Education and Science

Vol 45 (2020) No 203 215-229

Investigation of Chronological Thinking Skills of Secondary School Students and Development of These Skills Based on Grade Level

Bülent Akbaba [1]

Abstract

The aim of this study is to determine the chronological thinking skills of secondary school students in the light of two approaches in the literature and to reveal the role of age (grade level) in the development of these skills. The study group of the research, which was designed as a screening model, consisted of 102 students (52 girls and 50 males) who studied in a high school in the city centre of Ankara in the academic year 2017-2018. The data of the study were obtained from performance tasks, prepared in accordance with the learning outcomes in the 2017 Curriculum of Secondary Education History Lesson (9th, 10th and 11th Grades) and Republic of Turkey Revolution History and Kemalism Lesson, with the aim of acquiring chronological thinking skills present in the curricula mentioned. The performance tasks included activities for six sub-dimensions of chronological thinking. The performance tasks were evaluated through a graded scoring key (rubric) by the history teacher who gave the lessons to the students in the study group and a faculty member apart from the researcher himself. According to the results of the study, the chronological thinking skills of the students at the 9th, 10th, 11th and 12th grades of the secondary education and aged between 15- 18 continue to develop depending on the grade level. This situation supports the ideas of child-centred thinkers in the teaching of the concept of historical time. In addition, the students in the study group have low skill levels also in six sub-dimensions of chronological thinking. This is more evident in the sub-dimensions of chronological thinking skills that require students to produce written or visual products. This result supports the idea that learning-teaching environments, as well as age-related development, are determinant in the teaching of historical time concept and related skills, and reveals that historical time and related skills cannot be acquired sufficiently in history lessons in secondary education level in our country.

Keywords

History
Curriculum
Skill
Historical time
Chronology
Chronological thinking

Article Info

Received: 03.28.2019
Accepted: 11.20.2019
Online Published: 04.21.2020

DOI: 10.15390/EB.2020.8631

[1] Gazi University, Faculty of Education, Department of Turkish and Social Sciences Education, Turkey, efeakbaba@gmail.com

Introduction

Since history discusses events and facts in the past by its nature, time is one of the most important components of this discipline. Historical time, on the other hand, is an element of the past which has been chosen by historiographers and used in defining historical events and facts that have left a trace and influenced the society deeply and an element which belongs to the history in this regard. Understanding historical time is an indispensable part of history education; it helps students form their identities and take part as citizens in a democratic society (Barton & Levstik, 2004). It is necessary to perceive the historical time in order to understand the phenomena of today and the time-dependent change of historical determinations (Seixas, 2004). The elements of historical time are defined as chronology knowledge, chronology skills and perception of change and continuity (Şimşek, 2006, p. 100).

In historical studies, time that can be measured objectively is called "chronology" and it is used to describe the flow of time which is necessary to establish dates for events and determine a beginning and ending in time (Reuvekamp, Boxtel, Ros, & Harnett, 2014). Chronology, which is formed by the arrangement of the events defined in historical time in a certain temporal order according to their order of precedence, is one of the fundamental elements of history in terms of establishing a solid bridge between the events (Demircioğlu & Akengin, 2007; Dilek, 2002). Chronology is more comprehensive than the sequencing of historical events and it requires understanding of past reasons, results, change and continuity (Drake & Nelson, 2008). It is not possible to study by ignoring the temporal structure of the elements of the history discipline. In this context, chronology is seen as the backbone of historical science (Pala & Şimşek, 2016; Şimşek & Bal, 2010).

Chronological thinking, which is described as a means of analysing the historical process by establishing cause-effect relations between historical events (Dilek, 2002), requires knowledge and use of the concepts about chronology, such as time, change, continuity alongside the knowledge of how to establish dates from past to present. Through chronological thinking, the difference between past, present and future can be distinguished properly and the past becomes more meaningful (Demircioğlu, 2009). Chronological thinking provides the necessary infrastructure for students to structure their historical knowledge, includes their ability to distinguish between past, present and future time, to understand the temporal structure of historical events, to interpret the information given about historical times and to explain the change and continuity in time (Özbaş, 2010). According to Demircioğlu and Akengin (2007), chronology and chronological thinking, which are among the basic concepts that should be taught to students in history teaching, play a key role in the learning and linking of historical events. The students' problem of not being able to grasp the concept of "time", which is one of its basic elements of history, and their failure to realize chronological thinking, constitute an obstacle also to the achievement of other aims of history teaching (Safran & Şimşek, 2006).

There are two main approaches in the literature in English language on the development of historical time concept and related skills. The supporters of first of these approaches are the child-centred thinkers who carry out their research by collecting data through standard measurement tools formed by Piaget's stages of mental development in children and try to explain them according to age-related mental development. The ones in the second group are the researchers who can be named as subject-centred thinkers who advocate that an age-related mental development is not the only necessity for the development of historical time and the idea of chronology in children, but instead, the target success can be achieved with a good organization of the learning-teaching processes (Dilek, 2002; Şimşek, 2006, 2007).

Researchers who think in a child-centred way about the development of the concept of historical time and related skills have tried to explain the mental development of children according to age-related mental development by collecting data with standard measurement tools. Being two of these researchers, Oakden and Stuart (1922) state that the age of 11 is a turning point to be introduced to the concept of historical time in children, while Bradly and Johada (2000) express that understanding and acknowledging dates are possible after the age of 10 and 11. Hallam (1970) states that the full

understanding of the chronology does not occur until the age of 16, therefore chronological history studies should not be given before high school education (as cited in Şimşek, 2006, 2007). According to Naylor and Diem (1987), time perception is a skill based on the principle of developing one's innate abilities and needs to be learned. Since time is an abstract structure, it takes a long time for children to grasp it, and the comprehension of this concept occurs in adulthood. Supporting this idea, Peel (1995) suggested that children in the first cycle of primary education cannot understand the essential nature of history or the importance of time in it. Flicker and Rehage (1976) assert that children begin to understand some concepts about the past at the age of eight, completely understand the system of counting time at the age of eleven, and begin to understand the timelines at the age of thirteen; that they reach maturity in relation to time and time-related words along with dates at about sixteen years of age (as cited in Dilek, 2002). Considering the findings of the researchers who conducted their studies based on the stages of mental development suggested by Piaget, it has been observed these studies show that children can only learn the concept of historical time between the ages of 11 and 16 on average and emphasize that this can happen in all children, with the same stages of mental development (Şimşek, 2006). This situation has raised the question "Shouldn't children be taught history until high school education?" and history educators have focused on the acquisition of the concept of historical time in order to solve this problem.

The researchers in the second group who consisted of subject-centred thinkers about the concept of historical time and the teaching of related skills, sought to explain that the cognitive development stages proposed by Piaget were not sufficient to explain the development of historical learning and thinking. The fact that researchers such as Watts proposed that in history, the child can think abstractly through concrete concepts and the fact that the contribution of language and concept development to mental activity has been recognized have given life to the idea that history can be taught in accordance with the scientific content of it (Dilek, 2002). Since the late 1970s, researchers in the United States and the United Kingdom who studied on children's time perception have moved away from the ideas of Piaget and his followers. Empirical studies in the UK have shown that children can learn the concept of historical time from the age of 7 (Blyth, 1978; Harnett, 1993; Hodkinson, 2002; Hoodless, 2002; West, 1981; Wood & Holden, 1997). In the United States, Levstik and Pappas (1987) and Brophy, VanSledright and Bredin (1993) have reached similar results. Based on the results of these studies, Barton and Levstik (1996) found that students aged between 5 and 12 years were able to put the pictures about daily life in the USA in a correct chronological order. The studies by the researchers who did not adopt the ideas of Piaget and his followers on the teaching of historical time show that age-related mental development is not the only necessity for the development of historical time thinking in children; understanding historical time is a learning process rather than a developmental one, and that children can begin this from early years of age (Barton, McCully, & Marks, 2004; Dilek, 2002; Harnett, 1993; Hodkinson, 2002, 2009; Hoodless, 2002; Şimşek, 2006; West, 1981; Wood & Holden, 1997).

The Place of Chronological Thinking Skills in History Lesson Curricula

The teaching of historical time starts in the primary school level in most countries. The skills aimed to be acquired by the students through history lessons in the UK are chronological understanding, understanding and acknowledging the change, people and events in the past, historical interpretation, historical research, organization and communication (Demircioğlu, 2009). The teaching of historical time in the history program in the UK has been reduced to 5 years of age (Reuvekamp et al., 2014).

One of the aims to be achieved in history teaching in the United States since the 1890s has been the development and promotion of chronology thinking in children (Şimşek, 2007). Skills that fall under "Historical Thinking Standard" in US history programs developed by the US National History Centre are chronological thinking skills, historical comprehension skills, historical analysis and interpretation skills, historical research skills, historical problem analysis and decision making skills (UCLA, 2018).

Chronological thinking/ comprehension skills, which take place on the top in history programs in the UK and the USA, has found a place in Turkey with the Social Studies Lesson Curriculum published in 2005, which is based on constructivist approach. One of the nine learning domains in this

program is “Time, Continuity and Change”. One of the basic skills in this program is “perceiving time and chronology” (Ministry of National Education [MoNE], 2005). In the 9th Grade History Lesson Curriculum which was published in 2007, in the 10th and 11th Grade History Lesson Curricula published afterwards, in Republic of Turkey Revolution History and Kemalism Lesson Curriculum and in Contemporary Turkish and World History Lesson Curriculum, five basic skills have been included, which are under the name of the historical thinking standard developed by the US National History Centre. In these programs, the importance of chronological thinking skills in terms of examining the relations between the events or explaining the cause and effect relations in the history has been mentioned and it has been stated that with this understanding, chronology was paid attention while writing the learning outcomes of the lesson (MoNE, 2007, 2008a, 2008b, 2009, 2010). In the History Lesson Curricula, while developing "Chronological Thinking Skills", which are included in historical thinking skills, students are requested to distinguish between past, present and future, to determine the time course (beginning, middle and end) in a historical text and to create a historical text according to a certain time course. In addition, it has been emphasized that students are supposed to calculate the time through types of calendars and relevant basic concepts by calculating the calendar time as days, weeks, months, years, centuries, millenniums and convert it into other calendar systems; to interpret the information presented in timelines; to create a historical flow chart with the aim of explaining the historical continuity and change, and to propose different approaches by comparing the approaches towards dividing history into periods (MoNE, 2007, 2008a, 2008b, 2009, 2010 as cited in Altun & Kaymakcı, 2016).

In the history lesson curricula published in 2017 and 2018, it has been explained that chronology functions as a mental structure that regulates historical thinking; the prerequisite of acquiring this skill is comparative teaching of the time concepts such as day, month, year, period, age, century etc. and calendar types and relevant basic concepts (such as BC, AD, century, etc.); and learning outcomes intended to improve chronological thinking in the history lesson curriculum published between 2007-2012 have not been included (MoNE, 2017, 2018). In the Secondary Education History Lesson (9th, 10th and 11th Grades) Curriculum which was published in 2018, the chronological and thematic approaches were dealt together; the chronological order of a large number of events was given in some learning outcomes in the program; it was stated that the chronological order given here was aimed to support the chronological thinking skills of the students and it was requested not to give a lecture about the events and facts ordered and not to make students memorize them (MoNE, 2018). This situation clearly reveals the necessity for teachers and students to have chronological thinking skills.

When the literature of history education in Turkey is reviewed, it is seen that theoretical and practical researches on the chronological thinking skills are carried out under various education levels and topics. In this context, studies on the topics below have been encountered in the literature: development and teaching of the concept of historical time in primary school children, development of chronological thinking (Safran & Şimşek, 2006, 2009; Şimşek, 2006, 2007), the use of time lines in the teaching of time and chronology (Altun & Kaymakcı, 2016; Şimşek, 2007), the use of photos in developing time perception (Marancı, 2017), the teaching of dates in social studies (Pala & Şimşek, 2016), experiences of class teachers in teaching the skill of "perceiving time and chronology" (Sağlam, Tınmaz, & Hayal, 2015), perceptions of history teachers on the level of acquiring students basic and historical thinking skills (Turan, 2016), investigation time perceptions of prospective teachers (Şimşek & Bal, 2010), problems encountered in the teaching of the concept of time in history teaching in secondary schools (Oymak, 2007), misconceptions related to historical time in high school students (Yıldırım, 2015), the effectiveness of history teaching which is based on developing historical thinking skills in secondary education level (Keleşzade, Güneyli, & Özkul, 2018). The hypothesis for the age-related development of chronological thinking was tested in the primary education level (Safran & Şimşek, 2006; Şimşek, 2006) and in the 6th grade students in primary education and 9th grade students in secondary education (Işık, 2014).

When the Turkish literature is reviewed, in the teaching of the concept of historical time at the secondary education level, the hypotheses whether there is an age-related development in accordance with the views of the researchers carrying out their studies on the basis of the mental development stages revealed by Piaget, or understanding historical time is a learning process rather than a developmental process were not tested. The opinions of child-centred thinker researchers who try to explain the concept of historical time and therefore acquisition of the knowledge of chronology, chronological thinking and perceiving change and continuity according to the mental development depending on age and the opinions of subject-centred thinker researchers who believe that the effect of learning-teaching environments is determinant in the teaching of the concept of historical time need to be addressed and discussed in the context of historical time and acquiring related skills in history lessons in secondary education level in Turkey. In this study, it is aimed to test the hypothesis for the effect of learning-teaching environments in acquiring chronological thinking skills and the development of chronological thinking skills based on the grade level, through the performance tasks performed by the students, and to enable the results of the research to be reference for the future studies.

Purpose

The aim of this research is to describe the level of acquiring chronological thinking skills and its development based on the grade level in the history lessons in secondary education. In this context, the answers to the following sub-problems were sought:

1. To what extent do the students in the study group achieve chronological thinking skills that are present in the curriculum of secondary education history lesson?
2. Are the chronological thinking skills of the students in the study group developing depending on the grade level?

Method

Research Design

In this research, a screening model was used to identify a past or present situation as it exists (Karasar, 2018). When the aim of the research is taken into consideration, the research is designed in the relational screening model to determine the role of learning teaching processes and age in chronological thinking skills through performance tasks in the current classroom environment. In this study, chronological thinking skills of the students in the study group are examined with performance tasks. The researcher was present in the class with the history teacher of the related class during the whole data collection process, informed the working groups about the general structure of the research before performing the performance tasks and shared the necessary explanations about the performance tasks with the participants.

Study Group

The study group of the research consisted of 102 students studying in a high school in the city centre of Ankara in the academic year 2017-2018, in accordance with the "purposive and convenience sampling". 52 of these students are girls and 50 are male. 26 of these students study in the 9th grade, 30 students study in the 10th grade, 24 students study in the 11th grade and 22 of them study in the 12th grade.

Data Collection Tools and Their Development

Studies that require a high level of mental effort and that are carried out in order to improve student achievement are called performance-based assessment. In performance-based assessment, students are not requested to perform simple and plain tasks which require lower-order thinking, but they are asked to perform certain complicated tasks that require higher-order thinking. The performance-based assessment focuses on constructing the knowledge and on high-order processes. The aim is to enable the student to go beyond their level of knowledge and produce new information (Kutlu, Doğan, & Karakaya, 2017). Since the aim of this study is to enable students to perform tasks that require high-order thinking, the data of the study were collected using six performance tasks for each grade level, which were prepared to reveal the level of the acquisition of the six sub-dimensions of

chronological thinking which are shown below and also rubrics developed for each performance task. The six sub-dimensions of chronological thinking are as follows:

1. Determining the time course (beginning, middle and end) in a historical text.
2. Creating a historical text based on a specific time course.
3. Measuring calendar time in days, weeks, months, years, centuries, millennia. Calculating time through types of calendars and relevant basic concepts (BC, AD, century etc.) and convert it into other calendar systems (Hijri and Julian Calendars and the Gregorian Calendar).
4. Interpreting the information presented in time lines.
5. Forming a historical flow chart to explain historical continuity and change.
6. Comparing the approaches to dividing history into periods and proposing different approaches.

Drafts for performance tasks for the six sub-dimensions of chronological thinking were formed and the content of these drafts was constructed with examples from course books published by the Ministry of National Education in line with the learning outcomes in the curriculum of the related lesson. The tasks to be performed by the students and the instructions for these tasks were prepared; afterwards, the method of scoring was determined and a graded scoring key (rubric) was formed. Expert opinion was received from a faculty member who studies in the field of history education and the history teacher who teaches the lessons of the students in the study group in the high school where the research is carried out, through the expert evaluation form, which includes the issues regarding the content of the performance tasks, the clarity of the expressions, the difficulty levels, whether it the incorporates the expected skills in terms of content validity and the suitability of the rubric. In line with the opinions received, necessary arrangements have been made in performance tasks and the rubric.

In order to determine the suitability and the comprehensibility of the content of the performance tasks, the time to be used, and the ability to give students feedback about the chronological thinking skills, pre-treatment was carried out with eight students from each of the 9th, 10th, 11th and 12th grades of a different high school than the one where the research took place. As a result of this treatment, it was revealed that 6 performance tasks could be carried out in two class hours and their content was suitable and comprehensible for the grade levels mentioned, also with the consensus of the two history teachers working in the high school where the pre-treatment was carried out.

Data Collection

The data of the study were obtained by applying 6 performance tasks for each class in a section of each of 9th, 10th, 11th and 12th grades of a high school in Ankara in April, in the second semester of the academic year 2017-2018. This process was carried out within a total of 8 lesson hours, 2 lesson hours per class.

Data Analysis

The performance tasks were also studied by a faculty member who is an expert in the field of history and the history teacher who teaches the lessons of the students in the study group in the high school where the research is carried out, and they were scored with the rubric which was formed to evaluate these tasks. Performance indicators in the rubric are scored as Inadequate (1), Needs Improvement (2), Successful (3), Very Successful (4). For the reliability of the analysis of the data; credibility, consistency and confirmability have been studied on, through expert review and the evaluation of data by the history teacher, as a participant and an expert, who conducted the history lessons of the study group. Kendall's W test was used to determine the level of concordance between the scores given by three raters and this value was determined to be .96. This value reveals that there is a close to perfect concordance between the scoring of the three raters. The program SPSS 22 for Windows was used for statistical analysis of the scores obtained by the students in the study group from the performance tasks. Descriptive statistics for performance tasks are included for the findings of the first sub-problem of the study. In the analysis of the second sub-problem, the normality analyses of the data were indicative of analysing the data by non-parametric techniques. In this context, Kruskal-Wallis Test was used to analyse the development of chronological thinking based on grade level.

Results

Table 1 presents the descriptive statistics results of the scores obtained by the students in the study group from the performance tasks for the six sub-dimensions of chronological thinking.

Table 1. The Descriptive Statistics Results of the Scores Obtained by the Study Group from the Performance Tasks for Determining Chronological Thinking Skills (N = 102)

Sub-dimensions of Chronological Thinking	Level								$\bar{X}$	s
	Inadequate (1)		Needs Improvement (2)		Successful (3)		Very Successful (4)			
	f	%	f	%	f	%	f	%		
1. Determining the time course in a historical text.	30	29.4	41	40.2	26	25.5	5	4.9	2.05	.86
2.Creating a historical text based on a specific time course.	62	60.8	27	26.5	6	5.9	7	6.9	1.58	.88
3.Measuring calendar time in days, weeks, months, years, centuries, millennia. Calculating time through types of calendars and relevant basic concepts and convert it into other calendar systems.	4	3.9	34	33.3	43	42.2	21	20.6	2.79	.81
4.Interpreting the information presented in time lines.	20	19.6	46	45.1	27	26.5	9	8.8	2.24	.87
5.Forming a historical flow chart to explain historical continuity and change.	52	51.0	39	38.2	9	8.8	2	2.0	1.61	.73
6.Comparing the approaches to dividing history into periods and proposing different approaches.	54	52.9	32	31.4	12	11.8	4	3.9	1.66	.83

According to Table 1, the students in the study group did not perform successfully in any of the six sub-dimensions of chronological thinking. The performance task in which the students in the study group are most successful is measuring calendar time and the chronological thinking and the activity of converting it to different types of calendars. The mean of the scores obtained from this performance task ($\bar{X}$ = 2.79) demonstrates that this dimension of chronological thinking has also not been sufficiently developed. In the ranking of the mean of the scores obtained by the study group from the performance tasks, the second sub-dimension in which they are most successful has been observed to be the ability to interpret the information presented in time lines. ($\bar{X}$ = 2.24). The mean of the scores obtained from the performance task for determining the time course in a historical text is ($\bar{X}$ = 2.05). The performance levels of the students in the study group in the three sub-dimensions of chronological thinking which are related to creating individual written and visual products are relatively low. Among these three dimensions, the dimension with the highest mean of scores ($\bar{X}$ =1.66) is comparing the approaches to dividing history into periods and proposing different approaches. The mean of the scores obtained from the performance task for creating a historical flow chart to explain the historical continuity and change is ($\bar{X}$ = 1.61). The sub-dimension of the chronological thinking skills at which students in the study group are most unsuccessful is the creating a historical text based on a specific time course ($\bar{X}$ = 1.58).

Tablo 2. Kruskal Wallis Test Results for the Change in the Level of Having Chronological Thinking Skills of the Study Group Based on the Grade Level

Chronological Thinking Sub-Dimension	Grade Level	N	Mean Rank	sd	X^2	p	Significant Difference
1. Determining the time course in a historical text.	9	26	38.25	3	20.086	.000	9-11 9-12 10-12
	10	30	44.90				
	11	24	55.02				
	12	22	72.32				
2. Creating a historical text based on a specific time course.	9	26	33.21	3	30.391	.000	9-11 9-12 10-12
	10	30	40.60				
	11	24	47.02				
	12	22	51.95				
3. Measuring calendar time in days, weeks, months, years, centuries, millennia. Calculating time through types of calendars and relevant basic concepts and convert it into other calendar systems.	9	26	32.63	3	19.962	.000	9-10 9-11 9-12 10-12
	10	30	50.66				
	11	24	55.44				
	12	22	65.32				
4. Interpreting the information presented in time lines.	9	26	33.95	3	17.358	.001	9-11 9-12
	10	30	56.41				
	11	24	58.23				
	12	22	61.38				
5. Forming a historical flow chart to explain historical continuity and change.	9	26	41.40	3	9.648	.022	9-12
	10	30	49.35				
	11	24	55.15				
	12	22	63.84				
6. Comparing the approaches to dividing history into periods and proposing different approaches.	9	26	37.57	3	30.330	.000	9-11 9-12 10-11 10-12
	10	30	39.12				
	11	24	66.68				
	12	22	68.42				
All Dimensions	9	26	32.33	3	23.044	.000	9-11 9-12 10-12
	10	30	46.90				
	11	24	61.42				
	12	22	69.61				

According to Table 2, chronological thinking skills of students in the study group differ significantly based on their grade levels. The scores of 9th grade students and 11th and 12th grade students differ in favour of the upper grade students in all dimensions except the 5th dimension of chronological thinking and in the mean of the scores. However, in the 5th dimension of chronological thinking, there is a difference between the scores of 9th grade students and 12th grade students in favour of 12th grade. In the first three dimensions and the sixth dimension of chronological thinking and in the mean of the scores, there are differences between the 10th grade and 12th grade students in favour of the upper grade. A differentiation in favour of the upper grades has been observed between 9th and 10th grade in the third sub-dimension of chronological thinking; and between the 10th and 11th grade in the 6th dimension. Std. J-T scores that were calculated for the six sub-dimensions of chronological thinking and total scores were also positive. This confirms the case in the mean ranks. It has been determined that the chronological thinking skill increases as the grade level increases.

Conclusion and Discussion

The findings related to the first sub-problem of the study reveal that chronological thinking skills which are included in the curriculum of the history lesson at the secondary education level and emphasized to be necessary to acquire cannot be acquired sufficiently for the students in the study group. This result supports the notion that age-related mental development is not the only requirement for the development of the idea of historical time and chronology; but instead, target success can be achieved by well-organized learning-teaching processes. Considering the history lessons at secondary level, these results are observed due to the fact that the necessary theoretical knowledge pertaining to gaining students the chronological knowledge, chronological thinking and the skills of perceiving change and continuity is not included in the curriculum of history lessons, that the learning outcomes in the curriculum cannot be correlated enough to these skills, that the course books are designed in this manner, and that teachers lack knowledge and skills related to this issue.

Findings on the first sub-problem of the research reveal that chronological thinking skills cannot be sufficiently acquired in history lessons in secondary education level. This case reveals the necessity of treating and developing chronological thinking in a holistic way. Results of the research by Şimşek (2006); Safran and Şimşek (2006) also support this finding. According to Safran and Şimşek (2006), the conclusion that children's chronological skills (locating, ordering, positioning, dating, distancing and synchronising) are related to each other's success has led to the interpretation that the learning of chronology skills emerges as a whole. According to the results of the study by Işık (2014), the mean of scores related to chronological knowledge is generally observed to be low in both grades (6th and 9th Grades).

According to the results of the study, the dimension at which the students in the study group are the most successful among the six sub-dimensions of chronological thinking is "Measuring calendar time in days, weeks, months, years, centuries, millennia. Calculating time through types of calendars and relevant basic concepts (BC, AD, century etc.) and convert it into other calendar systems (Hijri and Julian Calendars and the Gregorian Calendar)" ($\bar{X}$ = 2.79). The results of Turan's (2016) research, with 371 history teachers working in Ankara, indicating the perceptions of history teachers on the level of gaining students chronological thinking skills in history lessons support this finding. According to Turan (2016), the ability to measure calendar time in days, weeks, months, years, centuries and millennia and to calculate time through types of calendars and relevant basic concepts (BC, AD, century etc.) and convert it into other calendar systems (Hijri, Julian or Gregorian Calendars etc.) is a skill that is acquired at a relatively high level. In the research conducted by Şimşek and Bal (2010) with the undergraduate students of the primary school teaching department, it is at a positively high rate that the students use the concept of the birth date of Christ correctly in their time lines. Another striking finding in the analysis of students' time lines is that more than half (55.6%) of them did not use the phenomenon of age (term, period) in time lines. At the end of this research, it has been realized that a wide variety of time perceptions exist despite the historical time form predicted by the formal education given for many years. This has shown that there are some deficiencies related to the history teaching provided and the historical time concept presented in this framework. According to Demircioğlu's (2005) study, it has been understood that more than half of the eighth grade students did not develop an understanding of the concept of the century and that the majority of these students did not know correctly the concepts such as chronology, calendar, Hijri Calendar and the Gregorian Calendar. With the exception of a few, the children who participated in the research conducted by Şimşek (2006) at primary level do not know the meaning of historical time and chronology concepts. According to the results of the study conducted by Safran and Şimşek (2006) with 36 students between 4th and 8th grades, 75.8% of the students were not able to demonstrate the operation skill related to BC-AD, but only 24.2% of them could achieve it. According to Şimşek (2006), it was found that the success of the most of the participants in their ability of operations related to the BC-AD concepts was generally low, although it differed according to the socioeconomic environment variable and it increased based on the grade level.

The results of the study do not correspond with the ideas of Dawson (2004). Dawson explains the steps that must be followed for the development of chronology skills as: By the age of 14, students

should know the definitional chronological concepts (such as; before, after, decade, century, and millennium), technical concepts (BC, AD, knowing that 1485 is 15th century), conceptual expressions (such as change, continuity, anachronism, period, chronology, etc.). Although all of the students in the study group were older than 14 years of age, the qualifications expressed by Dawson could not be reached. The results of the study do not coincide with the results of the research conducted by Thornton and Vukulich (1988), either. According to the results of the research conducted by Thornton and Vukulich (1988), a time period of 11 years is required for children to fully understand the concepts related to time and chronology. Children between the ages of 12-14 can easily make the time classifications (as cited in Altun & Kaymakcı, 2016). In this study, students in the study group, all of whom are older than 14 years of age, could not fully comprehend the concepts related to time and chronology; and failed to make time classifications.

The mean of the scores of the students in the study group obtained from the performance task related to the sub-dimension for interpreting the information presented in the time lines is ($\overline{X}$ =2.24). Students in the study group do not have the sufficient skill to convert information from one form to another. This finding does not coincide with the results of Turan's (2016) research. According to Turan (2016), to be able to interpret the information presented in time lines is a skill that is thought to be acquired at a high level. 19.4% of the teachers think that this skill is completely acquired and 50.4% of the teachers think that it is generally acquired, while only 2% of them think that it is not acquired at all. This case reveals that history teachers' thoughts about improving chronological thinking skills and the results obtained from performance-based student products do not support each other, and it also brings into question how teachers have obtained these views.

The mean of the scores obtained by the students in the study group from the performance task related to the sub-dimension for determining the time course in a historical text is ($\overline{X}$ = 2.05). This result suggests that the students in the study group cannot adequately perceive the time course in historical texts. This finding does not coincide with the results of Turan's (2016) research, either. According to the research results of Turan (2016), the ability to determine the time course in historical text is the skill that history teachers think is acquired at the second highest level. Teachers' opinions on this issue are not reflected in the performance tasks performed by the study group in this research.

The mean of the scores obtained by the students in the study group from the performance task related to the sub-dimension for comparing different approaches to dividing history into periods and proposing different approaches is ($\overline{X}$ = 1.66). This result shows that the competence in the dimensions of the chronological thinking skill in which students are expected to create individual written and visual products is at a lower level. According to Turan (2016), the sub-dimension of chronological thinking which is thought to be acquired is the ability to compare the approaches to dividing history into periods and to propose different approaches.

The mean of scores obtained by the students in the study group from the performance task related to the sub-dimension for forming a historical flow chart to explain the historical continuity and change is ($\overline{X}$ = 1.61). This result supports the fact that the competence in the dimensions in which students are expected to create individual written and visual products is at a lower level. According to Turan (2016), the ability to form a historical flow chart to explain historical continuity and change is a skill that is acquired at a relatively low level. This result suggests that history teachers who participated in the research also have hesitations about this skill. The presentation of cause-effect relationships between historical events as a flow diagram instead of text only is noteworthy as a method which history teachers are away from, as much as the students are.

The mean score of the students in the study group from the performance task related to the sub-dimension for creating a historical text based on a specific time course is ($\overline{X}$ = 1.58). This value is the lowest mean score obtained from performance tasks related to six sub-dimensions of chronological thinking. According to Turan (2016), the ability to create a historical text based on a specific time course is one of the skills that are thought to be acquired the least among the sub-dimensions of chronological thinking. The finding related to the study group students' incompetence of creating a text with a chronological flow does not coincide with the results of the research conducted by Kiriş (2009). Kiriş

(2009) stated that high school students in the study group were aware of the historical time concept and causality relationship, which are fundamental features of the historical discourse, while creating their historical texts.

The mean of the scores obtained from the performance tasks where the students are expected to form a text with their own knowledge, present the information in a different form than the text and propose a different approach towards the current situation is lower compared to the other three dimensions in which the interpretation of the information is requested. This case is directly related to the fact that history lessons cannot be handled in a student-centred, skill and product-based structure. The results of Turan's (2016) research also support the results of this research. According to Turan (2016), history teachers think that relatively more complicated skills such as creating a historical text, forming a flowchart, comparing and proposing new approaches, which force students to high-level mental activities cannot be acquired at a sufficient level.

According to Yıldırım (2015), who carried out one of the studies which support the research result that reveal chronological thinking skills cannot be acquired in the history lessons in secondary education level, there is a problem in the learning of the concept of time for individuals studying in all high school types. It is seen that in most of the students, there are deficiencies or misconceptions about information related to calendar, century, age, chronology etc., which are thought to be taught in the lessons. According to Oymak (2007), which is another research that supports the conclusion that chronological thinking skills cannot be sufficiently acquired, teachers have stated that they encounter various problems in teaching the concept of time, students do not fully understand the concept of time to be learned in primary education, they cannot make operations about the concepts of Gregorian-Hijri, Hijri-Gregorian, their knowledge about the historical time concepts is quite inadequate and they cannot fully understand the meanings of time expressions present in the history course books. According to Marancı (2017), the majority of the students participating in the research have no knowledge of age. Approximately half of the students have the wrong idea that the age in which they live in is the New Age. The students participating in the study focused on environmental change, architectural change, technological change, changes in education and transportation. The students performed below average in terms of their ability to perceive continuity. Although they realized the continuity through the tangible data in the photographs, they could not realize the cases with continuity socio-culturally.

According to Reuvekamp et al. (2014), teachers in England and the Netherlands cannot teach all the goals of the conception of history. Even though the history curriculum in the UK starts earlier, the curriculum does not help students to support the historical understanding of time. In both countries, the teaching and learning of historical time needs to be improved.

In the second sub-problem of the study, it has been tried to determine the change of chronological thinking skill based on the grade level. Results of the study regarding this sub-problem indicate that chronological thinking skills continue to develop based on age (grade level) in the group of students aged between 15-18 years, who are in the secondary education level. According to the results of the study conducted by Safran and Şimşek (2006), where they tried to reveal the development of the concept of historical time in 4th-8th grade primary school students (10-14 years of age), there is a significant difference in study group children's total success in the historical time concept in accordance with the grades they study in. According to Şimşek (2006), based on the results of the historical time concept achievement test, there was a significant difference to from a group with the 4th, 5th and 6th grades on the basis of grade, and to form another group with the 7th and 8th grades. According to Safran and Şimşek (2006), the fact that the 7th and 8th grades in total achievement were significantly more successful than the 4th, 5th and 6th grade students emphasized the impact of mental development based on age, which is the issue that student-centred thinker researchers emphasize persistently. The results of our study, of the research by Şimşek (2006), and by Safran and Şimşek (2006) have confirmed Piaget's hypothesis that mental skills develop depending on age. Şimşek (2006) stated the reason of this case as the students in the lower grades (4-5-6th grade) not having the necessary mental hardware since the concept of historical time is abstract; and the lack of the necessary equipment, teacher, curriculum, method and techniques and course book for the teaching of the concept. According to Pala and Şimşek

(2016), the level of students' knowledge of the events in social studies course books is directly proportional to the grade level of the students. As the grade level increases, the level of knowledge of dates increases, as well.

Various kinds of research in recent years reveal that the development of historical time concept is a learning process, rather than being dependent on age and maturation (Barton & Levstik, 1996; Hodkinson, 2002, 2009; Hoodless, 2002, 2004). Şimşek (2006) stated that along with age-related mental maturity; gender, socio-economic environment of the school they study in, success in mathematics and language (Turkish), the relevant curriculum, the course books, the teaching strategy used, methods and techniques and teaching materials are also effective in primary students' acquirement of the concept of historical time in Safran and Şimşek's (2006) study. The results of Işık's (2014) research do not coincide with the results of our research. According to Işık (2014), in the chronology knowledge test, it was observed that the grade levels of the 6th grade students were higher than the 9th grade students. According to Işık, the workbooks presented together with the 6th grade course book contribute to the fact that the results of 6th grade students were more positive than the results of 9th grade students. It is thought that the fact that activities and especially the workbook were not included in the 9th grade history lessons was effective in the emergence of this difference. Besides, the fact that the 6th grade social studies course book was more qualified than the 9th grade history course book in terms of the content of the course book and especially the documents used has been effective on these results. According to Işık (2014), another issue that adversely affects the knowledge of chronology is that in the maps in the primary and secondary school course books, the states which existed in different periods are shown as neighbours.

As a result of this research whose aim was to determine chronological thinking skill level based on performance tasks performed with 102 students studying at all grade levels of secondary education and to reveal the change of this skill depending on age, it has been determined that the chronological thinking skills in history lessons at secondary education level cannot be improved sufficiently; however, chronological thinking continue to develop depending on age.

The strength of this research is that it reveals the age-related development of chronological thinking skill, which is aimed to be acquired in history teaching at the secondary school level, and the extent to which it is affected by the quality of the design of the learning-teaching environments, through performance-based assessment which aims that the students construct knowledge and create products using higher-order thinking skills. Performance-based assessment tools yield more valid and reliable results in determining the skill levels of students than measurement tools such as questionnaire forms and types of forms oriented to identify competence or self-efficacy. In this research, it is aimed that the students will be able to construct historical information and produce original written and visual products while determining their chronological thinking skills. On the other hand, the limitations of the research can be regarded as the inability to obtain the students' academic achievement in history, Turkish and mathematics lessons from school management; the lack of observation of previous history lessons of the study group with which the application was carried out; and inability to reveal the variables predicting the chronological thinking skills and the relationships between these variables as a result of the inability to conduct interviews with history teachers and observe teaching processes in their lessons.

Suggestions

Considering the results of the study, the following recommendations can be shared with the stakeholders of the issue:

Student-centred history-making activities should be carried out in order to develop sub-dimensions of chronological thinking, which are aimed to develop ideas and products.

Multivariate research should be conducted to determine which variables chronological thinking is affected from, along with the age-related development.

References

Altun, A., & Kaymakcı, S. (2016). Zaman ve kronolojinin öğretiminde bir materyal: Zaman şeritleri. *Turkish History Education Journal, 5*(1), 157-192. Retrieved from http://dergipark.gov.tr/download/article-file/261311

Barton, K. C., & Levstik, L. S. (1996). "Back when god was around and everything": Elementary children's understanding of historical time. *American Educational Research Journal*, *33*, 419-454.

Barton, K. C., & Levstik, L. S. (2004). *Teaching history for the common good*. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Barton, K. C., McCully, A. W., & Marks, M. J. (2004). Reflecting on elementary children's understanding of history and social studies: An inquiry project with beginning teachers in northern Ireland and the United States. *Journal of Teacher Education*, *55*(1), 70-90.

Blyth, J. E. (1978). Young children and their past. *Teaching History*, *21*, 15-19.

Brophy, J., VanSledright, B., & Bredin, N. (1993). What do entering fifth graders know about U. S. history?. *Journal of Social Studies Research*, *16*(17), 2-19.

Dawson, I. (2004). Time for chronology: Ideas for developing chronological understanding. *Teaching History*, *117*, 14-24.

Demircioğlu, İ. H. (2005). Sekizinci sınıf öğrencilerinin tarih öğretiminde kullanılan zaman ve kronolojiyle ilgili bazı kavramları anlama düzeyi. *Eğitim Araştırmaları Dergisi*, *19*, 155-163.

Demircioğlu, İ. H. (2009). Tarih öğretmenlerinin tarihsel düşünme becerilerine yönelik görüşleri. *Millî Eğitim, 184*, 228-239.

Demircioğlu, İ. H., & Akengin, H. (2007). Zaman ve mekâna ilişkin becerilerin öğretimi. In C. Öztürk (Ed.), *Sosyal bilgiler öğretimi* (5th ed., pp. 219-254). Ankara: PegemA Yayıncılık.

Dilek, D. (2002). *Tarih derslerinde öğrenme ve düşünme gelişimi*. Ankara: PegemA Yayıncılık.

Drake, D. F., & Nelson, L. R. (2008). *Engagement in teaching history* (2nd ed.). New Jersey: Pearson.

Harnett, P. (1993). Identifying progression in children's understanding: The use of visual materials to assess primary school children's learning in history. *Cambridge Journal of Education*, *23*(2), 137-154.

Hodkinson, A. (2009). To date or not to date, that is the question: A critical examination of the employment of subjective time phrases in the teaching and learning of primary history. *International Journal of Historical Learning, Teaching and Research*, *8*(2), 40-50.

Hodkinson, A. J. (2002). *Children's concepts of historical time* (Unpublished doctoral dissertation). Edge Hill University, Lancashire.

Hoodless, P. (2004). Spotting the adult agendas: investigating children's historical awareness using stories written for children in the past. *International Journal of History Learning, Teaching and Research, 4*(2), 66-75.

Hoodless, P. A. (2002). An investigation into children's developing awareness of time and chronology in story. *Journal of Curriculum Studies*, *34*(2), 173-200.

Işık, H. (2014). İlköğretim 6. sınıf ve ortaöğretim 9. sınıf öğrencilerinin mekânsal biliş ve kronoloji bilgilerinin karşılaştırılması. *Uluslararası Sosyal Araştırmalar Dergisi*, 7(30), 111-121. Retrieved from http://www.sosyalarastirmalar.com/cilt7/sayi30pdf/ISIK_HASAN.pdf

Karasar, N. (2018). *Bilimsel araştırma yöntemi* (33th ed.). Ankara: Nobel.

Keleşzade, G., Güneyli, A., & Özkul, A. (2018). Sosyal yapılandırmacı öğrenmeyi ve tarihsel düşünme becerilerini geliştirmeyi temel alan tarih öğretiminin etkililiği. *Eğitim ve Bilim*, *43*(195), 167-191. Retrieved from http://egitimvebilim.ted.org.tr/index.php/EB/article/view/7479/2788

Kiriş, A. (2009). *Tarih eğitimi ve tarihçilik mesleği: Lise tarih derslerinde yazma becerilerinin kullanılması ve geliştirilmesi* (Unpublished doctoral dissertation). Gazi University, Ankara.

Kutlu, Ö., Doğan, C. D., & Karakaya, İ. (2017). *Ölçme ve değerlendirme* (5th ed.). Ankara: Pegem Akademi Yayıncılık.

Levstik, L. S., & Pappas, C. C. (1987). Exploring the development of historical understanding. *Journal of Research and Development in Education, 21*(1), 1-15.

Marancı, Ş. (2017). *Fotoğraflarla 7. sınıf öğrencilerinin tarihsel zaman algısı* (Unpublished master's thesis). Kafkas University, Kars.

Ministry of National Education. (2005). *Sosyal bilgiler dersi (4-5. sınıflar) öğretim programı ve kılavuzu.* Ankara: MEB Talim ve Terbiye Kurulu Başkanlığı.

Ministry of National Education. (2007). *Ortaöğretim 9. sınıf tarih dersi öğretim programı*. Ankara: MEB Talim ve Terbiye Kurulu Başkanlığı.

Ministry of National Education. (2008a). *Ortaöğretim 10. sınıf tarih dersi öğretim programı*. Ankara: MEB Talim ve Terbiye Kurulu Başkanlığı.

Ministry of National Education. (2008b). *Ortaöğretim çağdaş Türk ve Dünya tarihi dersi öğretim programı*. Ankara: MEB Talim ve Terbiye Kurulu Başkanlığı.

Ministry of National Education. (2009). *Ortaöğretim 11. sınıf tarih dersi öğretim programı*. Ankara: MEB Talim ve Terbiye Kurulu Başkanlığı.

Ministry of National Education. (2010). *Ortaöğretim Türkiye Cumhuriyeti inkılap tarihi ve Atatürkçülük dersi öğretim programı*. Ankara: MEB Talim ve Terbiye Kurulu Başkanlığı.

Ministry of National Education. (2017). *Ortaöğretim tarih dersi 9-11 öğretim programı*. Ankara: MEB Ortaöğretim Genel Müdürlüğü.

Ministry of National Education. (2018). *Ortaöğretim tarih dersi eğitim programı.* Retrieved from http://mufredat.meb.gov.tr/ProgramDetay.aspx?PID=344

Naylor, D. T., & Diem, R. A. (1987). *Elementary and middle school social studies*. New York: Random Hause.

Oymak, İ. (2007). *Ortaöğretim kurumlarında tarih öğretiminde zaman kavramının öğretilmesinde karşılaşılan sorunlar ve bu konuda tarih öğretmenlerinin görüşleri (Aksaray ili örneği)* (Unpublished master's thesis). Gazi University, Ankara.

Özbaş, B. Ç. (2010). *12-14 yaş grubu öğrencilerin tarihsel düşünme gelişimi ve tarihsel kanıt kullanımı* (Unpublished doctoral dissertation). Dokuz Eylül University, İzmir.

Pala, F., & Şimşek, A. (2016). Sosyal bilgiler derslerinde tarihlerin (dates) öğretimi. *Turkish History Education Journal*, *5*(1), 136-156. Retrieved from http://dergipark.gov.tr/download/article-file/261310

Reuvekamp, M. J. G., Boxtel, C. V., Ros, A., & Harnett, P. (2014). The understanding of historical time in the primary history curriculum in England and the Netherlands. *Journal of Curriculum Studies*, *46*(4), 487-514. doi:10.1080/00220272.2013.8698

Safran, M., & Şimşek, A. (2006). İlköğretim öğrencilerinde tarihsel zaman kavramının gelişimi. *İlköğretim Online*, *5*(2), 87-109. Retrieved from http://dergipark.gov.tr/download/article-file/91046

Safran, M., & Şimşek, A. (2009). Çocuklarda zaman algısının gelişimi. *Uluslararası Sosyal Araştırmalar Dergisi*, *2*(6), 542-548. Retrieved from http://www.sosyalarastirmalar.com/cilt2/sayi6pdf/safran_simsek.pdf

Sağlam, H. İ., Tınmaz, E., & Hayal, M. A. (2015). Sınıf öğretmenlerinin "zaman ve kronolojiyi algılama" becerisini öğretme deneyimlerine fenomonolojik bir bakış. *Türk Tarih Eğitimi Dergisi*, *4*(1), 49-66. Retrieved from http://dergipark.gov.tr/download/article-file/164044

Seixas, P. (2004). *Theorizing historical consciousness.* Toronto: University of Toronto Press.

Şimşek, A. (2006). *İlköğretim öğrencilerinde tarihsel zamana kavramının gelişimi ve öğretimi* (Unpublished doctoral dissertation). Gazi University, Ankara.

Şimşek, A. (2007). İlköğretim 5. sınıf öğrencilerinin kronolojik algılarının geliştirilmesine yönelik yarı deneysel bir çalışma. *Kuram ve Uygulamada Eğitim Bilimleri*, *7*(1), 589-615. Retrieved from http://oldsite.estp.com.tr/pdf/tr/6ce7fba4d9bb71400125a175f1fc328dkfull.pdf

Şimşek, A., & Bal, M. S. (2010). Tarih şeridi aracılığıyla öğretmen adaylarının tarihsel zaman algılarının incelenmesi. *Sosyal Bilgiler Eğitimi Araştırmaları Dergisi*, *1*(1), 124-151. Retrieved from http://dergipark.gov.tr/download/article-file/179008

Turan, R. (2016). Tarih öğretmenlerinin öğrencilere temel ve tarihsel düşünme becerilerinin kazandırılma düzeyine ilişkin görüşleri. *Turkish Studies*, *11*(14), 705-730. Retrieved from http://www.turkishstudies.net/Makaleler/1758134316_35TuranRefik-egt-705-730.pdf

UCLA. (2018). *Historical thinking*. Retrieved from http://nchs.ucla.edu/standards/thinking5-12.html

West, J. (1981). *Children's awareness of the past* (Unpublished doctoral dissertation). University of Keele, Keele.

Wood, E., & Holden, C. (1997). I can't remember doing Romans: The development of children's understanding in history. *Teaching History, 89*, 9-12.

Yıldırım, A. (2015). *Ortaöğretim kurumlarında 10. sınıf öğrencilerinde tarihsel zaman kavram yanılgıları (Samsun ili örneği)* (Unpublished master's thesis). Ondokuz Mayıs University, Samsun.