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Enhancing Historical Reasoning: A Strategy Including Formative Assessment with Systematic Continuous Feedback

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Enhancing Historical Reasoning: A Strategy Including Formative Assessment with Systematic Continuous Feedback

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Abstract

Learning History promotes students' reasoning. According to Van Drie & Van Boxtel (2008), historical reasoning involves six elements: substantive concepts, metaconcepts, asking historical questions, using sources, contextualization, and argumentation. Although there are didactic strategies that promote historical reasoning, these do not include systematic continuous feedback using rubrics, which can be useful both in assessing and promoting students' progress and progression of ideas on metaconcepts. This study described the development of the six historical reasoning elements in a strategy that included formative assessment for K8 students. A case study was carried out in Mexico City: four teams of three students were formed according to their knowledge of history, with a single History teacher providing continuous systematic feedback on metaconcepts by using graded rubrics. Results showed that the six historical reasoning elements were developed in different ways and suggested possible methods for use in future didactics.

Keywords: historical reasoning, formative assessment, progression of ideas, rubrics

Promoviendo el Razonamiento Histórico: una Estrategia de Evaluación Formativa con Feedback Sistemático

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Resumen

La Historia promueve el razonamiento en los estudiantes. El razonamiento histórico involucra seis elementos: conceptos sustantivos, metaconceptos, realizar preguntas históricas, uso de fuentes, contextualización y argumentación (Van Drie y Van Boxtel, 2008). Las estrategias didácticas que promueven dicho razonamiento no consideran la retroalimentación sistemática continua mediante rúbricas, que evalúan progreso y progresión de ideas en metaconceptos. El propósito de este estudio fue describir el desarrollo de los seis elementos del razonamiento histórico en una estrategia que involucró evaluación formativa en estudiantes de segundo grado de secundaria. Se trabajó un estudio de caso en la Ciudad de México: cuatro equipos de tres estudiantes; el profesor de Historia brindó retroalimentación sistemática continua mediante rúbricas calificadas. Los resultados mostraron que los elementos del razonamiento histórico fueron desarrollados de diferente manera y se sugirieron posibles métodos para futuras didácticas.

Palabras clave: razonamiento histórico, evaluación formativa, progresión de ideas, rúbricas.

History is a subject that has many purposes at school, such as facilitating the comprehension of present times, developing intellectual skills, stimulating extracurricular activities, and acquiring social, aesthetic, and scientific sensibilities (SEP, 2011, p.33). Most importantly, in the process of doing History students develop their reasoning (Lévesque, 2008; Van Drie & Van Boxtel, 2008; Wineburg, 2001). However, despite the potential that History as a subject has, it has lost presence in curricula (Wineburg, 2001) and has been overshadowed in education by Mathematics, language and sciences (Carretero & Castorina, 2010). This is also the case in Mexico, where an evaluation of the subject of History carried out every three years has shown increasingly low scores (SEP, 2010).

In a study on the current state of History teaching in Mexico, Plá & Latapí (2014) stress that, from a psychological point of view, many theoretical and methodological aspects of teaching History are omitted, and that the teaching of this subject from a sociocultural point of view is at an early stage.

Studies on the teaching of History tend to refer to the development of either historical reasoning or historical thinking (Lévesque, 2008; Levstik & Barton, 2011; Wineburg, 2007). Generally speaking, their components are similar and go beyond memorization, a common practice in history teaching that does not demand a high degree of cognitive activity (Carretero & Castorina, 2010). Nevertheless, Van Drie & Van Boxtel (2008) mention that “historical reasoning” emphasizes the students’ activities, through which they acquire information of the past and use this knowledge to interpret phenomena of past and present times (p.88); and propose a framework for secondary students which considers the following elements: substantive concepts, metaconcepts, asking historical questions, using sources, contextualization, and argumentation.

Formative assessment is a requirement in the Mexican curriculum for secondary school, which enables teachers to provide feedback to students during the learning process by developing learning strategies (SEP, 2013). Studies on formative assessment show that it can substantially improve students’ learning by helping them to understand the learning objectives and

the assessment criteria based on the provided feedback (Black and Wiliam 1998).

Rubrics are used in formative assessment to evaluate students' performance based on learning standards and scales (Mertler, 2001); teachers can rely on rubrics for promoting the learning of content during the educational process (Heritage, 2010). They can also help students judge and comment on their learning, which helps them understand the goal of the rubrics in relation to the established criteria (Sadler, 1989, 1998). Referring to History, there are rubrics in order to assess students' historical reasoning in writing tasks (Monte-Sano & De La Paz, 2012), rubrics for evaluating epistemological instances in historical thinking (Lévesque, 2012) and rubrics that assess historical explanations based on narratives (Levstik & Barton, 2011).

In formative assessment, it is important to take both students' progress and progression into account. The former refers to the acquisition of information that leads students to achieve better grades, while the latter considers both the acquisition of information and the development of the structure of students' ideas (Lee & Shemilt 2003). According to Lee & Shemilt (2003), using metaconcepts or procedural concepts in History teaching is crucial for developing historical thinking, as using only substantive concepts fails to develop the progression of ideas. In addition, Shepard (2009) argues that strategies should include transectional measures in the longitudinal progress, such as assessing various episodes during the educational experience in terms of the progression of ideas. Such progression occurs when students are able to carry their ideas from a concrete level to a critical one (Lévesque, 2012). This can be achieved by providing systematic continuous feedback supported by rubrics in which the progression is evaluated at different levels.

Various studies on teaching History in Mexico have applied formative assessment and show its importance for facilitating the learning process by providing feedback (Plá et al., 2012). Despite the fact that formative assessment refers to the learning process and not only to the end result (Sadler, 1989, 1998; SEP, 2013), the strategies for teaching History which include formative assessment generally disregard the progression of ideas of the metaconcepts, which, according to Lévesque (2008), students need to

appropriate in the process of doing history. In addition, these strategies do not provide continuous systematic feedback, which would make it possible to assess whether students' ideas progressed from a concrete level to a critical one (Lévesque, 2012), and would allow students themselves to assess the progression of their ideas more than once. Finally, there are no strategies in Mexico including formative assessment which take into account the six elements of the historical reasoning framework proposed by Van Drie & Van Boxtel (2008) as a whole.

Purpose of the Study

This study describes a strategy for promoting historical reasoning based on the framework proposed by Van Drie & Van Boxtel (2008) and designed for K8 students in a public secondary school in Mexico, as well as its implementation in a case study in which student's development of the six elements of historical reasoning was observed. The strategy includes formative assessment in order to provide systematic continuous feedback to students based on the rubric criteria which show the progression of ideas of the metaconcepts considered in this study. The ultimate objective of this study is to help students learn to reason and to comprehend history, as well as to provide teachers with a method for designing strategies that promote historical reasoning, without the sole use of memorization.

Strategy Design

This section analyzes the elements of Van Drie & Van Boxtel's (2008) framework, and describes their inclusion in the strategy design.

Substantive concepts

Substantive concepts refer to historical information that can be found in history books, textbooks, films, accounts, and in students' understanding of certain issues, events, phenomena, characters (Lévesque, 2008; Wineburg, 2001), and historical periods (Van Drie & Van Boxtel, 2008). The five historical periods considered in this strategy are those proposed by the Mexican K8 History program (SEP, 2011a). Based on these periods, an open-ended questionnaire was designed to assess the students' degree of historical knowledge by asking them what main historical events happened (see Figure 1).

Name: _____ Average: _____
HISTORICAL EVENTS QUESTIONS
The following questions intend to find out what information you have about certain historical events. Please answer the questions below, do not leave any unanswered. These answers will not affect your school grade. If you have any questions, raise your hand and the teacher will clarify your doubt. Thanks for your participation.
1. - What historical event was the most important in the period from 1960 to 2013?
2. - What historical event was the most important in the period from 1920 to 1960?
3. - What historical event was the most important in the period from 1850 to 1920?
4. - What historical event was the most important in the period from 1750 to 1850?
5. - What historical event was the most important in the period from 1550 to 1750?

Figure 1. Open-ended questionnaire to assess students' historical knowledge.

Procedural Concepts or Metaconcepts

Procedural concepts or metaconcepts give meaning to the substance of the past by promoting historical inquiry (Lévesque, 2008) and by developing the description and understanding of historical processes (Limón, 2002). In this strategy, we included the metaconcepts mentioned in the History program—causality, progress and decline, primary and secondary sources (SEP, 2011, p. 75)—as well as those representing the past-present-future relation (Pagès, 2003), crucial for developing historical consciousness: Historical significance (importance in the past), Effects in the present, and Envisioning future events.

For this strategy, we designed six rubrics, one for each of the metaconcepts mentioned above (see Table 1), and used them to provide systematic continuous feedback on the progression of the students' ideas in order to encourage students to use them as a learning support by judging their own performance with a critical attitude (Andrade & Du, 2005). Six experts reviewed them and obtained an inter-agreement of 94%, confirming that each rubric was well constructed and that its criteria showed the progression of ideas for each metaconcept considered. In what follows, we describe how the progression of ideas of each metaconcept was assessed. Figure 2 shows the rubric levels describing the progression of ideas for each procedural concept.

Procedural concepts	Rubrics' levels					
	0	1	2	3	4	5
Historical significance	The group fails to mention any event embedded in the period	The group is able to mention only events that affect individuals or their communities, villages, schools, workplaces, towns, etc.	The group mentions, in greater numbers, events which affects a country	The group mentions, in greater numbers, events that have affected several countries (international)	The group mentions, in greater numbers, events that have global impact, but does not mention more than five	The group mentions events that have global impact (more than five)
Consequences	The group is not able to mention any kind of consequence related with the historical event	The group is able to mention many beneficial consequences or many harmful ones related to the historical event	The group mentions one beneficial consequence and one harmful consequence related to the historical event	The group mentions many consequences, and at least, one beneficial consequence and one harmful consequence	The group is able to mention many consequences (at least three beneficial consequences and three harmful ones) related to the historical event	The group mentions many consequences related to the historical event (more than three beneficial and more than three harmful)
Effects in the present	The group doesn't relate the effects of the historical event to nowadays	The group is able to relate the effects of the historical event to nowadays considering communities, villages, schools, workplaces, towns, etc.	The group relates the effects of the historical event to the current situation of a country	The group is able to relate the effects of the historical event to the current situation of many countries (internationally)	The group relates the effects of the historical event to the worldwide situation (at least three)	The group is able to relate the effects of the historical event considering completely the worldwide situation (more than three)
Causality	The group doesn't mention any historical character or condition that explains a cause related to the historical event	The group only mentions specific historical characters that explain the causes of the historical event	The group mentions more specific historical characters than the conditions that explain the causes of the historical event	The group mentions more conditions than historical characters that explain the causes of the historical event	The group mentions just the conditions that explain the causes of the historical event	The group mentions just the conditions that explain the causes of the historical event (more than three)
Historical sources	The group doesn't mention any kind of historical source related to the historical event	The group mentions just secondary sources related to the historical event	The group mentions in great number more than primary ones related to the historical event	The group is able to mention primary sources more than the secondary ones related to the historical event	The group just mentions primary sources of the historical event (less than three)	The group is able to mention just primary sources of the historical event (more than three)
Envisioning future events	The group doesn't envision any future event based on the effects of the historical event	The group is able to envision future events based on the effects of the historical event considering communities, villages, schools, workplaces, towns, etc.	The group envisions more future events, based on the effects of the historical event, considering a country	The group envisions more future events, based on the effects of the historical event, considering many countries (internationally)	The group envisions more future events, based on the effects of the historical event, considering worldwide situation (no more than three)	The group is able to envision just future events, based on the effects of the historical event, considering the worldwide situation (more than three)

Figure 2: Levels of the rubrics that show the progression of ideas for each procedural concept

Historical significance refers to the individual's capacity of identifying the most significant events (Lomas, 1990). The progression of ideas in this procedural concept was assessed by asking students to differentiate between events that involve a single person or place (Level 1 in the rubric), and those involving a larger number of people worldwide (Level 5 in the rubric); this assessment was based on the criteria of quantity (Partington, 1980).

Consequences attend the understanding of historical consequences in the past. The rubric assessed the students' progression of ideas regarding their understanding of the fact that historical events have many beneficial and many harmful consequences (Level 5), and do not just have one beneficial or one harmful consequence (Level 1). When students integrate both perspectives, a thoughtful and critical history is constructed (McCarthy, 1998); the sense of history is restored; and a secular history, which involves progress and decline, is articulated (Le Goff, 2005).

Effects in the present refer to understanding the effects of historical events on the present. Carretero & Montanero (2008) state that by understanding the present times, collective memory is extrapolated and mental representations are articulated. The Effects in the present rubric assesses the students' progression of ideas regarding this understanding from the individual (Level 1) to a global scale (Level 5) (Chesnaux, 2009).

Causality refers to understanding why events happened and what circumstances contributed to their origin (Montanero & Lucero, 2011). The progression of ideas, assessed with the Causality rubric, involves understanding that historical events were not originated only by historical characters (Level 1), that is a common sense explanation (Halldén, 1998); but also by considering the historical context (Level 5), because students tend to have very limited or mistaken conceptions of this one (Wineburg, 2001).

Historical sources involve understanding documents, objects, images, etc. that provide relevant information of historical events (Prats, 2001). While the use of Historical sources is one of the elements in Van Drie and Van Boxtel's (2008) historical reasoning framework and will be discussed in the following section, here, Historical sources are considered as a metaconcept in order to observe the students' progression of ideas. The

Historical sources rubric assesses students' discernment between sources that were produced when the events emerged (primary sources) (Level 5), and the reflections or comments that have been made based on them (secondary sources) (Level 1) (Prats, 2001). Primary sources have been privileged in the analysis of history (Lévesque, 2008) and are the main sources used in the classroom to understand history (Prieto, Gomez & Miralles, 2013).

Envisioning future events drives students to imagine forthcoming events, based on the effects of a past event in present times. The progression of ideas, assessed by the Envisioning future events rubric, goes from imagining future events that consider one person (Level 1) to those that consider many people worldwide (Level 5). To envision is not to determine, but to represent and imagine (Staley, 2002), and it needs to be based on evidence by joining past and future times (Staley, 2007).

While all these metaconcepts are closely related, we follow Van Drie and Van Boxtel (2008) historical reasoning framework in considering them separately, by using rubric levels to obtain an objective assessment of the progression of ideas on each metaconcept.

Asking Historical Questions

Asking historical questions shapes and promotes inquiry by working with procedural concepts (Counsell, 2000). According to Levstik & Barton (2011), this inquiry should be a disciplined one that teaches students what to ask and how to answer historical questions by finding information, evaluating sources, and integrating conflicting explanations to provide an interpretation.

Lévesque (2008a) has underlined the importance of students searching for information in digital environments, especially in History. If students search only for information supported by the textbook, they construct its contents as absolute truths (Carretero, Jacott & López-Manjón, 2002).

To implement asking historical questions in our strategy, we designed six historical questions based on the metaconcepts described above (see Figure 3).

The image shows a digital template for historical inquiry. At the top left is a logo with a globe and the text 'KronoTop'. To its right is a red box labeled 'Chronology' containing the text '1960 to 2013'. Further right is a dark blue box labeled 'Where:' with 'United States' written in white. Below that is another dark blue box labeled 'Name of the period' with 'Contemporary' written in white. A white box labeled 'Contextualization' is positioned below the 'Where:' box. In the middle left, a red-bordered box labeled 'Illustrations/images' contains three photographs: the Twin Towers, a plane flying towards them, and the towers in flames. Below this is a white box labeled 'Use of sources'. To the right, a green-bordered box labeled 'Topology' contains a map of the United States with red arrows pointing to New York City, and a small inset photo of the towers. Below the map is a white box labeled 'Disciplined inquiry'. At the bottom, a dark blue box contains the title 'The Twin Towers Attack' and a list of six questions. A red oval highlights the 'Disciplined inquiry' box and the list of questions.

Chronology
1960 to 2013

Where: United States

Name of the period
Contemporary

Contextualization

Illustrations/images

Use of sources

Topology

The Twin Towers Attack

Disciplined inquiry

- What were the most significant events in this period?
- What were the beneficial and/or harmful consequences that this event produced?
- What effects persist of this event in the present time?
- Why did this event happen?
- What sources support the event referred (documents, relics, pictures, etc.)?
- What events do you think might happen in the future?

Figure 3. KronoTop template.

The teacher asked the students to answer six questions per historical period, one by one, by looking for responses in the history textbook and in the web. Because asking historical questions refers to promoting inquiry in students, we first decided to teach them what types of questions to ask in order to see whether they asked other questions during the learning process by responding to the ones constructed by the teacher with the support of the rubrics. The questions were embedded into five PowerPoint templates designed for the purpose of this strategy, each of which represents one of the five historical periods considered in this strategy. Use of sources and Contextualization are also integrated into these templates (see Figure 3).

Use of Sources

Nowadays, technology has enabled us to search and find primary sources quickly and simply (Lee, 2002). Objects, images, and all kinds of documents can be found in order to obtain a wide range of information (Van Drie & Van Boxtel, 2008). Studies of History teaching examine the use of digitized primary sources and mention positive perspectives towards their use (Hicks, Doolittle & Lee; 2004; Waring & Torrez, 2010).

To implement use of sources in our strategy, students searched for primary digitized sources in the web in order to illustrate the historical events they had selected by making a collage and placing it in the appropriate space in a Power Point template designed specifically for this strategy (see Figure 3). Before this task, students needed to identify the difference between primary and secondary sources, as shown by the progression of ideas of Historical sources as a metaconcept.

Contextualization

Contextualization is defined as the competence to place a historical phenomenon, an object, an argument, a text, or a drawing into a social, spatial, and temporal context in order to describe, explain, compare, and evaluate it (Van Drie & Van Boxtel, 2008). According to a study by Shemilt (1983), adolescents have difficulties in making sense of history by trying to place historical events. By working with Contextualization, the intention is for students to interpret and understand historical events, based on their own historical time (Wineburg, 2007). In order to promote Contextualization, we indicated the historical period being researched in a space at the top of the PowerPoint template, thus representing time (Kronos). To represent place/space (Topos), we included a space below it, in which students were asked to locate the historical events of the period in a map (see Figure 2). For these reasons, we called the template KronoTop.

Argumentation

The Use of sources is related to argumentation because arguments are based on documented evidence (Perfetti et al., 1994) that supports the students' claims (Barton & Levstik, 2004). Van Drie & Van Boxtel (2008) also stress the importance of argumentation, considering it one of the six elements of historical reasoning. However, while they refer to the quality of argumentation, they do not mention its assessment. Therefore, Toulmin's model of argumentation is useful because it is embedded into the general domain models of argumentation where the quality of arguments can be assessed inside or outside the scientific field (Sampson & Clark, 2008). In addition, this model is useful in historical reasoning because it stresses that evidences play an important role in an argument structure (Toulmin, 2003), and because it has been found to be useful in applying historical reasoning to ill-defined problems (Voss, 2006). Based on Toulmin's model, Simon, Erduran & Osborne (2006) made a distinction between argument and argumentation. They define argument as the set of statements, data, guarantees, and backings that are involved in the conformation of the pronounced argument, while argumentation is defined as the process of joining these components. The use of rebuttals is a complex skill that allows students to argue which argument is better by demonstrating a greater commitment and ability to integrate original and alternative claims (Kuhn, 1991).

Erduran, Simon & Osborne (2004) generated a method for analyzing the quality of argumentation in small groups of students, taking the above-mentioned components into account. They assessed the quality of argumentation based on the nature and presence of the rebuttals emitted by the students involved in the argumentation. A low level quality of argumentation indicates an opposition among students consisting of unrelated counterarguments that do not challenge the validity of the evidence or of the justifications that were offered previously in an understanding of refutation. However, when there is a rebuttal that defies the pieces of evidence (statements, guarantees or backings), the argumentation is considered high quality (see Table 1).

Table 1:

Analytical Framework used for assessing the Quality of Argumentation proposed by Erduran, Simon & Osborne (2004, p. 928).

Level 1	Level 1 argumentation consists of arguments that are a simple claim versus a counter-claim or a claim versus a claim.
Level 2	Level 2 argumentation has arguments consisting of a claim versus a claim with either data, warrants, or backings but do not contain any rebuttals.
Level 3	Level 3 argumentation has arguments with a series of claims or counter-claims with either data, warrants, or backings with the occasional weak rebuttal.
Level 4	Level 4 argumentation shows arguments with a claim with a clearly identifiable rebuttal. Such an argument may have several claims and counter-claims.
Level 5	Level 5 argumentation displays an extended argument with more than one rebuttal.

From a sociocultural perspective, argumentation is essential for learning science and its appropriation is promoted by working within communities of practice (Kelly & Chen, 1999). Students develop argumentation by discussing topics while they are embedded in a dialogic process (Mortimer & Scott, 2003) in which they manage to externalize their thinking, transcending the intra-psychological act and staying in the inter-psychological one (Vygotsky, 1978); and in which the teacher promotes collaboration and participants can provide social support or scaffolding, which generates the principle of Proximal Development Zone (Vygotsky, 1986).

Coffin & O'Halloran (2009) conclude that the argumentation subject has changed from being a "combat adversary" to a "dialogic exchange" (p. 302). For this reason, our strategy was designed to have the students reach a consensus, instead of pointing at the student who made the best argument.

Case Study

The strategy designed to enhance the six elements of historical reasoning as a whole was implemented in a case study with a group of K8 students in a public secondary school in Mexico. The strategy included both providing formative assessment with systematic continuous feedback on metaconcepts using rubrics and the assessment of the quality of argumentation in the students' dialog.

The strategy designed to enhance the six elements of historical reasoning as a whole was implemented in a case study with a group of K8 students in a public secondary school in Mexico. The strategy included both providing formative assessment with systematic continuous feedback on metaconcepts using rubrics and the assessment of the quality of argumentation in the students' dialog.

This strategy was designed and implemented with secondary students because the curriculum in Mexico stresses the importance of developing historical thinking in primary and secondary schools (SEP, 2011a), and because the framework on which we based the strategy design is directed at secondary students (Van Drie and Van Boxtel, 2008). K8 grade was selected because in K7 grade, the first secondary grade in Mexico, History is not taught in Mexican public schools (SEP, 2011a).

The case study method was selected because it allows the strategy to be considered in a real environment (Yin, 1994). The public secondary school selected for the case study has a very low degree of marginalization and high scores in most subjects, according to SEP (2010).

In order to select the participants for the strategy, an open-ended questionnaire referring to substantive concepts (Figure 1) was designed based on the five historical periods mentioned by the Ministry of Education for K8 grade (SEP, 2011a) and was applied to the K8 students of the chosen secondary school. Two judges graded the questionnaires without any discrepancies.

Based on their grades, four students who obtained more than 80% correct answers were selected (high performance); four who obtained between 60% and 79% correct answers (average performance); and four who obtained less than 59% (low performance). The twelve participants selected—six males

and six females—were thirteen years old and had not interrupted their studies nor taken extra classes beyond the ones received at school. Based on this selection, four teams were created (A, B, C and D) with three students in each one (medium — average — high), in order to consider the principle of Zone of Proximal Development (Vygotsky, 1986), in which the more advanced students help the less advanced. The teacher worked with each team separately after an informed consent form based on the ethics code (APA, 2010) was obtained from the students and their parents.

Once each team met with the teacher, he asked each student to send him the description of five historical events they considered to be of great importance for the first period (1960-2013) via e-mail. Subsequently, each of the four teams gathered separately with the teacher and read the first question embedded in the KronoTop template: “What were the most significant events in this period”. The students were asked to reach a consensus and to write their responses below the first question—a task designed in order to consider the metaconcept of Historical significance.

Subsequently, the teacher asked each team to choose one of the significant events they agreed on in order to answer, by consensus, the following five questions in the KronoTop template which referred to the metaconcepts of Consequences, Effects in the present, Causation, Evidences, and Envisioning future events, respectively. For the purpose of these tasks, the teacher allowed the students to search for information on the web and in the History textbook, which allowed them to develop disciplined inquiry, that is, to learn what types of questions to ask and how to answer historical questions (Levstik & Barton, 2011). Our interest lay in providing students with historical questions to see whether they posed other questions based on the previous one and on the systematic continuous feedback provided by the rubrics.

The teacher then asked each team to choose, by consensus, two to five representative images of the period using an image web browser, and to make a collage in the KronoTop template (“Use of sources”). Subsequently, the teacher asked each team to locate the historical events that occurred in the historical period being discussed in a map and to copy it into the template (“Contextualization”). The purpose of asking students to reach

consensus in their answers was to be able to assess the quality of their argumentation.

The teacher then proceeded to grade the six rubrics based on the teams' responses in the KronoTop template and show them to each team before starting work on the tasks for the next period (1920-1960), thus providing continuous systematic feedback (formative assessment). Students were able to observe the grades they achieved during the strategy (progress) and the structure of their ideas (progression); they argued about the quality of their responses based on the rubrics' criteria and if they did not understand these, the teacher explained them in order to motivate the students to discuss what they needed to do to increase their scores for the next historical period.

Each team repeated the same process until they completed the five periods considered in the strategy. After each period, students' responses in KronoTop were used in order to assess the reliability of the rubrics. Two judges obtained a kappa coefficient of 0.86, which is considered a very acceptable inter-agreement according to the values indicated by Abad et al. (2011). All sessions were videotaped and at the end of the strategy, the teacher asked the students to answer the open-ended questionnaire again in order to determine whether students were able to relate events to the periods in which they occurred.

Development of the Elements of Historical Reasoning in the Case Study

In this case study, the elements of historical reasoning proposed by Van Drie & Van Boxtel (2008) were developed in different ways, as will be analyzed in this section. This development was related with the systematic continuous feedback provided to the students, which led to the development of the student's disciplined inquiry and argumentation. While the latter was generated, its quality was low.

The development of the metaconcepts can be observed in the progress and progression of ideas, shown in the rubrics, during the learning process that comprehended the five historical periods mentioned by the Ministry of Education (SEP, 2011a). As mentioned above, rubrics were designed to facilitate progress and progression on metaconcepts. Level 5 in the rubrics

refers to increasing the number of events, showing progress, and Level 4 refers to the change of the structure of ideas, showing progression.

The most significant events of each period selected by the teams are shown in [Table 2](#).

Table 2:
Events selected by team consensus.

HISTORICAL PERIODS	1960-2013	1920 – 1960	1850 – 1920	1750 – 1850	1550 -1750
<i>Team A</i>	AIDS emergence	Sputnik launch	Telephone invention	Industrial Revolution	Protestant Reformation
<i>Team B</i>	Technological changes	Polio vaccine	Second Industrial Revolution	Origin of Species Publication	Spices exchange
<i>Team C</i>	Apolo XI	Penicillin vaccine	Second Industrial Revolution	Industrial Revolution	Renaissance
<i>Team D</i>	Mexico City’s earthquake in 1985	Second World War	First World War	Enlightenment	Newton’s physics theory

[Table 3](#) refers to the teams’ progress by showing the scores of the first period (P1) in which feedback was not provided and the average of the other four (P4) in which feedback was provided by the teacher. The mean increased in all cases, suggesting that the students’ progress regarding the metaconcepts was achieved due to the systematic continuous feedback provided by the teacher using the rubrics.

Table 3:
Scores for the four teams.

	Events		Consequences		Effects		Causes		Sources		Envisioning future events	
	P1	P4	P1	P4	P1	P4	P1	P4	P1	P4	P1	P4
Team A	4	5	3	4.5	1	4.5	0	4.25	1	4.75	2	4.5
Team B	4	4.75	3	4	4	4.75	1	4.75	1	4.5	2	5
Team C	3	4.75	2	4	1	4.75	3	5	1	4.75	2	5
Team D	3	4.75	2	3.75	1	4.5	2	3.5	1	5	0	4.5

Referring to Historical significance, all teams understood the criteria by mentioning events that involve people worldwide (progression), and three of them reached the Level 5 of the rubric which involves mentioning more than three events based on this criteria (progress). Team B was the only one that did not reach Level 5 for the period from 1550 to 1750, having mentioned just three events that involve people worldwide: spice exchange, slave trade, and the Independence of the Thirteen Colonies in North America.

Similar results were observed regarding Consequences. All teams showed progression in their ideas because all of them comprehended that historical events produce both beneficial and prejudicial consequences, reaching Level 4 in the rubric. Progress was not reached completely: teams C and D had difficulty citing more than three benefits and more than three damages resulting from the Renaissance and Newton’s theory of physics (Level 5). For example, in the case of the Renaissance, team C mentioned more than three benefits and only one damage reached in consensus: the Church lost believers.

As seen in Figure 4, working with the metaconcept of Effects in the present, progress and progression of ideas were completely accomplished

(Level 5). They could easily relate more than three past events that affect people worldwide with today, based on what they had experienced in their own lives, without searching for information neither in the web nor in the History textbook.

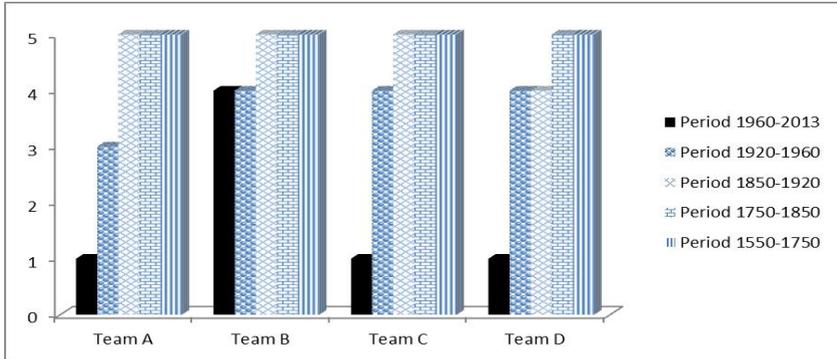


Figure 4 “Effects in present times” progression of ideas in each team for each period.

Referring to Causality, students’ scores declined on three occasions, as seen in *Figure 5*: team A when working on the telephone invention event (third period), and team D when working on WWI and Newton’s physics theory (third and fifth periods, respectively). These observable decreases were due to the fact that the teams gave more importance to historical characters than to the historical context to explain Causality (see Levels 2 and 3 in the rubrics); therefore, neither progression nor progress was observed.

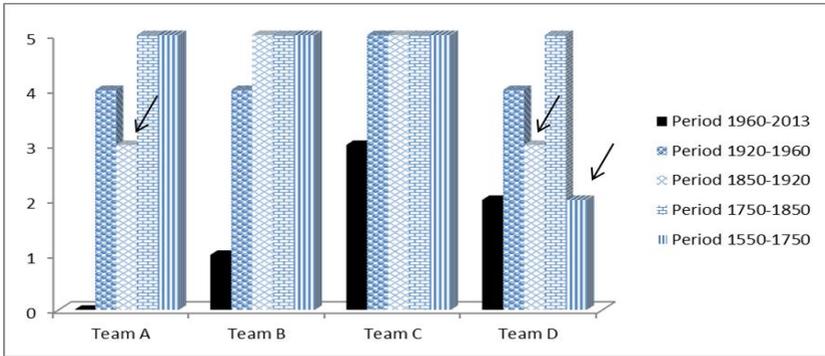


Figure 5. “Causes” progression of ideas in each team for each period.

All teams showed a progression of ideas regarding Historical sources (see Figure 6). Team B was the only one with a score decrease when working with the last period, because it did not mention enough primary sources to reach the maximum rubric score (Level 5—more than three primary sources).

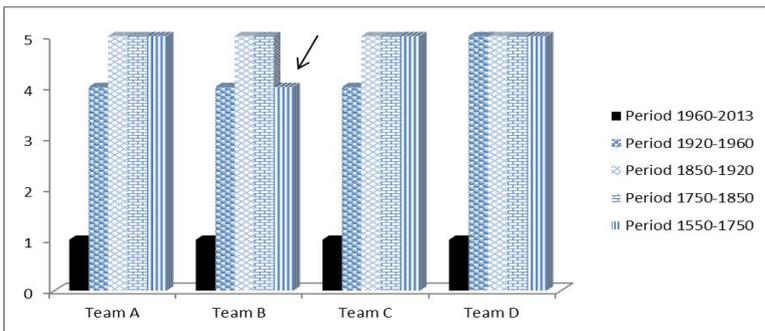


Figure 6. “Historical sources” progression of ideas in each team for each period.

There was progression in all cases when working with the metaconcept of Envisioning future events, evident in the comprehension of imagining events that involve people worldwide based on the Effects in the present. Progress was not completely accomplished because there was a decrease in

Team A's score in the last period (Protestant Reformation) due to not envision more than three events that involved people worldwide (Level 5). All teams referred to future events without searching for information, like they did when working with the Effects in the present metaconcept.

Using rubrics to provide systematic continuous feedback was useful in developing and assessing progress and progression on the six metaconcepts considered in this strategy. It led students to pose questions based on the rubrics' criteria in order to achieve better grades, change the structure of their ideas, and generate argumentation with the members of each team.

The fact that students posed questions is related to the way in which the component of Asking questions (disciplined inquiry) was incorporated: students learnt what kind of historical questions they needed to answer by reading the ones embedded in KronoTop, and they learnt how to answer them by looking for information on the web and in the History textbook. The following dialogue shows a disciplined inquiry made by the students when they tried to answer the question "What were the most significant events in this period (from 1550 to 1750)?"

S1: Who did this historical event affect? The whole world.

S2: [reading the History textbook] The Independence of the Thirteen Colonies?

S3: But, that event is not worldwide. Well, OK.

S2: From who did the Thirteen Colonies get their independence?

S3: United States. Only.

S2: ¿And it didn't affect the whole world? ¿This event just affected them?

S1: Perhaps it affected [the whole world] with the economy.

S2: [reading the History textbook] As you wish, but the Independence of the Thirteen Colonies was in 1776.

S1: In that case no, because the period is from 1550 to 1750.

S3: Ok, keep on searching

In this dialog, students looked for information in the History textbook in order to find what the most significant events in that period were. They also asked other questions based on the rubrics' criteria as they looked for events that had impacted people worldwide and realized that the historical event of the Independence of the Thirteen Colonies did not fall into the period they

were considering. By answering questions, posing others, and finding information, students developed discipline inquiry as established by Levstik & Barton (2011). Other kinds of inquiries were observed in the students' discussions among themselves. These inquiries were also based on the rubrics' criteria, which referred to the progression of ideas for the metaconcepts included in the strategy.

As well as leading the students to pose questions, the continuous systematic feedback elicited argumentation. As the previous dialog showed, the members of each team were able to build arguments based on the rubrics' criteria for developing progress and progression on the metaconcepts considered in this strategy. In addition, argumentation was elicited by answering the questions in KronoTop and by looking for information on the Web and in the History textbook.

Videotapes of the students' argumentation process for reaching consensus on each procedural concept were transcribed. The analysis of the quality of argumentation was done based on the levels suggested by Erduran, Simon & Osborne (2004) (Table 1). Team A was chosen for this analysis because its score on the metaconcept of Causality improved from 0 to 4 after feedback was provided and it had the highest number of total responses in the strategy.

Team A's results showed that the largest number of arguments were at level 1; very few arguments were generated at levels 2 and 3; and arguments at levels 4 and 5 never appeared (see Figure 7). Two judges obtained a very good level of inter-agreement ($k = 0.82$) according to the values expressed by Abad et al. (2011).

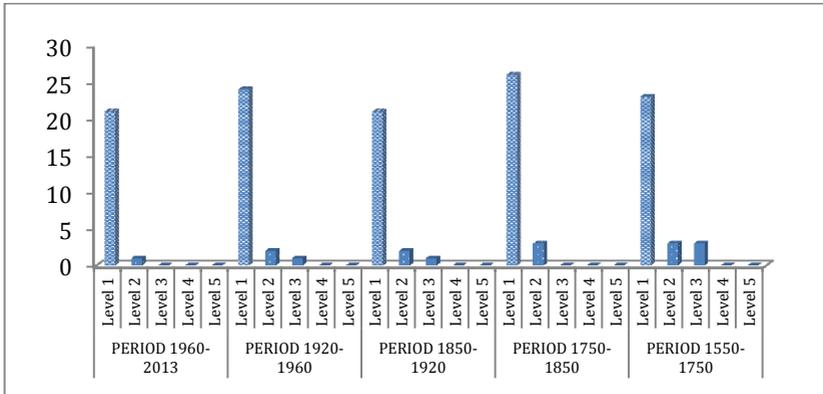


Figure 7. Quality of argumentation in team A by historical period.

The following dialog shows an example in which the consequences of the historical event (technological changes) from 1960 to 2013 were discussed by the students:

- S1: More communication, the communication was a bit easier.
- S2: The communication...is more...
- S1: The communication using signs of...
- S3: But there were more robberies.
- S1: What?
- S3: But there were more robberies.
- S1: Yes, but that we can write as damage.

In the conversation, a weak rebuttal is offered by student 3 (S3) who argues that the consequence was not the one put forward by S1, but the increase in robberies. It is considered a weak rebuttal because it was not taken into account for the consensus in the end, and student 3 (S3) did not back up or strengthen his claim in order to substitute the first claim with his own.

Argumentation and disciplined inquiry played an important role in various tasks of the strategy: answering the questions about the metaconcepts by reaching consensus, looking for digitized sources (“Use of

sources”) in the Web to make a collage in KronoTop illustrating the period, and locating the significant events in a map (“Contextualization”). Throughout these tasks, students discussed, reached consensus, looked up information, and posed questions based on the previous answers in KronoTop.

Concerning “Use of Sources” and “Contextualization”, figure 8 shows a KronoTop template, in which historical events are illustrated with digitized sources and through the location of the events in the maps; according to the period from 1750 to 1850.

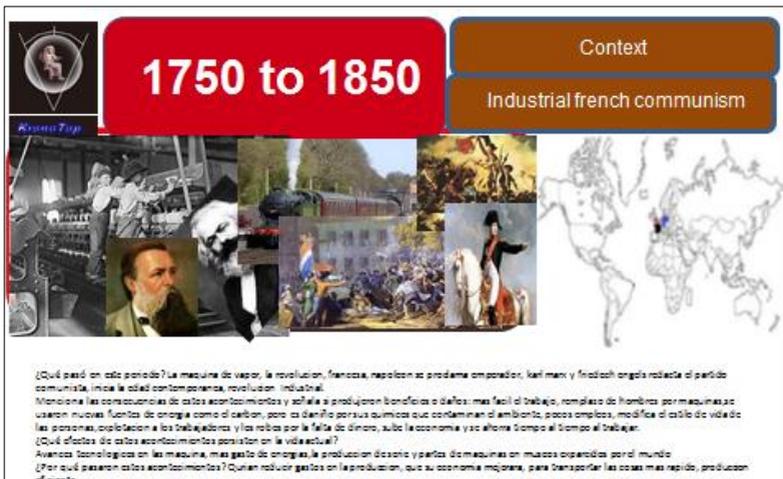


Figure 8. Use of digitized sources and spatial location of historical events in the period from 1750 to 1850.

With regard to substantive concepts, the open-ended questionnaire applied at the end of the strategy showed significant differences from the one which was applied before ($T = 2$, $n = 11$, $p < 0.01$), according to the values offered by Triola (2009); just eleven students responded the questionnaire at the end, because one of them dropped out of school. The History teacher graded student’s answers in the questionnaires, and found that they corresponded with what the History textbook states. This indicates that

students were able to expand on previously acquired information. The tasks that could help to this result were: sending the historical events to the teacher via e-mail, working with KronoTop templates because the period was explicitly written at the top of them, and answering the first question by consensus, which referred to Historical significance.

Conclusions

A strategy including formative assessment with systematic continuous feedback based on the progression of ideas of metaconcepts. was implemented in a case study with K8 grade students and in general terms, the six elements of historical reasoning proposed by Van Drie & Van Boxtel (2008) were developed in the four teams that participated in it. While the results are not generalizable, they help to understand what tools may aid students in developing their historical reasoning and what adaptations might be implemented in future strategies, as will be discussed in this section.

During the learning process, the results showed that the progression of ideas for each metaconcept was different, which is consistent with the observations made by Lee & Shemilt (2003) who found that the procedural concepts or metaconcepts are not developed in parallel, but differ in their appropriation, which underscores the importance of the context of each historical event. Another explanation for the few decreasing scores in the rubrics may be the diversity and complexity of historical events, which entail a different level of analysis. Finally, the fact that students reached higher scores in the rubrics might suggest that, as Lévesque (2012) proposes, they generated more critical and realistic thinking.

The lowest grades obtained by the teams were in the Causality rubric, reflecting the non-progression of their ideas. Students tended to prioritize historical characters in order to explain the origin of the historical events, which is consistent with the observations of Halldén (1998). It would therefore be necessary, in future strategies, to write in the Causality rubric the type of contexts (economic, social, cultural, etc.) that might explain the origin of a historical event, instead of just mentioning “conditions”.

Students should be motivated to search for more information about the farthest historical events because most descriptions in which progress was

not reached by the teams referred to the farthest period (from 1550 to 1750). Also, in future strategies, students should be asked to support their answers with evidence, especially when working with the metaconcepts of Effects in the present and Envisioning future events, as Staley (2007) argues, because teams did not search sources in the web nor in the History textbook by answering the questions of these metaconcepts during the strategy.

Although students failed to search for information in order to support their responses, specifically for the metaconcept of Effects in the present, all teams reached the highest scores on the rubrics for all the periods considered in the strategy. This suggests that students managed to concatenate significant events up to the present and articulate mental representations of the current time, which demonstrates progression in terms of this concept (Carretero & Montanero, 2008) and which constitutes an advance in the field, which, as Muñoz & Pagés (2012) point out, is very necessary.

Considering Asking historical questions, the dialog showed that the KronoTop templates and the rubrics were useful to the students because they were able to learn what to ask by responding the questions in the KronoTop templates and how to answer historical questions by searching the information in the web and in the History textbook, as discipline inquiry mention (Levstik & Barton, 2011). Likewise, students posed other questions based on the rubrics' criteria. Because students used technology in order to find information, the content of textbooks was no longer regarded as absolute truth, an effect observed by Carretero, Jacott & López-Manjón (2002).

Digital sources were used as illustrations when they were considered significant in supporting the occurrence of the events. Once students have the ability to distinguish between primary and secondary sources, they are able to use them as evidence for the creation of hypothesis and interpretations, thus achieving better contextual thinking (Dickinson & Lee, 1980; Wineburg, 2007).

Regarding the element of Contextualization, students related the events temporally and geographically using the KronoTop template. With regard to argumentation, the framework proposed by Erduran, Simon & Osborne (2004), based on Toulmin's model for the oral evaluation of the quality of argumentation in students, was useful for the subject of History and

confirmed with small groups. Results showed that the quality of argumentation in the assessed team was very low, consistent with the results of Van Drie et al. (2006), who observed that students cited several arguments to support their claim without mentioning rebuttals. This suggests that although in this strategy students were asked to reach consensus setting aside debate, as Coffin & O'Halloran (2009) suggest, it might be necessary to design tasks that involve both debate and consensus in order to see whether students consider contradictory statements to generate rebuttals, and at the end have the opportunity to deliberate and reach consensus.

Despite having created teams in communities of practice with different levels of expertise, as Lave & Wenger (1991) suggest, students only managed to co-construct arguments, and a high quality of argumentation was not achieved. Therefore, it will be necessary to develop argumentation by implementing any of the following strategies: direct explanation through instruction, structured tasks and modeling as Mason (1996) suggests; the teacher can ask questions in order to make students provide arguments in their answers, as Simon, Erduran & Osborne (2006) propose; or constructing and validating rubrics that show levels in which the progression of argumentation could be noted in order to change students' ideas over time, as Smith, Wiser, Anderson, & Krajcik (2006) suggest. This last point is of particular importance because there is little research regarding the progression of argumentation (Duschl, Schweingruber, & Shouse 2007). In general, the results showed that the strategy was useful in helping students reach higher scores on the substantive concepts questionnaire at the end of the strategy; helping students look for the information to answer historical questions and ask historical questions in order to reach higher scores on the metaconcepts rubrics (to carry out disciplined inquiry); helping students be able to find digital sources by discerning between primary and secondary sources; helping students contextualize historical events by matching their location in a map with the digital sources; and eliciting argumentation among the students, who discussed the criteria of each metaconcept rubric in order to reach a consensus on each question. The KronoTop templates were useful to find digitized sources and to locate historical events, as well as to develop their historical reasoning by developing its six elements. In future

research, it will be important to evaluate the strategy in an entire classroom and analyze the results in order to make further generalizations.

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