Conceptions underlying the construction of knowledge: A model from history teaching*

Concepciones subyacentes a la construcción del conocimiento: un modelo desde la didáctica de la historia

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Abstract:

The aim of this article is, given the scarcity of studies in the field of education, to establish a model of the concepts underlying the methodological dimension of the construction of historical knowledge. To do so, we start by defining the operations of the historical method, which make up the empirical variables. We then consider the contributions from didactics to define the constructs. The initial model comprises two dimensions: structuring operations, which are defined as the operations essential for proceeding in accordance with the historical method, which entails methodical thought; and alternative operations, which provide divergence and multiplicity, in accordance with an avant-garde history. To verify the model, we designed an objective instrument with 44 items and carried out a study with 222 subjects, aged between 13 and 18. The data were analysed using a variety of procedures (Pearson correlations, CFA, descriptive statistics, etc.), using SPSS and MPlus statistical software. Among other interesting results, verifying the proposed model involves verifying a structure established in accordance with the nature of the operations, confirming the proposed dimensions. This configuration of the model has implications for the field of research as well as direct consequences for classroom practice.

* This work was carried out under the framework of the predoctoral contract (19811/FPI/15) of the Seneca Foundation, Science and Technology Agency of the Region de Murcia, held by the first author, and of the project "The evaluation of competences and the development of cognitive capacities regarding history in compulsory secondary education" (EDU2015-65621-C3-2-R).

Revision accepted: 2021-12-15.

This is the English version of an article originally printed in Spanish in issue 282 of the **revista española de pedagogía.** For this reason, the abbreviation EV has been added to the page numbers. Please, cite this article as follows: Ponce Gea, A. I., & Sánchez-Pérez, N. (2022). Concepciones subyacentes a la construcción del conocimiento: un modelo desde la didáctica de la historia | *Conceptions underlying the construction of knowledge: A model from history teaching. Revista Española de Pedagogía, 80* (282), 269-287. https://doi.org/10.22550/REP80-2-2022-04

https://revistadepedagogia.org/ ISSN: 0034-9461 (Impreso), 2174-0909 (Online)

Keywords: conceptions, historical thinking, methodical thought, creative thought, secondary education.

Resumen:

En este artículo, y atendiendo a la escasez de estudios en el ámbito educativo, delimitamos como objetivo configurar un modelo de concepciones subyacentes a la dimensión metodológica de la construcción del conocimiento histórico. Para ello, en primer lugar, delimitamos las operaciones del método histórico, que constituyen las variables empíricas, considerando, en segundo lugar, las aportaciones desde la didáctica, para definir los constructos. El modelo inicial está constituido por dos dimensiones: operaciones estructurantes, definidas como operaciones imprescindibles para proceder acorde con el método histórico, lo que implica un pensamiento metódico; y operaciones alternativas, que aportan divergencia y multiplicidad, acorde con una historia vanguardista. Para la confirmación del modelo, diseñamos un instrumento objetivo, de 44 ítems, realizando un estudio con 222 sujetos, de entre 13 y 18 años. La información fue analizada mediante diferentes procedimientos (correlaciones de Pearson, CFA, estadística descriptiva...), utilizando los programas estadísticos SPSS y MPlus. Entre otros resultados interesantes, la confirmación del modelo propuesto implica la verificación de una estructura establecida según la naturaleza de las operaciones, confirmando las dimensiones propuestas. Esta configuración del modelo presenta implicaciones para el ámbito investigador, pero también consecuencias directas para el trabajo en el aula.

Descriptores: concepciones, pensamiento histórico, pensamiento metódico, pensamiento creativo, educación secundaria.

1. Introduction

The aim of this work is to configure a model of the conceptions that underlie the methodological dimension of construction of historical knowledge, taking the educational sphere as its context and contributions from and for the teaching of history.

According to Johnston et al. (2017), there are three types of knowledge: declarative, conceptual, and epistemic. The last of these is the only one to address how we are able to know what we know and how knowledge is constructed within the framework of each discipline (Miguel-Revilla et al., 2021). Since research into personal epistemology began, principally with the work of Perry (1970), which was followed by later more systematic studies (Hofer, 2004; King & Kitchener, 2002; Schommer, 1990), there has been growing interest in epistemic thinking relating to specific domains (Greene, 2016), in other words, the types proper to each discipline.

This consideration of specific domains recognises that each discipline has its own specific characteristics. In the case of history, these include the distance between the present and the past and the ambiguity of historical objects (Prats & Fernández, 2017). None of this is novel within the

discipline. However, these matters, which are the subject of much historiographic debate, have only recently been included in the educational field (Miguel-Revilla et al., 2021). This is despite the recognition that knowledge of substantive content and procedural concepts does not suffice for developing historical thinking competences: knowledge of the epistemology of the discipline is also needed (Mathis & Parkes, 2020). In other words, the teaching and learning of history cannot be separated from how it originates and how knowledge of it is validated.

In this regard, study, in the educational field, of the beliefs that comprise a particular type of disposition towards knowledge, considering both their nature and how they are constructed (Hofer, 2004), known as epistemological theories, has been relatively frequent in relation to perceptions of history as a school subject or discipline (Miguel-Revilla & Fernández-Portela, 2017; Suárez, 2012; VanSledright et al., 2011; among many others). Nonetheless, the field of conceptions, in relation to the teaching of history, cannot be restricted to general theories about the nature of history or the form in which knowledge is built in the abstract. Instead it involves considering concepts that underlie how students themselves process information. We are not then strictly speaking about the epistemology of history but rather of what conceptions or constructions should underlie the operations students perform to construct historical knowledge, or, to put it another way, we address the concepts that underlie the methodological dimension of the construction of historical knowledge. These conceptions, as well as their ideal, are defined by using as a basis a review of the history teaching–learning process from the didactic transposition of the skills of a researcher; or, in other words, in accordance with the approaches done under the framework of the development of historical thinking by the didactics of history (Lee & Shemilt, 2003; Seixas, 2017; VanSledright, 2015, among others).

The lack of studies on the conceptions underlying the methodological dimension of the construction of historical knowledge may partly be explained by the different focuses in research into the historical perspective and research into the historical method (Duquette, 2015) or what VanSledright (2015) calls, respectively, organising procedural concepts and strategic competences. So, while the former (evidence, historical perspective, etc.) have been analysed from their intrinsic conceptual perspective, resulting in models that provide reference points for the teaching of history and research into didactics (Lee & Shemilt, 2003; Seixas, 2017), the latter, centred on method, have focussed on measuring the development of skills and not so much on the underlying conceptions. And in any case, one or more operations have been analysed independently and not the process of construction of knowledge as a whole (Wiley et al., 2020).

In addition to the above there is the inherent difficulty of quantifying this object of study, meaning that most research has been qualitative (Kropman et al., 2019) and that there are very few instruments that are useful in their own right for general-

ising the results. Among others, we note the *Beliefs about History Questionnaire (BHQ)* (Maggioni et al., 2010), the *Historical Thinking Test (HTT)* (Smith, 2018), and the *One-Hour Test* (Seixas et al., 2015), which in no case consider the underlying conceptions for the process as a whole.

Within this framework, we set the objective of creating a model of the conceptions that underlie the methodological dimension of the construction of historical knowledge, a model that encompasses the set of operations involved in this construction, considering the development and application of a test for the construct as a whole.

1.1. Model of concepts underlying the construction of historical knowledge

There are two needs when configuring this model. Firstly, the operations involved in the construction of historical knowledge must be set out and defined so that they can be operationalised as empirical variables. Secondly, based on recent contributions from the didactics of history, hypotheses must be established regarding the different constructs that make up the model.

To delimit the operations, we review the literature about the historical method, considering three works with nuances that are of interest for establishing the variables. Aróstegui (1995), a reference point in the context of historiography, started description of the method in the construction of the first hypotheses, which is followed by observation of sources and an explanatory method, which considers the relationship between pieces of evidence, something that is essential in their positioning. Finally, he distinguishes a process which he calls *exposition*, focussed on solving the problem and elaborating of the historical discourse. Two decades later, in a relatively recent contribution, Alía (2016) distinguished similar operations, delimiting the selection of the topic and the justification as a preliminary step for constructing the first hypotheses. With regards to working with sources, he considered two different operations: description and systematic observation on the one hand and validation or checking on the other. The author gave the last of the processes he distinguished the name of explanation, in accordance with the importance of interpretation in its positioning. This process is equivalent to the exposition Aróstegui (1995) described, but is closer to analysis. The phases Ricoeur (2004) identified are of special interest owing to their vision of the historical method as a constructive process, in line with our postulates. The starting point for Ricouer's well-known proposal is the construction of historical knowledge as construction of discourses, understanding that the solution of any historical problem occurs in an ongoing way in three phases: the documentary phase, the explanation and understanding phase, and the representation. Some aspects of his description that are of interest for our proposal should be noted. Firstly, he identifies an explanation project as part of the documentary phase, which overlaps to some extent with the construction of the first hypotheses of Aróstegui (1995) and Alía (2016). In this documentary phase, sources are located and selected. Secondly, the representative phase is equivalent to the writing of the discourse. Therefore, the discourse is understood to be drawn up over the two

preliminary phases, with this last one being where the representation of the resolution is obtained. Finally, and in line with the above, the explanation–understanding phase is the cornerstone of the proposal, as it represents the step from the source to the elaboration of the discourse.

Having considered and compared these authors' definitions of operations, we opt for the definition of the operations in our model, understanding the process in its broadest sense and adopting names with didactic utility. On these lines, as shown in Table 1, the first operation we include is *Preliminary steps for formulating the problem*, considering the beliefs that influence the selection of the problem. We also adopt the title of *Formulating problems*, which includes the construction of the first hypotheses. Secondly, in relation to sources, we differentiate between *Searching for sources* (choice), *Reading sources* (evidence), and *Making inferences* (relations). Finally, we include the *Solving the question* and *Elaborating the discourse* operations, considering both the specific response to the problem and its justification, as well as the form and content of the discourse.

Having defined the operations in the model, it is necessary to establish hypotheses regarding the constructs that comprise the model, taking as a basis the definition of historical thinking from didactics, the concepts that underlie it, and the implication that the of the differentiation of dimensions for the teaching and learning of history.

Seixas and Morton (2013) define historical thinking as a creative process in which historians, through evidence from the past, generate stories about history. In one definition that is illuminating for our purpose, two elements are involved that are vital for the configuration of the model. On the one hand, thinking historically is linked to the creation of evidence-based accounts, positioning the historical method as cornerstone of any approach. In this regard, numerous formulations concerning historical thinking in the field of the didactics of history have taken the research method as a reference point to formulate the elements, dimensions, or concepts of historical thinking, approaching the idea of construction that we view as significant (for example, Smith et al. (2018) or Van Drie and Van Boxtel (2007)). In any case, developing historical thinking in students involves the development of skills in line with the scientific and critical thinking characteristic of the historian and the conception of knowledge as explained through methods, evidence, and arguments (Sakki & Pirttilä-Backman, 2019).

On the other hand, developing historical thinking entails elements of creative thinking, which Guerrero and Miralles (2017) reflect with the name of creative-historical thinking. Using this idea, some of the second-order concepts formulated in historical thinking are conceptualised and explained. So, the move from traces of the past, in the words of Rüsen (1994), to the construction of narrative involves gaps that necessarily require us to imagine how things we have no information about might have happened, locating the historical imagination as a fundamental component (Cooper, 2013). On the

same lines, comprehending the actions of the other in a past time – historical empathy – involves adopting perspectives that require us to imagine what the thoughts, feelings, and motivations of an agent from the past were in his or her context. Equally fundamental are the divergent elements when interpreting sources, not just creating unconventional relationships between pieces of evidence, but also posing creative questions about the source.

Consequently, historical thinking is conceived of as a type of higher-order thinking that tends towards reflection, relation and divergence in ideas, and a holistic perspective (Bartelds et al., 2020; Chapman, 2021; Cooper, 2013). Therefore, students are not just expected to act in accordance with the parameters of the scientific method, but also to include, as part of it, unconventional handling of information, creating original and diverse discourses that truly make knowledge progress.

Under this conceptual framework, in order to configure a model of the conceptions that underlie the methodological dimension of the construction of historical knowledge, we assume there are two types of operations, which make up the dimensions of the model, defined on the basis of the theoretical assumptions. On the one hand, there are structuring operations, defined as the operations vital for constructing historical knowledge based on the historical method. We undertake methodical thinking, in which there are principles that confirm the rigour of the arguments (López de la Vieja, 2009). On the other hand, there are some alternative operations (Chapman, 2021), which provide divergence and multiplicity when undertaking the construction of historical knowledge. Accordingly, these operations are not indispensable for a scientific process, understood in its most synoptic and general version, but are necessary for avant-garde history and propositions from didactics.

This differentiation between dimensions not only makes it possible to establish profiles in accordance with the conceptions underlying the construction of historical knowledge, something that makes it possible to classify students' conceptions into unscientific conceptions (if the conceptions linked to structuring operations have not been developed), scientific ones (if the conceptions linked to structuring operations are developed, but those linked to alternative ones are not), or avant-garde (if both are developed). It also makes it possible to eval uate the repercussions of a specific didactic proposal in line with its influence on the conceptual element, and, more importantly, to design future didactic interventions in line with students' needs. This question is of particular interest considering that a change in how a task is performed does not necessarily entail a modification of the underlying conceptions (Magionni et al., 2010), which is the ultimate aim of any intervention.

Based on this hypothesis, we regard each operation in the historical method as belonging to one or other of the dimensions, or to both, in which case the variable is duplicated, taking its methodical or creative character into account when defining it. Table 1 shows the initial model on which we carry out a first study, defining the dimensions and variables.

TABLE 1. Initial model of conceptions underlying the construction of historical knowledge.

Dimensions	Variables	Definition
Structuring operations	Formulating problems (methodical)	Evaluation of conceptions about the formulation of research problems (connection to the object of study, relevance, and materialisation) and the choice of the hypothesis for the start of the research process.
	Searching for sources (methodical)	Evaluation of conceptions about searching for diverse historical sources, justifying the validity of the sources through historical contextualisation, and considering multiple perspectives.
	Reading sources (methodical)	Evaluation of conceptions about the interpretation of the information offered by the source in its context as well as transformation in historical evidence.
	Making inferences (methodical)	Evaluation of conceptions about the selection of evidence relevant to the research problem, consideration of the complex relationships for making an inference and their evaluation with other discourses.
	Solving the question	Evaluation of conceptions about solving the problem, critique of the resulting discourse, and the conceptual change that the resolution implies.
	Elaborating the discourse	Evaluation of conceptions about the elaboration of the discourse are evaluated, understanding content and form as equally relevant in the resolution of the historical problem.
Alternative operations	Preliminary steps for formulating the problem	Evaluation of conceptions about the influence of prior conceptual schemes in the posing of problems and the questioning of official knowledge.
	Formulating problems (creative)	Evaluation of conceptions about the initial need to formulate multiple differing hypotheses, that might lead to the reformulation of the problem.
	Searching for sources (creative)	Evaluation of conceptions about the use of individual memories or unconventional information as a basis for searching for information, which entails identifying the perspectives on which sources can be constructed.
	Reading sources (creative)	Evaluation of conceptions about asking a variety of questions about sources, considering explicit and implicit aspects.
	Making inferences (creative)	Evaluation of conceptions about the creation of novel connections between pieces of historical evidence.

Source: Own elaboration.

2. Method

2.1. Participants

To analyse the structure of the model, we undertook an initial study with students from compulsory secondary education. Purposive non-probability sampling was used, choosing students from non-consecutive levels in order to represent possible differences in levels of thinking and ensure a figure greater than five students for each item in the test (Abad et al., 2011).

The sample initially comprised 311 subjects (148 male, 163 female), aged between 13 and 18, from the first and third years of Educación Secundaria Obligatoria (compulsory secondary education – ESO) from the Region of Murcia (Spain). However, 89 subjects were excluded during the application and analysis owing to incorrect or partial completion of the test. Consequently, the final sample comprised 222 participants (98 male, 134 female), studying in the first year (119 participants) and third year (103 participants) of ESO and aged between 13 and 18 (M = 14.15, SD = 1.10).

2.2. Data collection: instrument and procedure

The *Prueba sobre la Construcción del Conocimiento Histórico (Construction of Historical Knowledge Test–CONCONHIS)* was used and validated accepting the proposed model. This test is specifically intended to measure conceptions underlying the methodological dimension of the construction of historical knowledge by students aged between 12 and 16. This is a standardised, objective, non-verbal test, comprising 44 items divided into two parts. The two parts of the test include parallel items for each aspect of the meaured variable.

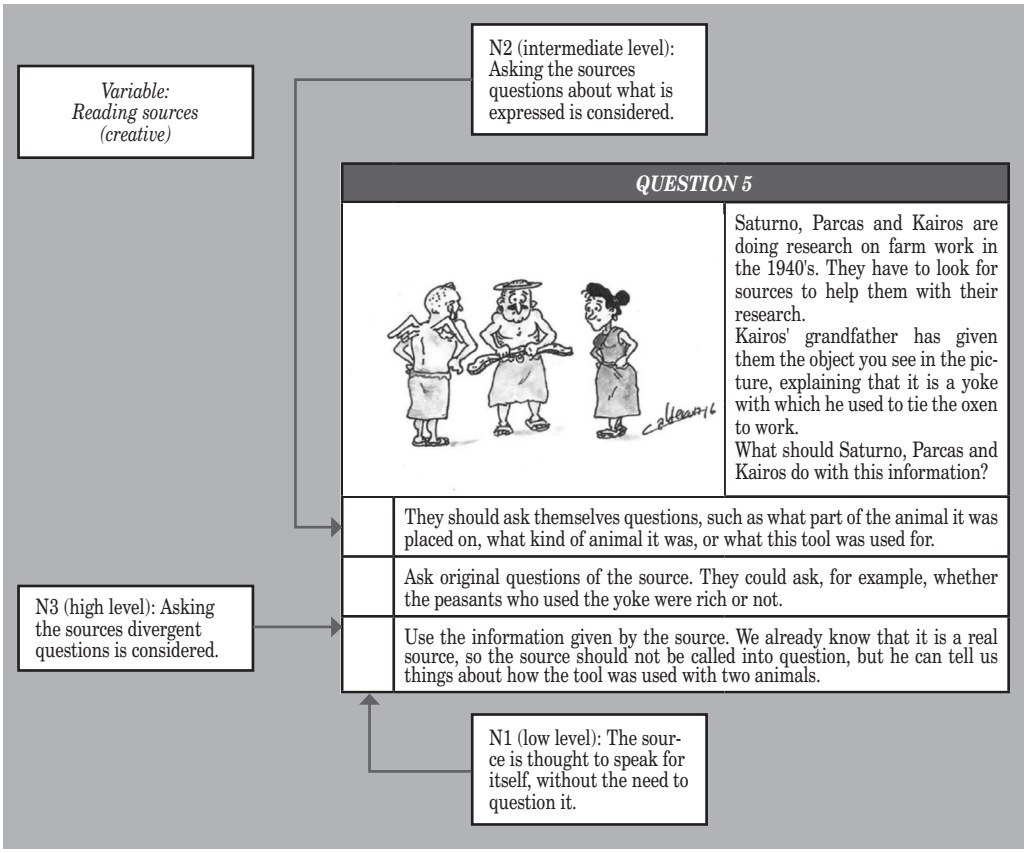
The items are all multiple-choice questions, with three answer options, from which the participants select the one they identify with the most. Their structure includes the situation before which subjects must position themselves in the statement, and each answer option corresponds to a level of development of the variable being measured. Furthermore, all of the items in the *CONCONHIS* test include an image alongside the statement and one or more of the characters (Saturn, Kairos, and the Parcas) that function as the main didactic axis of the test. Graph 1 shows one of the items and its operationalisation based on the *Reading sources (creative)* variable. The complete test and the extent of its validation process can be found in other works (Ponce, 2019).

Its application was done under a cooperation agreement between the Ministry of Education, Youth and Sport of the Autonomous Community of the Region of Murcia and the Universidad de Murcia. It had a favourable report from the university's ethics committee and informed consent from the research subjects, whose confidentiality was safeguarded.

The *CONCONHIS* test was applied collectively in the previously established groups in the educational centre, which ranged between 21 and 32 students. Data collection was done in two phases between two and three weeks apart, with one of the two parts of the test being applied in each one. The instructions were given in

writing, and participants were told orally to complete the tests individually and that there were no correct or incorrect answers. The participants had up to 50 minutes to complete each part, and had to write their answers in the test booklet itself.

GRAPH 1. Example of an item from the *CONCONHIS* test.



Source: Own elaboration.

2.3. Data analysis

The test score is obtained by calculating the mean of items from the same scale, with values ranging between 1 and 3, both for the variables and for the dimensions, included in Table 1. Values of 1, 2, and 3 are defined as low, medium, and high development in the corresponding underlying concepts. We consider a score of 2.50 to be the minimum required for each scale to be classed as developed.

However, interpretation of the scores differs depending on the dimensions of the model, as well as for the scales of the empirical variables that comprise them, in accordance with the theoretical framework: the higher the score for the *Structuring operations* dimension, the closer the underlying conceptions are to a historical procedure; the higher the score for the *Alternative operations* dimension, the closer the underlying conceptions are to a diverging process. Finally, both

dimensions must be developed if some of the conceptions are to be regarded as compatible with the development of historical thinking.

Data analysis was done in four consecutive steps. First, we calculated the descriptive statistics (means and standard deviations) and Pearson correlations for the scales in the questionnaire. We then analysed possible differences by age. Next, considering the conceptual bases and without performing a prior exploratory factor analysis (EFA), we carried out confirmatory factor analysis (CFA) to test the factor structure as a function of both latent variables with their respective scales. Finally, we examined the internal validity coefficients of the latent variables and calculated their descriptive statistics. To perform these analyses, we used the SPSS, version 24, and MPlus statistics programs.

3. Results

3.1. First-order variables: descriptive statistics and correlations

Firstly, we calculated skew and kurtosis coefficients to test whether the scores on the scales in the *CONCONHIS* test followed a normal distribution, and we also calculated the descriptive statistics (mean and standard deviation) for each scale (see Table 2).

As Table 3 shows, within the scales proposed for the *Structuring operations* latent variable, *Solving the question* and *elaborating the discourse* correlate positively and significantly (r = .35***) with *Formulating problems (methodical)* (r = .24*** and .22**, respectively), *Searching for sources (methodical)* (r = .28*** and .21**, respectively), and *Reading sources (methodical)* (r = .23** and .18**, respectively). Furthermore, there are positive and marginally significant correlations between the *Reading* and *Searching for sources* variables (methodical in both cases) (r = .13†) and between *Elaborating the discourse* and *Making inferences (methodical)* (r = .11†).

As for the scales proposed for inclusion in the *Alternative operations* latent variable, *Preliminary steps for formulating the problem*, *Formulating problems (creative)*, and *Searching for sources (creative)* are significantly and positively related (r = .32*** and .22**, respectively). In contrast, the *Reading sources (creative)* scale either does not correlate with the other scales included in *Alternative operations* (r = .08 for *Preliminary steps*) or does so at a marginal level (r = .11†, both for *Formulating problems (creative)*, and for *Searching for sources (creative)*), while *Making inferences (creative)* only correlates significantly with *Preliminary steps* (r = .16*).

3.2. First-order variables: differences by year

In order to establish possible differences by year in the scales relating to the construction of historical knowledge, we carried out Student's t test for independent samples for each of the scales. The analyses gave significant results for the scales of *Formulating problems (methodical)* (t(220) = -4.98***), *Formulating problems (creative)* (t(220) = -4.02***), *Searching for sources (methodical)* (t(211.11) = -4.35***), *Searching for sources (creative)* (t(219.30) = -4.58***), *Solving the question* (t(218.38) = -7.46***), and *Elaborating the discourse* (t(220) = -5.44***).

TABLE 2. Descriptive statistics for the scales in the *CONCONHIS* test

	Kurtosis	Skew	Overall	Y1 of ESO (*n*=119)	Y3 of ESO (*n*=103)
Preliminary steps for formulation	-.73	-.27	2.29 (.44)	2.26 (.43)	2.32 (.45)
Formulating problems (met.)	-.43	-.41	2.34 (.39)	2.23 (.39)	2.48 (.34)
Formulating problems (cre.)	-.92	-.39	2.22 (.68)	2.06 (.68)	2.41 (.63)
Searching for sources (met.)	-.43	-.44	2.36 (.32)	2.28 (.35)	2.46 (.25)
Searching for sources (cre.)	-.22	-.60	2.35 (.46)	2.23 (.48)	2.50 (.40)
Reading sources (met.)	-.21	-.47	2.45 (.34)	2.41 (.37)	2.50 (.30)
Reading sources (cre.)	-.49	-.17	2.01 (.47)	2.00 (.54)	2.02 (.39)
Making inferences (met.)	-.40	316	2.04 (.36)	2.04 (.37)	2.03 (.35)
Making inferences (met.)	-.44	.07	1.90 (.51)	1.90 (.55)	1.89 (48)
Solving the question	-.49	-.46	2.36 (.32)	2.22 (.32)	2.51 (.25)
Elaborating the discourse	-.99	-.20	2.25 (.60)	2.05 (.57)	2.47 (.55)

Source: Own elaboration.

TABLE 3. Pearson correlations between the scales of the *CONCONHIS* test.

		1	2	3	4	5	6	7	8	9	10	11
1	Preliminary steps	1										
2	Problem (met.)	.00	1									
3	Problem (cre.)	.32***	.17*	1								
4	Searching (met.)	.19**	.10	.20**	1							
5	Searching (cre.)	.22**	.19**	.26***	.19**	1						
6	Reading (met.)	.10	.06	.20**	.13†	.26***	1					
7	Reading (cre.)	.08	.06	.11†	.09	.11†	.01	1				
8	Inference (met.)	.03	-.04	.08	.10	-.10	.07	-.07	1			
9	Inference (cre.)	.16*	.02	-.05	.01	-.03	-.03	-.00	.08	1		
10	Solving	.21**	.24***	.27***	.28***	.36***	.23**	.10	.03	-.02	1	
11	Elab. discourse	.01	.22**	.16*	.21**	.21**	.18**	.00	.11†	-.02	.35***	1

Source: Own elaboration.

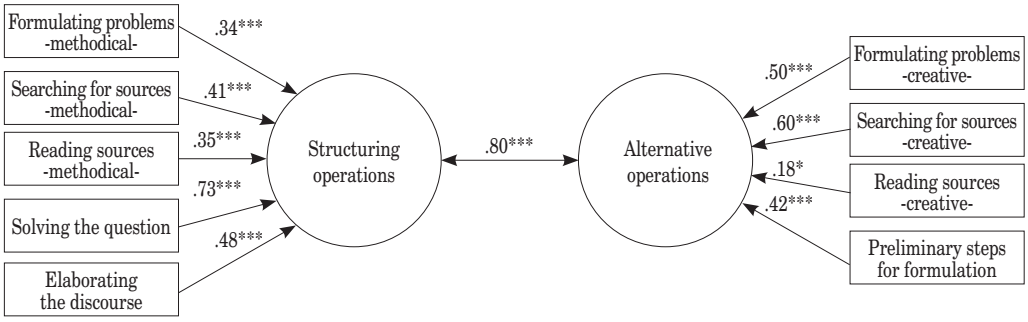
The results indicate that third-year students reported underlying conceptions that were closer to the ideal than those of the first-year students in formulating problems, looking for sources, and resolution of questions. No differences by level were found for preliminary steps, reading sources, or making inferences.

3.3. Confirmatory factor analysis

We performed a first CFA with two latent variables: *Structuring operations* (*Formulating problems -methodical-, Searching for sources -methodical-, Reading sources -methodical-, making inferences-methodical-, Solving the question and elaborating the discourse*) and *Alternative operations* (*Preliminary steps, Formulating problems -creative-, Searching for sources -creative-, Reading sources - creative - and making inferences -creative-*). The results of the CFA gave satisfactory values (CFI = .99, TLI = .99, RMSEA = .01, and SRMR = .04). As for the indicators of the latent variables, all of the scales have significant loadings in them, apart from the *Making inferences (methodical)* (*standardised beta* = 0.05, p = .506) and *making inferences (creative)* (*standardised beta* = -.02, p = .827) variables.

Having excluded these variables from the analyses, the model's indices of fit improved (CFI = 1, TLI = 1, RMSEA < .001, and SRMR = .04) and all of the scales had positive and significant loadings in the proposed latent variables (see Graph 2).

GRAPH 2. CFA of *CONCONHIS*.



Source: Own elaboration.

3.4. Second-order variables: internal validity, descriptive statistics, and differences by year.

Having verified the factorial structure of the questionnaire, we calculated the internal validity of the second-order variables using Cronbach's alpha. In the case of the *Structuring operations* variable (24 items), the α was .58. Analysing the item–test correlation showed that three items (9, 26, and 32) had a negative correlation, and so these were eliminated, giving an α level of .62 (21 items). In the case of *Alternative operations* (12 items), the α was .52. Two items (5 and 28) had an item–test correlation close to zero, and so were eliminated, giving an α of .56 (mean test–item correlation of .25). Subsequently, the indices of kurtosis, skew,

and descriptive statistics (mean and standard deviation) were calculated for the second-order variables (see Table 4).

Finally, we analysed the potential differences by year in these variables using Student's *t* test for independent samples. The results display significant differences in *Structuring operations*, $t(220) = -9.65^{***}$, and *Alternative operations*, $t(220) = -4.40^{***}$, in favour of third-year students.

TABLE 4. Descriptive statistics for the second-order scales in the *CONCONHIS*

	Kurtosis	Skew	Overall	Y1 of ESO (*n*=119)	Y3 of ESO (*n*=103)
Structuring operations	-.75	-.37	2.40 (.25)	2.28 (.22)	2.54 (.19)
Alternative operations	-.60	-.33	2.31 (.36)	2.21 (.35)	2.42 (.34)

Source: Own elaboration.

4. Discussion and conclusions

In view of the aim of creating a model of the concepts underlying the methodological dimension of the construction of historical knowledge, this empirical study offers results suitable for discussion in relation to verification of the model and its latent variables, the behaviour of empirical variables, and the differences between educational levels, always within a framework of statistical results that can be improved.

Firstly, verification of the proposed model involves the testing of a structure organised according to the nature of the operations, in two related dimensions: *Structuring operations* and *Alternative operations*. Consequently, characterising operations in accordance with the thinking with which they are associated is key when understanding how the underlying concepts are organised. This organisation of variables is in line with our starting hypothesis for configuring the conceptual bases of the construct, distinguishing the methodical and the creative as cornerstone of the proposal. Furthermore, the significant correlation between the second-order scales underlines the connection between structuring conceptions and alternative conceptions, consistent with the definition of historical thinking as creative thinking (Seixas, 2017), history as an exercise of freedom (Ramada, 2013), and, ultimately, the need to teach history creatively (Cooper, 2013).

Secondly, the behaviour of the first-order variables offers some more specific results with a particular impact at the theoretical level. On the one hand, eliminating the variable relating to making inferences stands out in the redefinition of the model. An internal review of the test detected an overlap with the items corresponding to the *Reading sources (methodical)* variable, with an identical formulation. Although the differentiation between evidence and

inference in educational measurement has been the subject of debate (Mislevy, 1994), both operations involve deductive process that are difficult to differentiate when expressed as items in a closed-response format. Notwithstanding any reformulation in later studies, we believe that removing this variable does not invalidate the model, as the epistemological concepts can be understood to be included in *Reading sources (methodical)*. On the other hand, when defining the construct, it is important to consider the importance of the variables that relate to solving the question, something that goes hand in hand with the definition of the construction of knowledge as the construction of discourse. On this line, the *Solving the question* and *Elaborating the discourse* variables are fundamental, with correlations between them and with the scales defined for formulating the research problem or searching for and reading sources. These empirical results again confirm the theoretical propositions: on the one hand, the content and form of the discourse are two inseparable realities when considering the discourse in the communicative framework (Domínguez-Rey, 2013); on the other hand, elaborating the discourse does not correspond with writing it, but instead is continuously related to the other procedures involved in knowledge construction (Ricoeur, 2004). For its part, the relationship between knowledge and prior experience and the type of problems and sources used is consistent with the principle of this study for which developing thinking is not simply a question that is procedural in nature but is also an attitude towards history (Thorp & Persson, 2020).

Thirdly and finally, there are differences in students' scores, with third-year students being closer to the ideal than first-year students. This matter is consistent with many studies carried out on the subject of the development of historical thinking, which, from a Piagetian base, reveal greater difficulties among children and adolescents owing to the abstraction required in temporal concepts (Pagès & Santisteban, 2010). Likewise, the fact that differences by level are greater for *Structuring operations* might be explained by the type of skills this discipline has traditionally paid the most attention to in the Spanish educational system, fundamentally through text books (Martínez-Hita & Gómez-Carrasco, 2018).

4.1. Limitations of the study

While carrying out this work, we observed limitations intrinsic to the object of study itself and others that are specific to our approach. Among the latter type, the results of this research suggest that a study with a larger and more heterogeneous sample of participants will make it possible to verify the model in different scenarios and obtain scores that can act as points of reference. Similarly, a review of problematic items in the test is needed to improve their internal consistency for more reliable work with the model. In any case, the reliability of the instrument is lower than is considered to be acceptable and the correlations observed are low or very low. This means that the results must be interpreted with the prudence that these data suggest, and also that future studies to improve these parameters should be undertaken.

5. Conclusion

In this study we set ourselves the aim of establishing a model for the conceptions underlying the methodological dimension of the construction of historical knowledge, in the framework of the teaching of history. In accordance with the results, we conclude that the bases for a model of conceptions about the construction of historical knowledge have been provided, based on the nature of the operations, albeit not without some need for improvement. This leads us to consider some ideas by way of conclusions.

Firstly, the results obtained underline the difficulty of quantifying a construct that is eminently qualitative and highly complex. In this sense, despite criticisms of quantitative research projects, it is vital to continue with this type of work, where there is a lack of studies. Establishing defined, empirically tested models with objective tests that enable their measurement is the only way to generalise results that can, sometimes, be seen as indispensable. This also makes it possible to obtain information rapidly, with the benefit this can provide for the teaching–learning process. All of this should be understood, and especially for the construct measured, as complementing a qualitative focus.

Secondly, in line with the above, careful definition of constructs is essential, clearly defining what the aim of the model is. On this line, the study is part of the measurement of conceptions that are linked to the methodological, viewing the process of construction of historical knowledge as a whole. In view of this, we accept the idea that if the ultimate intention of history is to prepare citizens for the society to which we aspire, then achieving a public history that is made by, for, and with the citizen (Torres-Ayala, 2020), then the application of skills without a coherent model of the underlying conceptions means that, at the very moment that individuals find themselves in unknown situations, they will frequently apply traditional patterns, which are far from being scientific (Fuentes, 2004). Therefore, we find ourselves before a learning of history, without effects for social transformation. Hence, the importance of working on the configuration of this sort of model.

Thirdly, if we truly want to support combining research and innovation, then models, even if they are operationalised in the plane of research, must be conceptualised in accordance with their usefulness in the classroom. This idea is also applicable to the design of instruments. In this sense, and despite the improvements identified for the model, the proposed configuration involves a basis for reflection on teaching practices and students' needs while also offering an attractive test that is suitable for partial use in specific didactic proposals. Promoting a teaching of history that goes beyond handling a technique in the framework of development of civic competence, is translated, in our proposal, into the development of the structural and alternative operations. The configuration of the model and delimitation of its variables allows the teacher to identify operations where work with students is more necessary to approach the ideal of conceptions. On the same lines, it makes it

possible to test the impact of the didactic proposals implemented, which contributes to well-founded teaching practices.

We, therefore, consider the contributions from this approach to the model to be a necessary step towards work on its filtering and improvement.

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