes, amplifies, and interprets objects and processes for the child (Kozulin & Presseisen, 1995).

In our study, we applied mediated learning with DST in a social-cultural framework. Teachers act as mediators in students' learning. When teachers set the learning objectives of the DST project and when they guide the students during the working process, they mediate the students' learning through making pedagogical decisions concerning the learning activities, tasks, tools, and processes. From a Vygotskian perspective, teachers apply mediational practices between themselves and the students to scaffold the students within the zone of proximal development (ZPD) (Vygotsky, 1978).

In a DST project, the teacher initiates and designs the learning tools and activities, and the students interact with learning material and other resources and work in groups to create

their digital story products together. During the learning process, the teacher guides and leads the learning through facilitating many activities, providing supports, and creating learning opportunities with pedagogical interventions. The teacher's role in DST is different than in traditional instruction, as it shifts from knowledge transmission to the mediation of the students' active learning. Teachers become mediators who support the students' work.

Research Question

We wanted to find out what kinds of pedagogical decisions and actions teachers carried out in the process of DST and how they supported students in different phases of DST when students played a central role in exploring and building knowledge as creators, producers, and discussants rather than as mere passive listeners.

In our study, we focused on what teachers did before the DST project, in the beginning of the project, during the project, and at the end of the project; we used that data to identify the teachers' pedagogical role in leading and guiding the students' learning in DST. In this study, the following research question (RQ) is proposed:

Research Question: What are the teachers' roles in leading and guiding students' learning through mediation with digital storytelling (DST) as a pedagogical method?

Research Method and Data Gathering

Participants

This study design was based on qualitative research methods. Four classes in China in Beijing and two classes in Finland in Helsinki participated in this study. In Finland, each class had one primary school class teacher. At that time, four student teachers were doing their teaching practice in those two classes. In China, there were five teachers who were involved in the project: two math teachers, two classroom teachers, and one computer teacher. The participants in this study are presented in Table 1.

Table 1. Participants in the Study

Public School	Number of classes	Student ages	Number of DST sessions	Number of participating teachers	Experience using DST
Finnish School in Helsinki	2 (about 23 students each class)	10–11	8 (learning geometry shapes)	2 class teachers + 4 student teachers	First time using DST, have used designed based learning and project-based learning method before
Chinese School in Beijing	4 (about 40 students each class)	10–11	10–12 (learning geometry area size calculation)	2 math teachers + 2 head teachers + 1 computer teacher	First time using DST, have not used other student-centered approach before

Data collection

The data of this study were collected through interviews with teachers, classroom observations by researchers, teachers' course-planning notes and documentation, and discussion notes among researchers and teachers. Table 2 describes the data collection process in this study. We analyzed the data to find out how teachers mediated the students' learning based on what teachers did before the DST, and at the beginning, middle, and end of the projects. Our aim was to identify how the teachers mediated the students' learning and what roles they played in the DST math learning project.

The researchers had several discussions and meetings with the participating teachers before the projects began. We discussed these questions together:

- What is DST?
- What are the benefits of using DST?
- What are the differences in DST compared to project-based learning?
- What are the processes and steps of DST?

- What are the learning outcomes?
- What are the learning contents?
- What kind of learning environments can be used to support the learning in DST?
- How can assessments be carried out?

Those discussions helped teachers in their project planning and implementation. The Finnish teachers felt more confident about this method, since they were familiar with a student-centered approach. The Chinese teachers and students, in contrast, were used to a teacher-centered approach.

Table 2. Data collection in the Study

Public School	Interviews	Classroom observation	Course planning notes, documents	Discussion notes between teachers and researchers	DST videos
Finnish School in Helsinki	2 separate classroom teacher interviews (90 minutes per each and recorded) 1 group student teachers interview (120 minutes and recorded)	6 times with notes, pictures, videos	Teaching course materials, slides	E-mails, shared Google documents	12 videos
Chinese School in Beijing	2 group interviews (about 120 minutes) and recorded	10 times with notes, pictures, videos	Teaching course materials, slides	E-mails, Word documents, WeChat messages (a Chinese social media platform)	20 videos

We did semi-structured group interviews for student teachers in Finland and a semi-structured group interview in China with all teachers. Semi-structured interviews allow researchers to develop in-depth accounts of experiences and perceptions with individuals (Cousin, 2009). Researchers can use group interviews as a more efficient use of resources and as a means of adding valuable insight to the interpretation of a social or behavioral event (Frey & Fontana 1991). Before the interview, we developed an interview guide. Some example of the teacher interview questions are as follows. What is your overall experience with the DST method? How does DST change teachers' pedagogy? How does DST support students' learning? What did you do and how did you support the students' learning in this DST project? What are your roles as a teacher in using DST method? Do you plan to use DST method in your future teaching?

We used the list of questions and topics that needed to be covered during the interview in a particular order. We followed the guide, and we allowed additional discussions around the topics where appropriate. This provided additional information and data besides what we planned to have. We noticed in our group interview that one person's answer could stimulate another person's thoughts, and then we saw additional perspectives. We also received immediate feedback if all the participants discussed the topic with one another. It also saved us a lot of time. But we were cautious not to allow one person to dominate the conversation; we led the conversation so that everyone had the chance to participate and contribute.

Analysis

In this study, we used content analysis. When using content analysis, the aim is to build a model to describe the phenomenon in a conceptual form. Both inductive and deductive analysis processes are represented as three main phases: the preparation, organizing, and reporting of the research material (Elo & Kyngäs, 2007). Content analysis is a research method for making valid inferences from data to their context; the purpose is to provide knowledge, new insights, a representation of facts, and a practical guide for action (Krippendorff, 1980). The challenge can be that each researcher interprets the data according to her or his subjective perspective (Sandelowski, 1995). Each inquiry is distinctive, and the results depend on the skills, insights, analytic abilities, and style of the investigator (Hoskins & Mariano, 2004). In this study, the researchers discussed their observations and interview data to ensure their interpretations would be valid.

Creswell (2007) says that qualitative researchers approach their topic with a specific worldview, which contains a set of beliefs or assumptions. In this study, we had Finnish-, Chinese-, and English-speaking researchers, and we wanted to be aware of our cultural backgrounds while we aimed to understand what happened in Finnish and Chinese

classrooms. As van Manen (1990, p. 33) notes, qualitative research asks “What is it?” Levitt (2015) argues that qualitative research requires one to adopt an interpretative rather than a procedure-driven way of working. Qualitative research relies on the identification of the “subjective interpretation of data,” which enables meaningful data interpretation (Levitt, 2015). Table 3 gives the process of the data analysis, in which three main concepts are identified.

Table 3. The Process of Qualitative Analysis in the Study

EXTRACTED DATA EXAMPLES (activities, tasks, tools, processes etc. through pedagogical decisions)	CODE	CATEGORY	THEME
<p>Planning and designing learning environments/space, dividing groups, roleplay...</p> <p>Camera, iPhone, iPad, paperboard, iMoive software, digital story example, real-life examples of different geometry shapes...</p> <p>What do you try to achieve? What do you need? How do you do it? Can you explain it to me? What have you learned? You did so well; how did you do it? I like the way you discuss and agree in your group...</p>	<p>Plan Initiate Organize</p> <p>Support Using tools Explaining Illustrating Demonstrating</p> <p>Ask good questions Provoke thinking Encouraging</p>	<p>Facilitating the learning</p> <p>Scaffolding the learning</p> <p>Coaching the learning</p>	<p>Mediators stimulate learning activities</p> <p>Mediating the Learning</p> <p>Tools and social interactions have an important role in learning</p> <p>The importance of sociocultural role in human development</p>

Research Results

How Teachers Prepared Students' Learning before the DST Project

First, based on the research data, we describe what teachers did before the DST project. Both Finnish and Chinese teachers decided to use DST in students' math learning. The teachers decided geometry instruction would be used in the DST project. In the Finnish classes, the teachers decided that the students would learn geometry shapes, the associated math concepts, and how those geometry shapes are used in real-life situations. In the Chinese classrooms, the teachers wanted students to learn how to calculate the area size of different geometry shapes and to apply their learning in real-life situations.

The teachers planned time for the project and made sure to have resources, such as iPads and computers, to create the digital stories. Even though DST is student-centered knowledge creation, the teachers made many arrangements to ensure students' learning. The teachers' planning work was demonstrated in the discussion notes, slides, and documents. In the teachers' interviews, one teacher said the following:

“We also organize how many courses for the projects, how much time is needed, and what is to be covered in each lesson.”

“Teachers play important roles in selecting the topics.”

Another teacher had this to say:

“We also felt that it is important for teachers to do the pedagogical course planning—how much time is needed and what needs to be carried out in each lesson.”

From these descriptions of what teachers did before the DST project and even though the project gave students much freedom to design their own stories, the teachers needed to make many pedagogical decisions (e.g., how the project would fit within the school curriculum). The teachers also facilitated the project through preparation. These two educational systems have different curriculums as well as different teaching and learning traditions; however, both countries strive to prepare students to work independently in their groups.

How Teachers Mediated Students' Learning in the Beginning of the DST Project

In the beginning of the project, the teachers explained to the students what the DST project was about, the process and the steps, and how many lesson hours in this math learning

project with DST. When introducing math learning with DST to students, the Chinese and Finnish teachers had different approaches. The Chinese teachers provided students structured guidance. For example, they showed a digital story video to the students to demonstrate what kinds of digital stories can be created. The video shows how students work in groups to discover and learn about the structural design of a bridge through activities, such as reading books, search information from internet, asking experts, discussing among the students, demonstrating it with paper boards and other objects. Then, the teachers explained to the students what they planned to do, the expected learning outcomes, and how the final assessment would be carried out.

The Finnish classes were more open and were less formal with the final assessment. In one class, the student teachers used roleplay to introduce a real-life problem and asked students to solve it by using geometry concepts. In the roleplay, the student teachers explained that a company had just developed a wonderful new product, but the old product package was outdated, so the company needed to design a sophisticated new product package. The student teachers asked the students to design a product package for their chosen product (e.g., mobile phone, iPad). The students could choose the product and design the product package using their knowledge of geometry.

In the Finnish school, the teachers divided students into groups. There were fewer students (i.e., about twenty-three students) in the Finnish class, and the groups each included three to five students. In the Chinese school, the teachers let the students form groups of five to six students. The Chinese students were excited, but there were problems. Six boys wanted to be in one group; however, the teachers preferred each group to have both boys and girls. Also, many high-achieving students gathered in one group. The teachers negotiated with the students to balance the group by gender and skill levels.

In the Chinese teachers' group interview, one teacher said the following:

We introduced and explained to the students what the DST method is, and how we planned to use it in our math studying. We showed one example. Then we helped and participated in forming the groups. We also suggested that each group needs to define the roles of each group member.

In an interview, one Finnish teacher commented as follows:

We [the teacher and student teachers] first selected four topics. Then we asked the students to select which topic they were interested in. We formed the groups based on the students' interests. If too many students were interested in one topic, then we had to decide and negotiate with the students. In the beginning, we had eight small groups; each group had about three students. We noticed

that in one small group, one person was very active, and the other two students were not so active. It was difficult for the one active student to make the other two passive students join in the group work. Then we combined the small groups to the bigger group (five or six students together). Even in bigger group, there were only two students who were very active; these two students were able to motivate others to do things together.

We can see that at the beginning of the project, the teachers mediated the students' learning in many ways. The teachers facilitated learning by introducing the method and theme. Then, pedagogical decisions were made by the teachers on how to introduce the DST project and to determine the themes. The formation of student groups was organized by the teachers, and they made pedagogical decisions about how the groups would be formed.

How Teachers Mediated Students' Learning during the DST Project

After the teachers provided the information needed to start the projects, the teachers stepped aside, and the students were in the center of the stage while they made plans, divided responsibilities, searched for information, recorded the learning artifacts, discussed different alternatives, and synthesized and created their digital stories. The teachers, however, still played an active backstage role.

The teachers ensured that every child was participating in the learning. In China, the teachers had to find additional learning space for students (e.g., corridors) because the classroom was too small for so many groups engaged in active learning, and it was quite noisy when the students made video clips.

The teachers also had to provide some new tools and resources (e.g., iPads, computers). The teachers asked for support from the IT teacher, and they facilitated the students' learning by providing help and support whenever needed.

In the teachers' group interview, one teacher said the following:

“Through this project, we paid more attention to individual students' different capability levels. We can give more support to the students who need [it].”

“And [we can] ensure all the students actively participate in the learning process and activities.”

Another teacher added the following:

“We asked the IT teacher to provide some training for students about how to use digital tools and how to create videos. We provide support to students when they ask for help.”

Teachers paid attention to the students' progress and asked questions—an important coaching strategy to create awareness among the students about their progress at a given time. The teachers used a praising strategy in their coaching by drawing attention to the students' progress, their creative ideas, and their effort, which increased their confidence and motivation. The teachers often did not give direct answers and suggestions to the students; instead, the teachers asked good questions to help the students' awareness of the situation and to help them move forward. Through coaching, the teachers tried to help students improve their work and learning.

The teachers also used scaffolding strategies, such as providing a checklist (i.e., the digital story assessment form showing how a good digital story looks) for students to use when they made their own stories. To scaffold the students' learning, the teachers also used visual and tangible objects (e.g., toothpick sticks and candies to form different shapes) to illustrate geometry concepts. The teachers reminded students of previous learning related to geometry, which students then applied to the current problem. In the self-assessment and peer-assessment, the students were asked to give a grade to each question—five (extremely well), four (very well), three (well), two (moderately), and one (not really at all)—and to give suggestions for improvement. Here is the list of questions:

- How are the important concepts, terms, and information, such as the triangle, square, and surface area, displayed in the video?
- How well is the story of the video structured? Consider the introduction, the interchange between the pictures, the events, and the ending.
- How well does the story give explanations and reasoning for such thing as why a certain shape is a triangle?
- How does the video make the material that is supposed to be learned understandable for the viewer? Consider the conversations, pictures, animations, etc.
- How does the subtitling help the viewers understand the most important mathematical terms as well as the material that is supposed to be learned?
- How does the video keep the viewer engaged? Consider the music, the viewing angles, and the close and remote shooting.

- What is your overall opinion of the video?

The assessment questionnaire was given to students before they started to make their digital story videos so that they could see what the important elements in good digital stories were.

In the interviews, we asked the teachers directly, "What are your roles as a teacher in using DST method?" One teacher gave very clear description in response:

"We are organizers for the project. We provide inspiration and guidance for the students. We are also coordinators when there are conflicts and difficulties. We are helpers and supporters during the process, as scaffolding to our students."

One teacher stated the following, with which several other teachers agreed:

"One challenge for me as teacher in doing DST is that it takes longer than the usual way we teach. We notice that DST has many good sides. Students are very excited and engaged in what they are doing, and they learn many things besides math. Sometimes it takes longer for the students to carry out the activities than we expected. I feel that we need more time to plan for next DST project."

Another teacher commented:

"This digital storytelling method needs many skills from children. As a teacher, I can observe what skills children already have and what they are good at and what skills need further development."

The interview data clearly showed that the teachers mediate the students' learning by facilitating, coaching, and scaffolding. This also showed the teachers' professional competence in identifying the students' needs and developing their potential.

What Teachers Did to Mediate Students' Learning at the End of the DST Project

At the end of the project, each group presented their digital story to the whole class. After each group presentation, the teacher asked the group to self-assess their digital story and then asked other students to give a peer assessment; the teacher then provided their assessment. The assessment was designed for students' improvement. The teacher asked the students to assess their digital story, based on the criteria in the assessment form, by asking two main questions: (a) what were the good elements in this digital story; (b) if you would have more time, how would you like to make the digital story better? In addition, the Finnish teachers asked their students questions to check students' learning and

understanding of the geometry shapes and concepts. The Chinese teachers asked students to solve three math problems related to calculating the area of geometry shapes.

In summary, at the end of the DST project, the teachers made pedagogical decisions on how the assessment would be used to achieve improvement-led assessment. The teachers facilitated the assessment by leading and guiding the assessment questions; they also used scaffolding to check if the students understood the math and geometrical concepts.

During one classroom observation, after one group of students made their digital story presentation, one Finnish teacher asked the other students the following:

“Can someone tell us what good things in this digital story were? If there were more time, how could they improve their digital stories?”

Later, in one interview with a student from that class, the researcher asked her: “What have you learned from this DST project?” The student said, “I learned...and I also learned how to give comments to others nicely.” This demonstrates that the teacher scaffolded the students in how to give feedback to others nicely.

In this DST project, the improvement-based assessment was used for learning and to help students to see what went well; their achievement made them feel proud of themselves and also increased their confidence in learning. At the same time, the assessment helped students see how they could develop further with suggestions. Additionally, we included learning reflection by asking good questions to the students after they finished their DST presentations.

In the teachers' interview, we also asked this question: “What are the biggest changes for teachers in doing this DST project? The following are the teachers' collective answers:

“With the traditional method, we teach the students, then the students do the exercise, and then we check whether they have done it correctly. Now with the digital storytelling method, the students need to find out how to solve the math problems.”

“The teachers step from the front of the stage to the back of the stage.”

“With the traditional method, students are more passive during studying. With DST, students are more engaged and more active.”

This [DST] method is totally different compared to traditional teaching methods. Compared to the traditional method, in which teachers are at center stage and teach knowledge to their students, the DST method is a student-centered approach. In this new

method, we did not teach the students. It was the students who learn the knowledge by themselves. In this method, the key point is that the teachers step out from the center of the classroom.

The evidence indicates that DST can bring students to the center of the learning stage. Teachers had moved to the side of the classroom to have a more supportive role. When we looked through all the students' DST videos, we noticed that they demonstrated the objectives the teachers had set before the projects. The Finnish students' videos show how they proposed a real-life problem and how they used math concepts of geometry shapes to solve the problem and how they designed real product packages. The Chinese students' videos show them learning how to calculate the area size of different geometry shapes and how to use their learning in real-life problems. It is interesting to see that the Finnish students' videos have more creativity elements in terms the diversity of the products. The Chinese students' videos have more common elements and were more knowledge focused. In both the Chinese and Finnish students' videos, we can see that students have used other skills besides the math elements, such as language, music, ICT, and story logic structure.

Based on the research data of classroom observation, discussion with teachers, and the DST videos, we also noticed that the Finnish teachers used more coaching strategies than the Chinese ones in mediating students learning. The Finnish teachers asked more questions to provoke students' learning. They paid more attention to students' skills and competence development beyond simply math knowledge, such as communication skills. Chinese teachers focused more on students' knowledge learning during the projects.

Summary of the Findings

In this study, we focused on the teachers' roles as mediators in leading and guiding students' learning. The data described what the teachers did in the process of a DST project and demonstrated that the teachers made many pedagogical decisions based on the students' needs and classroom situations. As mediators, they had the three main roles are (1) **facilitating**; (2) **coaching**; and (3) scaffolding the students' learning:

The teachers facilitated the DST project to enable students to actively engage in student-centered learning. Facilitating the students' learning consists of important aspects in the process of teachers' pedagogical decisions, which were related to managing the whole DST project. These aspects included the following: introducing the method and theme; creating a learning community; being responsible for the project's process; providing needed information as well as a learning space; and creating an interactive and collaborative learning atmosphere.

The teachers used coaching tactics to inspire and lead the students in learning through

roleplaying, asking good questions, praising the students' progress, and giving positive and constructive feedback. Teachers' coaching of the students' learning includes aspects that help students to improve their work, which included the following: inspiring the students; uncovering the students' potential, talents, and goals; clarifying and helping the students breaking down tasks; and motivating and empowering the students by praising their progress and emphasizing their strengths.

Scaffolding strategies were used by teachers to demonstrate the learning outcome product through an existing digital story; they also used visual and tangible objects (e.g., paper board, toothpick sticks) to illustrate the geometry shapes. Scaffolding includes teachers' pedagogical decisions that provide structural or mental tools to support students' learning and can include the following: demonstrating and modelling what the students need to do; providing checklists for the students' expected outcome product; using visual and tangible objects to illustrate the geometry shapes; and checking for understanding.

The focus of this research was to find how teachers led and guided students' learning, which reflects the teachers' pedagogical role as mediators. Figure 1 illustrates the teachers' pedagogical role as mediators in facilitating, coaching, and scaffolding through pedagogical decision making for the students' learning in DST.

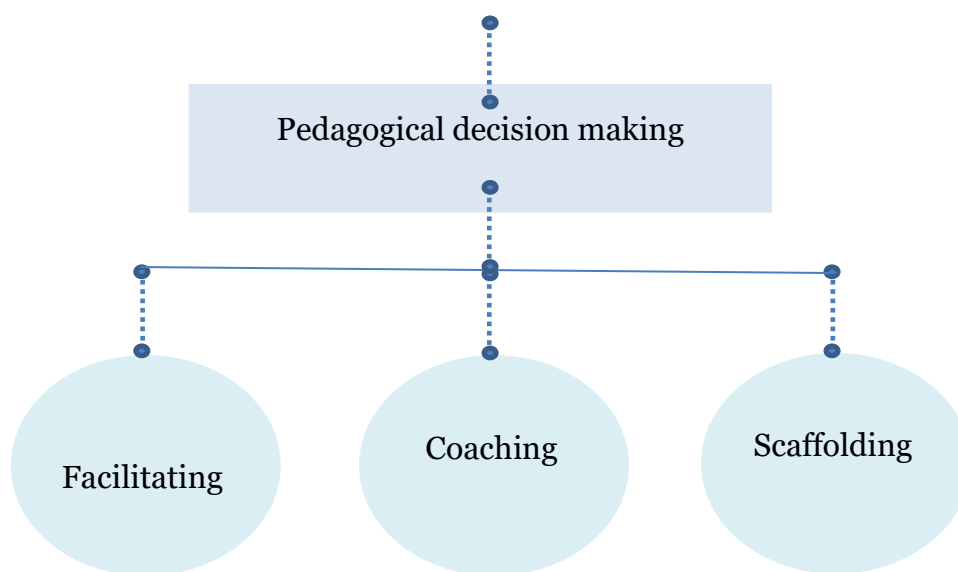


Figure 1. Summary of the teachers' pedagogical role as mediators in DST

Discussion

The aim of this study was to discover the teachers' pedagogical role as mediators (Vygotsky, 1978) in leading and guiding the students' learning with DST. The teacher's role is changing from knowledge transmission at the center of the classroom stage to a

supportive role from the side of the classroom, which enables the students' active knowledge construction. As McWilliam (2009, p. 281–293) stated, teachers' pedagogical identity shifted from “Sage-on-the stage” to “Guide-on-the-side.” We identified the three main functions of facilitating, coaching and scaffolding, which the teachers did as mediators through pedagogical decision making in the DST project.

Facilitation is a common term in education. A facilitator helps a group of people to understand their common objectives and helps them to plan how to achieve these objectives (Bens, 2012). This requires that the facilitator design and run the group activity smoothly so to achieve the objectives. Facilitating enables groups to work more effectively to collaborate and achieve their goals (Kaner et al. 2007). The facilitator's job is to support everyone to do their best thinking and working. To do this, the facilitator encourages full participation, promotes mutual understanding, and cultivates shared responsibility (Kaner et al. 2007). In education, facilitating works with the goal of having students take as much responsibility for their own learning as possible (Metz, 2013). Teachers may shift to a facilitative role to increase student ownership of the learning process (Underhill 1999).

One main characteristic of the DST method is the student-centered knowledge creation approach. The students are at the center of the learning stage; however, this will not happen without teachers facilitating the learning process. Facilitating means planning, guiding, and managing the group activity by creating a flourishing learning process and environment; this ensures everyone's participation and success in meeting the objectives of the group activity. Facilitation was very visible in this DST project. As Gu (2018) has pointed out, teachers are the organizers of the learning process, designers of the learning environment, and helpers of the students' learning experience. In this DST project, teachers facilitated the students' learning by (a) introducing the method and theme, (b) creating learning community, (c) being responsible for the learning process, (d) providing needed information and a supportive learning environment, and (e) supporting interactions within the collaborative learning process.

The concept of coaching is often used in sport or in goal-oriented learning processes. It is a form of development in which a person (i.e., coach) supports a learner or client in achieving a specific goal by providing training and guidance (Passmore, 2016). Coaching is the process of aiming for improved performance. In this DST study, coaching was often associated with asking good questions to discover the right direction, to build motivation, and to define concrete actions. Through the teachers' questions, the students became aware of the learning outcomes; they uncovered their potential and built their inner strength, confidence, and motivation. Additionally, the teachers encouraged the students even when there were difficulties; they praised the students' progress, built students' strength and motivation, and led the students to concrete actions. The teachers, therefore, played an extremely important role in coaching students in the right direction and

providing motivation to achieve better performance.

Scaffolding is a structure of “support points” for performing an action to develop the children’s zone of proximal development (ZPD) (Vygotsky, 1978; Obukhova & Korepanova, 2009). At school, in classroom practice, teachers can use various scaffolding strategies to support the students’ development in their zone of proximal development (ZPD). In Vivitsou et al.’s (2017) study, teachers used scaffolding techniques in DST. In this DST project, to support student-centered learning, the teachers scaffolded the students by showing them a good digital story and then by encouraging them to use paper board to cut different geometry shapes. The teachers provided a checklist for assessing the digital stories. Visual and tangible objects were used to illustrate the geometry shapes. Scaffolding is the support given during the learning process, which is tailored to the needs of the students; the intention is to help the students achieve their learning goals (Sawyer, 2013). Some scaffolding means (Van de Pol et al. 2010) are modeling, explaining, demonstrating, and giving feedbacks and handouts.

These three concepts identified in the teachers’ work in the DST project are widely used in educational settings, not only in the context of DST. We can conclude that findings suggest the teachers’ pedagogical role as mediators in DST is very essential. The teachers made concrete and realistic pedagogical planning, and made decisions to react and adjust to the learning situation and on the students’ needs and capacities in order to develop the students’ active learning and to achieve the desired learning outcomes.

Limitations and Further Study

In this study, the main topic of learning with DST was related to geometry for ten- and eleven-year-old students. Also, this study studies the teacher’s role only in one subject matter and only in two schools and with students at a specific age level. It is important to expand the study to other subject matters, such as language, ICT, and music. The project could also be more inter-disciplinary in using DST in learning. It would be important to find out whether teacher’s role would change if the students were younger or older or if the learning concepts were more abstract and difficult. In this study, the teachers led and guided the students’ learning in groups, and the study did not provide detailed information about how teachers supported for weaker students in an individualized manner. Further studies could focus more on how teachers support individualized learning in the student-centered learning method.

This study was carried out in Finland and in China, which have very different education systems and different cultural backgrounds. Additional studies could be done in other countries. Additionally, it is also important to find out how teachers integrate their teaching with their national curriculum over a longer period of time.

Even though these research findings were discovered using DST, it would be interesting to find out if the same results could be found and tested in other student-centered pedagogical methods or approaches with a different emphasis. Future studies can pursue research in project-based or problem-based learning, or in phenomenon-based learning. We suggest that more research should be carried out to help teachers who use student-centered pedagogical methods and approaches.

Acknowledgements

Authors want to thank the Advanced Innovation Center for Future Education (AICFE), Beijing Normal University, and University of Helsinki for financing the project.

Authors express thanks to their co-researchers: Baoping Li from Beijing Normal University and Marianna Vivitsou from the University of Helsinki for project implementation and data collection.

References

- Bens, I. (2012). *Facilitating with ease! Core skills for facilitators, team leaders and members, managers, consultants, and trainers*. San Francisco: Wiley.
- Creswell, J.W. (2007). *Qualitative inquiry and research design: Choosing among five approaches (2nd ed.)*. Thousand Oaks, CA: Sage.
- Elo, S. & Kyngäs, H. (2008), The qualitative content analysis process. *Journal of Advanced Nursing*, 62: 107-115. <https://doi.org/10.1111/j.1365-2648.2007.04569.x>
- Feuerstein, R. (1990). The theory of structural cognitive modifiability. In B. Presseisen (Ed.), *Learning and thinking styles: Classroom interaction*, (pp. 68–134). Washington, DC: National Education Association.
- Feuerstein, R., & Feuerstein, S. (1991). Mediated learning experience: A theoretical review. In R. Feuerstein, P. Klein, & A. Tannenbaum (Eds.), *Mediated learning experience: Theoretical, psychological, and learning implications*, (pp. 3–52). Tel Aviv and London: Freund
- Frey, J. & Fontana, A. (1991). The Group Interview in Social Research. *The Social Science Journal*, 28(2), 175-187. [https://doi.org/10.1016/0362-3319\(91\)90003-M](https://doi.org/10.1016/0362-3319(91)90003-M)
- Cousin, G. (2009). *Researching learning in higher education: an introduction to contemporary methods and approaches*. New York: Routledge.

- Creswell, J. W., Hanson, W. E., Clark Plano, V. L., & Morales, A. (2007). Qualitative Research Designs: Selection and Implementation. *The Counseling Psychologist*, 35(2), 236–264. <https://doi.org/10.1177/0011000006287390>
- Gu, M. (2018). Challenges and solutions faced by China's teachers in the era of globalization. In H. Niemi, A. Toom, A. Kallioniemi & J. Lavonen (Eds.), *The teachers' role in the changing globalizing world* (pp. 109-123). Leiden: Brill Sense.
- Hoskins C.N. & Mariano C. (2004). *Research in Nursing and Health: Understanding and Using Quantitative and Qualitative Methods*. 2nd ed., New York: Springer Publishing Company.
- Jenkins, H., Purushotma, R., Weigel, M., Clinton, K., & Robinson, A. J. (2009). *Confronting the challenges of participatory culture: Media education for the twenty-first century*. Chicago, IL: MacArthur Foundation. <https://doi.org/10.7551/mitpress/8435.001.0001>
- Kaner, S. with Lind, L., Toldi, C., Fisk, S. and Berger, D. (2007). *Facilitator's Guide to Participatory Decision-Making*. San Fransisco: Jossey-Bass
- Kennedy, K. J. (2008). Globalised economies and liberalised curriculum: New challenges for national citizenship education. In D. Grossman, W. O. Lee & K. Kennedy (Eds.), *Citizenship curriculum in Asia and the Pacific* (pp. 13–26). Hong Kong: Springer/Comparative Education Research Centre, University of Hong Kong.
- Kozulin, A. (1990). *Vygotsky's psychology: A biography of ideas*. Cambridge, MA: Harvard University Press.
- Kozulin, A. (Ed.). (1997). *The ontogeny of cognitive modifiability*. Jerusalem: International Centre for the Enhancement of Learning Potential, ICELP Press
- Kozulin, A. & Presseisen, B.Z. (1995) Mediated Learning Experience and Psychological Tools: Vygotsky's and Feuerstein's perspectives in a study of student learning, *Educational Psychologist*, 30(2), 67–75. https://doi.org/10.1207/s15326985ep3002_3
- Krippendorff K. (1980) *Content Analysis: An Introduction to its Methodology*. Newbury Park : Sage Publications.
- Kulla-Abbott, T., & Polman, J. (2008). Engaging student voice and fulfilling curriculum goals with digital stories. *THEN Journal: Technology Humanities Education and Narrative*, 5(1), 38–60.
- Lambert, J. (2013). *Digital storytelling: Capturing lives, creating community*. New York, NY: Routledge. <https://doi.org/10.4324/9780203102329>

- Lee, W., & Tan, J. P. (2018 in print). The new roles of twenty-first-century teachers: Facilitator, knowledge broker, and pedagogical weaver. In H. Niemi, A. Toom, A. Kallioniemi, and J. Lavonen (Eds.), *The teachers' role in the changing globalizing world* (pp. 11-31). Leiden: Brill Sense.
- Levitt, H.M. (2015). Interpretation-driven guidelines for designing and evaluating grounded theory research: a constructivist-social justice approach. In O. C. G. Gelo, A. Pritz, & Rieken (Eds.), *Psychotherapy research* (pp.455-483). Vienna: Springer. Retrieved from https://link.springer.com/chapter/10.1007/978-3-7091-1382-0_22.
https://doi.org/10.1007/978-3-7091-1382-0_22
- McGee, P. (2015). *The instructional value of digital storytelling: Higher education, professional, and adult learning settings*. New York, NY: Routledge.
<https://doi.org/10.4324/9780203066140>
- McWilliam, E. L. (2009). Teaching for creativity: From sage to guide to meddler. *Asia Pacific Journal of Education*, 29(3), 281–293.
<https://doi.org/10.1080/02188790903092787>
- Metz, T. (2013), *"The FAST Facilitative Session Leader"*. Productivity Press, Boca Raton, Florida.
- Nelson, M. E., & Hull, G. (2008). Self-presentation through multimedia: A Bakhtinian perspective on digital storytelling." In K. Lundby (Ed.), *Digital storytelling, mediatized stories: Self-representations in new media* (pp. 123–144). New York: Peter Lang.
- Niemi, H., Harju, V., Vivitsou, M., Viitanen, K., Multisilta, J., & Kuokkanen, A. (2014). Digital storytelling for 21st-century skills in virtual learning environments, *Creative Education*, 5(9), 657–671. <https://doi.org/10.4236/ce.2014.59078>
- Niemi, H., & Multisilta, J. (2016). Digital storytelling promoting twenty-first century skills and student engagement. *Technology, Pedagogy and Education*, 25(4), 451-468.
<https://doi.org/10.1080/1475939X.2015.1074610>
- Nieuwerburgh, C. van (2012). *Coaching in Education: Getting Better Results for Students, Educators, and Parents. Professional Coaching Series*. London: Karnac Books. ISBN 9781780490793. OCLC 778418798
- Obukhova, L. F., & Korepanova, I. A. (2009). The Zone of Proximal Development: A spatiotemporal model. *Journal of Russian & East European Psychology*, 47(6), 25-47. <https://doi.org/10.2753/RPO1061-0405470602>
- Ohler, J. (2008). *Digital storytelling in the classroom: New media pathways to literacy, learning and creativity*. Thousand Oaks, CA: Corwin Press.

- Passmore, J. (Ed.). (2016). *Excellence in coaching: The industry guide (3rd ed.)*. Philadelphia: Kogan Page.
- Robin, B. (2008). The effective uses of digital storytelling as a teaching and learning tool. In D. Lapp, J. Flood, & S. B. Heath (Eds.), *Handbook of research on teaching literacy through the communicative and visual arts. Vol. 2*. New York: Lawrence Erlbaum Associates. <https://doi.org/10.4324/9781315759616.ch43>
- Rossiter, M., & Garcia, P. A. (2010). Digital storytelling: A new player on the narrative field. *New directions for adult and continuing education*, 126, 3748. <https://doi.org/10.1002/ace.370>
- Sadik, A. (2008). Digital storytelling: A meaningful technology-integrated approach for engaged student learning. *Educational Technology Research & Development*, 56, 487506. <https://doi.org/10.1007/s11423-008-9091-8>
- Sandelowski M. (1995). Qualitative analysis: what it is and how to begin? *Research in Nursing & Health* 18, 371–375. <https://doi.org/10.1002/nur.4770180411>
- Shelby-Caffey, C., bda, E., & Jenkins, B. (2014). Digital storytelling revisited. *The Reading Teacher*, 68(3), 191199. <https://doi.org/10.1002/trtr.1273>
- Stewart, K. D., & Ivala, E. (2017). Silence, voice, and “other languages”: Digital storytelling as a site for resistance and restoration in a South African higher education classroom. *British Journal of Educational Technology*, 48(5), 1164-1175. <https://doi.org/10.1111/bjet.12540>
- Sukovic, S. (2014). iTell: Transliteracy and digital storytelling. *Australian Academic & Research Libraries*, 45(3), 205229. <https://doi.org/10.1080/00048623.2014.951114>
- Sawyer, R. K (2006). *The Cambridge Handbook of the Learning Sciences*. New York: Cambridge University Press, 2006
- Toom, A. & Husu, J. (2018 in print). Teacher's work in changing educational contexts: Balancing the role and the person. In H. Niemi, A. Toom, A. Kallioniemi & J. Lavonen (Eds.), *The teachers' role in the changing globalizing world* (pp. 1-9). Leiden: Brill Sense.
- Underhill, A. (1999). “Facilitation in Language Teaching”. In J. Arnold. *Affect in Language Learning*. Cambridge: Cambridge University press (p. 126.)
- Van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in Teacher–Student Interaction: A Decade of Research. *Educational Psychology Review*, 22:271–296. <https://doi.org/10.1007/s10648-010-9127-6>
- Van Manen, M., (1990). *Researching lived experience*. Albany, NY: State University of New York Press (SUNY) Press.

Vivitsou, M., Niemi, H., Wei, G., Kallunki, V., & Miao, R. (2017). Teachers' practices to support students' work in digital storytelling: A study on Finnish and Chinese school teachers' experiences. *Seminar.net: Media, Technology & Lifelong Learning*. <https://journals.hioa.no/index.php/seminar/article/view/2306>.

Vygotsky, L. (1978). *Mind in society*. Cambridge, MA: MIT Press.

Vygotsky, L. S. & Luria, A. N. (1994). Tool and symbol in the child development. In R. Van der Veer & J. Valsiner (Ed.), *The Vygotsky reader*, 99–174. Oxford: Blackwell.

Woodhouse, J. (2008). *Storytelling: A telling approach in healthcare education*. Paper presented at the Narrative Practitioner Conference, Wrexham, England.