Towards a differentiated and domain-specific view of educational technology: An exploratory study of history teachers' technology use.

ABSTRACT

Adopting a differentiated and domain-specific view of educational technology, the present study focusses on the case of school history. It argues that, in this particular context, one of technology's main assets is its ability to support inquiry-based learning activities, during which students interpret the past through historical reasoning. As little is known about how history teachers use technology in the classroom, an exploratory study was carried out with 22 teachers in fourth grade of secondary education in Flanders (Belgium). Semi-structured interviews were used to investigate beliefs about technology, ways in which technology was implemented, and factors influencing the adoption process. The results suggest that most teachers held positive beliefs about technology, and that use of technology was driven by several rationales. Although a significant group of teachers was thoughtful of how their own use of technology could support students' learning, student use remained limited to instances where technology served as a resource for the task, rather than a tool for supporting cognitive or social activity. It appears that teachers were not yet aware of technology's ability to scaffold inquiry activities. Furthermore, limitations in school infrastructure often prevented them from experimenting with more pervasive student uses of technology.

1. INTRODUCTION

Since the 1980s, the use of technology to support learning and teaching has been highly valued in educational research, as it has often been assumed that technology can turn learning activities into more active and engaging processes, and make schools more effective than they currently are (Cuban, 2001). In the decades that followed, however, reports revealed that implementation of technology was often obstructed by factors internal to the teacher, as well as external barriers situated across different levels of educational practice. In a review of these studies, Hew and Brush (2007) outlined six types of barriers that interacted in influencing teachers' decision to adopt technology: (1) lack of time and resources, (2) limited knowledge and skills, (3) unsupportive leadership and school time-tabling, (4) negative attitudes and beliefs, (5) pressures of high-stakes testing, and (6) incompatibility with subject culture norms. As a consequence, a large part of the research

conducted during the past decade focused on overcoming these barriers (Ertmer, 2005; Haydn & Barton, 2007). The result was a number of design principles for technology courses in teacher training, with recommendations such as: providing role models, offering opportunities to learn by design, and learning with and from peers (see also the review of Tondeur et al., 2012).

Recent large-scale surveys on technology in education suggest that the increased attention to this issue is now starting to bear fruit. The ICT in Education Survey of schools, carried out on behalf of the European Commission (2013), gives an overview of the situation in Europe (i.e. the 28 member states of the EU, but also Iceland, Turkey, and Norway). The results indicate that teachers are now confident in their ability to use technology, hold positive beliefs about technology's potential for improving students' learning process, and organise more technology-based learning activities compared to several years ago. A more global perspective is provided by the Teaching and Learning International Survey (TALIS), conducted by the OECD (2014) in 35 nations across several continents (i.e. Australia, Asia, Europe, North and South America). Similar to the European context, the data suggest that more than 80% of the teachers provide students with projects or class work involving the use of technology, although some teachers do so more frequently than others.

At the same time, it has been argued that, instead of examining teachers' implementation of technology in general, there is a need for a *differentiated view* that distinguishes high- from low-level use of technology (e.g. Ertmer, 2005). Whereas low-level use serves to optimise traditional teaching practices, high-level use is aimed at fostering the development of higher-order thinking skills through more student-centred learning (Ertmer, 2005; Smeets & Mooij, 2001). Similarly, others have criticized most of the literature for not taking a *domain-specific perspective* towards teaching with technology, claiming that the subject matter is decisive for determining the ways in which technology can be of assistance (Haydn & Barton, 2007). A significant body of research has therefore called for an approach that does not merely focus on whether technology is used, but rather on *how* it is used *within* specific subject domains (e.g. Mishra & Koehler, 2006).

In short, there is a need for more domain-specific studies, focussing on how teachers use technology to instruct a particular subject. The present study is part of a research project on school history (also see Voet & De Wever, 2016) and sets out to provide a more clear picture of high-level use within this specific context, in order to examine teachers' practice.

2. DEFINING HIGH-LEVEL USE OF TECHNOLOGY IN HISTORY EDUCATION

In history, higher-order, disciplinary thinking markedly differs from that in other domains. This is mainly because knowledge of the past is neither fixed nor given (Lee, 2005). Instead, the past is constructed by historians, through study of human-constructed artefacts that generally represent a particular world view, and offer only a piece of the historical puzzle. Information must therefore be meticulously interrogated and corroborated, but may still give rise to more than one plausible interpretation of the same event (Reisman, 2012). Becoming adept at historical reasoning therefore means that students must learn to: (1) ask relevant historical questions, (2) assess the value and reliability of sources in light of the questions asked, (3) interpret and situate information within its historical context, (4) form a conclusion by weighing arguments based on the available evidence, and (5) draw on domain-specific terms and concepts as 'tools' for thinking (for more information, see the review by van Drie & van Boxtel, 2008).

Involving students in authentic *inquiry-based learning* activities that draw on one or more of these aspects of historical reasoning has been put forward as a logical, but also effective, approach to realizing this goal (Reisman, 2012). As such, inquiry-based learning activities have consistently moved toward the center of scholarly work and history curricula across the world (van Drie & van Boxtel, 2008). In practice, however, the ill-structured nature of inquiry-based learning makes it difficult for novices to successfully complete such activities without assistance (Hmelo-Silver, Duncan, & Chinn, 2007). For instance, it has been found that students do not spontaneously adopt an analytical approach to information, and often find it difficult to balance multiple arguments (van Drie & van Boxtel, 2008). Fortunately, other studies also indicate that technology can help teachers to offer the support required for facilitating reasoning during inquiries. Bearing in mind the prior characterization of high-level use of technology as a means to stimulate both student-centred learning and higher-order thinking, this, then, is how high-level use of technology in history can be understood.

Looking further into this matter, research shows that high-level use of technology can facilitate historical inquiries in several ways, by providing either cognitive or social support, or both (Weinberger, Ertl, Fischer, & Mandl, 2005). When used as a cognitive tool, technology stimulates or supports students to engage in the domain-specific reasoning processes outlined above. For example, Saye and Brush (2002) described how a combination of storyboard templates and hyperlinks connecting different information sources assisted students in resolving conflicting accounts, and encouraged the creation of a personal narrative. Alternatively, when used as a social tool, technology can help to facilitate students' collaborative reasoning. An illustration can be found in the work by

Higgins, Mercier, Burd, and Joyce-Gibbons (2012), who conclude that certain features of multi-touch tables, such as a shared display and a zoom function, increased students' joint attention to clues in a historical inquiry task, and hence stimulated a constructive approach to the task.

In short, this overview makes the case that, in the context of school history, one of the main assets of technology is its ability to support inquiry-based learning activities, during which students engage in historical reasoning. As of yet, little is known about the ways in which history teachers actually use technology in their daily classroom practice. The question thus arises whether teachers have in fact embraced the examples of high-level use of technology that have been put forward by scholarly work, in addition to any low-level use that may also be present in their teaching. Therefore, the present study aims to investigate the ways in which history teachers use technology to support learning within their classrooms.

3. DESIGN AND METHOD

The study is part of a research project on history teachers' conceptions of the nature of their subject, and the way it should be taught. The main goal of this project was to explore how teachers integrated inquiry-based learning activities into their lessons, as well as to examine the beliefs that underlie their approach (for more information, see Voet & De Wever, 2016). Interviews were selected as the method of data collection, in order to provide teachers with the opportunity to describe and explain their use of technology in their own words.

3.1. Participants' selection and background

In total, 22 teachers from various secondary schools in Flanders (Belgium) were interviewed about their use of technology. In Flanders, secondary education spans six grades, with students generally starting at age 12 and graduating at age 18. Depending on the grade and study track that they have chosen, the majority of Flemish students receives either one or two 50-minute history lessons during each week of the school year. From the third grade on, the broad attainment targets set out by the government start to put a strong focus on inquiry skills, such as finding, selecting and analysing information (Flemish Government, 2014). In the present study, only teachers working in fourth grade (average student age: 15-16 years old) were allowed to participate. In addition, only teachers with at least three years of experience in teaching history could take part, to ensure that all participants had had sufficient time to experiment with the use of technology in the classroom. Finally, potential participants were only told that the study would explore their classroom practice (i.e. technology was not mentioned), in order to avoid a selection bias. Participants' mean age was 43 years (SD: 11 years) and their mean experience in teaching history was 15 years (SD:

8 years). Exactly half of the group was male, the other half was female. A first group of 5 teachers held a Bachelor degree (three-year university college program). The other 17 teachers had received an advanced degree, with 16 having obtained a Master degree (four-year university program, followed by a one-year teacher training), and 1 also a PhD (in history).

3.2. Data collection and analysis

Each teacher took part in a semi-structured interview, focussing on (1) beliefs about technology in education, (2) ways in which technology was used during the history lesson, and (3) factors that influenced the implementation of technology (see appendix 1 for the complete interview protocol). All interviews were recorded, transcribed and then coded using NVivo 10. Using the overview of high-level technology use in history as the guiding framework, a preliminary reading of the transcripts allowed to construct a coding scheme for analysing history teachers' technology use more closely. This coding scheme was applied to the interviews in order to identify and label units of meaning, expressing a single idea. In line with the central themes during the interview, the main codes included: beliefs, types of use, and barriers. Each of these main codes was then further split into a number of sub-codes (e.g. 'types of use' was split up into 'teacher use' and 'student use', which in turn covered several codes corresponding to specific applications). Following the recommendations of Miles and Huberman (1994), a matrix holding a summary of each teacher's individual case was compiled after the coding was completed, as a visual aid to the interpretation of the data.

4. RESULTS

When teachers talked about their school and the history classroom, it became clear that each of them worked in an environment that offered several possibilities for teaching and learning with technology. All teachers gave their lessons in classrooms equipped with a computer connected to a beamer, or an interactive whiteboard. An Internet connection was often available, either through cable or wireless access. Although most classrooms did not hold computers for students, teachers could generally request to have their lessons scheduled in the school's computer lab or, in some cases, make a reservation for a mobile tray with student laptops. Partly because of these conditions, all participating teachers reported that they frequently used technology in their class. This also became clear from their accounts of technology use, which drew on a number of classroom experiences.

4.1. Rationales for technology in instruction

As teachers related their beliefs about technology and its role in history education, there emerged four clearly distinct rationales for adopting technological tools for instruction. In general, teachers used technology to (1) increase the effectiveness of instruction, (2) connect to students' daily life, (3) increase work efficiency, or (4) comply with a subjective norm. Table 1 provides an outline of these findings.

Table 1

Rationales for technology use

Category	Description	Frequency
Increasing effectiveness	Technology offers new possibilities to meet the needs and interest of all students in class.	17
Connecting to everyday life	Seeing that technology is ubiquitous in everyday life, it should not be kept out of schools.	12
Increasing efficiency	The use of technology reduces teachers' workload and allows to focus more on teaching.	11
Complying with subjective norm	Technology is used because influential others (e.g. colleagues, inspection) think it is important.	4

Most important, 17 teachers firmly believed that technology is able to make teaching more effective, by enabling teachers to quickly switch between teaching methods, providing aids to improve students' understanding, or drawing their attention. As teacher 11 said: "There are some students that learn more… Some students have an auditory disposition, while others have a visual one. Some have both of them. Technological support helps you to cater to all of them, to reach as much students in the group as possible."

A second rationale for using technology, mentioned by 12 teachers, was a belief that education should reflect students' daily life. As teacher 16 stated: "I think it is important for education, because they are using it every day. It is, after all, the world they live in. And it is increasingly becoming our world, so I cannot see why it should be kept out of schools." Teacher 6 held the same beliefs, but added that schools also have a role in building students' proficiency with these tools: "I think it is important that they learn how to use the tools of the current age. They have to be able to keep up with the changes of our time."

Third, 11 teachers also mentioned that technology assisted them in working more efficiently. For teacher 8, one of the most important changes was that: "You no longer need to spend all your time writing on a blackboard with your back to the students. It allows me to keep my connection with the class, and makes teaching so much easier for me." Similarly,

teacher 4 noted that: "It has made teaching more agreeable to me. For instance, if you have to give the same lesson 10 times, and you use PowerPoint, you have to prepare it only once. Without technology, you would still need to use the blackboard during each of these lessons."

A last rationale, which surfaced during the interviews with a minority of 4 teachers, involved a need to comply with a subjective norm. These teachers reported how others, such as their colleagues, or school inspectors checking up on the realisation of the governments' attainment goals, expected them to use technology in their teaching. Whereas most only regarded this as a minor influence, teacher 2 admitted that she would not use technology if the decision would be left entirely up to her: "In fact, I could do without… The main reason I use technology is to keep others satisfied. I do believe it has potential, but there are a lot of things that prevent me from going any further" (see also part 3 of the results section on factors inhibiting technology use).

4.2. Types of technology use

Looking at teachers' adoption of technology to support learning, a general distinction can be made between teacher use and student use of technology. The former refers to instances where technology is used exclusively by the teacher, whereas the latter involves cases where students actively work with technology.

Table 2

Types of technology use

Category	Description	Frequency
Teacher use		
Bringing the past into class	Employing multimedia to let students experience certain aspects of the past.	17
Structuring the learning content	Using presentation and diagramming tools to point out the core insights of the lesson.	5
Looking up information	Searching the web for information to answer unexpected student questions.	6
Student use		
Looking up information	Searching the web for information to construct a report about a topic in history.	15
Presenting findings	Using various software to report findings within	9

As teachers talked about their classroom practice, 18 provided illustrations of both teacher use and student use of technology, while 4 solely mentioned examples of teacher use. The analysis revealed three types of teacher use of technology, next to two types of student use. Teacher use was mainly aimed at (1) bringing the past into the classroom, (2) structuring the learning content and (3) looking up information to answer student questions. On the other hand, student use generally involved (1) looking up information to report on a historical topic, or (2) creating multimedia to present the findings of such activities. An overview of these findings is presented in table 2.

Looking at *teacher use of technology*, a large majority of 21 teachers argued that the largest potential of technology lay in its power to store impressions of the past, and present those to students in the classroom. As teacher 3 said: "For instance, you are able to bring the medieval ages to life. Some time ago, we were covering roman and gothic architecture, which is hard to explain without pictures to illustrate the differences. […] Otherwise, most students would not understand what I am talking about. I think it is very important, and students themselves often say that they are better able to remember something if they have seen it." Next to this, 5 teachers noted that technology offers a number of possibilities for structuring the learning content. For example, teacher 11 remarked that: "There is PowerPoint, but that is already somewhat outdated. There are other ways now. I have a tool installed on my computer that allows me to make mind maps, which I sometimes use when I am trying to point out the main ideas near the end of a lesson." Finally, 6 teachers also expressed themselves positively about how technology allows teachers to look up additional information during lessons, in order to answer student questions. Teacher 12 said that: "When students want to know or have trouble understanding something, you can look it up on the Internet and find the answers to their questions. Being a teacher does not make me all-knowing."

With regard to *student use of technology*, a large group of 15 teachers reported giving students assignments that required them to use the Internet for looking up and comparing information sources, with the goal of drafting a report about a historical topic. As teacher 5 indicated, the Internet gave her students access to sources that she otherwise would not be able to bring into the classroom: "If the information is on the Internet, they can access it, through online archives, and such. There was an assignment that I gave for two years, for which they always had to use the Internet. I asked them to visit the archives of the Public Welfare Centre, in order to look at the records of foundlings and other sources stored there." Next to this, 9 teachers regarded technology as a medium that students could use to

present their findings within the context of an assignment. Illustrating this, teacher 19 recounted: "I made a task on the origins of the EU, which provides students with an introductory text and some questions. I expect them to use these to create a short lecture, using a PowerPoint, to convince me that they have learned something. They should learn how to present the results of their work in a structured way."

4.3. Factors inhibiting technology use

Overall, teachers' adoption of technology seemed to be inhibited by three factors, of which the first one was situated at the school level, and the other two were internal to the teachers. These inhibiting factors were related to (1) school infrastructure, (2) perceived added value of technological tools, and (3) proficiency with technology. An overview of these findings is presented in table 3.

Table 3

Factors inhibiting technology use

Category	Description	Frequency
School infrastructure	Malfunctioning equipment and limited access to computer labs can make it hard to use technology.	12
Perceived added value	The value of technology decreases when it does not improve traditional approaches.	9
Technology proficiency	Some teachers feel unfamiliar with technology, making them slower in unlocking its potential.	4

School infrastructure turned out to be a major inhibitor. It was brought up by 12 teachers, and typically in a negative way. Teachers either complained about limited possibilities for having students use technology, due to busy schedules for computer labs, or technological difficulties, such as regular malfunctions of the school's Internet or incorrect equipment settings. This first factor appeared to be particularly present in cases where teachers had referred to a subjective norm as one of the rationales for technology use. For instance, teacher 2, who had admitted earlier that she primarily used technology to keep others satisfied, complained that: "It bothers me to no end that there are always surprises. Sometimes, I open the closet and all of the cables are gone. In some classes, it is really hard to look for a solution and keep control at the same time. At other times, I cannot find the remote, or the Internet is down. Those are tough problems, which make me want to teach without…"

Second, teachers' remarks about the different applications that they used in the classroom indicated that a large part of them were critical about their usefulness. Out of all teachers, 9 explicitly mentioned that technology should only be used in class if it offers a certain added value. Teacher 8, who recently participated in an in-service training, related that: "It was about interactive whiteboards. I attended the session, and other teachers explained how you could use it. I want to use it, but it seems that it cannot really do much more than PowerPoint. Whether you write on the board with an electric pen or chalk, it really does not make a difference. It has to offer something that you cannot do without it. And when you find what it is, you can use it in class". Adding to this, teacher 7 was convinced that: "A good teacher is not simply one who uses technology, but one who uses technology to help him achieve the learning goals that he has set".

The third factor revolved around teachers' proficiency with technology. A small group of 4 female teachers between 35 and 65 years reported a rather limited capability. Each of these teachers explained how they were largely unfamiliar with most of the technological equipment in the classroom, because they had grown up without them. Still, however, this did not appear to stop them from implementing technology, but mainly seemed to slow down their adoption process. As teacher 20 said: "One time, I was teaching with tablet computers. I was writing something on the blackboard and told a student to grab a piece of paper. But this student told me that we could also use the tablet. The fact that I am not from the digital age, is the largest obstacle for me. I still have to acquire all this knowledge, because I just do not have it."

5. DISCUSSION AND CONCLUSION

Advocating a differentiated and domain-specific view of educational technology, the present study focuses on history teachers' use of technology. It argues that, in school history, high-level use of technology can be defined as instances where technology is used to facilitate student-centred inquiries into the past. When used as a cognitive or social tool, technology can respectively stimulate students to engage in domain-specific reasoning processes, such as assessing the value of information or using evidence to construct arguments (e.g. Saye & Brush, 2002), or promote a constructive approach to the task (e.g.g Higgins et al., 2012).

In line with recent large-scale research (European Commission, 2013), the results suggest that today's history teachers hold mainly positive beliefs about educational technology. Most teachers personally valued technology and, sometimes citing up to three different rationales, believed that it could make their teaching more effective, mend the gap between school and students' daily life, or simply allow them do their work more efficiently. However, in a few cases, teachers also indicated that they had adopted technology because they felt compelled by social (e.g. colleagues) or institutional (e.g. an inspector verifying the

attainment of the national curriculum) pressures. This finding is in line with earlier studies reporting how teachers' technology use is not only determined by personal values, but also by external influences situated at different levels of the educational system (e.g. Hew & Brush, 2007).

Furthermore, the present study confirms that, next to using technology themselves, the majority of teachers also organise activities during which students actively use technology (OECD, 2014). The results show that that teachers carefully considered how their own use of technology could improve students' understanding. From this angle, technology's main potential was often described in terms of using multimedia to bring the past into the classroom, in order to illustrate and clarify the learning content. Yet, when teachers talked about student use of technology, they generally reported instances where technology served as a resource for student work (e.g. using the Internet to gain access to information sources, making a PowerPoint to present an overview of findings), rather than a tool for scaffolding inquiry-based learning activities. None of the teachers appeared to use technology as a cognitive or social tool for supporting students' reasoning with historical information, after the manner of the examples presented by earlier work (Higgins et al., 2012; Saye & Brush, 2002). The results thus indicate that, although teachers frequently used technology, their approach did not correspond to high-level use of technology in history.

However, it turned out that a significant number of teachers were nevertheless critical users of technology, who argued that its use must be warranted by a certain added value. Even though they were not using technology to the best advantage, they thus appeared to be in the process of adopting a differentiated view, similar to what the present study advocates (see also Ertmer, 2005). One of the reasons that these teachers then did not report high-level uses of technology, may be that they are simply unaware of its potential as a tool for facilitating student inquiries. Next to this, the results also indicate that limited access and insufficient technological support continue to form a major barrier to organizing more pervasive, student-centred activities with technology (Cuban, 2001). This is in part surprising, as earlier work has made a number of suggestions to resolve these issues, such as the use of trained student helpers, or rotation systems enabling each student to use technology during a certain amount of the lesson time (Hew & Brush, 2007).

Finally, the finding that a limited proficiency with technology was mainly reported by female middle-aged to older teachers could be coincidental due to the small sample, but is nevertheless in line with earlier work (Ilomäki, 2011). However, as current teacher training programs are increasingly paying attention to learning to teach with technology (e.g. Tondeur et al., 2012), it seems likely that this last barrier will gradually cease to exist in the near future.

6. FUTURE WORK

The finding that history teachers' adoption of technology does not correspond with what the present study has described as high-level use in history, holds a number of implications for future research. This finding first of all calls for further investigation, as an important limitation of the present study is that the available data are limited to what teachers reported during interviews. In addition to more large-scale research, other qualitative methods, such as observations, would therefore be important to increase knowledge of history teachers' technology use. Furthermore, future research could also examine how teachers might be supported in learning exactly how high-level use of technology can be realized within the context of history education.

With regard to educational practice, the results indicate that teacher training programs should carefully reflect on whether their current technology courses endorse a differentiated and domain-specific view. Related to this, one of the main questions is whether these programs give sufficient preparation on how technology can be used as a cognitive or social tool for supporting students' historical reasoning. The frequently cited barrier of limited access and insufficient technological support also suggests that more efforts should be made to disseminate recommendations found within the literature across the educational sector, so that schools can make the most of their often limited infrastructure.

7. REFERENCES

Cuban, L. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal*, *38*(4), 813–834.

Ertmer, P. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration ? *Educational Technology Research and Development*, *53*(4), 25–39.

European Commission. (2013). Survey of schools - ICT in education: Benchmarking access, use and attitudes to technology in europe's schools. *http://ec.europa.eu/digital-agenda/en/news/survey-schools-ict-education*.

Flemish Government. (2014). Attainment goals, developmental objectives, key competencies and goals for vocational training. Retrieved from http://www.ond.vlaanderen.be/curriculum/

Haydn, T., & Barton, R. (2007). Common needs and different agendas: How trainee teachers make progress in their ability to use ICT in subject teaching. Some lessons from the UK. *Computers & Education*, *49*(4), 1018–1036.

Hew, K., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and reccomendations for future research. *Educational Technology, Research and Development*, *55*(3), 223–252.

Higgins, S., Mercier, E., Burd, L., & Joyce-Gibbons, A. (2012). Multi-touch tables and collaborative learning. *British Journal of Educational Technology*, *43*(6), 1041–1054.

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A Response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist*, *42*(2), 99–107.

Ilomäki, L. (2011). Does gender have a role in ICT among Finnish teachers and students? *Scandinavian Journal of Educational Research*, *55*(3), 325–340.

Lee, P. J. (2005). Putting principles into practice: Understanding history. In S. Donavan & J. Bransfor (Eds.), *How students learn: History in the classroom* (pp. 31–77). Washington, DC: National Academies Press.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded source book*. *Huberman,* (2nd ed.). London: Sage.

Mishra, P., & Koehler, M. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054.

OECD. (2014). *TALIS 2013 results: An international perspective on teaching and learning*. Paris: OECD Publishing.

Reisman, A. (2012). Reading like a historian: A document-based history curriculum intervention in urban high schools. *Cognition and Instruction*, *30*(1), 86–112.

Saye, J. W., & Brush, T. (2002). Scaffolding critical reasoning about history and social issues in multimedia-supported learning environments. *Educational Technology Research and Development*, *50*(3), 77–96.

Smeets, E., & Mooij, T. (2001). Pupil-centred learning, ICT, and teacher behaviour: Observations in educational practice. *British Journal of Educational Technology*, *32*(4), 403–417.

Tondeur, J., Van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2012). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers and Education*, *59*(1), 134–144.

van Drie, J., & van Boxtel, C. (2008). Historical reasoning: Towards a framework for analyzing students' reasoning about the past. *Educational Psychology Review*, *20*(2), 87–110.

Voet, M., & De Wever, B. (2016). History teachers' conceptions of inquiry-based learning, beliefs about the nature of history, and their relation to the classroom context. *Teaching and Teacher Education*, *55*(1), 57–67.

Weinberger, A., Ertl, B., Fischer, F., & Mandl, H. (2005). Epistemic and social scripts in computer-supported collaborative learning. *Instructional Science*, *33*(1), 1–30.

8. APPENDIX A: INTERVIEW PROTOCOL

8.1. Introduction

- Thank the teacher for participating in the study.
- Explain that the goal of the research is to investigate teachers' approach to history teaching, in order to explore and get and overview of current practices in history education.
- Emphasize our interest in the teacher's own opinion, and that there are no right or wrong answers.
- Ask permission to tape the interview, and explain that al data will be treated confidentially.

8.2. Background

- What is your age?
- How long have you been teaching history in secondary school?
  - How long have you been teaching the subject in grade 4?
- What higher education courses did you follow prior to teaching?
- Why did you ultimately become a history teacher?

8.3. Teaching approach

- Which pedagogical approach is most fit for teaching history, and why?
  - What is the main strength of this approach?
  - What are weaknesses of this approach?
- Can you describe your own teaching approach during a 50-minute period of history?
  - Which phases can be distinguished in each lesson?
  - What are you doing during each phase?
  - What are the pupils doing during each phase?
- According to you, is an inquiry (e.g. with multiple information sources) a good approach for teaching knowledge and skills? Why (not)?
  - Do you use this approach during your own lessons?
  - *[If yes] Please describe how you implement inquiry in the classroom*

8.4. Beliefs about and use of technology

- Do you think it is important that history teachers use technology, such as computers, iPads?
  - How do you feel about technology?
  - Does technology offer added value?
- Do you use technology to prepare your instruction?
  - *[If yes]* Can you explain how and for what purposes you use technology?
  - *[If no]* Can you explain why not?
- Do you use technology in your classroom?

- *[If yes]* Can you clarify how and for what purposes technology is commonly used?
- *[If no]* Can you explain why not?

- Do your students sometimes use technology in class?
  - *[If yes]* Can you describe how students use technology and for what purposes?
  - *[If yes]* Does students' use of technology differ from your own use as a teacher, or do they overlap?
  - *[If no]* Can you explain why not?

- Does students' homework sometimes involve use of technology?
  - *[If yes] C*an you explain in what ways technology is involved in students' homework, and why?
  - *[If yes]* Does students' use of technology at home differ from that in the classroom?
  - *[If no]* Can you explain why not?

- Do you think technology may be able to help you with organizing or supporting student inquiry activities?
  - *[If yes]* Please explain why you think so.
  - *[If no]* Can you explain why not?

8.5. Contextual influences

- What stimulates, or could stimulate you, to use technology during your work as a teacher? These factors can be both personal or situated at school level.
- Which barriers obstruct you from using technology for the history lesson? Again, these can be both personal or situated at the school level.

8.6. End

- Say that this concludes the interview, and ask whether the teacher has additional comments related to the topics of the interview, or more general remarks or questions.
- Again, thank the teacher for participating in the study.