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Timewise

Improving pupils' understanding of historical time in primary school

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Chapter 7

CONCLUSIONS AND DISCUSSION

7.1 Introduction

The understanding of historical time is an important aim in history education which is conditional for the development of historical consciousness (Pandel, 1987; Angvik & Borries, 1997; Grever, 2009; Seixas, 2006; Rösen, 2012) and for preparing pupils to participate as citizens in a pluralistic democracy (Barton & Levstik, 2004) in which the fast development of new technologies and media ask for critical interpretation of information. Renewed interest in chronology as a means of gaining overview knowledge resulted in the Netherlands in the implementation of a new curriculum for history, which included a ten-era framework and characteristic features to support pupils in their orientation in time (Dutch Ministry of Education, Culture and Sciences, 2006, 2010). However, hardly any research has been conducted on primary school pupils' development in the understanding of historical time, nor on effects of the new curriculum on this understanding. The only studies on this topic consist of surveys with pupils in grade 8 at the end of primary school, which concluded that too few pupils performed sufficiently on the understanding of historical time (Wagenaar et al., 2010).

The central question of this dissertation was: How can pupils' understanding of historical time in primary school be improved? The study not only explored the concept of the understanding of historical time and pupils' development, but also focused on the measurement of results and on improvement of the curriculum on the understanding of historical time. To answer the central question, five specific research questions were addressed, which corresponded to the five empirical chapters (2-6) of this dissertation:

1. How does the Dutch primary school curriculum address the development of the understanding of historical time, compared to the English curriculum?
2. How do Dutch primary school pupils aged six to twelve perform with regard to their understanding of historical time?
3. Which types of problems related to the objectives of the understanding of historical time arise in Dutch primary school pupils' reasoning while placing historical phenomena in time?
4. What are the effects of an intervention with a new teaching approach, Timewise, on pupils' understanding of historical time?
5. Which components are effective in a professional development program on improving primary school pupils' understanding of historical time?

In this chapter the main findings and conclusions for each sub-study are presented, followed by general conclusions, discussion and directions for future research. This chapter concludes with practical implications.

7.2 Main findings and conclusions

7.2.1 *How does the Dutch curriculum address the development of the understanding of historical time, compared to the English curriculum?*

To answer this question the intended and implemented curricula for the understanding of historical time in the Netherlands and England were analysed, based on the model of the curricular spider web (Van den Akker, 2003; Thijs & Van den Akker, 2009). Based on literature (Stow & Haydn, 2000; Dawson, 2004; Wilschut, 2012) important aspects of the understanding of historical time were defined, such as the use of the vocabulary of time, the chronological sequence of historical phenomena and periods, the use of the timeline and characteristics of historical periods, and reasoning about change and continuity. These aspects were investigated in the curricula.

Results from the analyses of the Dutch Core Objectives (Dutch Ministry of Education, Culture and Sciences, 2006) for history showed that all aspects were included in the *objectives*, with the exception of sequencing of historical periods in chronological order. However, with regard to the implemented curriculum results from surveys and interviews indicated that teachers did not teach all objectives in their lessons. Although about 90% of the teachers reported in the survey that they found the aspects important, teachers did not explicitly pay attention to the dates of historical periods, nor to their sequence. A majority of the teachers reported that they did not use timelines to teach pupils how to place events, people and changes in the correct historical period. Furthermore, teachers hardly engaged their pupils in identifying change and continuity within and between historical periods. The analysis of the English curriculum (Department for Education, 2013)¹⁵ showed similar results on the teaching of the objectives.

For the curriculum component *content* most Dutch schools teach the ten curricular eras in chronological order (Wagenaar et al., 2010). In interviews Dutch teacher trainers and experts stated that they found the ten-era framework more supportive for pupils' development in the understanding of historical time than the previous framework with traditional periods, such as Middle Ages and Modern Times. However, trainers and experts who were interviewed, doubted if the characteristic features were helpful for pupils, and called into question if teachers were aware of these curricular characteristics. In most English schools historical periods, such as the Romans, the Tudors and the Second World War, were not taught chronologically (Harnett & Nichol, 2011).

Another difference with regard to the curriculum component *time* was the start of the teaching of history, which in England is in Key Stage 1, at the age of 5-6, and in the Netherlands in most schools in grade 5, at the age of 8-9. In this respect the Dutch curriculum relies on older literature, based on the Piagetian stage theory (Jahoda, 1963; Piaget, 1969), according to which pupils cannot start to learn about historical time before the age of 9. Most Dutch teachers in the survey agreed to this (73%). The English curriculum is more in line with theories which state that the development of the understanding of historical time is a learning process rather than dependent on age and maturation (Barton & Levstik, 1996; Hoodless, 2002, 2004; Hodgkinson 2003a, 2009a; Cooper 2012).

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<http://webarchive.nationalarchives.gov.uk/20131202172639/http://www.education.gov.uk/schools/teachingandlearning/curriculum/primary>. The National Curriculum was under consultation at the time of writing. The new curriculum was implemented in September 2014.

Although the teaching of historical time starts earlier in England than in the Netherlands, evaluations indicate that English pupils find it difficult as well to make comparisons between events within and between historical periods and the present, and to place historical phenomena in the correct period (Ofsted, 2011). This may be caused by the episodic structure of the curriculum. However, just the chronological teaching of eras, as happens in the Netherlands, does not seem to guarantee that pupils develop an understanding of historical time, particularly when teachers do not stimulate pupils to make links between historical periods and to use timelines to visualise the sequence of the eras and to place historical phenomena in time.

In both countries there is hardly any *assessment* of pupils' performances in the understanding of historical time. National evaluations of the implemented history curricula showed that many pupils do not have a chronological overview and find it hard to make comparisons between historical periods and to place historical phenomena in time (Wagenaar et al., 2010; Ofsted, 2011). In the Netherlands these evaluations only include pupils of grade 8 (ages 11-12) at the end of the primary school. To gain more insight into pupils' development between the ages of 6 and 12 further research was conducted, which will be reported on in the next paragraph.

7.2.2 How do primary pupils aged 6-12 perform on the understanding of historical time?

Building on descriptions in English and Dutch curricula and on literature (Stow & Haydn, 2000; Dawson, 2004; Wilschut, 2012), five objectives on the understanding of historical time were defined in chapter 3, consisting of applying the vocabulary of time, sequencing events, people and historical eras in chronological order, using the timeline to place events and people in time, identifying characteristic features of different historical periods, and comparing and contrasting historical periods. With regard to these objectives pupils' development on the understanding of historical time was described on the basis of studies about pupils' performance in tasks on sequencing historical pictures (Levstik & Pappas, 1987; Harnett, 1993; Barton & Levstik, 1996; Hoge & Foster, 2002). This resulted in a developmental model on primary school pupils' development on the understanding of historical time (Table 3.1; 5.1) in three stages: *emergent*, *initial* and *continued* understanding of historical time. This model describes pupils' development on the objectives on the understanding of historical time in increasing difficulty and abstraction. For instance, the use of the vocabulary of time was described from the use of broad time phrases, such as 'long ago' to the use of dates and centuries. The identification of characteristics of historical eras in this model develops from concrete characteristics such as clothing and architecture to more abstract characteristics, like economic and political events.

Based on this developmental model a measuring instrument was constructed, consisting of multiple-choice items with increasing difficulty, according to the descriptions of the stages in the model. After a consultation with assessment experts thinking-aloud interviews with pupils, and a pilot in one school, the test was taken by 1457 pupils of grades 3-8 (ages 6-12) in seven Dutch primary schools. Results from this test showed that the mean scores for correct answers increased through the grades and that pupils in higher grades significantly outperformed pupils in lower grades. In line with findings in Dutch national tests (Wagenaar et al., 2010) we found a small but significant effect for parents' educational levels, a significant effect of pupils' reading levels, and significantly lower scores for girls versus boys.

From this study it can be concluded that pupils' performances confirmed the structure of the model with descriptions in increasing difficulty for pupils' development on the understanding of historical time. Furthermore, the test results indicated that there was room for improvement in all grades, which was expected for the lower grades, where history did not feature in the curriculum. However, pupils in the higher grades could also improve on understanding the relation between dates and centuries, the placing of pictures of events and situations on the timeline, and the ability to compare historical phenomena within and across historical periods.

7.2.3 Which types of problems related to the objectives of the understanding of historical time arise in primary school pupils' reasoning while placing historical phenomena in time?

Chapter 4 explored types of problems which arose in pupils' reasoning while solving assignments on situating historical phenomena in time. In this small-scale qualitative study (n=22) pupils of grade 3 to 8 were probed on their answers. In this way problems in their reasoning could be retrieved, which could not be revealed by the paper and pencil test in chapter 3.

Results showed that several types of problems related to the objectives on the understanding of historical time arose in pupils' reasoning. These problems could partially be related to problems previously described in literature with regard to pupils' use of the vocabulary of time, the identification of characteristic features of historical eras, and problems related to present-oriented thinking in assignments on sequencing and comparing historical phenomena of different historical periods (Levstik & Pappas, 1987; VanSledright & Brophy, 1992; Harnett, 1993; Barton & Levstik 1996; Foster et al., 1999; Hoge & Foster, 2002; Hodkinson, 2003b; Wagenaar & Hemker, 2004). However, next to these problems, other problems were identified in pupils' reasoning as well, which appeared to be related to the Dutch curriculum with ten eras and characteristic features. This curriculum was implemented in 2006 (Dutch Ministry of Education, Culture and Sciences, 2006) to support pupils in their orientation in time. Some names of eras appeared to be too abstract, whereas other names were too little specific. Pupils hardly reasoned with the curricular characteristic features of the ten eras and they often could not correctly place eras on a timeline with only dates. For timelines that included the names and icons of eras pupils often associated the names and the icons with clues in pictures or the texts of the assignments instead of trying to identify characteristic features of an era.

This study provides a coherent overview of types of problems, related to the objectives on the understanding of historical time which arise in pupils' reasoning when situating historical phenomena in time. This overview provides more insight into pupils' development in the understanding and learning of historical time, which is important for teachers and teacher trainers and can be helpful for the development of a teaching approach to improve pupils' understanding of historical time.

7.2.4 Effects of an intervention with Timewise on pupils' understanding of historical time

In chapter 5 effects of a curriculum intervention with a new teaching approach, named Timewise, were described. This teaching approach built on the developmental model with objectives and stages on the understanding of historical time (Chapter 3) and on literature about teaching of historical time (West, 1981a; Levstik & Pappas, 1987; Harnett, 1993; Barton

& Levstik, 1996, 2002; Hoodless, 2002; Hoge & Foster, 2002; Hodkinson 2003a; Masterman & Rogers, 2002; Prangma, Van Boxtel and Kanselaar, 2008; Van Boxtel & Van Drie, 2012). Deriving from this literature and findings in the previous chapters of the dissertation the main design principles of Timewise were that teachers should systematically pay attention to the objectives on the understanding of historical time and should engage their pupils in activities with timelines, stories and pictures. Sixteen teachers from grade 4 (ages 7-8) and grade 7 (ages 10-11) were trained to implement Timewise in weekly lessons for a period of five months. In a quasi-experimental pre-/post-test design with the treatment group (n=396) and a control group (n=392) pupils' learning gains were tested with the instrument that was developed in chapter 3.

Results showed that pupils in the treatment condition scored significantly higher on the post-test compared to pupils in the control condition and compared to the pre-test, with medium effect sizes both in grade 4 and grade 7. Furthermore, small effects were found for age, gender and reading levels, but no effects were found for parents' educational levels. This confirms findings in national assessments for grade 8 (ages 11-12) in the Netherlands (Wagenaar et al., 2010), except for the lack of effect of parental education.

For grade 4 the significantly higher learning gains of the treatment group, who were taught with Timewise, confirm suggestions from previous research (Harnett, 1993; Barton & Levstik, 1996; Stow & Haydn, 2000; Hoodless, 2002) that the development of understanding historical time in children can be stimulated by learning and instruction and can start earlier than the age of 9 or 10, as is usual in most countries.

For grade 7 it could be concluded that systematic teaching according to the objectives of historical time, with a consistent use of timelines, resulted in higher learning outcomes on pupils' understanding of historical time than in the control group, in which teachers were teaching with textbooks and did not use timelines. In this respect this study adds new empirical evidence to older studies on the use of timelines (West, 1981a; Masterman & Rogers, 2002; Hodkinson 2003a).

7.2.5 Which components were effective in a PDP on improving pupils' understanding of historical time?

In chapter 6 we explored which features of the PDP for teachers contributed to the positive effects on pupils' learning gains on the understanding of historical time, as described in chapter 5. The PDP, which consisted of a training and the implementation of Timewise, was based on a model about effective components for the development, implementation and evaluation of PDPs (Desimone; 2009) and on methods to support teachers in the implementation of a new teaching approach in their classroom practice (Kennedy, 2016). The model of Desimone (2009) links design features, changes of teachers' beliefs, increased knowledge and skills and changes in instruction to improvement of learning outcomes of pupils. The supportive methods of Kennedy (2016) consist of prescriptions, strategies, insights and a body of knowledge. Sixteen teachers took part in two training sessions, after which they implemented Timewise in their classrooms in grade 4 (age 7-8) or 7 (age 10-11).

Results from questionnaires, logs, observations and interviews confirmed that improved learning outcomes could be attributed to the interplay between changes of teachers' attitudes and beliefs, increased knowledge and skills and changes in instruction (Desimone, 2009). Furthermore, teachers appreciated the supportive methods (Kennedy, 2016): during the implementation of Timewise they felt supported by clear prescriptions, by

the instructional strategies and background knowledge, and by the attractive materials and resources. This is in line with findings in several studies on effectiveness of PDPs, which mention the importance of availability and usefulness of materials and resources, as well as teachers' autonomy to integrate a new teaching approach into their daily work (Knapp, 2003; Blank et al., 2008; Opfer & Pedder 2011; Van Veen, Zwart, & Meirink, 2012; Thurlings, Evers, & Vermeulen, 2015; Kennedy, 2016). In questionnaires and interviews teachers reported changes in beliefs on teaching about the understanding of historical time, with regard to pupils being more able to learn about historical time than they would have expected. However, the belief that learning clock and calendar time is a prerequisite for the learning about historical time, appeared to be rather persistent. Observations indicated that the highest learning gains were reached by the teachers with the highest results on the implementation of the instructional behaviour aimed at, which consisted of systematically paying attention to the five objectives on the understanding of historical time and a consequent use of timelines. In the questionnaire one year after the PDP, all teachers reported that they still felt fully competent in their knowledge and skills in the teaching of historical time, particularly in the use of the classroom timeline.

From this study it can be concluded that it is relevant for a PDP to focus on all components of the model of Desimone (2009) and to take the supportive methods of Kennedy (2016) into account. Practical and user-friendly materials and resources in particular appeared to be important to support teachers in the implementation of new pedagogical approaches in their classroom.

7.3 General conclusions

Our findings provide several conclusions with regard to answering the central research question of how pupils' understanding of historical time in primary school can be improved.

Firstly, improvement of pupils' understanding of historical time requires a clear conceptualization of the understanding of historical time and what it means to make progression on this understanding. The first studies in this dissertation resulted in an operationalization of the understanding of historical time in the primary school context in a set of objectives based on concepts of the understanding of historical time, such as chronology, periodization, change and continuity, and a sense of period (Stow & Haydn, 2000; Dawson, 2004; Wilschut, 2012). These objectives correspond with descriptions in the Dutch core objectives (Dutch Ministry of Education, Culture and Sciences) and the English National Curriculum (Department for Education, 2013). The developmental model with three stages (emergent, initial and continued understanding of historical time) describes pupils' development in the understanding of time. In this model the objectives are operationalized for each of the three stages, based on descriptions in curricula and literature (Levstik & Pappas, 1987; Harnett, 1993; Barton & Levstik, 1996; Hoge & Foster, 2002). The measuring instrument that was developed on the basis of the developmental model can be applied to gain insights into pupils' performance on the understanding of time. Measurements with pupils aged 6 to 12 indicated that these pupils developed their understanding of time in line with the described stages and that there seemed to be room for improvement on all stages. The third study resulted in an overview of types of problems that might arise in pupils' reasoning on the understanding of historical time, when they carried out assignments in which they have to place historical phenomena in time. These problems related to names

and characteristics in the Dutch ten-era curriculum and to problems that were also found in other studies, such as problems concerning the vocabulary of time, characteristics of historical periods and present-oriented thinking (Levstik & Pappas, 1987; VanSledright & Brophy, 1992; Harnett, 1993; Barton & Levstik 1996; Foster et al., 1999; Hoge & Foster, 2002; Hodkinson, 2003b; Wagenaar & Hemker, 2004).

Secondly, pupils' understanding of historical time can be improved by a pedagogical approach in which teachers systematically engage their pupils in learning activities that are important for the objectives on the understanding of historical time, such as attaching and sequencing pictures to a classroom timeline, identifying characteristic features of eras in pictures and stories, and comparing characteristics of different eras with each other and with the present. Timewise provided a teaching approach that appeared to be successful in improving pupils' understanding of time. Design principles of Timewise derived from earlier studies on teaching with timelines (West, 1981a; Masterman & Rogers, 2002; Hodkinson 2003a; Prangmsma et al., 2008) and on the use of pictures and stories (Levstik & Pappas, 1987; Harnett, 1993; Barton & Levstik, 1996, 2002; Hoodless, 2002; Hoge & Foster, 2002; Van Boxtel & Van Drie, 2012). It could be concluded that the pupils in grade 4 as well as in grade 7 who were taught with Timewise showed significantly higher learning gains than a control group.

Thirdly, improvement of pupils' understanding of historical time can be realized by supporting teachers with a professional development program that provides insights into the development of pupils' understanding of historical time and concrete materials. The supportive methods (Kennedy, 2016) of the PDP in this study, which contained a comprehensive instructional manual and attractive materials and resources, such as a classroom timeline and a storybook, appeared to be important factors for the success of Timewise. Furthermore, results showed that participating teachers changed their beliefs about pupils' development in the understanding of historical time through the experience that pupils were more able than they expected, and that they gained knowledge and skills on teaching about historical time, which they applied in the instructional behaviour aimed for. By including measurements of pupils' learning outcomes this PDP included all components of the model of Desimone (2009). These findings indicate that for a PDP to be successful, the combination of the supportive methods of Kennedy (2016) and components of the model of Desimone (2009) is important.

7.4 Discussion and directions for future research

The goal of this dissertation was to improve the understanding of historical time of primary school pupils. The different studies focused not only on the operationalization of objectives and on pupils' development in the understanding of historical time, but also on aspects of teaching and the professionalization of teachers with regard to improving pupils' understanding of historical time.

The understanding of historical time was conceptualized according to concepts derived from educational literature (Stow & Haydn, 2000; Dawson, 2004; Wilschut, 2012). On the basis of these concepts, objectives were formulated for the primary school context, with descriptions of knowledge, insights and skills that pupils require to understand historical time. However, the objectives as defined in this study do not concern the phenomenon of time as a metahistorical concept, nor how time is dealt with in different

societies in the past and in the present. Such concepts might be difficult for primary school pupils; it would nevertheless be interesting for further research to explore pupils' reasoning on time as a second order concept.

With regard to pupils' development in the understanding of historical time a model with stages of development was developed, based on curricula and literature (Levstik & Pappas, 1987; Harnett, 1993; Barton & Levstik, 1996; Hoge & Foster, 2002), which could provide a valuable addition to the Dutch curriculum for history in primary school. The present core objectives are formulated in rather broad terms (Dutch Ministry of Education, Culture and Sciences, 2006, 2010), and suggestions in the additionally suggested learning trajectories¹⁶ are hardly elaborated for the teaching of historical time, which particularly applies for younger pupils. The developmental model represents an elaborated learning trajectory, based on concepts in international literature on the understanding of historical time (Stow & Haydn, 2000; Dawson, 2004; Wilschut, 2012). In this respect the objectives in the model could apply to curricula in other countries as well. However, the elaborations for the three stages were described in the context of the Dutch primary school history curriculum, which is rather nationally orientated. Further research could explore whether it would be possible to describe pupils' development in more general terms or how descriptions could be adapted to suit curricula in other parts of the world.

Since no existing instruments were available, a measuring instrument was developed to gain more insight into pupils' performances on the understanding of historical time. For the Dutch context this is the first instrument to examine the understanding of historical time of pupils between the ages 6-12. A drawback was the modest reliability. Although the development of the instrument went through different versions and pilots, we did not succeed in reaching higher Cronbach's alphas. These modest alphas might be explained by the fact that different objectives were measured with different types of questions, with and without pictures and with and without timelines. Additionally, there were relatively many pupils with low scores, probably because of guessing. To enhance validity, the questions were based on consultations with experts, on the curriculum for history and on the developmental model, which was based on previous studies. Because of the chronological structure of the curriculum, however, many pupils had not yet been taught about several eras, which particularly applied for the lower grades in which history did not feature at all. Other approaches might be possible, for instance in measuring pupils' insights into the concept of time. Despite these limitations results showed that the mean scores of correct answers rose through the years.

The small-scale study on problems in pupils' reasoning on historical time provided insights into types of problems that might arise in pupils' reasoning when situating historical phenomena in time. These problems partially related to the names of eras and to characteristic features that were hardly known. More research would be needed to systematically investigate which names of eras and characteristic features cause more or less problems in pupils' reasoning. Furthermore, more large-scale research could explore which problems belong to different ages and how a pedagogy can take these problems into account.

Findings in this dissertation appeared to confirm that pupils' development in the understanding of historical time can be stimulated by teaching, which seems to further refute the Piagetian stage theory and the limitations of early grade cognition that for a long time influenced curriculum developers and teachers to believe that the teaching of historical

¹⁶ <http://tule.slo.nl/>

time cannot start before pupils are at least 9 years old (Jahoda, 1963; Piaget, 1969; Hallam, 1970). However, pupils in grade 4 in the control condition, who received no teaching on the understanding of historical time, showed progress as well. More research is needed into the question to what extent the development of the understanding of time within children is a process of maturation and/or learning, and which factors inside and outside school influence this process.

Grade 4 pupils (age 7-8) who took part in the intervention appeared to have no problems in the learning activities of *Timewise*, despite the fact that some of the teachers believed these lessons would be too difficult. Furthermore, experiences in England and findings in literature indicate that history lessons can start from the age of 5 (Levstik & Pappas, 1987; VanSledright & Brophy, 1992; Harnett, 1993; Brophy, VanSledright, & Bredin, 1993; Barton & Levstik, 1996; Hoge & Foster, 2002; Hoodless, 2002; Blow, Lee & Shemilt, 2012). An advantage would be that pupils can spend more time on the development of the understanding of time. However, the effects of an early start of the teaching of historical time in relation to possible advantages in later years are not yet clear. Further longitudinal research could give insights into how an early start of the teaching about historical time might positively influence pupils' understanding of historical time in higher grades of primary school and in secondary education.

The curriculum intervention with *Timewise* represents the first intervention study in the Dutch context that measures the effects of a teaching approach on the improvement of pupils' understanding of historical time. Positive effects on pupils' learning outcomes were found, but limitations must be taken into account that only sixteen, mostly motivated teachers took part in the intervention.

Six of the eight participating teachers in grade 7 used *Timewise* in addition to regular textbook lessons, which meant that they spent extra time on history lessons. Usually teachers will not have this time available. On the other hand, in the classes of the two teachers who used the *Timewise* approach instead of textbook lessons, pupils' learning gains were well above average. More large-scale research would be needed, in other grades in primary school as well, to investigate how *Timewise* might be integrated into textbooks or how teaching history through *Timewise* might replace the textbook curriculum for the teaching of history.

The components of the curricular spider web (Van den Akker, 2003; Thijs & Van den Akker, 2009) were supportive for the development, implementation and evaluation of *Timewise*. However, the components grouping and location were disregarded. The *Timewise* approach predominantly focused on whole class activities. Further research could explore the effect of co-operative tasks in which, for instance, all pupils use the vocabulary of time or work in groups on sequencing tasks with historical pictures and timelines. With regard to location, further research could focus on possibilities of ICT-applications to create possibilities for learning inside and outside the classroom (see for instance the studies of Masterman & Rogers (2002), Foreman, Boyd Davis, Moar, Korrallo, & Chappel, 2008, and Prangmsma et al., 2008). Although *Timewise* included a digital timeline with exercises for the interactive whiteboard (IWB), teachers hardly used this application, because they preferred learning activities with the large timeline on the classroom wall. Further research could investigate how applications that include timelines on the IWB, tablets or smart phones might be user-friendly and effective. Effects of ICT-applications that allow pupils to experience a sense of period (Dawson 2004), in for instance a Virtual Reality environment, would be interesting to explore as well.

The PDP consisting of a training and the implementation of Timewise showed significant effects on pupils' learning outcomes, although it must be acknowledged that this was a short-term effect and with a small group of participants. Supportive methods like prescriptions, strategies, insights and a body of knowledge (Kennedy, 2016) added content and pedagogical content knowledge, which appeared necessary since primary school teachers, who need to teach the whole range of subjects, often only have superficial pedagogical content and subject matter knowledge. In this study these methods appeared to be a valuable addition to the design features in the model of Desimone (2009). Since PDPs about specific school subjects, such as history or geography, are scarce, more research on the pedagogy of school subjects would be recommended, in which effects on pupils learning outcomes should be included. Furthermore, the fact that the PDP was conducted by the researcher, a teacher educator who is familiar with the work of teachers, could also have contributed to the positive effect, which is in line with findings of Yoon et al. (2007) and Kennedy (2016).

The PDP included neither coaching nor participation in whole school teams, which in literature are often mentioned as effective characteristic for PDPs (Knapp, 2003; Wayne, Yoon, Zhu, Cronen & Garet, 2008; Desimone, 2009; Opfer & Pedder, 2011; Van Veen et al., 2012). Future research could investigate the effects of a PDP on Timewise on a larger scale, with whole school teams and coaching sessions in the schools. In these session, for instance, the problems could be addressed that arose in the study about pupils' reasoning while situating historical phenomena in time, into which the PDP on Timewise paid only little attention.

7.5 Implications for practice

This dissertation aimed at improving pupils' understanding of historical time in primary school. The curriculum on the understanding of historical time in the primary school context was investigated, as well as pupils' development in the understanding and learning of historical time. Furthermore, effective aspects of teaching and teacher training were explored. Conclusions of the several studies lead to some practical implications for teachers, teacher trainers, textbook editors and educational policy makers. This dissertation yielded several practical tools that can be applied by primary school teachers and by teacher trainers in initial and in-service training of (prospective) teachers:

- a model with objectives and stages on pupils' development in the understanding of historical time;
- an instrument to assess pupils' development in the understanding of historical time;
- an overview of types of problems that might arise in pupils' reasoning about historical time;
- Timewise, a teaching approach with materials and resources on a website;
- a professional development program (PDP) for teachers on the implementation of Timewise.

For teachers these tools can be applied for the development, implementation and evaluation of lessons about the understanding of historical time in grades 3 to 8. Teacher trainers can apply these tools in educating student teachers and for in-service training with school teams.

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Textbook editors can apply the insights of this study to develop textbooks and on-line materials, not only for grade 5-8, but also for grade 3 and 4, that match with the objectives and stages in the developmental model. These materials may include activities with timelines and authentic pictures and stories to stimulate pupils' development in the understanding of historical time.

For educational policy makers a recommendation would be to evaluate the framework of the ten eras and the characteristic features, since this study indicates that primary school pupils have problems in reasoning on the understanding of historical time that relate to names of eras and the predominantly economic and political characteristic features. This evaluation already has started in the Dutch Association for Teachers in History and Citizenship Education (Van der Kooij & Van der Schans, 2017). A future revision of the curriculum might take the findings from this dissertation into account.

Finally the conclusions and practical implications in this dissertation could contribute to the professionalization of teachers and teacher trainers and inspire them to improve the understanding of historical time of pupils in primary school.