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Teaching towards historical expertise. Developing a pedagogy for fostering causal reasoning in history

G.L. STOEL, J.P. VAN DRIE and C.A.M. VAN BOXTEL

The present study seeks to develop a pedagogy aimed at fostering a student's ability to reason causally about history. The Model of Domain Learning was used as a framework to align domain-specific content with pedagogical principles. Developing causal historical reasoning was conceptualized as a multidimensional process, in which knowledge of first- and second-order concepts, strategies, epistemological beliefs and interest play a role. Five pedagogical principles (inquiry tasks, social interaction, situational interest, explicit teaching of domain-specific strategies and concepts, and epistemological reflection) were established and operationalized for causal historical reasoning. The effectiveness of the principles was explored in a lesson-unit concerning the outbreak of the First World War. A quasi-experimental pre-test–post-test study was conducted with two conditions in three 11th grade pre-university classrooms. Students in the *implicit condition* worked in triads on the inquiry task. Students in the *explicit condition* worked on the same task, but with explicit attention given to strategies, concepts and epistemological underpinnings. The results showed that first-order knowledge increased in both conditions, but students in the explicit condition acquired significantly more knowledge of second-order concepts and causal strategies. However, no differences were found in students' written explanations. Several possible reasons for this are discussed.

Keywords: instructional design; curriculum development; historical reasoning; causal reasoning; assessment

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Introduction

In the past two decades, many researchers in the field of history education have advocated a shift from 'teaching the facts' to developing students' historical reasoning abilities. Additionally, in many countries, including Canada, the Netherlands, Germany, the UK and Australia, historical thinking skills have been included among the mandatory goals of history education (Erdmann & Hasberg, 2011). However, hitherto, few

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intervention studies that investigate pedagogical principles to develop historical reasoning ability have been conducted (Levstik & Barton, 2008; Van Boxtel & Van Drie, 2013). This observation corresponds with the observation that much classroom practice is out of sync with the goal of teaching historical reasoning. In many classrooms, the focus is mainly on teaching (and examining) declarative first-order knowledge (historical content knowledge) and breadth of coverage (e.g. Van Boxtel, Van Drie, & Kropman, 2010; VanSledright, 2011). In light of these observations, we argue that it is important, both from a theoretical and a practical perspective, that research strives to scaffold historical classroom practice with well-founded theoretical and empirical perspectives.

The central aim of the study reported here was to work out a theoretically and empirically underpinned approach for developing a student's ability to engage in causal historical reasoning. To do so, Alexander's (2003) Model of Domain Learning (MDL) was adopted as a promising framework that could bring together questions about what to teach and how it might be taught. Through a review of the literature, the core ideas, concepts, strategies and beliefs involved in causal historical reasoning were operationalized within this framework. Similarly, several design principles, derived from pedagogical principles connected to the MDL (Alexander, 2005), were operationalized and made suitable for history education. On the basis of these theoretical underpinnings, a lesson-unit was designed and several instruments were developed to measure improvement in students' causal reasoning abilities. The lesson-unit was tested—in a quasi-experimental set-up—in three 11th grade pre-university classes.

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The MDL as an orienting framework

One of the challenges designers face is making an interpretative leap when matching situated, local theories about the types of knowledge involved in domain-specific reasoning (theories of *what* to teach) and general instructional theories that centre on *how* to teach. In this study, the notion of 'orienting frameworks' (diSessa & Cobb, 2004) was used to manage this 'gap'. An orienting framework can be understood as a 'meta-theory' that obtains its value by defining general aspects of more specific (pedagogical and domain specific) theories and embedding these local theories in a larger context. Orienting frameworks do not provide 'strong constraints or detailed prescriptions' but 'general perspectives [...] for conceptualizing issues of learning, teaching, and instructional design' (diSessa & Cobb, 2004, p. 81). An orienting framework, thus, provides researchers and practitioners with a generic lens that makes it possible to align questions of *what* to teach and *how* to teach it. In this study, the MDL (Alexander, 2003) was adopted as a promising meta-theory.

Four considerations motivated the choice of the MDL as an orienting framework in this study (Alexander, 2003): (1) The MDL focuses explicitly on learning within academic domains (e.g. history, physics and geography) and provides a perspective on the development of domain-specific expertise and the knowledge dimensions involved therein, based on research within multiple academic disciplines. (2) The MDL allows for a holistic perspective because it not only defines the cognitive dimensions of domain learning, but also takes motivational and sociocultural factors into account. (3) The MDL takes a developmental perspective on expertise and describes the interplay of knowledge, strategies and interests through time. Finally, (4) in a subsequent article, Alexander (2005) extended the model by connecting to it several pedagogical principles that are intended to foster the development of expertise. Thus, the model provided a first direction in connecting instruction with domain-specific goals.

The MDL as a model for conceptualizing the development of causal historical reasoning

The MDL distinguishes three phases of learning in a domain: acclimation, competence and proficiency. The phases are characterized by a gradual increase in (domain and topic) knowledge, (domain specific) knowledge-transforming strategies and individual interest and a decrease in reliance on situational interest and generic knowledge-telling strategies. Students in the higher levels of secondary education are expected to reach the stage of (early) competence, which is characterized by the possession of a certain amount of foundational domain knowledge, alternation between deep-level and surface-level strategies and a certain ability to independently connect new topics to prior knowledge, and therewith raise personal interest (Alexander, 2003).

The MDL stresses the importance of developing a student's ability to apply deep-level strategies. Deep-level strategies are often domain specific and involve active knowledge construction (elaboration, making new connections). These strategies can be termed *knowledge-transforming* strategies (Scardamalia & Bereiter, 1987). Alexander describes development of expertise as a gradual shift from relying on generic, surface-level strategies (*knowledge-telling* strategies, such as rereading, paraphrasing, etc.) to more deep-level strategies. A review study of research on history education (VanSledright & Limón, 2006) also stresses the importance of strategy knowledge that informs how to *do* history (e.g. formulating historical questions, constructing explanations, investigating sources).

Furthermore, the MDL distinguishes between domain knowledge and topic knowledge. Topic knowledge (or concrete first-order knowledge) in history refers to specific, factual knowledge an expert has of specific periods. This knowledge, sometimes called fingertip knowledge, is generally acquired in the context of a specific task and is often volatile. Domain knowledge, on the other hand, is more enduring and can be characterized as abstract conceptual knowledge that allows a person to orientate himself in the time and to reason historically (Van Drie & Van Boxtel 2008). In their review study, VanSledright and Limón (2006) conceptualize this domain knowledge as composed of: (1) abstract first-order knowledge (knowledge of key concepts: phenomena, developments and historical turning points) and (2) knowledge of second-order concepts (such as cause, evidence, change and significance). VanSledright and Limón

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(2006) define second-order knowledge as the conceptual knowledge historians use to 'construct' a narrative of the past. Limón (2002, p. 264) emphasizes the importance of these concepts by stating that they 'mediate students' understanding of substantive concepts and events in history'. In this study, we chose, for analytical purposes, to primarily use the distinction between first-order and second-order knowledge. In our conceptualization, first-order knowledge (knowledge about the past) referred to both concrete topic knowledge and more abstract conceptual knowledge of key historical concepts (Figure 1).

In addition to knowledge and strategies, the importance of epistemological beliefs for students' domain-specific reasoning was stressed in a subsequent article (Alexander, 2005, p. 38), which states that 'students who perceive knowledge as more complex, […], and constructed rather than provided by some external authority tend to be higher academic achievers, report more strategic processing and are more persistent in the face of difficulties'. The relationship between beliefs about the nature and source of historical knowledge and students' historical reasoning has also been suggested in literature on history education (Maggioni, VanSledright, & Alexander, 2009; VanSledright & Limón, 2006). Indeed, it is not difficult to imagine that a student who sees the past as given is less inclined to actively construct his own explanations than a student who sees historical knowledge as interpretative and is able to consider different criteria in assessing the quality of an interpretation. Unfortunately, within research on history education, we lack empirical evidence to support this idea.

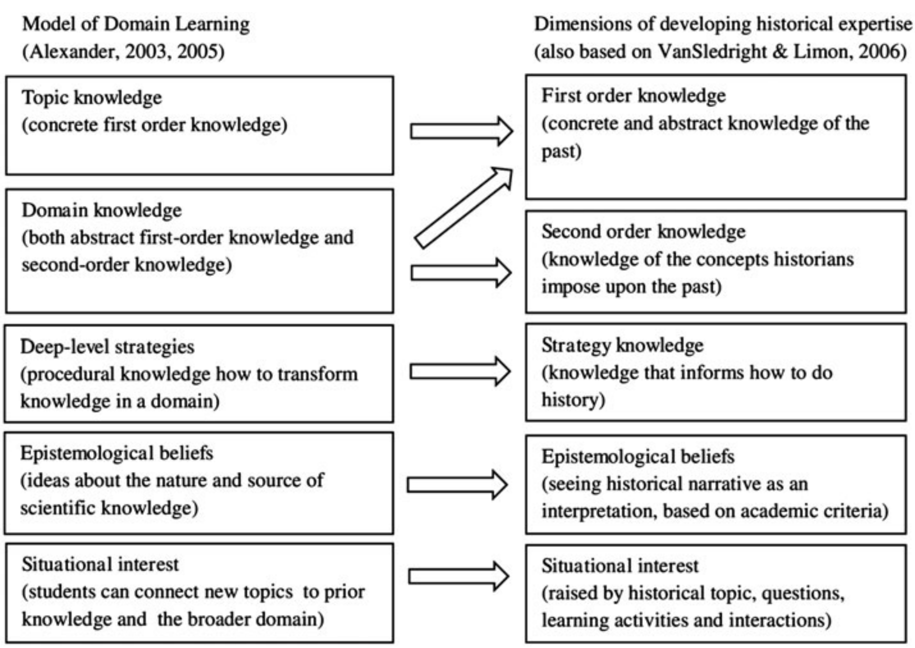

Figure 1. Dimensions of developing historical expertise.

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Finally, the MDL emphasizes interest as an important precondition for applying deep-level strategies and differentiates between individual interest and situational interest. Students in the early phases of expertise development often do not possess the rooted individual interest (and principled knowledge) necessary for deep and spontaneous engagement with a topic. To engage students in applying deep-level strategies, teachers should trigger and maintain situational interest through the topics they present, the questions they raise and the ways in which they design their lessons and tasks. They should help students build a contextualized understanding of the value of what is taught (Alexander, 2003). Figure 1 shows how our conceptualization of the dimensions involved in developing historical expertise relates to the MDL and the characterization of history domain knowledge.

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Causal reasoning in history

Although the MDL provided us with a clear framework for conceptualizing the dimensions involved in developing historical expertise, it did not directly tell us *what* to teach when we want to improve students' causal historical reasoning ability. In adherence to the notion of 'domain specific instructional theories' (diSessa & Cobb, 2004) and *principled understanding* (Alexander, 2005), it was necessary to operationalize the epistemological underpinnings, the strategy knowledge and the second-order knowledge that together constitute a student's understanding of the meta-concept historical causation and provide a basis for students to engage in causal historical reasoning (e.g. Chapman, 2003; Coffin, 2004; Halldén, 1997; Lee & Shemilt, 2009).

Epistemological underpinnings

Being able to answer causal questions and reflect upon causal explanations is an important element of historical reasoning. Historians spend much of their time explaining events, phenomena and developments. Why did the French Revolution occur? What caused the collapse of the Roman Empire? Why did Lincoln strive to abolish slavery? Although the answers to these questions may appear to be fairly straightforward, historical explanations will always be debated because they involve making interpretative connections between separate events. Students should understand, in the words of Lee and Shemilt (2009, p. 42), that 'no explanation is more robust than the premises on which it is grounded […] that history is—in the words of David Christian—an "endless waltz of chaos and complexity" […] and that historical explanations are limited and imperfect'.

For many students, the interpretative nature of history, in general, and of causal questions, in particular, is not at all evident. Scholars have stated that students typically regard causes as facts (listed by an authoritative author or teacher who knows 'the truth' about what caused an event) and view causal relationships as rooted in the past itself (Halldén, 1997; Lee & Shemilt, 2009). In line with this observation, students often consider causal explanations as things to be discovered instead of constructed, and view historians as best trained to do this job. These epistemological beliefs may lead students to uncritically accept the explanations of experts without themselves developing the conceptual apparatus needed to judge or construct causal explanations.

Strategy knowledge

The first procedural knowledge students should possess when engaging in causal analysis is an understanding that explaining a historical event always involves searching for multiple causes and multiple consequences, as a single cause never constitutes a sufficient explanation (Seixas & Morton, 2013). Second, whereas students have often been found to construe causation in a rather linear way (the so-called 'billiard-ball model'), they should learn that constructing a causal model also means describing multiple causes that exercise simultaneous influences—both direct and indirect—and work in different (and even opposing) directions (Coffin, 2004).

Students often appear to consider causes as a homogeneous group of factors, frequently speaking about *the* causes, without acknowledging differences between them. It is important that students develop a conceptual lens that allows them to differentiate between causes. In a seminal article, Chapman (2003) differentiates between *content* (economic, cultural, political and social); *time* (long term, short term, direct, indirect); *roles* (triggers, catalysts or preconditions); and *weight* (significance). While the content and time categories are mainly descriptive, the role category possesses more analytical power (Chapman, 2003). It draws students' attention to the fact that some causes can function as triggers that start events or processes, while others act as catalysts that speed things up (or slow them down). Furthermore, some phenomena may be present for long periods of time, acting as backdrops (or preconditions) that inspire certain actions or events and are in turn influenced by the events that take place (the concept of nationalism is a good example). Students should therefore acquire procedural knowledge that allows them to classify events according to *time*, *content* and *role*. Although we considered the category *weight* to be of a different nature than the other categories, it is important that students, as a fourth strategy, understand that explaining events in history always involves evaluating the impact of different causes and substantiating the relative weights of causes with historical arguments (Montanero & Lucero, 2011; Voss, Carretero, Kennet, & Silfies, 1994).

Halldén (1997) argued that students often interpret causal questions using a different conceptual framework from that of historians'. Historians appear to operate with one foot in the humanities—investigating actions, motives and intentions of human or institutional agents—and one foot in the social sciences—embedding these personal factors in more abstract, structural (economic, social or political) conditions that limit, motivate and guide individual (or institutional) actions in history. Students in

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secondary education, however, appear to have both feet in the humanities and tend to explain events mainly as the result of personal needs and wants, emphasizing the actions of individuals and institutions and often largely ignoring the historical context. Based on this consideration, we concluded that a fifth strategy students should grasp is that causal analysis requires analysis of the links between the actions and motives of historical agents and more structural factors that contextualize (explain, limit and motivate) these actions. In this way, we draw upon both the approach of analytic philosophers of history who focus more on the role of structures, necessary and sufficient conditions and the hermeneutic approach that focuses more on the actions and intentions of historical individuals.

Second-order knowledge

The meta-concept, causation, is an abstract umbrella concept underpinned by causal strategies and epistemological ideas, as elaborated above. In our conceptualization, a third dimension underlying a student's perception of historical causation is the knowledge one possesses about the concepts connected to causation. These second-order concepts can exist at different levels of abstraction. In the above paragraph, we described causal strategies, but using these strategies, abstract concepts such as time, role and weight can be discerned. At a more concrete level, students should possess knowledge of concepts such as long and short term, direct, indirect, economic, cultural, trigger, catalyst and precondition. At the most concrete level, students should possess a rich vocabulary and an extended set of connection words to adequately verbalize these causal nuances and differentiate between different categories. Woodcock (2005) describes a learning activity that provides students with a wordlist to express causal relations (e.g. 'underpin', 'drive', 'erupt', 'incite', 'underlying') and argues that teaching these words 'releases the conceptual'.

Defining causal reasoning

Based on the above considerations, we particularized the definition that Van Drie and Van Boxtel (2008) developed to analyse students' historical reasoning. Causal historical reasoning was defined as an activity, in which a person constructs a historical explanation by (a) asking a causal historical question; (b) constructing a historical context in order to explain individual actions and events; (c) using substantive (first-order) historical concepts; (d) using second-order concepts and strategies related to causality; (e) providing arguments and counterarguments to support causal statements; and (f) using evidence taken from historical sources. In adherence to Van Boxtel's (2014) elaboration of this definition, we further conceptualized the process and outcome of this activity, as shaped by a person's underlying (1) substantive (first order) knowledge, (2) understanding of causal second-order concepts, (3) strategic knowledge of causal reasoning (i.e. what a causal explanation may look like, how it can

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be constructed and how the historical context influences individual actions, but also how to provide arguments and—depending on the task—how to use sources), (4) epistemological beliefs and (5) historical interest.

The MDL as a model for conceptualizing pedagogical decisions

Parallel to the way in which the MDL provides a perspective on conceptualizing domain-specific knowledge, it also provides a perspective on pedagogical and instructional decision-making, giving some guidance regarding *how* to teach the knowledge, strategies and epistemological ideas and raise students' interest to engage in causal reasoning. Before becoming productive, this abstract perspective must be elaborated in what diSessa and Cobb call a 'framework for action' (2004, pp. 81–82). Such a framework provides a 'more or less general prescription of pedagogical strategies' and connects different (cognitive, social and motivational) theories in an attempt to define what effective instruction may look like. Examples include the model of direct instruction and reciprocal teaching (diSessa & Cobb, 2004). In this study, the pedagogical principles Alexander (2005) has defined on the basis of the MDL were adopted as a framework for action.

On the basis of the MDL, Alexander (2005) has proposed 11 pedagogical principles, from which this study selected five that we considered to be most concrete and most suitable for a relatively short unit and that matched our conceptualization of causal historical reasoning. These principles were hypothesized to foster the development of causal historical expertise. The principles are: (1) *seek principled understanding;* (2) *explicitly teach domain-specific strategies;* (3) *allow students to appreciate the complexity, sophistication and uncertainty of knowledge;* (4) *incorporate an array of social interaction patterns;* (5) *aim for rooted relevance* (Alexander, 2005). The first principle relates primarily to the *what* of teaching and was explicated in the paragraphs above. The other principles will be discussed below. The main focus will be to connect these principles to research conducted within the domain of history education.

Explicitly teach domain-specific strategies (and second-order concepts)

The second design principle adhered to the central role of second-order concepts and strategies in our conceptualization of causal historical reasoning. Evidence shows that—in general and specifically, in history classrooms—second-order concepts and thinking strategies often remain implicit (Alexander, 2005; VanSledright & Frankes, 2000). Within the domain of history education, several researchers have shown positive effects of explicit teaching, although this research has been scarce and limited to sourcing strategies (De La Paz, 2005; De La Paz & Felton 2010; De La Paz & Graham 2002; Nokes & Dole, 2004; Reisman, 2012).

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To design an explicit teaching environment, we drew on Merrill's (2002) review of instructional theories. All models, in addition to being problem centred, distinguish four learning phases: (a) activating prior knowledge and experience, (b) demonstrating skills, (c) applying skills and (d) integrating skills. Furthermore, we theorized that a basic ingredient of explicit teaching would be to 'make thinking visible' (Collins, Brown, & Holum, 1991; Donovan & Bransford, 2005). In the phase of demonstration (instruction), a teacher should explicate his thinking and discuss what a strategy is and how and under what conditions it can be used (Alexander, 2005). In the phase of application (guided practice), the role of the teacher is to scaffold, coach and reflect with students on their learning processes and task performances (Collins et al., 1991).

Within research on history education, several researchers have concluded that the use of graphical organizers or mediating tools (e.g. a causal map) provide effective visual support, structure and moderate group discussions and can increase learning gains by explicating causal relations (Prangsma, Van Boxtel, Kanselaar, & Kirschner, 2009; Van Drie & Van Boxtel, 2003; Van Drie, Van Boxtel, Jaspers, & Kanselaar, 2005).

Epistemological reflection

Research has shown that the epistemological beliefs of students influence their interest and task persistency and that students with more nuanced epistemological beliefs show a greater inclination to apply deep-level strategies (Alexander, 2005; Maggioni et al., 2009; VanSledright & Limón, 2006). An experimental study of Khishfe and Abd-El-Khalick (2002) in the domain of physics suggests that inquiry learning can help alter the epistemological beliefs of students, but only if teachers explicitly reflect with students on epistemological questions. We do not know of any intervention studies within history education that focus on epistemological beliefs.

Social interaction—interchanging group work and classroom discussion

Alexander (2005) has argued that social interaction is an important element in the development of students' conceptual knowledge, strategies and metacognitive skills. Well-designed group work forces students to externalize their thought processes, making their thinking visible and thus, allowing teachers to address possible misconceptions and effectively scaffold and coach the learning process. Social interaction may also be effective in developing students' epistemological beliefs, as it may encourage students to begin to perceive themselves as active contributors to knowledge construction in a domain (as opposed to passive consumers of expert knowledge) and in establishing a community of practitioners—together with their classmates—in which the criteria for valid knowledge claims are negotiated (Collins et al., 1991; VanSledright, 2011).

Within history education, Pontecorvo and Girardet (1993) have demonstrated that social interaction produces high-level reasoning, even in young children. Several studies have concluded that working in pairs on inquiry tasks and classroom discussions are effective learning activities that trigger historical reasoning (Prangsma, Van Boxtel, & Kanselaar 2007; Van Drie et al., 2005; Van Drie & Van Boxtel, 2011). Del Favero, Boscolo, Vidotto, & Vicentini (2007) have found that students in a 'discussion condition' more frequently report having learned about 'doing' history than students who solved the same inquiry question individually.

Aim for rooted relevance

The MDL regards interest as a basic component of engaging students in deep-level strategies (Alexander, 2005). In pursuit of this objective, Alexander formulates the principle of *rooted relevance*. Educators should allow students to forge meaningful connections between domain knowledge (answering questions about what is interesting and relevant within a topic) and students' prior knowledge, interests and experiences. Del Favero et al. (2007) distinguish three sources of situational interest within the domain of history education: (1) learning activities, (2) interpersonal relationships and (3) specific topics.

Related to learning activities, Collins et al. (1991) emphasize the influence of engaging students in realistic, whole and open-ended tasks to stimulate motivation and enable deep-level, principled learning. Related to interpersonal relationships, Del Favero et al. (2007) have found that social interaction can be a source of situational interest. Students in the social interaction conditions reported higher engagement in and enjoyment of learning activities. In relation to specific historical topics, life themes (such as death, war, love), moral and ethical dilemmas, and events, developments or phenomena linked to everyday experience (e.g. democracy, freedom, gender, race and religion) have been described as stimulating for students (Barton & Levstik, 2004; Del Favero et al., 2007; Hunt, 2000).

Hypotheses of our empirical study

Based on our theoretical framework, we hypothesized that causal historical reasoning can be effectively fostered in a collaborative inquiry task and also that explicit attention given to second-order concepts, strategies connected to historical causation and epistemological underpinnings of historical explanations are important characteristics of the learning environment. To test these assumptions, we designed two interventions: (1) an *explicit condition* based on all design principles (combining an inquiry task and group work with explicit teaching of causal strategies and epistemological reflection), and (2) an *implicit condition,* in which explicit

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teaching of causal strategies and epistemological reflection was omitted. We expected that:

- Historical (first order) knowledge increases in both conditions without differences between conditions.
- Students in the explicit condition will exhibit greater development than students in the implicit condition, with regard to second-order knowledge and knowledge of causal strategies.
- Students in the explicit condition will develop more towards a critical epistemological stance than students in the implicit condition.
- Students in both conditions will improve their ability to construct a causal historical explanation in an essay task, but students in the explicit condition will improve more than students in the implicit condition.

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Method

Research question

An empirical study was conducted to explore the effectiveness of our design principles in general and the added effects of explicit instruction and epistemological reflection in particular on the learning gains of 11th grade pre-university students with respect to: (a) historical (first order) knowledge, (b) knowledge of second-order concepts connected to historical causation, (c) knowledge of causal strategies, (d) epistemological beliefs and (e) ability to construct a causal explanation. Data were collected in a quasi-experimental pre-test–post-test design, with classes randomly assigned to conditions.

Participants

Seventy-four 11th grade pre-university students in three different history classes from one suburban school near Amsterdam, the Netherlands, participated in the experiment. Two classes were assigned to the *explicit condition* ($M = 28$, $F = 22$). One class was assigned to the *implicit condition* ($M = 16$, $F = 8$). Not all students were present for all lessons; therefore, the actual number of students participating in different pre- and post-tests varied. The average age of the students was 16.6 years, ranging between 16 and 18. The classes were drawn from two different teachers.

Procedure

The intervention focused on causes of the outbreak of the First World War and lasted for four 45-min lessons in the explicit condition and three 45-min lessons in the implicit condition. Pre- and post-test measurements required an additional four lessons. For experimental purposes, the

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Table 1. Lesson-unit.

Lesson	Explicit condition	Implicit condition	Tests
Pre-test I			First-order, second-order, causal reasoning strategies, epistemology
1 / 2	Preparatory content lessons		
Pre-test II			Essay I
3	Analogy lesson (Table 4)		
4/5/6	Activities (Table 4)	Activities (Table 5)	Situational Interest (lesson 6)
Post-test I			Essay II
Post-test II			First-order, second-order, causal reasoning strategies, epistemology

acquisition of first-order knowledge was separated from the lessons focusing on constructing a causal explanation. Students were taught two preparatory content lessons before the start of the experiment to provide them with enough historical background knowledge to write their pre-test essay. Subsequently, students in the explicit condition worked for four lessons on the inquiry task and students in the implicit condition worked for three lessons on the same task. The purpose of this difference was to balance the total amount of time students in each condition worked with the historical first-order knowledge, as students in the explicit condition spent the first inquiry lesson working on a non-historical analogy (Table 1). The acquisition of first-order knowledge did, of course, continue during the lessons that centred on the inquiry task.

To control for potential differences between conditions, we repeated all measurements as a pre-test and a post-test. To control for possible effects of different teachers and to ensure that the intervention was implemented according to plan, both conditions were taught by the researcher (the first author), who holds a teacher's degree and has taught history for eight years in secondary education. During parts of the intervention, students worked in triads. To control for potential differences between triads, each group was composed of a high-scoring, an average and a low-scoring student. These triads were formed in consultation with the class teacher. To control for potential differences between conditions with respect to ability to arouse interest among students—as this might be a confounding variable—we measured students' situational interest at the end of the final intervention lesson.

Learning goals and lesson design

The theoretical framework allowed us to conceptualize and elaborate causal historical reasoning and define several 'matching' pedagogical principles. These principles were subsequently 'translated' for history education by connecting them to research on learning and instruction, and, more specifically, to research on history education. A final, interpretative, step towards designing concrete lessons was made by 'inking in' these principles with classroom activities and learning tasks found in the descriptive literature on causal historical reasoning. Below, the goals, activities and tasks of the lessons are schematically presented.

Learning goals. Drawing from our theoretical framework, one overarching goal was formulated that focused on students' ability to construct causal historical explanations. Two additional goals were formulated in connection with the preparatory lessons, focusing on first-order knowledge related to the period leading up to the First World War. Additionally, in the *explicit condition*, several additional goals were formulated to make explicit specific second-order concepts, strategies and epistemological beliefs. A presentation of the learning goals can be found in Tables 2 and 3. For reasons of feasibility, we limited the number of learning goals in the four lessons that centred on causal reasoning.

Lessons design. In both conditions, inquiry learning, raising situational interest and social interaction were important principles.

Inquiry task: Students worked on an open-ended inquiry question: 'how can the outbreak of the First World War be explained?' This task was expected to elicit causal historical reasoning and potentially foster epistemological beliefs by allowing for multiple valid answers.

Collaborative learning: Group work (triads) and classroom discussions were interchanged. This was expected to elicit causal historical reasoning and argument, make thinking visible and potentially foster epistemological beliefs by emphasizing the constructed nature of history.

Situational interest: The problem-solving task, the topic of the lessons (the First World War) and the group work were intended to raise

Table 2. Learning goals—both conditions.

Dimensions of causal reasoning	Content of learning goal
First-order knowledge (preparatory lessons—both conditions) (lessons 1 and 2)	(a) Students acquire knowledge of several concrete events, concepts, countries and dates in the period leading up to the First World War (*first-order topic knowledge*) (b) Students acquire knowledge of several abstract phenomena (i.e. nationalism, imperialism, alliances and arms race) (*first-order domain knowledge*)
Ability to construct a historical explanation (both conditions) (lessons (3),4,5,6)	(c) Students improve their ability to construct causal historical explanations by engaging in causal analysis through an inquiry task that prompts them to select and organize possible causes and construct a causal explanation of the outbreak of the First World War

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Table 3. Learning goals—explicit condition (lessons 3–6).

Second-order knowledge (explicit condition)	(d) Students develop a vocabulary related to causal second-order concepts (i.e. time, content, role, (in) direct, long term, short term, economic, cultural, trigger, catalyst, precondition) (e) Students develop a vocabulary of connection words that allows them to express causation in a nuanced manner, that acknowledges different roles and different types of influence causes can have (i.e. underpin, drive, erupt, incite, underlying)
Strategy knowledge (explicit condition)	(f) Students can explain that historical explanations always involve multiple causes (g) When constructing a historical explanation, students can organize and classify causes within the dimensions of time, content and role by applying the second-order concepts connected to them (i.e. (in)direct, economic, political, trigger, catalyst, precondition) (h) Students build causal models in which causes can exert both simultaneous and linear (direct or indirect) influences and can explain that this influence can work in differing (even opposing) directions (i) Students can evaluate the significance of causes and provide arguments for their evaluation
Epistemological underpinnings (explicit condition)	(j) Students should be able to explain that causal explanations are never a copy of history itself (*copier stance*) because the selection of causes, the construction of a causal explanation and the evaluation of significance are all subject to interpretation. Multiple valid explanations for an event can co-exist and depend on the perspective of the historian and the question asked. This does not mean that all explanations are equally valid (*subjectivist stance*). There are (academic) criteria for judging the strength of historical explanations. These include the use of evidence and arguments (*criterialist stance*)

situational interest in both conditions and provide a basis for engaging in deep-level analysis.

Furthermore, the lessons were designed around the phases of engaging prior knowledge, instruction, application and integration, with a focus on making thinking visible. In the implicit condition, the activities focused on acquiring first-order knowledge, preparing a group presentation, and presenting and discussing students' causal explanations. The explicit condition added explicit instruction and epistemological reflection that targeted students' second-order knowledge and knowledge of causal strategies. Tables 4 and 5 show how the principles in both conditions have been translated into learning activities.

In Table 5, it can be seen that students in the implicit condition worked on a whole task. By contrast, students in the explicit condition worked on the same topic, with the same overarching inquiry question, but the task was divided into smaller segments that provided guided practices on separate strategies and second-order concepts.

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Table 4. Intervention lessons—explicit condition (number represents lesson—see Table 1).

No.	Lesson phase	Explicit condition
3.	Prior knowledge/ situational interest	Analogical story about Alphonse the Camel (Chapman 2003) to stimulate thinking about multi-causality and causal categories
	Instruction	Using the story about Alphonse, the teacher makes explicit the concepts of multi-causality, causal categories and the second-order concepts related to these categories
	Application	Students work in groups (triads) and apply the knowledge of causal categories and second-order knowledge to the initial story
	Integration	Classroom discussion to evaluate group work and address possible misconceptions
4.	Instruction	The teacher discusses the importance of a rich vocabulary of connection words to express differences between causes The teacher presents and discusses a wordlist of verbs, nouns and conjunctions (adapted from Woodcock, 2005)
	Application	Students work in groups (triads) and apply their knowledge of categories and connecting words that express second-order concepts (time, content, role) to the inquiry task; they organize and connect causes of the First World War in a 'causal map'
	Integration	Classroom discussion in which students present, discuss and evaluate their causal analyses and elaborate on the roles (i.e. structural, triggers), direct and indirect causes, the language used in this discussion, and how they model causal relationships (linear, simultaneous or more complex) The teacher asks epistemological questions, such as: Why are your constructions different? What does this tell us about historical knowledge?
5.	Instruction	The teacher introduces the concept of significance (different causes may have different impacts) and discusses strategies to determine significance (analysing the consequences of single causes and asking what-if questions) (Chapman, 2003)
	Application	Students work in groups (triads) and discuss the consequences of several causes
	Integration	Classroom discussion to exchange student ideas and discuss what-if questions, reflecting on the relative importance of causes
6.	Application	Students work in groups (triads) to organize causes into a diamond divided into nine parts (Chapman, 2003). They exchange arguments and, on the basis of these arguments, assign relative weights. They also consider vertical and horizontal relationships
	Integration	Classroom discussion in which students present, discuss and evaluate the significance they attribute to different causes The teacher asks epistemological questions, such as: Why do different groups select different causes as most important? Who is right? What criteria can we use to judge the validity of your choices?

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Table 5. Intervention lessons—implicit condition (number represents lesson—see Table 1).

No.	Lesson phase	Implicit condition
4.	Prior knowledge/ situational interest	A short video clip about the murder of Franz Ferdinand and a classroom discussion about the inquiry question to activate prior knowledge
	Instruction	Explicating the inquiry task and the goal of the task
	Application	Preparing a group (triads) presentation. Selecting and organizing causes (analysing) Writing a synopsis (text) for the presentation (synthesizing)
5.	Application	Creating and preparing the presentation (creative application)
6.	Integration	Presenting, giving and receiving feedback Feedback focusing on first-order knowledge and quality of presentation Students actively criticize each other's presentations

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Instruments

In this study, we took a multidimensional perspective on learning. For analytical purposes, we found it important that the assessment of learning outcomes mirrored this multidimensional approach. Therefore, we measured students' (a) first-order knowledge, (b) knowledge of causal second-order concepts, (c) knowledge of causal strategies, (d) epistemological beliefs, (e) ability to construct causal explanations and (f) situational interest. Because this article reports the results of an initial experiment, intended to explore both the effectiveness of our design principles and the fitness of our research instruments, our research instruments are briefly discussed below.

First-order knowledge. The same first-order knowledge test was conducted twice (pre-test, post-test). The test consisted of 16 items divided into four categories. The first three categories (12 items) focused on concrete topic knowledge: (1) recalling pre-war alliances (1 item),(2) connecting specific historical concepts and events to countries (10 items) and (3) chronologically ordering events (1 item). The fourth category (4 items) focused on connecting topic knowledge (giving concrete examples) to abstract concepts we regarded as first-order domain knowledge (i.e. nationalism, alliances). From the items in the second category, three items were excluded from the analysis because students already scored very high in pre-test, which left little room for improvement. A second rater scored the items of the fourth category on a set of 24 randomly chosen tests (18%). The interrater correlation for this question was Pearson's $r = 0.8$.

Second-order knowledge. The same second-order test was administered twice, together with the first-order test. Students were presented with a short fictional story about a collision between a scooter and a car on a

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crossing near school. The test prompted them to provide examples (through elaboration of the story) of different *types* of causes (e.g. trigger, precondition, cultural cause, personal motive, unintended consequence). This non-historical task was used to assess students' explicit knowledge of second-order concepts independently of their first-order knowledge. In the coding phase, four items (underlying cause, personal motive, indirect consequence and unintended consequence) were excluded because answers on these items could not be reliably scored. The concept, 'trigger', was skipped because the pre-test mean was already very high, which left little room for improvement. In the final analysis, structural cause, economic cause and cultural cause were included. A second rater scored the items on a set of 24 randomly chosen tests (18%). The interrater correlation on these items was Pearson's $r = 0.95$.

Knowledge of causal strategies. The same 17-item questionnaire was administered twice, together with the knowledge-tests. A 6-point Likert scale questionnaire (ranging from 'strongly disagree' to 'strongly agree') was designed to measure students' knowledge of causal strategies. Four history teacher educators provided feedback to heighten face validity. On the basis of their feedback, some modifications were made. We decided to make some items more concrete by relating them to a historical event (i.e. the Second World War). To avoid confounding strategy knowledge with students' increasing first-order knowledge, the First World War was not used. Sample items included: 'To explain the outbreak of the Second World War, a historian must research the actions of important people', 'For every historical event, a multitude of causes can be discerned' and 'Indirect causes of the Second World War are not important in a historical explanation'. After analysis, seven items that reduced scale reliability were omitted. Six items were recoded because negative answers were appropriate. Ten final items were selected. For these items, Cronbach's alpha for the pre-test was 0.64 and for the post-test, it was 0.67, which is considered to be acceptable.

Epistemological beliefs. The same 21-item questionnaire was administered twice, together with the knowledge-tests. A 6-point Likert scale questionnaire (ranging from 'strongly disagree' to 'strongly agree') was used to measure students' beliefs about history. The questionnaire was adapted for secondary school students by the original researcher from a validated questionnaire developed for teachers (Maggioni, 2010; Maggioni, Alexander, & VanSledright, 2004; Maggioni et al., 2009). A translation into Dutch was made by Havekes in collaboration with Maggioni (unpublished document).

Initial reliability analysis was performed on a larger sample of 11th grade pre-university students from different schools in the Netherlands ($n = 200$). In line with our theoretical assumptions, the items could be grouped into two factors. Factor 1 consisted of nine items that measured students' ideas about historical knowledge being (1) an exact copy of the past (copier stance) or (2) a mere interpretation (subjectivist stance). Because both stances can be viewed as naive, all items were recoded. Factor 2 consisted of the six items that measured students' ability to navigate the tension between history as 'truth-finding' and history as a construction by considering academic criteria for evaluating historical narratives.

In our own sample, Cronbach's alpha for factor 1 was 0.81 for the pre-test and 0.81 for the post-test. For factor 2, on the other hand, the reliability for the pre-test was poor (0.57) and for the post-test, it was unacceptable (0.4). Therefore, we decided to exclude factor 2 from our analysis. Unfortunately, no post-test was administered in one of the experimental groups. As a result, our post-test analysis is based on a smaller number of cases (implicit $n = 21$, explicit $n = 22$).

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Ability to construct a causal explanation. Two essay tasks were administered to assess students' abilities to apply causal strategies and second-order concepts. We randomly divided each class into two groups, with each group taking a different task at pre-test and switching at post-test. Towards this end, two parallel essay tasks were designed, in which students had to construct argued explanations of approximately 300 words discussing: (a) why Germany became involved in the First World War or (b) why Russia became involved? Students were provided with a set of six primary historical sources. Furthermore, they were allowed to use the background information from the preparatory content lessons. The number of words and the number and types of possible arguments pro and con in the sources were balanced. Research shows that reading multiple sources and writing argumentative accounts are effective in eliciting historical reasoning (Rouet, Britt, Mason, & Perfetti, 1996; Van Drie, Van Boxtel, & Van der Linden, 2006; Wiley & Voss, 1999). A historian and two history teacher educators critically examined the tasks and provided feedback. Eight 11th grade students provided feedback on the language and length of the task. On the basis of this feedback, some modifications were made.

To analyse students' written work, a rubric consisting of seven criteria (Appendix 1) was developed. On each criterion, students received a score of between zero and two points. Students were scored on: (1) the number of structural causes presented in their writing, (2) the number of structural causes substantiated by specific historical events (triggers or catalysts), (3) the listing and degree of integration of direct causes with indirect causes, (4) the explanatory model (linear, complex/mixed, abstract), (5) the use of (nuanced) second-order language and causal connections, (6) evaluation and use of counterarguments and (7) historical correctness.

After training on a dummy set, two raters independently scored all essays. For the first 39 essays, the interrater reliability was not yet satisfactory; therefore, a final score was determined through discussion. For the following 93 essays, a mean score of both raters was calculated. After analysis, three variables (3, 6 and 7) that reduced internal consistency were omitted. Subsequently, Cronbach's alpha for the pre-test was 0.77 and for the post-test, it was 0.69, which can be considered good. The interrater correlation on the total score of the remaining four items was Pearson's $r = 0.75$ ($n = 93$).

Situational interest. Situational interest was measured to control for potential differences in motivation between conditions. A 12-item questionnaire was administered in the final intervention lesson to measure students' situational interest. A 6-point Likert scale questionnaire (ranging from 'strongly disagree' to 'strongly agree') was designed, based on a validated questionnaire for mathematics education (Linnenbrink-Garcia et al., 2010). Sample items included: 'what I have learned in these lessons is useful for me to know', 'I liked what we learned in these lessons' and 'these lessons were so exciting that I could easily maintain my attention'. Cronbach's alpha for our SI-questionnaire was 0.8.

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Results

Pre- and post-test means, standard deviations and the number of participants are presented in Table 6.

First-order knowledge

Increases in first-order knowledge were analysed using a repeated measures MANOVA. The 13 items on the test were treated as separate dependent variables in the analysis. As we had hypothesized, we found a significant main effect of time ($F(1, 56) = 154.05$, $p < 0.000$, $\eta_p^2 = 0.75$, which is considered a large effect; Cohen, 1988). This means that

Table 6. Pre- and post-test means.

	Condition	Pre-test Mean (SD)	Post-test Mean (SD)	*n*
First-order knowledge	Expl.	5.4 (2.0)	8.8 (1.8)	37
	Impl.	4.81 (1.5)	7.8 (1.6)	21
Second-order knowledge	Expl.	2.0 (0.9)	2.8 (1.0)	37
	Impl.	1.5 (0.8)	1.5 (0.8)	21
Knowledge of causal strategies	Expl.	3.7 (0.5)	4.5 (0.5)	31
	Impl.	3.8 (0.6)	4.1 (0.4)	21
Epistemological beliefs (factor 1)	Expl.	3.7 (0.8)	3.6 (0.7)	19
	Impl.	3.9 (0.7)	3.7 (0.7)	20
Ability to construct a causal explanation	Expl.	4.2 (1.6)	4.9 (1.4)	38
	Impl.	3.4 (2.0)	5.1 (1.6)	20

students in both conditions improved with respect to historical (first-order) knowledge. No time * condition interaction effect was found, which was also in line with our expectations.

Second-order knowledge

Increases in second-order knowledge were analysed using a repeated measures MANOVA. The three items of the test were treated as separate dependent variables in the analysis. As we had hypothesized, we found a significant time * condition interaction effect ($F(1, 56) = 11.84$, $p = 0.001$, $\eta_p^2 = 0.18$, which is considered a large effect; Cohen, 1988). This means that students in the explicit condition developed significantly more knowledge of causal second-order concepts than students in the implicit condition.

Knowledge of causal strategies

Development of causal reasoning was analysed using a repeated measures ANOVA. A significant main effect of time was found ($F(1, 50) = 52.13$, $p < 0.000$, $\eta_p^2 = 0.51$). As we had hypothesized, we also found a significant time * condition interaction effect ($F(1, 50) = 8.61$, $p = 0.005$, $\eta_p^2 = 0.15$, which is considered a large effect; Cohen, 1988). This means that, although both groups developed significantly with respect to knowledge of causal strategies, this development was significantly larger among students in the explicit condition.

Epistemological beliefs

We conducted a repeated measures ANOVA on factor 1 of the epistemological beliefs questionnaire to analyse students' development in this dimension. Contrary to our expectations, we found no significant main effect and no significant time * condition interaction effect. Because of low scale reliability, we did not include the items belonging to factor 2 in our analysis.

Ability to construct a causal explanation

Students' development in constructing causal explanations, assessed on the basis of an essay task, was analysed using repeated measures ANOVA. A significant main effect of time ($F(1, 56) = 17.01$, $p = 0.000$, $\eta_p^2 = 0.23$, which is considered a large effect; Cohen, 1988) was found. However, contrary to our expectations, we found no significant time * condition interaction effect.

Situational interest

A one-way ANOVA was performed to compare the effect of the treatment on students' situational interest. In line with our expectations, no

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significant between-group differences were found ($F(1, 62) = 0.035$, $p = 0.85$). Furthermore, as we expected, the mean in both groups was above average on a 6-point scale (explicit $M = 4.0$, SD = 0.67, $n = 43$, implicit = $M = 4.0$, SD = 0.64, $n = 21$).

Conclusion and discussion

This study adopted the MDL (Alexander, 2003, 2005) as a framework for conceptualizing the levels of knowledge that constitute causal historical reasoning and for delineating principles involved in fostering this reasoning. We combined the framework with a model of historical domain knowledge (VanSledright & Limón, 2006), operationalized second-order concepts, strategies and epistemological beliefs involved in causal historical reasoning, and designed several research instruments to match our framework and operationalization. Furthermore, the MDL provided us with several principles that are expected to foster the development of expertise. This study selected four principles and elaborated them with notions taken from broader research on learning and instruction and research from within the domain of history education. Finally, the learning activities were 'inked in' with tasks found in the (descriptive) literature on causal reasoning. Although we strove, in our design, for theoretical consistency, and our framework provided compelling perspectives and directions, it was our experience that this final step towards concrete lessons is also to a certain extent creative and situated.

To investigate our assumptions of effectiveness, we conducted a quasi-experimental study consisting of two experimental conditions: an *implicit* condition, in which students worked in triads on an explanatory inquiry task; and an *explicit condition*, which added explicit teaching of causal strategies, second-order concepts and epistemological reflection. As expected, first-order knowledge developed significantly with students in both conditions and no differences between conditions were found. It appears that a collaborative inquiry approach does effectively foster the acquisition of historical first-order knowledge. Despite the fact that students, in the explicit condition, spent part of their time—in all four lessons—learning about causal strategies and second-order concepts, this did not result in less historical first-order knowledge, which seems to debunk a common argument against the teaching of reasoning skills. Further research may focus on comparing the development of students' first-order knowledge in lessons designed within our framework to the development of such knowledge in a condition in which students study a topic in a more teacher-centred, transmissive manner.

Contrary to our expectations, students in both conditions improved their knowledge of causal strategies, which implies that working on an explanatory inquiry task does enhance such knowledge, even without explicit attention, although this effect may also be caused by a testing- or a confounding-effect. It may be that students' increase in first-order knowledge allows them at post-test to construct more concrete representations of the items in the questionnaire. Nevertheless, students in the

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explicit condition performed significantly better than students in the implicit condition. Furthermore, students in the explicit condition significantly developed their knowledge of second-order concepts related to historical causality, whereas no such development was observed among students in the implicit condition. We therefore conclude that explicit attention is an effective element in enhancing knowledge of second-order concepts and causal strategies.

Students' abilities to construct causal historical explanations increased in all conditions. Nevertheless, contrary to our expectations—although students in the explicit condition improved more than students in the implicit condition in their underlying knowledge of second-order concepts and causal reasoning strategies—this did not translate into larger improvements in their abilities to apply this knowledge when constructing causal historical explanations. Several reasons may be given for this. First, students may simply not have had sufficient practice to integrate and apply the new knowledge and strategies, and therefore, this skill may not yet have fully developed. Second, students may lack practice to be able to *transfer* their acquired skills in causal reasoning to a new task (the explanatory questions students worked on during the essay tasks differed slightly from the inquiry question of the intervention lessons). Third, students may be unable to translate their new knowledge and skills to writing an explanatory text. The intervention focused primarily on developing students' conceptual and strategic knowledge of historical causation and did not explicitly teach students how this knowledge might be organized in the form of written text. Finally, because our goal was to develop a realistic historical task, we appended the task with six historical sources that enabled students to draw arguments (pro and con) from and were meant to provide students with some dilemma's that required evaluation. It may be that these sources heightened the task difficulty and prevented students from demonstrating their acquired knowledge of historical causation. They may have had to navigate too much information.

Contrary to our expectations, no effect on students' epistemological beliefs was observed. However, we were able to test our hypothesis using only one factor of the questionnaire because of unacceptable scale reliability with the other factor. The items of the included factor were rather abstract, focusing primarily on the nature of historical knowledge. The excluded factor focused more on methodological criteria for generating historical knowledge, and it may be that the explicit attention drawn to the concepts and strategies historians use to construct historical explanations did affect this factor. Future research should therefore focus on heightening the validity of the epistemological questionnaire and exploring whether our design principles can help students start to perceive history more as a construction and less as a reservoir of facts to be learned.

Students in both conditions reported positive situational interest; the mean in both conditions was 4.0. Therefore, it appears that the group work, the inquiry approach and the topic of the lessons did succeed in raising situational interest. Furthermore, the learning tasks that focused on strategy knowledge and second-order concepts did not negatively affect students' interest. An important reason for measuring situational interest

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was to control for a potential confounding variable that might independently cause differences in learning outcomes. As expected, such differences between conditions were not found.

On the basis of our analysis, we conclude that the MDL does indeed provide a fruitful framework for conceptualizing the dimensions involved in developing causal historical reasoning. Furthermore, we found the framework to be a valuable model for approaching the question of assessing this reasoning. A notable benefit of our theoretical framework was that it compelled us to conceptualize the teaching and assessing of causal reasoning as a multidimensional goal, inspiring us not only to measure students' ability to construct causal explanations, but also tap underlying levels of knowledge, epistemological beliefs and interest. This more detailed inspection revealed several interesting differences between the implicit and explicit condition that may have been overlooked had we limited ourselves only to the explanatory writing task in which students had to integrate and apply their conceptual and strategic knowledge. It is this stronger development of knowledge about causal strategies and second-order concepts in the explicit teaching condition that may provide important starting points for developing an integrated skill in the long run.

In our view, an important characteristic of the instruments used in this study was that they were contextually situated and closely tied to the theoretical framework and the specific lesson goals. The items in the rubric, questionnaires and knowledge tests that proved most reliable and achieved the strongest development were those items that best met these criteria. Especially the rubric proved a valuable instrument for analysing student writing and for focusing on specific elements of causal historical reasoning. In contrast, our data also show that more general measures on cognitive development tend to lose sensitivity. This effect can be observed, for instance, in the questionnaire on epistemology and in the items skipped in other tests. Of course, these demands raise questions on issues of broader validity and reliability, for instance, in other age groups, cultures and on other aspects of (historical) reasoning. Furthermore, one might ask whether good measures of domain-specific reasoning can ever be one-size-fits-all. In any event, we conclude that the most important characteristic of a good instrument should be its power to gauge student's thinking, prior knowledge and learning outcomes, and therewith provide diagnostic insights on multiple levels.

We advocate two adjustments to our pedagogical approach. First, an even sharper choice should be made regarding the complexity and number of learning activities. Alexander (2005) stressed the importance of investing sufficient time and energy to thoroughly teach the intended knowledge and strategies. It was our experience that in the intervention, we still strove to achieve too many goals for four lessons. Therefore, students may have been unable to fully process the information and transform it into a personal skill. Second, more explicitly *modelling* the skill may strengthen the principle of explicit instruction. In many studies, modelling is discussed as a powerful approach to transferring complex skills (e.g. Alexander, 2005; Collins et al., 1991). Additionally, within history education, several studies discuss modelling as an important principle

(De La Paz, 2005; De La Paz & Felton, 2010). Therefore, we expect that modelling can assist students in translating their knowledge into skills that they can apply in the essay task.

Future research should seek to strengthen these conclusions by conducting a more strictly randomized experiment based on an improved design and several changes made to the research instruments. In addition, research could focus on other age groups or cultural settings to raise more knowledge about the generalizability of our pedagogical principles and instruments, and the feasibility of our lesson goals. Furthermore, research might focus on how causal historical knowledge, strategies and beliefs can be effectively integrated into a reasoning skill that is transferable to other explanatory tasks. Fourth, future research should seek to transfer the design principles and the research instruments to other types of historical reasoning (i.e. reasoning with change and continuity, judging sources). Researchers and practitioners should work to explicate the conceptual knowledge and strategies that underpin these types of reasoning and develop a common language that enables designing lessons and assessing students' learning gains. Furthermore, more specific and conceptually valid research instruments should be developed to assess elements of historical reasoning. Finally, research outside the domain of history could add many insights to the generalizability of our framework of knowledge dimensions involved in historical reasoning, of the pedagogical principles that we formulated and of the types of assessment we created.

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Appendix 1. Scoring rubric—ability to construct a historical explanation

	Beginning	Developing	Adequate	Points
Structural causes	The author mentions no or only one historically correct structural cause	The author mentions two historically correct structural causes	The author mentions three or more historically correct structural causes	Max 2
Substantiation of structural causes[a]	The author does not substantiate any structural cause with concrete historical events (incidental causes). OR: the author only superficially elaborates one or two structural causes (for instance, elaboration without using incidental causes or without making clear the relationship between a structural and incidental cause)	The author substantiates one or two structural causes with concrete historical events (incidental causes). OR: the author superficially elaborates more than two structural causes (for instance, elaboration without using incidental causes or without making clear the relationship between a structural and incidental cause)	The author substantiates more than two structural causes with concrete historical events (incidental causes)	Max 2
Direct causes	The author only mentions indirect causes	The author mentions both direct and indirect causes. However, the relationship between direct and indirect causes remains implicit or is absent	The author mentions both direct and indirect causes. The author makes the relationship between them explicit (connecting direct and indirect causes)	Max 2
Explanatory model	Concrete. The author describes causality on a linear level	Abstract. The author describes causality on an abstract level, but this genre is still in development. The structure of the text can be characterized as messy or incomplete	Abstract. The author describes causality on an abstract level and does so in an appropriate and structured manner	Max 2

(*Continued*)

Appendix 1. (*Continued*)

	Beginning	Developing	Adequate	Points
Use of second-order language/causal connections	The author uses no or few causal connectors or second-order language (this category also applies to students who only use 'because' and 'therefore', unless this is done in a very thorough manner)	The author uses causal connectors and second-order language, but such language is almost exclusively aimed at organizing the text (i.e. first, multiple) AND/OR: The author makes adequate use of connection words (throughout the text, in a correct way, that makes clear the causal links)	The author uses causal connectors and second-order language not only to organize but also describe impact and directness (evaluate) AND/OR: The author uses a rich repertoire of causal connectors that describe nuanced relationships (and differences) between causes (i.e. this stimulated, in the background)	Max 2
Evaluation	The text is descriptive or summarizing. No evaluation is made: the author makes no historical claim, or this claim is not or barely supported by the essay (neither at the end, at the beginning or throughout the text)	A conclusion is being drawn in the text (a historical claim is made). The claim is underpinned only by pro-arguments (at the end, at the beginning or throughout the text)	An evaluation is being made. The author weighs the significance of different causes and provides argumentation in which counterarguments play a role	Max 2
Historical correctness	Historical facts, dates, concepts, etc. are (partly) incorrect. These mistakes are substantial	Historical facts, dates, concepts, etc., are correct	Historical facts, dates, concepts, etc. are correct, and concrete historical information plays an important role in the text	Max 2

[a]On this criterion, argumentation is an important element (the relationship between structural and incidental causes must be described).

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