

Learning Literacy and Content Through Video Activities in Primary Education

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Abstract: This case study research explored to what extent and in which ways teachers used Technological Pedagogical Content Knowledge (TPCK) and related competencies to implement video activities in primary education. Three Dutch teachers implemented video activities to improve students' content knowledge and literacy- and communication skills simultaneously. Lesson materials were provided but teachers chose the theme or subject (content) linked to the video activities themselves. Results show that applying TPCK in practice is not obvious for all teachers. Differences between teachers are mainly found in applying Technological Pedagogical Knowledge (TPK). Two teachers used the lesson materials as a guideline while the third teacher used it more prescriptive in teaching the lessons. Teachers were excited about students' performance and enthusiasm. All teachers thought the video activities fit their usual program and none of them experienced the lessons as additional or too much effort.

Introduction

Various studies show that the usage of Information and Communication technology (ICT) in education has a positive effect on literacy- and communication skills. Especially tools that support students in their writing process lead to better performances (Hofer & Swan, 2008; McKenney & Voogt, 2011). Further more it is known that students' motivation increases when their education is connected to the way they experience the world around them (Fleming & Levie, 1993). These days, video is everywhere; most cell phones record and play videos and on the Internet videos are an important way of communication. However, video is barely used in Dutch education and therefore a gap exists between what students experience in their own world and what happens at school (Kennisnet, 2005).

Teacher's ICT skills play an important role, as they are the ones that need to link the opportunities of ICT and the pedagogical aspects needed to apply ICT in practice. Many teachers seem to possess basic skills in this area these days, but lack the knowledge and skills to use ICT in a pedagogical way within the context of their own educational practice (Mishra & Koehler, 2006).

In this paper a multiple case study is described, that focuses on the competences teachers use to integrate video activities in education. This research builds on a project called LIVE (Language Instruction through Video-making Experiences) (McKenney & Voogt, 2011). The LIVE project concentrates on the way in which video activities can be successfully integrated in the primary education language curriculum. Former research resulted in the design of six learner-centered lessons including a teacher guide and student workbook. The lessons focused on a step-by-step approach in which small groups of students designed, recorded and edited a concise (three-minute) video message using a video camera and MovieMaker. The work done so far was used as a base for this research.

Theoretical Underpinnings

The Relation Between Video and Education

Since the early 90's, process-orientated writing as a social activity has been popular in Dutch primary education. (Sperling, 1998 in Smits, 2009). In contrast to the product-orientated way, process orientated writing focuses on the writing process, the systematic approach used to develop a text (Smits, 2009). The social aspect in this is found in social interaction with others, which is part of the development process. Ideas are generated and revised through conversation about the text with others. Just as the goal in writing a text is to communicate a concise message, the same goal accounts for designing video messages. Comparing the phases that emerge from different

communication theories (e.g. Tannenbaum, 1998) with the phases of process orientated writing (Smits 2009; Peterson, 2003) shows that generally the same systematic approach of orientating, planning, formulating, revising and publishing plays an important role in designing video messages.

Since both go through the same phases, the skills needed to design a video message correspond to the skills needed to write a text or prepare a presentation (McKenney & Voogt, 2011). Additionally, collaboratively working on media products fosters social interaction. During the process of making the script and editing the video, students need to select and organize images/scenes to create a concise, smooth running message. Video images make substantial information meaningful by placing this information in a meaningful context (cf. Birmingham & Davies, 2001).

Conditions for an effective learning environment with video

In order to use video in education to its full potential, it is essential to create a learning environment that supports learning with video. The effectiveness will be influenced by the conditions of the learning environment in which the video activities are integrated. To what extent the video activities are integrated effectively will be determined by (Hermans, Tondeur, van Braak, & Valcke, 2008):

- The teacher (knowledge and skills, positive/negative experiences, beliefs, attitudes towards ICT (or video) in education, usages of ICT, etc.)
- The students (Knowledge and skills, experiences, attitudes, ICT usage, etc.)
- The context (available facilities, ICT infrastructure, alignment between ICT and the curriculum, etc.)

Research shows that from these three factors the effectiveness of ICT applications in educations mostly depends on the way the teacher integrates ICT and learning (Hermans et al., 2008; Hofer & Swan, 2008).

Teacher knowledge, skills, attitudes and beliefs

To integrate ICT in practice, teachers need to be able to integrate ICT knowledge with the knowledge about content and pedagogy they already own. Mishra and Koehler (2006) call this knowledge Technological Pedagogical Content Knowledge (TPCK). TPCK describes the knowledge and skills teachers need to teach content in a pedagogical way supported by technology, within a given context. Teachers who are positive towards ICT are more able to integrate ICT in their practice than teachers who are not (Hermans et al., 2008; Christensen & Knezek, 2001). Next to that, beliefs about teaching seem important.

While these aspects are important, they are not reflected in the TPCK model. Knowledge does not necessarily imply whether the teacher actually uses this knowledge. So and Kim (2009) state that teacher's beliefs determine whether or not they use their ICT knowledge in practice. Also self-efficacy and confidence are important for the actual use of ICT by teachers (Christensen & Knezek, 2001).

Figure 1 visualizes the relations between all these underlying ideas. To successfully implement video activities, positive beliefs, attitudes and experiences towards video are important. Next to that, the teacher needs TPCK. Self-efficacy functions as a filter, which determines whether the teacher will put ICT related education into practice or not. Beliefs and attitudes influence the teacher's TPCK and vice versa. These factors influence the way a teacher will arrange the learning environment and thus the learning results of the students. The context encompasses factors like availability of facilities, ICT infrastructure, student's prior knowledge, alignment between curriculum and ICT, etc.

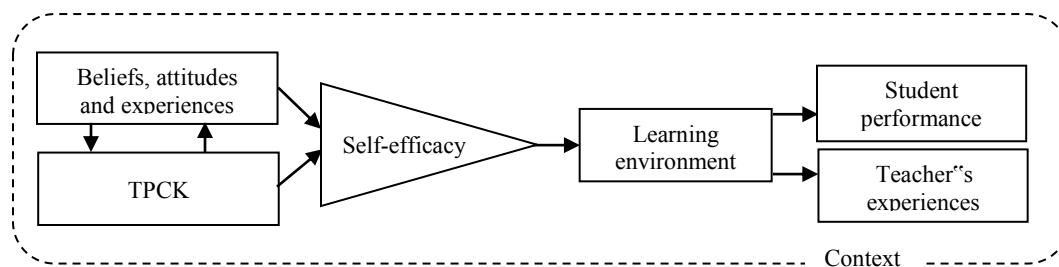


Figure 1 Relations between underlying ideas

This study aims to answer the following research question: “How do teacher factors (beliefs, attitudes self-efficacy and TPCK) impact the implementation of video activities and eventually student performance”. All the aspects visualized in Figure 1 are examined. Additionally, because performance is depended on how both the teachers and students experience the lessons, students' experiences are also examined.

Method

A multiple case study was employed. Video activities were implemented in three classrooms on two different schools. Each class was considered a case. Each case had two units of analysis: the teacher and the students. Respondents for this research were three primary education teachers and their students. The video activities were employed with students of 9-12 years old (K4-6). Background information about the teachers and their classes is provided in Table 1.

Location	Teacher	Class size	Gender	Age (years)	Experience (years)
School A	Teacher 1	26	Female	37	14
	Teacher 2	26	Female	26	4
School B	Teacher 3	30	Female	53	21

Table 1. Demographic data

Both schools possessed the needed ICT facilities (e.g. computer with MovieMaker, video camera). None of the teachers ever recorded or edited a movie. Some students however did have some experience. In School A 43% of the students recorded a movie before and 24% of the students edited a movie before. In School B 52% recorded a movie before but none ever edited a movie.

Instruments

Data is collected through interview, observation, questionnaires and an evaluation rubric to foster triangulation. Before the implementation of the video activities, teachers filled out a questionnaire that provided information about the perception of their own TPCK and their attitude towards ICT in education. Components of this questionnaire were based on existing questionnaires from Schmidt, Baran, Thompson, Koehler, Mishra & Shin (2009) (TPCK), Ten Brummelhuis & Drent (2000) (educational orientation/approach) and Knezek, Christensen, Miyashita, & Ropp, (2000) (ICT skills). In addition students filled out a questionnaire about computer usage, video recording and video editing.

During the implementation, observations were conducted guided by an observation scheme. All lessons were videotaped and observed to determine in which way the teachers applied TK, TCK, TPK, PCK and TPCK in their teaching. Note that „knowledge“ is not really observable which is why the observation scheme emphasized competencies and teacher behavior was observed. Two observers observed the first two lessons of every teacher. The inter rater reliability was ($\kappa = 0,81$) (Cohen, 1960).

After the implementation both teacher interviews and student questionnaires were administered and students video products were evaluated by a rubric. Through a teacher interview information was collected about the teacher's ideas on how to implement video activities and barriers experienced during the implementation. Questions focused on TPCK in relation to the video activities and the practicality of the intervention. A student questionnaire contained questions about difficulty (of creating videos, collaborating and the workbook), teacher guidance and appreciation of the video activities. A rubric was designed to evaluate the final video products based on the characteristics of content, organization, communication, style and conventions (Voogt, McKenney, Smits & Bustraan, 2009). To determine reliability different experts scored video products using the rubric; a language expert (SLO), the researcher (UT), an involved teacher and an independent teacher. The results yielded an acceptable inter rater reliability (Fleiss's kappa = 0.68) (Fleiss, 1971).

Results

Teacher's TPCK

Table 2 shows to which extent the teachers applied different components of TPCK during implementation of the video activities. Note that these results are only based on observations and knowledge by itself cannot be observed. This means that even if a teacher used some TPCK components less than others it does not mean that she does not possess the knowledge or related competences. It just means it was not observed.

Lesson 1 - 5	Teacher 1	Teacher 2	Teacher 3
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TK	Average (56%)	Barely (25%)	High (88%)
TCK	High (75%)	Average (55%)	High (75%)
TPK	Average (59%)	Low (41%)	High (82%)
TPACK	High (77%)	Average (56%)	High (89%)
PCK	Average (55%)	Low (41%)	Average (70%)

Note: a 75% score or higher is marked as „high“; used a certain component a lot. A score between 50% and 75% is average, between 25% and 50% is low and a score lower than 25% means the component was barely or not used.

Table 2 Extent to which teachers used TPCK components during implementation of the video activities (observed)

Overall the results show that Teacher 3 used a lot of the TPCK components. Teacher 1 scored average and teacher 2 scored rather low during the observations. For example, Teacher 3 showed her students in which way framing and perspectives worked and how these are related to content. She demonstrated this with a video camera by filming a student from a low viewpoint (frog-perspective) to show how someone looks big this way. After the demonstration, the teacher put the just made video on her computer to show the result to all of the students. While students were working on their video scripts, she kept reminding them of the different filming techniques. Teacher 1 also explained her students about the different framings and perspectives but showed this by pictures. She also shortly linked the different techniques to content and kept reminding students of these techniques. Teacher 2 told the students about framing and perspectives but did not concretely show this in any way. Additionally she did not help students remember these techniques. Another example is the way in which the teacher supported the students during video recording and editing. Teacher 3 walked around and asked constructive questions to students, like „how could you do that differently“ or „do tulips really grow from seeds?“. Teacher 1 walked around every now and then but most of the time waited for students to come to her with questions. If students asked questions, she took a coaching role. Teacher 2 let her students work independently and barely offered support during video recording and editing.

Beliefs, Attitudes and educational orientation

The teacher questionnaire was used to analyze the teachers“ pedagogical orientation. Teacher 1 and Teacher 3 are directed towards a constructivistic approach, in which Teacher 3 scores higher on the constructivistic scale than Teacher 1. Teacher 2 takes a more neutral position. All teachers perceive themselves as experienced teachers who are not afraid to use ICT in their education. All teachers suggested that they would be able to use ICT to support their teaching and that they were able to use ICT in different contexts to foster learning. The scores on TPCK items showed that teachers estimate their TPCK to be above average. There are no spectacular differences on the different underlying scales. The largest difference is found in the TPK component. On this component, Teacher 1 scores lowest and Teacher 2 highest. Furthermore all teachers state that both themselves and the students use ICT every day in their lessons.

Results show that all teachers have high self-efficacy and confidence in using ICT in practice. Also attitude towards ICT seems positive. Next to this, video activities fit in a constructivistic approach. Teacher 1 and 3 seemed constructivistic orientated while teacher 2 takes a more neutral position in this.

Student Performances

The rubric was used to evaluate the student“s video products. Results are shown in table 3.

Class	<i>N</i>	<i>M</i>	<i>SD</i>
Class 1 (Teacher 1)	4	3.34	0.25
Class 2 (Teacher 2)	6	2.30	0.49
Class 3 (Teacher 3)	10	3.16	0.42

Note: averages can be between 1(low) and 4 (high)

Table 2 Performances on video products by class

Examining the data in detail shows that the largest differences can be found in the way video was related to content, line of reasoning, goal orientation and selecting content. The data was analyzed with ANOVA. Results show significant differences, $F(2,15) = 4.73$, $p = .01$. Bonferroni reliability intervals show that these differences mainly refer to the differences between students of teacher 2 and students of teacher 1 and 3 ($p = 0.004$ en $p = 0.003$ respectively). The differences between students of teacher 1 and 3 are not significant.

Student Experiences

Means and standard deviations on difficulty ($a = 0.81$), teacher guidance ($a = 0.70$) and fun ($a = 0.69$) of the student questionnaire results showed that differences between groups are minimal. None of the classes thought the video activities were either too difficult or too easy. Some students felt supported by the teachers in writing their script, using the camera and using Moviemaker while others wrote that they did not need the teacher's help. Furthermore, all students experienced the video activities as fun. In the open comments section, some students wrote that they did not like how their collaboration went or when something failed the first time.

Teacher Experiences

Teacher experiences are divided in two main themes: ideas of the teacher about using video activities in practice and the practicality of the video activities intervention.

Ideas about implementing video activities

Overall teachers were enthusiastic about the enthusiasm and performance of the students. Teacher 1 and 3 indicated that not everything worked out as they had planned. Teacher 3 said she wants to emphasize the script next time and Teacher 2 indicated that for a next time, she wants to organize the logistics in a better way. However, a bad script didn't mean students did not learn anything. After class teacher 3 asked the students what they thought they learned. One student said: *„First I thought the script wasn't really important, I just wanted to go to recording as soon as possible. So we didn't make a good script, and when we started recording we didn't know what to do. So, we made sure we had a good script first and then went on with recording'.*

Not all teachers were confident they had enough skills to guide the students. Especially when it came to editing the movie. Teachers handled this differently. Teacher 1 and 2 indicated they did not try editing or video recording before class. Teacher 3 did try out both editing and video recording. All teachers indicated however that when they did not feel competent enough in the usage of technology, students were able to help most of the time. Teachers selected the topics to link with the video activities. Teacher 1 linked the video activities a project called „happy with yourself" because the way of working matched. The expected written reports changed to the video messages. Teacher 3 linked the video activities to the annual presentation rounds. *„a presentation is like a video message, students need to tell something about certain content and use their communication skills to do so'.* All teachers said they would do it again.

Practicality of the video activities

All teachers thought the lesson materials were an extra information source that supported them in integrating the video activities. Teacher 1 and 3 used the teacher guide like a framework for teaching. Teacher 2 tried to follow the teacher guide to every detail and used it as a prescription. All teachers needed more time to teach the lessons than expected. None of teachers however experienced this as a problem. All teachers reported that the video activities were well aligned with the curriculum. Teacher 1: *'We underestimated the time we needed, but that is okay because the video activities were a good fit with the theme to which we linked it. This way we could easily leave parts out of our usual program. Students learn more from video activities than from a literacy lesson'.*

Because the video activities were new to the teachers, they found it hard to pay enough attention to the depth of the stories students made. Video recording and editing gave so many extra points of attention that they tended to forget the content and language part of the activities. Teacher 1 solved this by looking to the videos together with the students through asking critical questions. Teachers thought that the efforts needed to implement the video activities balanced students' results. All teachers indicated that they did not spend much more time in preparing for the lessons they would usually do.

Conclusions and Discussion

This research contributes to insights about the impact of attitudes, beliefs, self-efficacy and the use of TPCK on student performances when implementing video activities. Applying TPCK is not obvious for all teachers. Differences between teachers are mainly found in applying Technological Pedagogical Knowledge (TPK). Teachers were excited about the quality of student's products and the enthusiasm of students. Two teachers used the lesson materials as an information source and used it as a guideline to work from in practice. One teacher used the lesson materials in a more prescriptive way. Also benefits (student results) matched the efforts the teachers had to put in implementing the activities. All teachers thought the video activities were aligned with their curriculum. The student's final products were rated above average.

Especially the needed technical skills were new for the teachers. Often students were asked to help. It seemed that the teachers experienced most difficulty in the pedagogical part of the implementation, especially TPK. Teacher 3 showed most TPCK related behavior, Teacher 1 average and Teacher 2 barely. Also the students' results show that Teachers 1 and 3 scored higher compared to Teacher 2. Teachers 1 and 3 seemed more confident with the expected pedagogy than Teacher 2 and were better able to link domain content and the video to the students. However, all teachers seemed to have a positive attitude towards ICT in education and all perceived themselves to be above average, but not all of the teachers actually showed this during observations. Next to the quality of the video products, enthusiasm of the students was an important factor for the teachers to implement the materials. This is consistent with former similar research as well (Doyle & Ponder, 1978).

The difference between teacher 2 and teachers 3 and 1 could be a result of the difference in years of teaching experience. Teachers 1 and 3 were experienced teachers while teacher 2 just started. The relative low score on pedagogy seems to be explained by this as well. Research of Grossman & Thompson (2008) shows that less experienced teachers tend to stick to the teacher guide while experienced teachers use the teacher guide as a guideline and that in the latter case beliefs play a bigger role in interpreting the guidelines.

Notable was that all teachers thought the video activities were aligned with their curriculum. Most studies find the opposite to be true when talking about implementing new curriculum materials in education (Zhao, 2003; Hermans, Tondeur, van Braak, & Valcke, 2008). A reason for this could be that teachers were able to choose the topic themselves. In this way it was easier for the teachers to decide what they could replace in their usual program. Teachers did not only see the link with domain knowledge but also with literacy.

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