Review article

Four design principles for student learning of substantive historical concepts – a realistic review study

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How to cite
Smets, W. (2024). 'Four design principles for student learning of substantive historical concepts – a realistic review study'. *History Education Research Journal*, 21(*1*), 4. DOI: https://doi.org/10.14324/HERJ.21.1.04.

Peer review
This article has been peer-reviewed through the journal's standard double-anonymous peer-review process, where both the reviewers and authors are anonymised during review.

Open access
History Education Research Journal is a peer-reviewed open-access journal.

Abstract

Substantive historical concepts are an essential part of the history curriculum. In contrast to the use of meta-historical concepts, this aspect of historical thinking has received relatively little attention from educational scholars in recent years. This article draws on theory from cognitive developmental psychology, and seeks to apply this in the field of history didactics. In order to foster authoritative judgement in its application in history education, research evidence is synthesised. A realistic review methodology was used to conduct this synthesis. Four *context-mechanism-outcome* configurations were identified: (1) when working memory is overloaded, effective learning is impossible; (2) to acquire knowledge sustainably, it must be stored as a schema in long-term memory; (3) knowledge is learned more effectively when it builds on previously acquired knowledge; and (4) knowledge will gradually become more easily accessible for working memory. These context-mechanism-outcome configurations stimulate insight into, and long-term memory of, substantive historical concepts. Didactic design principles for teaching

substantive historical concepts are proposed, and implications for history education are illustrated and discussed.

Introduction

Problem statement

The teaching of concepts is traditionally regarded as one of the elementary goals of the humanities and social sciences (Sandahl, 2015). One classic target of history education is that it pays attention to developing students' understanding of historical concepts. Knowledge of substantive historical concepts is one of the elements that students need to learn to think historically (Van Boxtel and Van Drie, 2018). Students need domain-specific subject knowledge to reason about the past, and historical concepts are an elementary part of this knowledge (Wilschut, 2002).

A great deal of research has been done into how meta-historical concepts can contribute to the development of historical thinking. For example, they form the basis of the well-known Canadian historical thinking project (Peck and Seixas, 2008). In recent decades, increasing importance has been attached in the English history national curriculum to second-order concepts: the implicit assumption was that knowledge of second-order concepts would automatically lead to more historical thinking (Counsel, 2001; Hammond, 2016). However, Fordham (2016: 45) argues that too little attention is still being paid to substantive historical concepts: 'further attention needs to be given by history teachers to how substantive concepts are operationalized in curriculum, pedagogy and assessment in history'. Ford (2014) also notes the need to operationalise more and less complex ways of using substantive historical concepts in the history curriculum. Some scholars have proposed learning activities aimed, for example, at reflecting on the relationship between factual knowledge and conceptual knowledge (for example, Counsel, 2001, 2004). However, didactic research that substantiates the effectiveness of learning activities aimed at developing substantive conceptual knowledge is rare for history. As a result of this, it is not always clear how to sustainably integrate knowledge of historical concepts in curricula. Teachers do use a variety of instructional strategies to increase their students' insight about particular historical concepts, but they are often unaware of which strategies are best used for this purpose, and which cognitive mechanisms are at work when doing so.

Theoretical framework

Historical concepts

Van Drie and Van Boxtel (2008) distinguish between substantive historical concepts and meta-historical concepts. In other literature, a similar distinction is made, but referred to as concepts of the first or second order (Lee, 2005; Sandahl, 2015). In this study, the former terminology is used. Meta-historical concepts are used by historians to reason about the past. This may concern general concepts from argumentation, such as concepts that are used to establish causal connections (for example, causality, effect, chance), or to substantiate evidence (inference, evidence). In addition, meta-historical concepts also include a number of concepts that are used to underpin specific historical methods of reasoning (for example, arguments about continuity and change, multiperspectivity or historical empathy).

Substantive historical concepts are a broad category of concepts used to talk about the past. They are used, for example, when situating events in their historical context, when arguing about chronology or when investigating a theme (Van Boxtel and Van Drie, 2018). The classic distinction that is made between factual knowledge and conceptual knowledge also applies to substantive aspects of historical thinking. Factual knowledge of substantive historical concepts concerns the basic terminology that is used to give names to persons, places or events. Conceptual knowledge is a more abstract form of knowledge about theories, principles or categories, which can be used to make connections between

events, structures or themes. Sandahl (2015), for instance, uses the example of globalisation, whereas Van Boxtel and Van Drie (2018) give the example of the concept of Renaissance.

Both factual knowledge and conceptual knowledge of substantive historical concepts are essential cornerstones that enable insight into the past. Fordham (2016) demonstrates the relationship between factual and conceptual knowledge of substantive historical concepts with an example: the concept of slavery is used by historians to be able to generalise about phenomena such as Spartan helots and about Black farmers on sugar plantations in the US. Students learn that there are conceptual similarities between these very different phenomena, which allow the use of a common concept such as slavery. In concrete terms, 'slavery' could be characterised here, for example, by the fact that people are restricted in their personal freedom. At the same time, students learn factual knowledge about the specific manifestations of the concept of 'slavery', in this case in the Greek or American context, whereby they learn that not every manifestation of the concept is the same. Conceptual historical knowledge and specific factual knowledge are therefore complementary. Hence, the study of substantive historical concepts in itself can constitute a powerful way of fostering historical thinking. Moreover, this knowledge can also be used for other types of historical thinking. Knowledge of the concept of slavery could be used in this example to make historical analogies between slavery in the past and slavery today. These concepts could also be used when writing a critical essay in which the importance of human rights is evaluated. Understanding of the context-dependent nature of substantive historical concepts can consequently be seen as an important curricular target for history education. Hence, teaching historical concepts goes beyond rote memorising of factual knowledge or definitions; it aims to enable students to use this knowledge for complex historical thinking and reasoning. Wilschut (2002: 6) put it this way: 'Knowledge of facts is never an end in itself, its purpose is to provide orientation.'

Using cognitive psychology to inform history didactics

Theory of cognitive development provides a theoretical framework for didactic processes aimed at learning concepts. It concerns learning psychology that is mainly based on brain research, and on effectivity studies that measure and compare different learning strategies. VanSledright and Limón (2006) argue that cognitive developmental psychology constitutes a robust theoretical grounding for subject didactics of the social sciences.

Cognitive psychologists distinguish learning and understanding. Soderstrom and Bjork (2015) define learning as focused on long-term change: 'we want knowledge and skills to be durable in the sense of remaining accessible across periods of disuse and to be flexible in the sense of being accessible in the various contexts in which they are relevant, not simply in contexts that match those experienced during instruction'. Understanding, on the other hand, can be seen as an initial prerequisite to durable learning. It is assumed in this study that, while teaching historical concepts, history teachers aim initially at understanding, and subsequently at learning to use historical concepts in the long term. Aligned with this distinction between learning and understanding, Atkinson and Shiffrin (1968) conceptualise the working of memory: they distinguished between working memory and long-term memory. These types of memory have different functions. Working memory is used to temporarily understand, whereas long-term memory is used to durably store knowledge. In consequence, teaching historical concepts must be aligned with this fundamental structure of how our brain works. Cognitive developmental psychologists assume that the architecture of the human brain determines how cognition is best developed at school (Sweller et al., 1998, 2011). Effective learning strategies are aligned with insights into how the brain works (Leppink et al., 2015). These are considered 'effective' learning strategies based on extensive empirical research. Yet there is no defined set of effective learning strategies. Rather, this is a collective name for a number of learning strategies that put maximum emphasis on stimulating cognitive development by taking into account the functioning of the human brain (Surma et al., 2019). In the relative absence of didactic research focused on substantive as opposed to historical thinking concepts, it is not yet sufficiently clear how insights from cognitive developmental psychology can be used to develop an effective conceptual didactics. Systematic research in various domains of cognitive development also suggests its relevance to history as a subject (Dunlosky et al., 2013). In this article, some of these strategies will be elaborated and applied to teaching history, in particular for teaching substantive historical concepts.

Aim of the study

The focus of this study is on making an evidence base from cognitive developmental psychology accessible for history didactics; attention is paid to substantive historical concepts. The aim of this article is to give history educators insight into which cognitive mechanisms are at work while teaching substantive historical concepts. Therefore, design principles are articulated for student learning of historical concepts grounded in scientific evidence. The research question in this article is twofold: (1) which evidence-informed didactic principles are relevant for gaining insight into historical concepts in the short term?; and (2) which evidence-informed didactic principles are relevant for the acquisition of long-term knowledge of historical concepts?

Method

A realist review method was used for this literature study (Pawson et al., 2005). This is a type of review study that is mainly used for making policy recommendations in complex situations in which several, possibly conflicting, mechanisms are investigated simultaneously. It aims to combine complementary evidence from different types of interventions into useful recommendations (Booth et al., 2020). Realistic review aims to identify *context-mechanism-outcome* (CMO) configurations from existing scientific research. 'A CMO configuration is a proposition stating what it is about an initiative that works, for whom and in what circumstances' (Linsley et al., 2015: 28). The evidence-informed character of this literature review therefore lies not so much in determining whether or not a particular didactic approach is effective. Rather, it aims to summarise which mechanisms are at work during interventions, and how this could be related to the acquisition of substantive historical concepts.

A literature search was made for the mechanisms that explain why certain didactic principles lead to the sustainable acquisition of historical concepts. Because the results of research on cognitive developmental psychology are relatively well known, two recent syntheses of didactic research literature were initially used (Sumeracki, 2021; Surma et al., 2019). Table 1 provides an overview of the investigated principles that are summarised in both works. From these overviews, the principles that are most relevant for the development of a historical conceptual didactics were retained. As is usual in realist reviews, an assessment was made of the relevance and the quality of the evidence (Wong et al., 2013). The importance for answering the research question was assessed using the following inclusion criteria: (1) relevance for the acquisition of short-term insight into historical concepts (pedagogical-didactic implications); and/or (2) relevance to the acquisition of long-term knowledge and understanding of historical concepts (curriculum implications). After this initial search phase, further evidence was sought to gain a deeper understanding of the underlying mechanisms. The aim was to explain the efficacy of the described didactic strategies using backward and forward tracking (Jarneving, 2007; Weinberg, 1974). Hence, additional evidence was sought in the literature used in both syntheses (Sumeracki, 2021; Surma et al., 2019). Citation data provided by the journals in which the studies were published was used for backward and forward tracking. Subsequently, selected studies were analysed; first the titles, then the abstracts and finally the complete texts were scanned. The results found were summarised in four CMO configurations.

Table 1. Overview of the investigated principles summarised in Sumeracki (2021) and Surma et al. (2019)

Surma et al. (2019)	Sumeracki (2021)	Assessment
(8)* Spread exercise with subject matter over time	(1) Spaced practice: distributed learning	Relevant long-term retention of concepts
(1) Use actively prior knowledge	(2) Retrieval: retrieving prior knowledge from long-term memory	(a) Relevant for understanding concepts: reduces cognitive load; (b) Relevant for long-term retention of concepts

(2) Provide clear structured and challenging instruction	(3) Elaboration: explaining and illustrating ideas in detail	Relevant for understanding concepts: reduces cognitive load
	(4) Interleaving: alternating between ideas	Relevant for long-term retention of concepts
(3) Use examples to illustrate abstract ideas	(5) Concrete examples	Relevant for understanding concepts: reduces cognitive load
(4) Combine word and image	(6) Dual coding	Relevant for understanding concepts: enhanced processing
(5) Have learning material actively processed		Relevance to understanding concepts
(6) Find ways to find out whether the whole class has understood		Relevance limited
(7) Provide scaffolds for complex assignments		Relevant for learning to use concepts: avoids cognitive (over)load
(9) Provide variety in exercise types		Relevance limited
(10) Use assessment when learning and practice strategy		Relevance limited
(11) Provide feedback that makes students think		Relevance Limited
(12) Teach your students to learn effectively		Relevance limited

*Note: Numbers in parentheses refer to chapter numbers in the sources.

Results

Four *context-mechanism-outcome* configurations were identified. The CMO configurations provide insight into how substantive historical concepts are effectively learnt. These configurations explain why a certain didactic strategy or a specific curriculum structure is expected to lead to an increased learning outcome. In the following sections, the meaning of the found CMO configurations is explained and, as necessary, it is also explained why they are related to the learning of historical concepts.

CMO configuration 1: When working memory is overloaded, effective learning is impossible

Cognitive load theory assumes that people have limited working memory (Sweller et al., 2011). Humans can therefore never process too many or too abstract concepts at the same time. The limitations of working memory determine to what extent new historical concepts can be understood, and how deep this understanding can be. When too much unfamiliar information is used simultaneously in working memory, there is a threat of cognitive overload. As a result of that, the brain no longer succeeds in processing information. This mechanism provides an argument for having complex or abstract concepts explained explicitly. After all, listening attentively to someone who explains something requires less working memory capacity than gaining insight about a concept through self-directed learning. In addition to this, dual coding theory adds an argument to avoid cognitive overload. The way in which information is presented determines cognitive load: combining words with images can decrease the cognitive load, and hence foster deep understanding (Clark and Paivio, 1991; Debue and Van de Leemput, 2014). With regard to teaching historical concepts, this implies that a teacher who teaches concepts using visual illustrations of these concepts reduces cognitive load, and, hence, fosters learning. Furthermore, elaboration is a learning strategy in which the teacher illustrates a complex or abstract concept using concrete and detailed examples (Wood et al., 1994). Explicitly explaining new concepts causes less cognitive load than asking thinking questions in which students themselves conceptualise

(McLaughlin and McGill, 2017; Rupley et al., 2009). Figure 1 visually represents how working memory determines the understanding of historical concepts.

Figure 1. How working memory determines the understanding of historical concepts
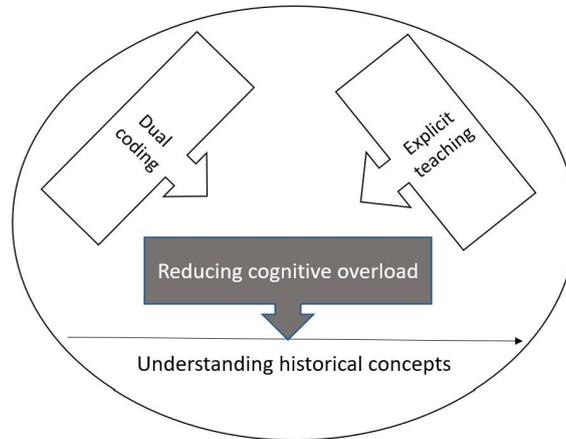
CMO configuration 2: To acquire knowledge sustainably, it must be stored as a schema in long-term memory

Understanding of substantive historical concepts does not automatically imply long-term retention. Understanding in working memory is short-lived. Learning is a process aiming at long-lasting change, but students can understand a historical concept in class without having learned it sustainably. It is therefore necessary that this concept is 'stored' in long-term memory. This 'storage' of substantive historical concepts occurs when schemas of interrelated knowledge are created in the brain (Cowan, 2008; Ghosh and Gilboa, 2014). Cognitive development implies creating new schemas, or elaborating existing schemas with new elements (Ausubel, 2000; Rumelhart, 1980). Hence, for example, when pharaohs and pyramids are linked several times in a history lesson, a new mental schema is generated in the brain.

Researchers therefore advocate the use of concept maps, which are visual representations of information (Bradley, 2021). Concept maps help to store knowledge in long-term memory (Nesbit and Adesope, 2006; Novak, 1990). When word and image are combined, knowledge is stored more efficiently in long-term memory. Dual coding theory (Clark and Paivio, 1991), mentioned in CMO configuration 2, is also useful to foster the storage of knowledge in long-term memory. In consequence, schematic representations for teaching several related historical concepts help students to remember them. They visually show how historical concepts relate to each other, thus helping to build schemas of these concepts in long-term memory. Figure 2 visually represents how historical concepts are effectively stored in long-term memory.

CMO configuration 3: Knowledge is learned more effectively when it builds on previously acquired knowledge

When new subject matter is associated with previously acquired knowledge that corresponds with it, this limits cognitive load. As a result, students will be able to process new subject matter more quickly and/or more easily. Retrieving prior knowledge out of long-term memory ensures that the new knowledge can be more effectively stored in long-term memory. The result is therefore twofold: it not only implies that more knowledge can be processed (because of the limited cognitive load), but also that it will be stored longer and/or better in the memory (because of the connection with existing schemas in the brain).

Therefore, the use of strategies to activate prior knowledge at the start of a learning process is advocated. Advance organisers and questioning are strategies that ensure that previously processed historical concepts are accessible for working memory at the right time. Advance organisers are used, among other things, to prepare students for subject matter containing various difficult concepts

(Ausubel, 1978). Research on advance organisers shows that students can focus their attention more specifically on the new subject matter because the activated prior knowledge limits the cognitive load. Retrieval practice is a term for diverse types of learning activities to retrieve relevant prior knowledge from long-term memory (Roediger and Butler, 2011). This is often effectuated by asking thinking questions or thinking assignments. By reactivating knowledge that students have previously processed, students acquire new knowledge that matches this prior knowledge (Cook, 2006). Figure 3 visually represents how using prior knowledge from long-term memory facilitates the understanding of substantive historical concepts.

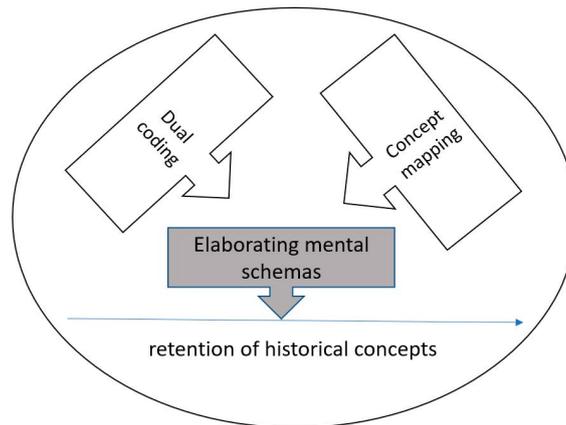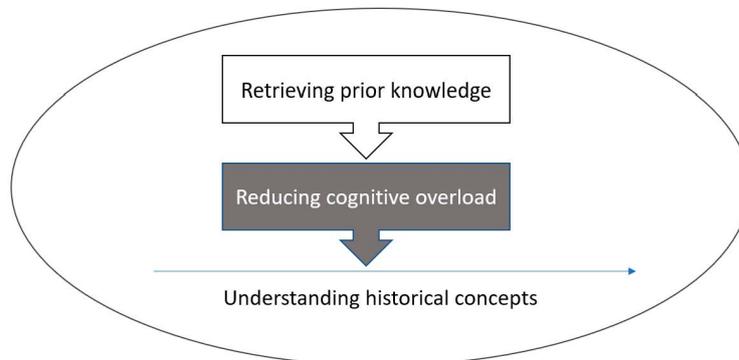**Figure 2. How long-term memory effectively stores historical concepts**

Figure 3. How long-term memory facilitates the understanding of historical concepts

CMO configuration 4: Knowledge will gradually become more easily accessible for working memory

The more often concepts in long-term memory are used by working memory, the easier it becomes for working memory to use them. Working memory gradually finds its way more easily to the place in long-term memory where this knowledge is stored. The same principle applies to the opposite: knowledge in long-term memory that is rarely or never activated risks becoming difficult to access for working memory. In a one-off or modulated learning activity, students are hardly able to permanently store knowledge in their memory (Takeda, 2019). Researchers therefore argue for interleaving and spaced practice, because these techniques ensure that knowledge is more easily accessible to working memory: knowledge that is repeated over time is, after all, more permanently stored in long-term memory. The reason for this is that after an interval in which one has been occupied with other subject matter, the previously stored prior knowledge needs to be retrieved from long-term memory (Roediger and Butler, 2011). Figure 4 visually represents how curriculum structure increases long-term retention of historical concepts.

Figure 4. How curriculum structure increases long-term retention of historical concepts
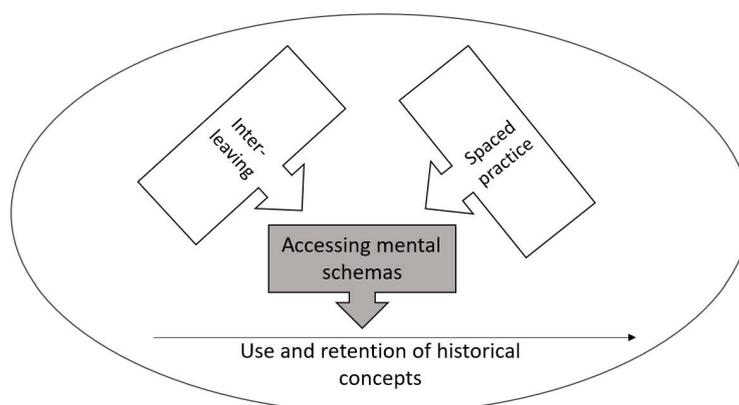
Discussion

Substantive historical concepts are pivotal to the development of students' historical thinking. They are the cornerstones for students to use historical sources, or for the construction of historical argumentation. This catalytic role in historical thinking depends on long-term stored, and easily accessible, knowledge of historical concepts. In the next sections, the implications for history didactics of the CMO configurations that were presented in the Results section are discussed.

Principle 1: Make relevant prior knowledge available for working memory

Van Drie and Van Boxtel (2008) have pointed out two main difficulties regarding the teaching of historical concepts: (1) substantive historical concepts are usually abstract, and therefore difficult to understand; moreover, (2) they usually have no fixed meaning. Historians often disagree about the way in which concepts can or should be used, and abstract concepts also often refer to concepts that are only partially similar. Making relevant prior knowledge available is a learning strategy that avoids cognitive overload when learning abstract or diffuse historical concepts. Seixas (2016) analyses how collective memory constitutes an important source of prior knowledge for history students. Lévesque and Croteau (2020) note that students have prior knowledge, and often also prior misconceptions, about particular historical topics. Personal narratives and collective memory consequently constitute a powerful source of understanding in the history classroom, and potentially also a source of misunderstanding. Avoiding cognitive overload while teaching historical concepts may involve using prior knowledge of underlying concrete concepts. This can also imply relating concepts that belong to the same conceptual root, but that have a different appearance in a different time or society.

Advance organisers can be used to activate relevant prior knowledge of students, or to focus their attention on difficult concepts. By rehearsing previously acquired concepts, students do not have to use the capacity of their working memory for this. In other words, the cognitive load is kept limited, so that students can use all their attention to understand the information about the concept. For example, a teacher who wants to teach the concept of democracy can rehearse previously acquired concepts that are closely related to it, such as autocracy or oligarchy, by means of an advance organiser. In this way, students are stimulated to recall prior knowledge, and hence do not have to use the capacity of their working memory for these latter concepts.

Asking questions is another especially useful technique as a learning activity when it concerns thinking about questions to which students can find an answer themselves. Students are given the time to search deep in their memory for the answer to a question. In a free recall, this is a broad question to which different answers are possible (Glanzer and Cunitz, 1966). The open nature of the question makes it difficult for students, and means that they have to search their memory archive. This thinking activity is a learning activity in itself, which ensures that previously acquired knowledge is better anchored in memory. The question may also be accompanied by an image or text fragment intended as a prompt to reactivate

memory. Such a stimulated thinking question ensures that students can search in their memory in a more targeted way (Blumenthal, 1967). For the same reason, the question can also be asked more specifically.

When using these questioning strategies, it is essential to formulate them in such a way that the questions are not too difficult for students to independently find the previously acquired prior knowledge in their memory. That is why a free recall can be combined with a stimulated or a focused thinking question, so that students for whom the free-thinking question was too ambitious, with some thinking support, still succeed in digging up the necessary prior knowledge from their memory. In history education, this may involve listening to the teacher, watching a video clip, or reading a written lesson text or historical source. By providing essential impulses succinctly and clearly, reading or listening is more focused (Ozuru et al., 2009).

Principle 2: Explain abstract substantive historical concepts with concrete or visual examples

Learning substantive historical concepts requires continuous consideration of the necessary degree of abstraction of the concepts to be learned. Factual knowledge and conceptual knowledge of historical concepts are both indispensable for historical thinking. Visualisation of abstract concepts may add to understanding of abstract concepts. A second design principle for teaching of historical concepts is therefore to explain abstract concepts with concrete or visual examples. The concept of social hierarchy is an example of an abstract concept in which elaboration can be an added value. Factual and conceptual knowledge of the concepts of birthright and social class is, for instance, needed to understand the context-dependent nature of this concept. When students are unaware of this, there may be a tendency to confuse birthright with social class. Elaborating the details of medieval birthright, and contemporary social classes, increases conceptual knowledge of social hierarchy.

Students need concrete factual knowledge about concrete historical circumstances in order to be able to contextualise historical concepts. More abstract conceptual knowledge, on the other hand, enables students to make connections between concepts. When historical concepts relate to different places or have evolved over time, linking factual knowledge and conceptual knowledge allows students to understand the relationship between the two. Explicitly explaining concepts, supported by concrete details and examples, allows the brain to understand complex historical concepts, and yet avoids cognitive overload. In doing so, students gain enriched conceptual knowledge that can be used to reason about the past. Moreover, dual coding strategies can also be used when abstract concepts are learned. Adding an image next to historical concepts could also have a similar effect in teaching these terms.

There is often a debate in history education as to whether it is best to learn new concepts inductively, or whether a deductive approach is the most effective learning strategy (Muys, 2004). Cognitive learning psychology argues that when there is a threat of cognitive overload, it is best to opt for a learning strategy in which the cognitive load of students is limited (Koedinger et al., 2013; Leppink et al., 2015). A guided deductive approach might be preferred over an inquiry-based approach, as is advocated by several scholars. If there is no risk of cognitive overload, then inductive or inquiry-based learning strategies can be useful (Jadoulle, 2015; Voet and De Wever, 2017).

Principle 3: Build conceptual schemas in long-term memory

A crucial task for the history teacher is to think through which connections between particular historical concepts are the most relevant, and how these mutual connections are interpreted (Virgin, 2014). In order to durably learn historical concepts, they must be stored in long-term memory as mental schemas. This means that they are presented as schemas of facts and concepts that are related to each other. This is a third design principle for teaching historical concepts. Myers (2010) documents adolescents' mental schemas on globalisation or citizenship, and finds important differences among students. Relating first- and second-order conceptual knowledge results in a deeper and longer-lasting understanding of historical concepts. This principle is in keeping with Van Boxtel and Van Drie's (2012) claim that a rich associative network of historical knowledge organised around key historical concepts helps students anchor and calibrate timelines for effective contextualisation. For example, the concept of monarchy is a concept that can be used to explain diverse types of monarchies such as kingdoms, empires or chiefdoms. Understanding the relation between these types of monarchies helps students understand

what they have in common or what separates them. Moreover, understanding the concept of democracy requires subordinate conceptual knowledge; for instance. about the concept of suffrage or of citizenship (secondary concepts). By relating these concepts, they are also stored together in long-term memory. When one of these elements of conceptual knowledge is later prompted, it will also be easier to activate the associated elements of knowledge as relevant prior knowledge.

Principle 4: Make long-term memory concepts easily accessible

Rehearsing or reusing substantive historical concepts helps to permanently store knowledge of these concepts in memory. Regularly activating prior knowledge will make it easier for working memory to access prior knowledge. Therefore, a fourth design principle for teaching historical concepts is that long-term stored historical concepts must be made easily accessible for working memory. Historical concepts learned only once can be compared to needles in a haystack: they are so hard to 'find' that hardly anyone bothers to look for them. Because working memory does not have quick access to these concepts, they cannot be used to process new information. Van Drie and Van Boxtel (2004) demonstrate that experts are better than novices at using substantive concepts when contextualising historical sources. It is only if prior knowledge is easily accessible from long-term memory that experts can do so, and use these concepts when they think about related events or concepts. This principle is in line with the often-made recommendation for a concentric history curriculum (see, for example, Van Straaten et al., 2015). In such a concentric curriculum, topics are revisited multiple times in order to allow students to gain a gradual deeper understanding of the content.

Distributed learning activities such as interleaving and spaced practice require a curriculum in which certain core concepts recur across different chapters or modules. Students learn to distinguish similarities and differences between societies through the recurrence of the same historical concepts. This constitutes essential knowledge to reason about change and continuity (Van Drie and Van Boxtel, 2004), or to reflect on interculturality (Rapanta and Trovão, 2021). A well-designed history curriculum, therefore, builds on a set of context-independent concepts that can be applied to different societies or in different periods (for example, governance, territory, trade, prosperity). By analysing concepts over time or across places, complex mental schemas can be learned. Thematic or chronological clustering of learning material has the advantage that it fits in well with the third principle ('Build up conceptual schemas in long-term memory'), but it therefore has the risk that there is no longer an eye for making processed material accessible to working memory.

Conclusions

A richly developed apparatus of substantive historical concepts that is easily accessible to working memory is a cornerstone for the development of historical thinking and reasoning. In this article, didactic principles for teaching substantive historical concepts have been formulated based on insights from cognitive developmental psychology. By aligning the learning of historical concepts with insights about how the brain works, we can ensure that historical concepts are learned more effectively. Based on the CMO configurations that were found, the following four design principles have been described: (1) ensure that relevant prior knowledge is actively available for working memory – this can be done, for example, by asking questions or by using advance organisers; (2) explain abstract concepts with concrete examples, thinking carefully about the relationship between factual and conceptual knowledge of the concepts you want to learn; (3) build conceptual schemas in long-term memory – concept maps can be used to clarify the relationship between concepts, which ensures that concepts and connections between them are better preserved in long-term memory; (4) make long-term memory concepts easily accessible – by analysing concepts over time or across places, students gain a deeper and more long-lasting insight into historical concepts.

This study documents mechanisms from the field of cognitive psychology, and applies them to the field of history education. Some of the practices that are advocated are increasingly known among history educators (Fordham, 2017). However, not all teachers know which mechanisms are at work when using them. The added value of this study is consequently that it provides an evidence-based framework for teachers that fosters authoritative judgement for lesson planning. This aspect of history education is pre-eminently cognitive in nature, which is why a theoretical framework based on cognitive

developmental psychology was chosen. Other aspects of history education can be less naturally substantiated with cognitive developmental psychology. For example, more inquiry-based (Voet and De Wever, 2017) or dialogic (Alexander, 2015) forms of learning also have their place in history education. From these additional visions of the subject, or parts thereof, other instruction models or other literature syntheses could also be derived (such as Alexander, 2004). It must be emphasised that the teaching of historical concepts is only one aspect of learning to think historically, and that the design principles proposed here therefore cannot form a comprehensive history didactics.

Declarations and conflicts of interest

Research ethics statement

Not applicable to this article.

Consent for publication statement

Not applicable to this article.

Conflicts of interest statement

The author declares no conflicts of interest with this work. All efforts to sufficiently anonymise the author during peer review of this article have been made. The author declares no further conflicts with this article.

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