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Student questioning: What does questioning reveal about prior knowledge, historical reasoning and affect?

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ABSTRACT

Students ask historical questions when they are engaged in historical reasoning and trying to understand a particular historical phenomenon. Student questioning can be regarded as the engine and a destination of historical reasoning. This study is aimed at deeper insight into thinking processes underlying students' historical questions using a general model of questioning and a domain-specific model of historical reasoning. Thirty-three secondary school students were instructed to read a text and underline striking text segments. At the point of underlining, students were asked to verbalize their thoughts. In our protocol analysis we focused on the questions students spontaneously asked while verbalizing their prior knowledge, reasoning, and feelings. It appeared that in half of the 251 analyzed fragments (episodes) students verbalized an extent of historical reasoning and expressed feelings. Questions were mostly asked when students expressed a knowledge deficit, but spontaneous questions were also present in episodes with historical reasoning and episodes with affective responses. All components, activating prior knowledge, realizing a knowledge deficit, historical reasoning and experiencing affective thoughts, help students to ask their questions and help them to process the introduction into a historical topic.

KEYWORDS

History learning, Student questioning, Domain-specific thinking skills, Affect

CITATION

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Introduction

Research in history learning focuses on students' thinking and reasoning about the past (e.g., VanSledright & Limón, 2006). Although several scholars consider the asking of historical questions to be an important component of historical thinking or reasoning (e.g., Schreiber et al., 2006; Van Boxtel & Van Drie, 2008), there is little explicit insight in how historical questions evolve. Voss and Wiley (2006) state in their summary of characteristics of expertise in history: "…an aspect of the historian's task that is virtually never studied (…) is the ability of the expert to be adroit in selecting and defining the issue to be studied. Problem finding is the critical first step in problem solving, and expert historians must have skill at posing interesting yet researchable questions" (p. 573). Regarding students, questioning plays an important role in studying aspects of historical reasoning such as sourcing (Britt & Aglinskas, 2002) and performing historical inquiry in the classroom. According to Rüsen (2007) the 'need for orientation' is a fundamental component of historical consciousness. Historical questions are asked when people or groups experience uncertainty, for example, by experiencing loss or disorder, or interest. People, including historians, can address these questions by re-constructing or de-constructing historical narratives, and these interpretations can be used to better understand or think about possibilities for the future (see also Seixas, 2015 and responses to his contribution; Trautwein et al., 2017). From this perspective, asking questions is related to history in life praxis and creates space for affective elements (cf. Logtenberg, Van Boxtel & Van Hout-Wolters, 2010).

Our goal of the present study is to conceptualize the skill of question asking in the domain of history, more specifically, to gain deep insight into students' questioning while reading a historical text. Carefully reading historical texts and asking questions are core activities in a history classroom. Reading in history goes further than the usual goals of explaining and comprehension of the content of text but demands disciplinary literacy and questions that evaluate the nature and content, criticize and connect past, present and future. Furthermore, we expect that readers' emotions influence the type of questions asked (Logtenberg, Van Boxtel & Van Hout-Wolters, 2011). Research already exists that deals with reading and questioning historical texts (e.g., Wineburg, 1991; Britt & Sommer, 2004; Reisman, 2012; Cameron, van Meter & Long, 2017; Nokes, 2017). However, these studies do not explicitly focus on *how* student questions develop, i.e., the underlying thinking processes. In addition to cognitive components, we are especially curious about the role historical reasoning and affective processes might play in the (potential) onset of questions in the domain of history (cf. Logtenberg, et al., 2010; Rüsen, 2007).

Theoretical framework: The onset of students' questioning

Research on student questioning mostly conceptualizes questioning in terms of a strategy that is important for (text) comprehension and deep meaningful learning (see for reviews Chin & Osborne, 2008; Janssen, 2002; Rosenshine, Meister, & Chapman, 1996). Graesser and Lehman (2011) state that 'Questions are at the heart of virtually any complex task that an adult performs (p. 54.)'. Questioning supports students in articulating their interest and activating prior knowledge. Questions are asked when students experience a knowledge deficit or conflict

(Graesser & Olde, 2003). The model of questioning developed by Dillon (1990) and further elaborated on by Van der Meij (1994) describes the state of puzzlement, surprise or confusion that occurs before formulating a question with the 'perplexity' construct. In line with this research, we depart from the idea that questions arise from a state of perplexity triggered by a cognitive disequilibrium (Graesser & Olde, 2003). However, working within the domain of history, we not only focus on the role of prior knowledge, but also aim at clarifying the affective and historical reasoning processes that may underlie questions.

First, we describe general models of questioning describing perplexity with a strong focus on the role of prior knowledge from a general perspective. Second, we discuss questioning from the perspective of learning history that deals with the potential role of historical reasoning and affective processes, resulting in our research question.

General models of questioning: the onset and formulating of questions

Research on student questioning (Rosenshine et al., 1996) has mainly focused on domain-exceeding skills, which has resulted in general models of questioning. Two general models support the description of the underlying processes of questioning: the model of Dillon (1990) and the model of Graesser and McMahen (1993).

Van der Meij (1994) presents a componential analysis of questioning, based on Dillon's theory of the mechanism of questioning. Three stages characterize the process of questioning: (1) the onset of questioning (perplexity), (2) the development of a question (asking) and (3) the search for and processing of an answer (answering). Van der Meij also emphasizes individual and personal factors of questioning, but still little is known about how students' questioning skills originate. In the first stage the onset of questioning is characterized by perplexity that can be triggered internally or externally. Internal cues cause uncertainty related to one's prior knowledge, while external cues trigger curiosity by surprising events or facts.

Graesser and McMahen (1993) propose a general model of questioning including three components: anomaly detection, question articulation and social editing. Their focus is mainly on the cognitive triggers of questioning, also known as the cognitive disequilibrium hypothesis. Otero and Graesser (2001) describe several 'production rules' (e.g., text characteristics) that trigger cognitive disequilibrium such as contradiction, discrepancies, salient contrasts and expectation violations.

In comparing the two models, the role of cognitive disequilibrium is prominent. The models suggest a question is triggered by a disequilibrium, but a perplexity or anomaly detection not necessarily results in the articulation of a question. When students read a history text, the experience of disequilibrium may accompany spontaneously asking questions. The characteristics of students' disequilibrium may be specified by domain-specific production rules (Otero & Graesser, 2001; Portnoy & Rabinowitz, 2014). A production rule can be used to describe the underlying process of a question, defined by disciplinary literacy in a domain. For example, a disequilibrium that students experience when reading a text about history could reflect their historical reasoning competency, their subject-specific beliefs about knowledge (Wolfe & Goldman, 2005) and could be grounded in both cognitive and affective processes. In the following sections we elaborate on the onset and formulation of questions from a domain-specific perspective. We discuss the potential role of students' prior knowledge, historical reasoning and affective processes in the onset and formulation of questions while reading a historical text.

The onset and formulation of questions while reading a historical text

Although researchers in history education state that questioning plays an important role in historical thinking and reasoning (Cameron, et al., 2017; Ciardiello & Cicchelli, 1994; Rüsen, 2007; Schreiber et al., 2006; Wineburg, 1991), empirical studies that focus on questioning processes in history are scarce. Van Drie and Van Boxtel (2008; 2018) developed a framework for studying historical reasoning. According to these authors, historical reasoning is constructing or evaluating a description of processes of change and continuity, an explanation of a historical phenomenon or

a comparison of historical phenomena or periods. Their framework consists of six components: asking historical questions, using sources, contextualization, argumentation, using substantive concepts, and using meta-concepts of history.

In this framework questioning takes a central position, as it is seen as an 'engine' of historical reasoning. Interpreting a historical phenomenon implies a search for explanations (e.g., Why did it happen?), differences and communalities (e.g., What changed?) and historical context (e.g., Was it common in that time?). From this domain-specific perspective students ask questions when they are engaged in historical reasoning in order to better understand a particular historical phenomenon. Questions are informed by students' historical interest, knowledge and beliefs about the nature and construction of historical knowledge (Van Boxtel & Van Drie, 2018). According to Seixas, historical questions 1) form a link between past, present and future, 2) are naturally occurring questions in our culture today (everybody's questions) but 3) are difficult to answer because of the complexity and uncertainty and different perspectives and the 'pastness' of the past (pp. 15-16). While asking such questions students should consider historical thinking concepts, such as historical significance, continuity and change, cause and consequence, historical evidence, historical perspectives and the ethical dimension of history (Seixas & Morton, 2012; Rüsen, 2007).

Students, however, when confronted with historical content tend to judge historical agents and situations from a present-oriented perspective or use stereotypes to describe and explain historical actions or events (De Leur et al., 2017; Hartmann & Hasselhorn, 2008). They experience difficulty in seeing persons, events and developments in the past in their own historical context (Huijgen et al., 2017; Barton & Levstik, 2004; Wineburg, 2001). Students may be perplexed when they experience disequilibrium between the information that is given about the past and what they know from their experience, the narratives they are familiar with from the communities in which they participate, and present-day standards. This experience may also be characterised by emotions, such as excitement or indignation which can trigger feelings of interest. Strong emotions may be triggered by (inter)nationally sensitive topics such as genocide, slavery or long-lasting historical conflicts within and between countries. But less strong, more general affective student reactions and imagination (interest, engagement, joy) can also play a role in learning (De Leur et al., 2017; Demetriou & Wilson, 2009; Silvia, 2006).

Indignation or astonishment about the past caused by the 'otherness' of the past can be a powerful emotion that may trigger a question that reflects this emotion or that reflects the aim to contextualise. When students experience a disequilibrium in the sense of seeing the past as 'strange' they can use different ways of reasoning in which questions can be embedded. First, students may try to empathize with past persons, actions or events, especially while reading historical narratives. Mar and colleagues (2011) describe feelings of sympathy, identification, empathy and relived and remembered emotions as playing an important role while reading narratives. Introductory texts regularly contain narrative characteristics about a historical topic. Second, questions that reflect emotion or judgment based on present-day standards may occur when students take a present-day perspective. Third, students can (or try to) contextualise past actions or events by describing or explaining in order to make sense of them. While doing this they activate prior knowledge about the historical phenomenon or period in the text. Contextualization questions reflect an attempt to deeply understand a historical event or situation (Huijgen et al., 2018).

In conclusion, students' questioning in the general questioning models is mainly regarded as a cognitive process described as a result of a knowledge deficit or a cognitive disequilibrium, whereas in history education it seems relevant to describe the underlying onset of historical reasoning and affect. In this study, we distinguish two 'appearances' in students' questioning: underlying thinking processes and spontaneously formulated questions. The thinking processes (or the onset of questioning) are characterized in terms of experiencing a lack of, or conflict with prior knowledge (as described in general models of questioning), in terms of historical reasoning , and in terms of affect (as described in history education research). In order to characterize the spontaneous questions we describe processes that co-occur and accompany question formulation.

Research Question

How can student questions be characterized by underlying processes during the onset and formulation of (spontaneous) questions?

Method

In this research, we were aiming at '*underlying*' processes of questioning, i.e., processes that remain rather covert in other studies of student questioning. For this reason a specific thinking aloud procedure was developed. This method is aimed at revealing how an introductory text triggers the first two stages of questioning, i.e., onset and formulation of questions (Van der Meij, 1994). Furthermore we were inspired by the plus-minus method that is used to evaluate reader experiences and asks readers to report their positive and negative experiences by inserting pluses and minuses in the text margin (De Jong & Rijnks, 2006, pp. 160). Thereafter, readers are asked to verbalize the reasons behind the pluses and minuses. The introductory text used in our study is mainly aimed at triggering questions, problem finding and interests. Respondents were asked to underline text fragments and verbalize their explanation afterwards. This method was added to a traditional thinking aloud approach that is mainly used to evaluate student thinking while solving a problem or understanding a text (Van Someren, Barnard, & Sandberg, 1994).

Participants

Thirty-three students in higher secondary education (mean age = 15) participated in this study. They were drawn from eight different classes at six schools with a similar history curriculum in history. The Dutch history curriculum aims at teaching students to use a historical frame of reference combined with historical thinking (Van Boxtel, 2014). In lower secondary education, the asking of historical questions is not an explicit learning objective. As far as historical thinking skills are concerned, emphasis is on critical examination of historical sources and thus on asking questions that deal with usefulness and reliability of these sources.

Bearing in mind the relatively large differences in the historical knowledge and interest of students in the Dutch school system, we carefully selected 33 participants from a larger sample of 174 students. Working with the labour-intensive think aloud methodology, we had to select a number of students. Because prior knowledge and interest are important variables when it comes to questioning (Chin & Osborne, 2008), we used two criteria of selection in order to draw a representative sample from regular Dutch history classes with as much diversity in prior knowledge and interest as possible. We used a prior knowledge test about the Industrial Revolution, one of the topics in the national curriculum (8 items, $\alpha = .74$) and an interest in history questionnaire (32 items, $\alpha = .92$) to divide the sample of 174 students into groups of low interest/prior knowledge, medium interest/prior knowledge, and high interest/prior knowledge. We randomly chose 11 students from each of these groups. The groups were formed solely for selection purposes and to uncover diverse thinking processes; they were not utilized for comparisons. After getting parental consent, students were invited for an interview session (30-45 minutes). All student names in the results are fictional.

Introductory text

We composed a text about the historical topic Industrial Revolution (760 words, see Appendix). The function of this text was to introduce a new topic in the history curriculum (lesson-starter) and to trigger text-based interest and questions. Text-based interest is an 'emotional state aroused by specific text features' (Schiefele & Krapp, 1996). These text features can trigger situational interest that may give rise to questions (Hidi & Renninger, 2006). Texts containing an unexpected element, incongruence, or an appeal to one's imagination can stimulate situational interest (Brantmeier, 2006; Schraw, Bruning, & Svoboda, 1995). The text contained narrative and problematizing characteristics that we considered important for triggering situational interest

(engagement, and emotions such as indignation), cognitive disequilibrium (Graesser & Olde, 2003), and various types of questions. The text included a vivid eye-witness description by Friedrich Engels, the son of a German factory owner, of his visit to a nineteenth-century factory in Manchester and the poor conditions he saw there. The text then gives a (problematizing) comparison with the contemporary industrialization process of modern-day China and finishes with a concluding paragraph about the positive and negative consequences of the Industrial Revolution. Important historical information, such as dates and context, is left out in order to trigger knowledge deficits and historical questions.

Task and procedure

Students were asked to read the text and to underline text segments that were striking, (un)familiar or (un)clear to them. At each underlined text element, participants were instructed to verbalize (thinking-aloud) what they thought regarding this element, why they underlined it and to explain their thoughts. The instruction was written down for students and verbally repeated by the researcher (Appendix). At every underlined segment the researcher followed a protocol by using prompts such as 'what do you think?' to stimulate the student to think aloud and explain their thoughts. Because we were interested in the process of spontaneous asked questions, we did not instruct students to formulate questions during the reading of the text. Students indicated the theme of the text, explained their thoughts, and reacted to the prompting of the researcher (e.g., 'What do you think now?' and 'What do you mean by that?')

Coding system and analysis

We transcribed 33 protocols of students verbalizing their thoughts about striking fragments in the text. These data were divided into episodes. An episode is defined as 'all utterances of the student after underling a text segment'. We considered the moment of underlining to be a possible indication of a cognitive disequilibrium/deficit, historical or more present-day reasoning, or some type of affect. We defined 251 episodes (M = 7.6 per student). A coding scheme was developed to code verbalizations found within these episodes. An episode ends when the student stops verbalizing (or does not react to the researcher's prompts) and continues reading. Transcribed episodes vary in length from 2 to 25 sentences.

Each episode is coded on these three dimensions. We used the episode, not the student, as a unit of analysis because we wanted to get insight into the onset of questioning processes that occurs when students read a text about history and how spontaneously asked questions are related to these different processes. To analyze the protocols, we developed a coding scheme in order to label each episode on the following three dimensions: 1) prior knowledge (experiencing a deficit in, a contradiction or a correspondence with prior knowledge), 2) historical reasoning (contextualization, comparing, causal reasoning and argumentation) and 3) affective processes (indignation, interest, astonishment, empathy or boredom). Additionally, we coded each episode on the appearance of spontaneously asked question(s) (yes or no). Each dimension was coded in a specific way, so we discuss the analysis per dimension (Tables 1 to 4). Coding was done by two researchers and Cohen's kappa (reported in Tables 1 to 4) was used to calculate the level of agreement between the different raters using a sample of 45 (18%) episodes.

Coding scheme prior knowledge (Table 1).

Knowledge deficit was coded when a student explicitly stated his/her lack of knowledge about the topic by remarking that they don't know or understand or by asking a question that clearly reflects a lack of knowledge (e.g.: '*Manchester is in England, isn't it? '*). Only in this category of prior knowledge were (a certain type of) spontaneous questions seen as an indicator of the type of prior knowledge.

When no knowledge deficit appeared in the episode, it was coded with the codes 'knowledge conflict', 'association' or 'no prior knowledge'. A knowledge conflict means that students explicitly state that information in the text conflicts with prior knowledge. This could also mean that a

student compares this information with other information in the text. Association is referring to prior knowledge without verbalizing a knowledge deficit or contradiction. An association is expressed by the student by adding own knowledge, remembering lesson experiences, or information from a previous episode or text segment. An episode was coded as 'no prior knowledge' when a student only paraphrased the text or verbalized an affective reaction. A moderate Cohen's kappa (.63) was calculated.

Table 1

Codes, descriptions, and examples of prior knowledge (κ = .63)

Code	Description	Example
Knowledge deficit	Episode contains statements from the student that express a lack of knowledge, expressed in a question or by using the expression; 'I do not know'.	Well, I don't know. Apparently, England is more developed than Germany. But I don't know for sure, that's why I underlined it. I don't really understand it.
Knowledge conflict	Episode contains one or more expressions of prior knowledge that does not fit with the information in the text, according to the student. There is a contradiction with; - own knowledge - prior information from the text - own opinion, if supported with own knowledge - knowledge/information from the text.	Well, yes, it says that this Friedrich goes to his father's factory, a textile factory. But I don't understand, because it says in this sentence 'In a large, dark factory hall dozens of people are working; remarkably many women and children'. But I always thought it was the men that worked.
Association	Episode contains one or more expressions of prior knowledge related to the text segment. This prior knowledge can consist of; - own knowledge - preceding information from the text - lesson experience/recollection - own (life)experience.	Steam engines came; they began to work with steam. Things got more automated. How do you say that? That there was more productivity. That a lot more was produced. Yes, people are sad because they have to work, they can't do fun stuff and on Sundays they drink to forget.
No prior knowledge	Episode contains no statements that express prior knowledge related to the text-segment. - Information from text is repeated/paraphrased. - Episode only contains an affective reaction, opinion or judgment.	'10 to 12 hours' Um, that's too long. That, um. Well, I just don't think it's right that children had to work 10 to 12 hours a day.

Coding scheme historical reasoning (Table 2)

Episodes were analyzed based on the presence or absence of historical reasoning. (Cohen's kappa = .73). When students showed a present-day perspective by using their experiences or present-day standards in explaining their thoughts (e.g., only discussing present-day issues) this was coded as 'no historical reasoning'. But when a present-day issue was explicitly compared with the past or put into a historical context, this was coded as historical reasoning.

Describing the different types of historical reasoning in sub-categories was done by two raters *together* because only in some episodes different types of historical reasoning could be detected. In those cases, the raters discussed the main type of historical reasoning: contextualizing, comparing, causal reasoning and argumentation (Van Drie & Van Boxtel, 2008) and no kappa was calculated.

Table 2

Codes, descriptions, and examples of historical reasoning (κ = .73)

Code	Description	Example
No historical reasoning	Episode contains no use of a historical reasoning related to the text segment. Student judges a situation or event in the past from a present-oriented point of view (own experiences/values).	Well, that people weren't treated humanely in those factories. For example, that woman that wanted to comfort her child, or a child, and she immediately gets a fine because she's not working: I think that's really harsh. In this case I think of my own situation. I work 5 hours a week and I earn 3.85 an hour or something like that. And then I think 'they earned so little in the past.' That's just not right.
Historical reasoning	An episode contains use of historical reasoning related to the text segment aimed at giving meaning to a historical situation, event or phenomenon. The described information in the text is extended or made comprehensible by using one or more forms of reasoning: (1) contextualisation, (2) comparison, (3) causal reasoning, (4) argumentation.	
Contextualisation	Student constructs a historical context for the situation/event that is described in the text in order to make this situation more comprehensible.	The period, I think about 1700, 1800, when the steam engine appeared in England, I think. Yes, when things improved technically. That's what comes to mind.
	The episode contains statements about characteristics of a specific time, place or society.	Steam engine. Yes, that was the first invention of the Industrial Revolution (…) And the locomotive is derived from that. Yes, people worked six days a week in factories; streets were dirty and on Sundays they drank a lot.
Comparison	Student makes a comparison that concerns situations, events and phenomena in the past that are compared with each other or with present-day situations, events and phenomena. (A comparison between present-day situations is not considered historical reasoning; for example the comparison between China and present-day Europe.)	Well, because my idea about earlier times, for example the Golden Age (*17th century A.L.*), is that women didn't work as merchants or anything like that and they didn't work on ships. They were at home with the children. Men worked, so I think it's strange that now women and children have to work.
Causal reasoning	Student names causes and/or consequences of an event or situation that is described in the text.	Well, we now have faster transportation and people, yes, well, it changes, you know, we were able to move faster and, because of the train, we went to live in other places and we started to build cities. And that's what I mean with development. Progress, just like the Renaissance, for example.
Argumentation	Student gives arguments for or against a statement or interpretation, examines different arguments or interpretations.	I agree with the opinion that the existence of common people has improved. Um, well, the train came, so you can get anywhere within 3 hours. I think that's very important, that you can travel far (…) And what could we do without machines nowadays? Almost nothing. So that's my opinion. I agree with this.

Coding scheme for affect (Table 3)

First, we coded each episode on appearance of 'no affect' or 'affect' (Cohen's kappa = .90). Next, we coded the episodes that contained verbalizations of affect with the sub-categories interest, indignation, astonishment, empathy and boredom (Cohen's kappa = .79). These types of affect were inductively generated based on student utterances including words or expressions that refer to affective characteristics (e.g., like, fun, awful, etc.).

Table 3

Codes, descriptions and examples of affect (k = .90) and different types of affect (κ = .79)

Code	Description	Example
No Affect	Episode contains no statement from the student that expresses emotion or interest.	Yes, children had to work too instead of going to school. So here you see again that they didn't have much choice. They had to work to survive.
Affect	Episode contains one or more statements from the student that expresses emotion or interest.	
Interest	Episode contains one or more statements from the student that express interest. The student uses words like interesting, fascination or curious.	Um, yes, I think that's because it interests me. I am curious about working conditions. Well, um, I think things like child labour, for example, are topics that I find fascinating. How do I explain that?
Indignation	Episode contains one or more statements from student that express indignation. The student uses expressions like 'not normal', 'shocking' or 'awful'.	Well, a child should be comforted when she, well, you have to comfort people when they aren't feeling good. And in this case it's not allowed. That's shocking.
Astonishment	Episode contains one or more statements from the student that express astonishment. The student uses expressions like 'unbelievable', 'strange' or 'surprising'.	I think that people at that time had to work very long hours. It's hard for me to believe that it was so bad at that time…and also because it concerns children, of course. That always really surprises me.
Empathy	Episode contains one or more statements from the student that express empathy. The student can imagine herself/himself in the situation that is described in the text segment.	That people really lived like that! I hate to think that I'd ever have to live like that. It's a bit like you are him and you're looking out the window and you see what he sees.
Boredom	Episode contains one or more statements that express boredom. The student uses expressions like 'boring', 'annoying' or 'not interesting'.	Well, yes, I just said that I don't think the subject we have now is a nice one. Because, well…it's probably important but I prefer to talk about things like World War II.

Coding scheme spontaneous questions (Table 4)

Spontaneous questions were categorized into substantive questions (descriptive, comparative, explanative, evaluative) and non-substantive (procedural) questions. We used the coding system from our earlier study (Logtenberg et al*.,* 2011). Procedural questions function to understand the task and are mostly directed at the interviewer. The inter-rater reliability for the coding of spontaneously asked questions was calculated on a randomly chosen sample of 50 questions (Cohen's kappa = .76).

Table 4

Codes, descriptions, and examples of spontaneous questions (κ = .76)

Category	Code	Description	Example
Substantive	Descriptive	What, when, who, how questions that can support building a historical context or describing processes of change and continuity.	Manchester is in England, isn't it? What is this transition?
	Comparative	Questions that ask for differences and similarities in order to determine the uniqueness of historical phenomena.	What do we have now that they didn't have?
	Explanative	Questions that ask for explanations of historical phenomena, why questions, what were (short-term and long-term) causes and/or effects?	I would like to know why many women and children worked.
	Evaluative	Questions that discuss the significance of historical phenomena that foster discussion about the topic by asking for a judgment/opinion.	What was wrong with the people themselves during the Industrial Revolution?
Non-substantive	Procedural	Questions about the task or procedure directed at the interviewer or that support the thinking process.	How do I explain? Do I have to underline this? What do I think about this?

Results

In total, 251 episodes were analyzed to answer the research question. First we describe the appearance of thinking processes and spontaneous questions. Next, we describe episodes with and without spontaneous questions and the co-occurrence with the dimensions; prior knowledge, historical reasoning and affect.

Students' thinking processes in the episodes

Table 5 shows the results of the analysis of the episodes in which students verbalized their thinking after they underlined part of the text. We observed that prior knowledge was present in 74% (*f* = 186) of the episodes. In 23% (*f* = 57) of the episodes students expressed a knowledge deficit and in 8% a knowledge conflict (*f* = 21). 108 (43%) episodes contain an association. We found that in 120 (48%) of the episodes students verbalized historical reasoning, mainly contextualization (*f* = 81, 32%) and comparison (*f* = 26, 10%). In 51% (*f* = 128) of the episodes students showed an affective reaction, mainly indignation (*f* = 59, 24%) and astonishment (*f* = 27, 11%) about the poor working conditions and child labour.

Table 5

Frequencies and percentages of the dimensions prior knowledge, historical reasoning and affect

Prior knowledge	***f* (%)**	**Historical reasoning**	***f* (%)**	**Affect**	***f* (%)**
Knowledge deficit	57 (22.7)	Contextualisation	81 (32.3)	Interest	24 (9.6)
Knowledge conflict	21 (8.4)	Comparison	26 (10.4)	Indignation	59 (23.5)
Association	108 (43)	Causal reasoning	8 (3.2)	Astonishment	27 (10.8)
		Argumentation	5 (2.0)	Empathy	14 (5.6)
				Boredom	4 (1.6)
Prior knowledge	186 (74.1)	Historical reasoning	120 (47.8)	Affect	128 (51)
No prior knowledge	65 (25.9)	No Historical reasoning	131 (52.2)	No Affect	123 (49)
Total	251 (100)		251 (100)		251 (100)

Students' spontaneous questions in episodes

A total of 129 questions were spontaneously asked when students verbalized their thinking. Ninety-seven substantive questions (75%) were content-related and 32 procedural questions were asked. Most substantive questions were descriptive (*f* = 73, 57%) and were asked while reading the narrative text part that dealt with working conditions (see Appendix). Two comparative (1%), 14 explanative (11%) and 8 evaluative (6%) questions were spontaneously formulated.

Table 6 describes the co-occurrence of substantive questions (descriptive, comparative, explanative or evaluative) and the characteristics of the episodes (prior knowledge, historical reasoning and affect) in which they occurred. In 63 episodes (25% of a total of 251 episodes) students asked one or more substantive questions that can be related to the different thinking processes. We found that when questions were formulated, they were often embedded in episodes with a knowledge deficit. These questions were often very close to the text. Almost half of the substantive questions was connected to historical reasoning, mainly contextualization. With respect to affect, it appeared that almost half of the questions were embedded in episodes that included affect. Questions characterized by affect were mainly associated with interest, indignation, and amazement.

Table 6

Frequencies and percentages of episodes (in terms of prior knowledge, historical reasoning and affect) in which one or more questions are asked and frequency and percentages of substantive questions.

Dimension	Type of thinking processes		Episodes with substantive question(s)	Number of substantive questions
Prior Knowledge	Knowledge Deficit		41 (65%)	69 (71%)
	Knowledge Conflict		2 (3%)	4 (4%)
	Association		15 (24%)	16 (17%)
	No Prior Knowledge		5 (8%)	8 (8%)
		Total	63 (100%)	97 (100%)
Historical Reasoning	Historical reasoning		28 (44%)	44 (45%)
	No Historical reasoning		35 (56%)	53 (55%)
		Total	63 (100%)	97 (100%)
Affect	Affect		26 (41%)	41 (42%)
	No Affect		37 (59%)	56 (58%)
		Total	63 (25%)	97 (100%)

Below, we illustrate with examples how students' questions arise from different processes. We also give some examples of episodes that contain a potential onset for questions (e.g. a knowledge deficit or indignation) in which no spontaneous question was formulated, to better understand when questions aren't formulated.

Questions triggered by prior knowledge

With regard to prior knowledge most substantive questions (71% of all substantive questions) were asked in episodes in which students verbalized a knowledge deficit. Only 4% of all substantive questions were asked in episodes with a knowledge conflict. 17% of the questions were asked in episodes in which students verbalized associations.

Questions embedded in a knowledge deficit were often asked in episodes that did not contain historical reasoning nor affective responses. In 41(72%) of the 57 episodes with a knowledge deficit spontaneous questions were formulated. For example, when reading the text fragment 'At a distance poorly dressed men are watching' (see Appendix), Jody asked:

> 'What has that to do with this? I wonder, what kind of men are they?'

Reading about 'rattle and trampling sounds', Rose asked:

> 'What is the meaning of those rattle and trampling sounds? Where does it come from, that sound?'

Victor posed a question about the term 'weaving looms':

> 'What are weaving looms? Are those … looms … Yes, I do not know what it is. It is probably for the weaving?'

In coding students' thinking processes, we found that 21 episodes showed a knowledge conflict (see Table 5). Only 2 (10%) of these 21 episodes contained questions. In both episodes, students stopped reading at the part of the text where the comparison with China was made. Students were confused about this comparison. '*So this text is about something else?*', Jody asked, referring to the text section about current working conditions in a Chinese factory. Jody thought the situation concerned a development in the past. He knew about past developments and contextualizes by stating that these where '*200 or 300 years ago.*' At the same time, he was astonished reading about the comparison with China.

In 15 (14%) of the 108 episodes with expressed associations, questions were spontaneously asked. These episodes often also contained an affective response. These questions were mainly aimed at the questioner self while thinking aloud and reacting on the text. For example, while reading about the dirty canals, Eric said:

> 'This is not normal, that the water is so black and smelly (..) Well this is bad for the people, isn't it?'.

Eric then referred to another fragment earlier in the text "Friedrich breathes in the smell of the steam engine" and said:

> 'Well, it was like that in the past, that's bad for him and he probably hasn't done that before. You didn't have this before the Industrial Revolution started, with all those factories and so on. That's the cause (of the IR) so to say, that's why the city is full of dirt.'

Besides his indignation about these environmental issues, Eric knew that this issue is a consequence of industrialization and showed prior knowledge about environmental issues with an association accompanied by a question. On the other hand, his indignation about these environmental issues could be explained by a present-day perspective through which he tried to imagine how these issues were new for people living during the industrial era.

In several episodes where students conveyed a conflict in knowledge, a sense of perplexity was evident. However, despite this confusion, the students refrained from articulating a question. For example, George underlined the text fragment: 'Impressive', Friedrich thinks, 'A lot more modern than our Essen station in Germany.' George said:

> 'Well, that suddenly a German is standing at an English (Manchester) train station. I think that's unusual. Um, well it is in the time of the Industrial Revolution, but I didn't know that foreigners were already going to England, especially Germans. Um, well, I don't know exactly, I just thought it's unusual, I don't know. Well, I didn't exactly know that, say, Germans, other people, went to England. I thought it was America. Well, America was the new world. So, I think if they wanted a better life or something, then they'd go to America, not to England.'

George verbalized a knowledge conflict and tried to make sense of it by historical contextualization (without affective responses) but posed no spontaneous questions.

Another example of an episode with a knowledge conflict, historical reasoning and an affective reaction came from Sylvia. She underlined the text fragment 'remarkably many women and children' and reacted:

> 'The text describes that Friedrich goes to his fathers' factory, a textile factory. But I do not understand. I always thought that particularly the men worked. I didn't expect that women and children to work in a factory. Women took care of housekeeping and men earned money.'

Then she tried to understand this situation by contextualising and comparing this situation.

> 'My idea of the past is that, for example during the Golden Age, women also did not work as traders or work on ships. Women were at home with the kids. Men did those jobs and I think it is strange that now the women and children must work.'

Sylvia engaged in historical reasoning by comparing the situation described in the text with her knowledge of another historical period, specifically the seventeenth century. In this particular episode, Sylvia did not draw upon her prior knowledge to comprehend the reasons behind the high number of women and children working in a factory. On a more profound level, Sylvia's perplexity delved into the historical matter of continuity and change, questioning the factors that change and those that remain constant over time. In pre-industrialized society, it was quite common that children contributed to the family income. The inquiry into why things undergo change is implicit in the student's response, although she did not explicitly articulate a question.

Questions arising from historical reasoning

In 28 (23%) of the 120 episodes characterized by historical reasoning students asked one or more questions. 44 out of a total of 97 substantive questions (45%), mainly descriptive questions, were mainly asked in episodes with contextualizing.

In one episode, perplexity was triggered by the sentence in which Friedrich says that it (Manchester) was more modern than Essen (in Germany). Victor verbalized his lack of knowledge and asked: '*Were these two connected or something?*' and '*Was there something special about Germany, even then?*' He posed inquiries regarding the broader context of developments in Germany, and to facilitate this understanding, he sought information about the specific time period covered in the text. He stated, '*This is at the end of the 18th century'* and asked '*This is 19th century, isn't it?*' From the perspective of historical reasoning, these questions can be understood as an attempt to build a historical context in order to understand the difference between Germany and England. The questions were directed towards obtaining information that assisted Victor in situating the historical situation within the framework of both time and place.

Alice tried to contextualize and source the text itself. When reading the name Friedrich, she immediately asked ; 'Is it a story? Or what kind of story is it?' 'Yes, is it a source or something like that, regarding the Industrial Revolution? I don't know whether this is a primary or secondary (source)or what it may be'. She posed these questions and verbalized a knowledge deficit. She said 'I do not know who that man, Friedrich, is'. These questions may aid in achieving a understanding and contextualizing the events delineated in the text.

These examples show that spontaneous questions were part of historical reasoning, mainly supported by using knowledge that is not in the text. However, in 92 episodes characterized by historical reasoning no questions were asked. For example, regarding the last sentence of the text: 'Some (historians) think that the welfare of people decreased because of the Industrial Revolution, while others think that the lives of ordinary people improved because of it.' Sylvia underlined this sentence and said:

> 'I think this is a good position, because this is right. Children are behind their computers too long, they become fat, and they eat candy, and so on. And, during the Golden Age (17th century), for example, you did not have all those things. Children played outside and it was safer, there were no cars on the street. So I agree, but also with the other part of the sentence'.

Sylvia continued:

> 'In the past there was a big difference between poor and rich. When you were poor, you didn't have a future. But now that's normal, in Europe. There is no big difference between the rich and the poor. Poor people have a future now. Children from a family supported by social security can go to school and can go to university if they want to. So this revolution has advantages and disadvantages. I think, what if this revolution did not occur, I wouldn't be at school nowadays, you know?'.

This example of Sylvia showed how a student 'solved' the problematizing part in the text by reasoning historically by finding arguments regarding the advantages and disadvantages of industrialisation. This probably explains why no question was posed.

In conclusion, our in depth analyses of episodes revealed that questions can be embedded in historical reasoning, mainly in terms of contextualising but also by causal reasoning and argumentation. Students' historical reasoning and questioning is supported by prior knowledge. In episodes with historical reasoning where no questions are asked, students do not experience enough perplexity to formulate a question or they 'solve' perplexity by using prior knowledge and historical reasoning. However, some of this knowledge and reasoning is still quite naïve and could be deepened by further questioning.

Questions triggered by affect

With regard to affect 41 (42%) of the questions were asked in 26 (20%) episodes with affect (mainly interest, indignation and astonishment). Often these questions reflected a moral judgment because of taking a present-oriented perspective towards the situation or event described in the text. One of the students, for example, showed indignation about the fact that a woman who comforts a crying child gets a fine and asked '*Why does she get a fine?*'.

In some cases, affective responses such as indignation or amazement were succeeded by a question, after which the student attempted to contextualize or elucidate the situation or event in the text . For example, when reading about the working conditions in the factory, Carl expressed his indignation with a question: '*People are allowed to talk, aren't they?*' After this he contextualized the situation through a more extensive description of the working conditions in those factories:

> 'Taken into account the whole text and what we discussed in the lesson, people worked in really bad conditions, and many died in the factories. Children had to work because they were able to crawl between all those machines.'

In this episode, the question was the start of a historical reasoning. After reading about working conditions, a question that reflects emotion and a present-day perspective was asked. The question was followed by verbalizing prior knowledge in which the student tried to create understanding of the historical situation without losing his feelings of indignation.

Finally, we found episodes with an affective reaction without historical contextualization and no spontaneous questions, mostly expressing indignation about and empathy with working conditions. Eva, for example, read "In a large, dark area many people are working - remarkably many women and children." She said:

> 'This is pitiful, those people working in dark unhealthy circumstances. And even children work there. It says it was "dusty and stuffy over there. The noise is deafening and 10 to 12 hours a day." That's not normal, it's not healthy for a child and neither for a woman. They hardly see any daylight. I wouldn't want that in any case. This is striking to me. I think this is sad and it also interests me. Things about poor countries, I can empathize with that.'

This type of reaction to the description of working conditions in the text only reflected an affective process.

In sum, students showed affective reactions regarding the working conditions described in the text. In some episodes, questions emerged either embedded within or immediately following an affective response. Questions were an expression of affect, for example, indignation or amazement. When no questions were asked, the affective response was followed by historical contextualisation that 'solved' the affective perplexity. In other episodes the affective reaction was not accompanied by a question, probably because students were not used to pose this type of questions (that express indignation or empathy) in a classroom context.

These examples show that experience of a knowledge deficit, but also historical reasoning and affect can be regarded as important characteristics of question asking. Often these thinking processes co-occur and are intertwined.

Conclusion and discussion

In this study we described the thinking processes underlying questioning and spontaneous questions of secondary school students who read a historical introductory text. We were interested in the processes that characterize questions that students spontaneously formulated. In understanding these thinking processes, we focused on the first two stadia of a general model of questioning (van der Meij, 1994) and tried to enrich this model with domain specific 'production rules' of questions. According to general models of questioning, the onset and formulation of questions is characterized by a cognitive conflict or a knowledge deficit. In addition to these general components, we were especially curious about the domain-specific elements in questioning, i.e., the role historical reasoning and affective processes might play in the onset of questions in the domain of history. First, we examined thinking processes through student verbalizations about prior knowledge, historical reasoning, and affect. Then, we used these processes in order to analyze episodes with spontaneously asked questions.

Thinking processes

Prior knowledge appeared to be prominent in thinking processes the students engaged in. We found that students often stopped reading when terms or statements in the text triggered verbalizing associative knowledge. In almost a quarter of all episodes, students verbalized a knowledge deficit. However, students did not often express a knowledge conflict, whereas in general questioning models such conflicts are considered important sources of student questions (Graesser, 1993). This could also be caused by the fact that students have little prior knowledge and the text (re)introduces the topic to them.

In half of the episodes students reasoned historically, often by constructing a historical context for the situation or event described in the text (contextualization). This suggests that students, when reading a text, try to make sense of the historical context (Huijgen et al, 2018).

With respect to the role of the affective dimension in thinking, we conclude that in explaining their disequilibrium or reason to stop reading, students verbalize emotions and interest. We found affective reactions in about half of the episodes. Indignation and astonishment about the working conditions were particularly triggered by the text. This supports our idea that the disequilibrium students experience often is not only cognitive, but also affective. Events or situations described in the text conflict with what students think is correct or normal. In the domain of science, it is well-known that students can experience a cognitive conflict between scientific ideas and ideas based upon everyday experiences, perceptions and physical sensations (e.g., Limón, 2002). However, in the domain of history, conflicts may occur more on the level of values and norms, and emotions can play an important role. Emotions are clearly present when students learn about history (Rüsen, 2007; Logtenberg, 2012; De Leur, 2018).

Summarizing, the activation of prior knowledge, the realization of a knowledge deficit, historical reasoning, the verbalization of emotions such as indignation and astonishment are important components of the disequilibrium students experienced when reading the introductory text about the Industrial Revolution. Therefore, these components are useful to describe the onset of questions in history.

Spontaneous questions

Analysis of episodes with spontaneous questions shows that questions are especially asked when students experience a need for more information (and thus a knowledge deficit). There seems to be a difference between not knowing something and knowing what specific type of information is required to gain a better understanding of a 'specification of ignorance' (Wineburg, 2001). This need for information is sometimes grounded in the attempt to contextualize, which is an aspect of historical reasoning (Huijgen et al., 2017). Many spontaneously asked questions were found in episodes with historical reasoning. In some of these episodes, questions were the start of a historical reasoning or embedded in historical reasoning. Astonishment and indignation - when combined with the attempt to contextualize- can also characterize a question, although these questions often contain presuppositions reflecting a judgment or a present-oriented perspective. Indignation and astonishment were present in a third of all episodes, but only in a minority of these episodes students asked questions. Hence, these emotions did not lead to the initiation of questions.

Typical historical perplexity can be seen in episodes where students wonder about rapid developments, or the otherness of the past. We found several examples of episodes in which students asked questions when they reasoned or tried to reason about continuity and change, the particular historical context, differences and communalities between past and present or between different periods in the past, and even some instances of reflection on who wrote the text. These are important aspects of historical thinking and reasoning (Logtenberg, 2012) and are precisely the type of questions scholars in the field of history education see as important student questions when doing history. For example, the perplexity and questions students verbalized showed similarities with questions that Seixas (2006) characterizes as 'the questions of historical consciousness'. In answering such questions students and teachers should consider historical thinking concepts, such as historical significance, continuity and change, cause and consequence, historical evidence, historical perspectives and the ethical dimension of history (Seixas & Morton, 2012). Overall, the integration of general questioning models with domain-specific elements in questioning aids in comprehending the initiation and questioning patterns of students. This skill is often regarded as a fundamental activity in the history classroom.

Limitations and further research

A possible limitation of this study lies in the research methodology. The advantage of the method that let students decide to stop reading and explain their thoughts is that it allowed us to register affective student reactions on specific text segments. Affect, particularly, may be a brief and fleeting phenomenon and would not have been expressed after reading the whole text. On the other hand, this method may disrupt the reading process and may have caused students to mark fewer elements in the last section of the text because they became tired of explaining their thoughts every time they marked a text segment. It is also possible that students refrained from marking elements of which they knew nothing, being afraid to show that they were unable to discuss these issues. Alternatively, as noted before, it's possible that students were unaware of what type of knowledge they were lacking.

Furthermore, the prompting after each utterance could have influenced reasoning processes, student thinking and the asking of spontaneous questions. The researcher asked questions for explanation that caused students to be placed in 'answering mode', and therefore they did not automatically start asking questions. They were not instructed to formulate questions.

Since we only used an introductory text and a text about one historical topic, further research is needed using a variety of texts (e.g., explanatory texts or primary sources) and topics to support our findings that in the domain of history, prior knowledge, affect and historical reasoning are important components of the processes that students experience when reading a text, and that affect and domain-specific reasoning are also important in the development of questions.

Further research could also continue to explore differences and communalities in the ability to ask historical questions between students with different levels of prior knowledge and interest in history. Because of the small sample size in this study, we were not able to draw conclusions about these differences.

Furthermore, while making sense of historical substantive student's questions may be influenced by their socio-cultural backgrounds, communities and identities (Epstein, 2016). For example, students may ask questions when they feel that the narrative they are reading differs from the narrative they are being told at home or in the community to which they belong. Furthermore, prior knowledge, interest and affective responses – that often trigger questions - may be different for students with different socio-cultural backgrounds and identities. Quantitative studies could look at the effect of prior knowledge, interest and epistemological beliefs, but also of the extent to which a historical topic is important for students' identity on asking questions. However, gaining insight into these processes in large groups of students is a major task. Case studies could also be carried out in which students, who differ on several characteristics, think out loud, just like in our study.

In this study we focused on *spontaneou*s questioning, and we found that students do ask questions (triggered by the text) but also expressed many thoughts reflecting a feeling of perplexity that could lead to a question. Hence, exploring how students pose questions after receiving instruction to do so is an interesting idea for further research.

Practical implications

It is important that students are enabled to ask questions in the history classroom. We think that knowledge of the onset of a question, i.e. the thinking processes underlying questioning, provides us with more information in determining the *quality* of a question, and hence the quality of the thinking processes. In educational practice, the assessment and evaluation of the quality of the questions students ask is seen as useful teaching method (e.g. Dori & Herscovitz, 1999). Determining whether a question is a 'good' question can be done by looking at the disequilibrium the questioner experiences and whether the questioner is able to formulate a question out of this experience.

The findings that students do not often formulate a spontaneous question when they experience some form of disequilibrium, and that affect and historical reasoning are important components of students' onset of questioning, are not only important for research on learning history and on student questioning, but also for educational practice. Focusing on history education, historians and history educators consider question asking as an important ability. First, in history lessons students could be stimulated to articulate their thoughts about what they consider strange or unjust before being instructed to formulate questions (e.g. Ciardiello, 2007). When students ask questions that reflect affective responses as a result of taking a present-day perspective, the teacher has the opportunity to transform the taking of a present-day perspective into a more historical perspective, for example by modeling or providing information with which students can investigate why people in the past behaved as they did. Second, students could be stimulated to contextualize what they read in a text. Contextualization is an important activity for formulating descriptive, comparative and explanatory questions about historical phenomena and also for dealing with indignation and astonishment (Huijgen, 2017). The present study contributes to the debate about how students can be supported in problem-finding and formulating questions they are interested in or that are meaningful for them. Simultaneously, their question asking offer significant opportunities for building historical knowledge and improving historical reasoning skills.

References

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

Blau Portnoy, L., & Rabinowitz, M., (2014): What's in a domain: understanding how students approach questioning in history and science, *Educational Research and Evaluation: An International Journal on Theory and Practice*, *20*(2), 122-145. https://doi.org/10.1080/13803611.2014.885844

Brantmeier, C. (2006). Toward a multi-component model of interest and L2 reading: Sources of interest, perceived situational interest, and comprehension*. Reading in a Foreign Language, 18*(2), 89–115.

Britt, M. A., & Aglinskas, C. (2002). Improving students' ability to identify and use source information. *Cognition and Instruction, 20*, 485–522. https://psycnet.apa.org/doi/10.1207/S1532690XCI2004_2

Britt, M. A., & Sommer, J. (2004). Facilitating textual integration with macro-structure focusing tasks. *Reading Psychology, 25*, 313–339. https://doi.org/10.1080/02702710490522658

Cameron, C., van Meter, P., & Long, V. A. (2017). The Effects of Instruction on Students' Generation of Self-Questions When Reading Multiple Documents. *The Journal of Experimental Education, 85*(2), 334–351. https://psycnet.apa.org/doi/10.1080/00220973.2016.1182884

Chin, C., & Osborne, J. (2008). Students' questions: A potential resource for teaching and learning science. *Studies in Science Education, 44*, 1–39. https://doi.org/10.1080/03057260701828101

Ciardiello, A. V. (2007). *Puzzle them first: Motivating adolescent readers with question finding*. Newark, DE: International Reading Association.

Ciardiello, A. V., & Cicchelli, T. (1994). The effects of instructional training models and content knowledge on student questioning in social studies. *Journal of social studies research, 18*(1), 30-37.

De Jong, M., & Rijnks, D. (2006). Dynamics of iterative reader feedback an analysis of two successive plus-minus evaluation studies. *Journal of Business and Technical Communication, 20*(2), 159-176. https://doi.org/10.1177/1050651905284401

De Leur, T., Van Boxtel, C., & Wilschut, A. (2017). 'I Saw Angry People and Broken Statues': Historical Empathy in Secondary History Education. *British Journal of Educational Studies*, *65*(3), 331-352. https://doi.org/10.1080/00071005.2017.1291902

Demetriou, H., & Wilson, E. (2009). Synthesizing affect and cognition in teaching and learning. *Social Psychology of Education: an International Journal, 12*(2), 213-232. http://dx.doi.org/10.1007/s11218-008-9075-x

Dillon, J. T. (1990). *The practice of questioning*. New York: Routledge.

Dori, Y. J., & Herscovitz, O. (1999). Question-posing capability as an alternative evaluation method: analysis of an environmental case study. *Journal of Research in Science Teaching, 26*(4), 411-430. https://doi.org/10.1002/(SICI)1098-2736(199904)36:4%3C411::AID-TEA2%3E3.0.CO;2-E

Epstein, T. (2016). The relationship between narrative construction and identity in history education: Implications for teaching and learning. *Educar em Revista, 60*, 121-131. https://doi.oeg/10.1590/0104-4060.46024

Graesser, A., & Lehman, B. (2011). Questions drive comprehension of text and multimedia. In M. McCrudden, Magliano, J., & G. Schraw (Eds.), *Text relevance and learning from text* (pp. 54–74). Greenwich, CT: Information Age.

Graesser, A. C., & McMahen, C. L. (1993). Anomalous information triggers questions when adults solve quantitative problems and comprehend stories. *Journal of Educational Psychology*, *85*, 136-151. https://psycnet.apa.org/doi/10.1037/0022-0663.85.1.136

Graesser, A. C., & Olde, B. A. (2003). How does one know whether a person understands a device? The quality of the questions the person asks when the device breaks down. *Journal of Educational Psychology, 95*(3), 524-536. https://doi.org/10.1037/0022-0663.95.3.524

Hartmann, U. & Hasselhorn, M. (2008). Historical perspective taking. A standardized measure for an aspect of students' historical thinking. *Learning and Individual Differences*, *18*, 264-270. https://doi.org/10.1016/j.lindif.2007.10.002

Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. *Educational Psychologist, 41*(2), 111–127. https://psycnet.apa.org/doi/10.1207/s15326985ep4102_4

Huijgen, T., van de Grift, W., van Boxtel, C., & Holthuis, P. (2018). Promoting historical contextualization: the development and testing of a pedagogy. *Journal of Curriculum Studies*, *50*(3), 410-434. Advance online publication. https://doi.org/10.1080/00220272.2018.1435724

Huijgen, T., van Boxtel, C., van de Grift, W., & Holthuis, P. (2017). Toward historical perspective taking: Students' reasoning when contextualizing the actions of people in the past. *Theory and Research in Social Education*, *45*(1), 110-144. Advance online publication. https://doi.org/10.1080/00933104.2016.1208597

Janssen, T. (2002). Instruction in self-questioning as a literary reading strategy: an exploration of empirical research*. L1, Educational Studies in Language and Literature, 2*(2), 95-120. http://dx.doi.org/10.1023/A:1020855401075

Logtenberg, A. (2012) *Questioning the Past: Student Questioning and Historical Reasoning*. Amsterdam: Ipskamp.

Logtenberg, A., van Boxtel, C., & van Hout-Wolters, B. (2011). Stimulating situational interest and student questioning through three types of historical introductory texts. *European Journal of Psychology of Education*, *26*(2), 179-198. https://doi.org/10.1007/s10212-010-0041-6

Mar, R.A., Oatley,K., Djikic, M. & Mullin, J. (2011): Emotion and narrative fiction: Interactive influences before, during, and after reading, *Cognition & Emotion, 25*:5, 818-833. http://dx.doi.org/10.1080/02699931.2010

Nokes, J. (2017). Historical reading and writing in secondary school classrooms. In M. Carretero, S. Berger, & M. Grever (Eds.), *Palgrave handbook of research in historical culture and education* (pp. 553–571). London: Palgrave Macmillan.

Otero, J., & Graesser, A. C. (2001). PREG: Elements of a model of question asking. *Cognition and Instruction, 19*, 143-175. https://doi.org/10.1207/S1532690XCI1902_01

Reisman, A. (2012): Reading Like a Historian: A Document-Based History Curriculum Intervention in Urban High Schools, *Cognition and Instruction, 30(*1), 86-112. http://dx.doi.org/10.1080/07370008.2011.634081

Rosenshine, B., Meister, C., & Chapman, S. (1996). Teaching students to generate questions: A review of intervention studies. *Review of Educational Research, 66*(2), 181-221. https://doi.org/10.3102/00346543066002181

Rüsen, J. (2007). How to make sense of the past-salient issues of metahistory. *TD: The Journal for Transdisciplinary Research in Southern Africa, 3,* 169–221. https://doi.org/10.4102/td.v3i1.316

Schiefele, U., & Krapp, A. (1996). Topic interest and free recall of expository text. *Learning and Individual Differences, 8*(2), 141-160. https://psycnet.apa.org/doi/10.1016/S1041-6080(96)90030-8

Schraw, G., Bruning, R., & Svoboda, C. (1995). Sources of situational interest. *Journal of Reading Behavior, 27*(1), 1-17. https://doi.org/10.1080/10862969509547866

Schreiber, W., Körber, A., Von Borries, B., Krammer, R., Leutner-Ramme, S., Mebus, S., et al. (2006). *Historisches Denken. Ein Kompetenz-Strukturmodell*. [Historical Thinking: A model of competences], Neuried: Ars una.

Seixas, P. (2006). What is historical consciousness? In R. W. Sandwell (Ed.), *To the past. History education, public memory, and citizenship in Canada* (pp.50-69). Toronto, Buffalo & London: University of Toronto Press.

Seixas, P. (2015). A History/Memory Matrix for History Education. *Public History Weekly 4*, 6. http://dx.doi.org/10.1515/phw-2016-5370

Seixas, P., & Morton, T. (2012). *The Big Six Historical Thinking Concepts*. Toronto: Nelson Silvia, P. J. (2006). *Exploring the psychology of interest*. New York: Oxford University Press.

Trautwein, U., Bertram, C., Von Borries, B., Brauch,N., Hirsch, M., Klausmeier, K., Körber, A. Kühberger, C., Meyer-Hamme, J., Merkt, M., Neureiter, N., Schwan, S., Schreiber, W, Wagner, W. Waldis, M., Werner, M., Ziegler, B., Zuckowski, A. (2017). *Kompetenzen historischen Denkens erfassen. Konzeption, Operationalisierung und Befunde des Projekts "Historical Thinking - Competencies in History" (HiTCH)*. Waxmann.

Van der Meij, H. (1994). Student questioning: a componential analysis. *Learning and Individual Differences, 6*(2), 137-161. https://doi.org/10.1016/1041-6080(94)90007-8

Van Boxtel, C., & van Drie, J. (2018). Historical reasoning: conceptualizations and educational applications. In S. A. Metzger, & L. McArthur Harris (Eds.), *The Wiley International Handbook of History Teaching and Learning* (pp. 149-176). (The Wiley Handbooks in Education). Wiley-Blackwell. https://doi.org/10.1002/9781119100812.ch6

Van Boxtel, C. (2014). Insights from Dutch research on history education: historical reasoning and a chronological frame of reference. In M. Köster, H. Thünemann, & M. Zülsdorf-Kersting (Eds.), *Researching history education: international perspectives and disciplinary traditions* (pp. 236-262). (Geschichtsunterricht erforschen). Schwalbach: Wochenschau Verlag

Van Drie, J., & van Boxtel, C. (2008). Historical reasoning: towards a framework for analyzing students' reasoning about the past. *Educational Psychology Review*, *20(2)*, 87-110. https://doi.org/10.1007/s10648-007-9056-1

VanSledright, B., & Limón, M. (2006). Learning and teaching in social studies: Cognitive research on history and geography. In P. Alexander & P. Winne (Eds.), *The handbook of educational psychology* (2nd ed., pp. 545–570). Mahweh, NJ: Lawrence Erlbaum Associates.

Van Someren, M. W., Barnard, Y. F., & Sandberg, J. A. C. (1994). The think aloud method: A practical guide to modelling cognitive processes (knowledge-based Systems). San Diego. Academic Press.

Voss, J. F., & Wiley, J. (2006). Expertise in history. In K.A.Ericsson, N. Charness, P. Feltovich, & R. Hoffman (Eds.), *The Cambridge Handbook of Expertise and Expert Performance* (pp. 569-584). Cambridge: Cambridge University Press.

Wineburg, S. (2001). *Historical thinking and other unnatural acts. Charting the future of teaching the past*. Philadelphia: Temple University Press.

Wineburg, S. (1991). Historical problem solving: A study of the cognitive processes used in the evaluation of documentary and pictorial evidence. *Journal of Educational Psychology, 83*, 73-87. https://psycnet.apa.org/doi/10.1037/0022-0663.83.1.73

Wolfe, M. B. W., & Goldman. S. R. (2005) Relations Between Adolescents' Text Processing and Reasoning, *Cognition and Instruction, 23*(4), 467-502. https://psycnet.apa.org/doi/10.1207/s1532690xci2304_2

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Appendix

Instruction and introductory text (760 words)

On the next page you will find a text about a topic in history. Read this text carefully. Mark the text segments where you notice striking things, something funny, strange or interesting. It is also possible that you may recognize something, do not understand something or want to know more about something. In short, mark everything in this text that attracts your attention. Underline everything in the text that makes you think 'this is remarkable, this is interesting, I do not understand this, this feels strange, this is fun, or I want to know more about this.' Underline anything you want to. Read the underlined text-segment aloud and say what you think, what you feel and why you underlined this segment. You can say anything you want to; I want to hear what this text means to you, what attracts you. Anything you say is fine with me. When you underline something, I will ask you to explain why you underlined it.

The Industrial Revolution

The platform of the brand new train station in Manchester is packed with people; wealthy ladies with their children, gentlemen in high hats. In the background a steam locomotive is still puffing. At a distance poorly-dressed men are watching, waiting for a chance to give directions to rich train passengers in the big city. Friedrich breathes in the smell of the steam engine. He observes the modern station in admiration, waiting for a chance to collect his luggage. 'Impressive', Friedrich thinks, 'A lot more modern than our Essen station in Germany.'

'Jungherr Engels?' A large man is walking towards him. 'My name is Peter; I'm the supervisor in your father's factory. A carriage is waiting for you.' A little later Friedrich is travelling through the streets of the big, grey city. Everywhere he looks he sees chimneys fuming endless trails of smoke. From the buildings lining the streets, constant rattle and trampling sounds emerge from small windows. Narrow streets all around are filled with dirt. Even the water in the wide channel is black and smelly. Friedrich's thoughts wander back to home, where, fortunately, it is not as dirty and crowded. But here in Manchester, factories are bigger and the machines are more modern. That is the reason his father, a successful textile baron, had sent him here. Here, in his father's factory, he has to finish his education.

The carriage stops in front of a large, stone brick building. Friedrich follows Peter through the factory gate into a large hall. His father has spent a fortune on steam engines that drive the weaving looms. Friedrich and Peter walk upstairs to the first floor, where the weaving looms are. In a large, dark area many people are working – remarkably many women and children. It is dusty and stuffy over there. The noise is deafening. 'How many hours a day do they work?' Friedrich asks. '10 to 12 hours!' Peter screams.

Suddenly, Peter jumps between the machines. At one of the weaving looms a women is comforting a crying child. Peter pulls her roughly back on her feet. 'A fine for you! Talk in your own time!' The woman quickly gets back to work. The child has already disappeared. 'If the spools are not changed in time, we have to restart the machine. That takes a great deal of time, and time is money.' Peter explains. 'You have to keep them working'. Friedrich looks around at the toiling people. It feels strange becoming the boss of this.

At night, after a long and tiring day, Friedrich writes in his diary: 'The English entrepreneurs only think of making money. Workers are not people in their eyes but economic entities. Never have I seen such egoism. Factory owners do not realize that relationships other than buying and selling exist.'

This was the situation in textile factories in Manchester during the period of the Industrial Revolution that started in England. Is the situation really something from the past? Read the text below.

'To deliver orders in time, workers are working seven days a week, sometimes even 20 hours a day, for 5 cents an hour. Overtime is not paid. The girls are so tired that they fall asleep during their breaks. But they do not have a choice, unions are prohibited and those who protest or work too slowly can expect a fine or the sack. The labourers live on the factory premises and sleep 12 to a room.'

This is about a jeans factory in China, 2008! Jasmine, a 16-year-old girl, works there. A documentary has been made about her and the work in the factory.

Just as happened in Europe in the past, the rise of industry in China caused a drift from the countryside into the cities. Because of mass-production the price of products lowered, so that workers were able to buy products too. The process of industrialization probably shares similar traits with conditions such as those in modern China and earlier Europe. In England it took some time before the working and living conditions of the workers were improved. However, industrialization also brought technical progress, faster production and useful inventions, such as the railway.

Historians think that the Industrial Revolution is one of the most important events in history because that period was a fundamental transition to modern times. However, they disagree about the effects of this development on common people. Some think that the welfare of people decreased because of the Industrial Revolution, while others think that the lives of ordinary people improved because of it.