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Geohistorical cartography: a contribution from critical thinking and metacognitive awareness

Cartografía sentipensante geohistórica: un aporte desde el pensamiento crítico y la conciencia metacognitiva

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Abstract

The following research presents a cartographic strategy for teaching and learning Social Sciences, with the aim of fostering the development of critical thinking and metacognitive awareness, in the face of a global and changing society that requires mechanisms to understand the territory it inhabits. The sample consisted of twenty-nine sixth-grade students from an educational institution in the municipality of Villamaría (Caldas). A quantitative methodology was chosen, under a pre-experimental design of a group with pre-test and post-test using two instruments: a rubric designed and approved by Expert Judgment for the measurement of critical thinking and the MAI Junior test developed by Huertas et al. (2014) to evaluate changes in students' metacognitive awareness. As a result, it was obtained that the strategy was effective in the development of critical thinking and metacognitive awareness.

Key words: cartography, critical thinking, Teaching strategy.


Resumen

La siguiente investigación, presenta una estrategia cartográfica para la enseñanza y el aprendizaje de las Ciencias Sociales, con el fin de fomentar el desarrollo del pensamiento crítico y la conciencia metacognitiva, de cara a una sociedad global y cambiante que precisa de mecanismos para comprender el territorio que habita. La muestra estuvo representada por 29 estudiantes del grado sexto de una institución educativa en el municipio de Villamaría (Caldas). Se optó por una metodología cuantitativa, bajo un diseño preexperimental de un grupo con pre test y post test utilizando dos instrumentos: una rúbrica diseñada y aprobada por juicio de expertos para la medición del pensamiento


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crítico y la prueba del MAI Junior elaborada por Huertas et al. (2014) con el fin de evaluar los cambios en la conciencia metacognitiva de los estudiantes. Como resultado se obtuvo que la estrategia fue efectiva en el desarrollo del pensamiento crítico y la conciencia metacognitiva.

Palabras clave: cartografía, estrategia de enseñanza, pensamiento crítico

Introduction

In the face of global conflicts and environmental challenges of the 21st century, social sciences education is called upon to analyze and propose new teaching and learning strategies that foster critical thinking skills and metacognitive awareness. The goal is to provide students with adequate training and sufficient tools to face the challenges of contemporary society.

“We are witnessing increased environmental degradation, intensified effects of climate change, worsening job prospects for young people, a growing number of urbanization and migration issues, as well as the prolongation of violent conflicts and global economic recession.” — United Nations [UN], (2015)

Within this framework, the first proposal of this study is to integrate History and Geography by blurring disciplinary boundaries through a geo-historical methodology. In this regard, the following reflection by Raquel Gurevich can be found in the compendium edited by Beatriz Aisenberg and Silvia Alderoqui:

“Geography, along with other subjects in the field, aims to analyze, interpret, and critically think about the social world. Therefore, our discipline is tasked with understanding how nature and society are historically articulated, as different forms of spatial organization are the result of the specific ways in which societies, at given historical moments, relate to nature, transforming it according to their needs and interests.”
(Aisenberg & Alderoqui, 1999, p. 71)

Considering the above, the present study aims to determine the effect of the “Geo-historical Sentipensante Maps” strategy on critical thinking and metacognitive awareness. This was achieved by assessing students’ levels of critical thinking through rubrics and describing changes in critical thinking, metacognitive knowledge, and regulation using a test designed by Huertas et al. (2014), which was administered before and after the implementation of the “Geo-historical Sentipensante Maps” strategy.

As a hypothesis, the research proposes that teaching and learning strategies focused on non-traditional assessments, which are more closely linked to creativity, promote the development of critical thinking, metacognitive awareness, and enhance the understanding of various geo-historical phenomena. In this sense, both the strategy and methodology of the study could contribute to the construction of a new didactic approach in the teaching of Social Sciences. As Alicia Camilloni states:

“The teaching of social sciences is a privileged form of intervention in this process, which must give way to the epistemological rupture necessary for the attainment of scientific knowledge of one’s own reality and of the social processes in which it is instituted and which it, in turn, constitutes.”

(Aisenberg & Alderoqui, 1999, p. 41)

Methodology

The objective of this research is to determine the effectiveness of the teaching and learning strategy “Geo-historical Sentipensante Maps” in the development of critical thinking and metacognitive awareness.

This is a quantitative study with a total population of 50 sixth-grade students and a convenience sample of 29 students from a private educational institution in the municipality of Villamaría (Caldas).

The research design is pre-experimental: a one-group pre-test/post-test design (Hernández et al., 2014). This design was chosen because it involved a natural group within a real classroom context. To approve the implementation of the study, the institution required that the same teacher or researcher be responsible for controlling both internal and external variables and that the instruments be applied to both classes to ensure equal treatment for all students.

As a result, there was no case-control design for comparison, nor was the figure of an equivalent control group considered, as it would have posed challenges in controlling for sources of internal and external invalidation (Hernández et al., 2014).

Data analysis was performed using the R statistical software, version 4.0.4 (2021-02-15), and statistical inference was conducted at a 5% significance level. Descriptive statistics were used to describe variables, including measures of central tendency such as mean and median, and measures of dispersion such as standard deviation and coefficient of variation.

To determine whether the distribution of variables was normal, the Shapiro-Wilk test was applied (Razali & Wah, 2011). The Pearson correlation coefficient was used to establish relationships between the different variable groups (Daniel & Cross, 2013).

One of the two instruments used for the pre-test and post-test was the Metacognitive Skills Inventory (MAI) developed by Huertas et al. (2014), which is a validated adaptation of the “Metacognitive Awareness Inventory” created by Schraw and Dennison (1994). This instrument includes 52 items across eight categories: declarative, procedural, and conditional knowledge—used to assess students’ knowledge of cognition—and six additional items related to planning, organization, monitoring, debugging, and evaluation, used to assess cognitive regulation (Huertas et al., 2014).

This instrument was administered twice: once at the beginning of the study (before implementing the Geo-historical Sentipensante Maps strategy) as a pre-test, and again at the end of the study to evaluate changes after applying the strategy, serving as the post-test.

The second instrument was a rubric designed based on the universal intellectual standards outlined in *The Mini Guide to Critical Thinking Concepts and Tools* by Paul and Elder (2003). The rubric included nine critical thinking standards: accuracy, precision, clarity, breadth, significance, logic, relevance, and depth, which were adapted to the geo-historical approach. In this way, quantifiable criteria were developed to assess student performance.

Regarding this second instrument, two aspects are noteworthy: first, it was reviewed and approved by a panel of experts; second, students were expected to use the rubric as a roadmap for developing the strategy. In other words, they were aware of what was expected of them and how they would be evaluated.

At the top of the rubric (see Table 1), the grading levels and scoring system used for data systematization are displayed. At the bottom, each standard of critical thinking is explained. The full rubric includes five standards, but due to space limitations, only two are presented in this article.

Table 1. *Model rubric with assembled parameters*

Rubric

STANDARDS AND SPECIFIC CONTENT:	ADVANCED: 4 = 20 puntos.	PROFICIENT: 3 = 15 puntos.	BASIC 2 = 10 puntos	INSUFFICIENT 1 = 5 puntos	NO EVIDENCE 0 = 0 puntos
Subject Standard / Geo-history: The student defines the area for the "Sentipensante Maps" by considering the geopolitical dynamics of the place under study.					
1.1 Specific Skill - Spatial Orientation / Locating: To identify specific locations using physical or digital cartographic tools.	Accurately locates the border limits of the Sentipensante Map by placing the 8 cardinal points without any errors.	Accurately locates the border limits of the Sentipensante Map by placing the 4 basic cardinal points without any errors.	Locates the border limits of the Sentipensante Map by placing the 4 basic cardinal points with one error.	Fails to locate the border limits of the Sentipensante Map, making two or more errors in placing the 4 basic cardinal points	There is insufficient evidence to evaluate the process.
Intellectual Standards of Critical Thinking / Accuracy and Precision: The location is specific and detailed; the information provided can be verified through the comparison presented by the student.					
1.2 Specific Skill for Accuracy and Precision / Comparing: Compares the information provided through alternate maps, demonstrating precision in border location.	Compares the border limits located on their Sentipensante Map against an alternate reference map without finding any localization errors.	Compares the border limits located on their Sentipensante Map against an alternate reference map, without finding errors in the 4 basic cardinal points they identified.	Compares the border limits located on their Sentipensante Map against an alternate reference map, identifying one error in the 4 basic cardinal points they located.	Compares the border limits located on their Sentipensante Map against an alternate reference map, finding two or more errors in the 4 basic cardinal points they identified.	There is insufficient evidence to evaluate the process.
Subject Standard / Geohistory: The student designs "sentipensante" maps that reflect the geopolitically recognized territorial boundaries.					
2.1 Specific Skill: Designing: Designs "sentipensante" maps on blank sketches without altering the territorial boundaries.	<i>i. Designs "sentipensante" maps on a blank sketch, without extending their image or figure beyond the territorial boundaries.</i>	<i>Designs "sentipensante" maps on a blank sketch, outlining a territorial boundary with their image or figure without coloring it in.</i>	<i>Designs "sentipensante" maps on a blank sketch, extending their image or figure across up to two territorial boundaries.</i>	<i>Does not succeed in designing "sentipensante" maps on a blank sketch, as their image or figure extends beyond more than two territorial boundaries.</i>	There is not enough evidence to assess the process.

STANDARDS AND SPECIFIC CONTENT:	ADVANCED: 4 = 20 puntos.	PROFICIENT: 3 = 15 puntos.	BASIC 2 = 10 puntos	INSUFFICIENT 1 = 5 puntos	NO EVIDENCE 0 = 0 puntos
2.2 Specific Skill: <i>Designing: Designs "sentipensante" maps on a blank sketch, using different techniques. (See suggested techniques in the task description)</i>	Designs "sentipensante" maps on a blank sketch using non-conventional digital or physical media.*	Designs "sentipensante" maps on a blank sketch using conventional physical media such as paper, pencil, and colors, applying at least two techniques.	Designs "sentipensante" maps on a blank sketch, using conventional physical media and applying only one technique.	Does not use any technique for the design of their "sentipensante" map presented on a blank sketch.	<i>There is insufficient evidence to evaluate the process.</i>
<i>Designs "sentipensante" maps on blank sketches, using original conventions that cannot be found in common thematic maps.</i>	<i>Designs "sentipensante" maps on blank sketches with more than two original conventions in their image or figure, which cannot be found in common thematic maps.</i>	<i>Designs "sentipensante" maps on blank sketches with one original convention in their image or figure that cannot be found in common thematic maps.</i>	<i>Designs "sentipensante" maps on blank sketches with one original convention in their image or figure that cannot be found in common thematic maps.</i>	<i>The conventions employed in the design of "sentipensante" maps on blank sketches are standardized conventions used in common maps.</i>	There is insufficient evidence to evaluate the process.
Intellectual Standard PC / Clarity: The student clearly illustrates the idea in the "sentipensante" map.					
2.4 Specific Skill for Clarity / Illustrating: Illustrates images and/or figures within a blank sketch, representing a territorial theme and thereby creating a "sentipensante" map.	Illustrates images and/or figures within a blank sketch that are original in their design, recognizable at first glance, and coherent with the territory represented in the "sentipensante" map.	Illustrates images and/or figures within a blank sketch, making them easily recognizable at first glance in the "sentipensante" map.	Illustrates images and/or figures within a blank sketch that are not easily recognizable at first glance, requiring a narrative description of the "sentipensante" map.	The images and/or figures illustrated within a blank sketch cannot be recognized at first glance; therefore, the "sentipensante" map is not understood.	There is insufficient evidence to evaluate the process.

Source: Author's own work.

Geohistorical Methodological Approach

Geohistory as a tool that synthesizes the analysis of societies within a specific space and time was proposed as a method by Braudel (1949) in his work *The Mediterranean and the Mediterranean World in the Age of Philip II*. The application of this approach had to meet parameters such as the choice of territory, delimitation of time following a chronological evolution, presentation of sources, visual synthesis of a theme, and creation of a document.

Although the term was later dismissed by Braudel himself, the application of the method continued to be present in works such as *Material Civilization, Economy, and Capitalism: 15th–18th Century, Volume III* (Braudel, 1979).

From Latin America, Santaella (2005) incorporated into their debates the methodological feasibility proposed by Braudel, given the need to associate history and geography. According to José Luis Orella:

“Geohistory initially combines the methods of reflection and reasoning and then the methodologies of the two sciences: geography and history. Subsequently, geohistory seeks mixed modes of operation, resulting from space-time observation, and enters specific fields of investigation such as the means and systems of production within their spatial support.” (Unzué, 2010, p. 239).

More recently, Arturo Escobar’s localized and descriptive ethnographic proposal about places could contribute to the debate by presenting geohistory beyond the method, possibly marking the beginning of a second phase as suggested by the aforementioned authors, since it represents an interpretative bridge of the different cultural, ecological, economic, and political expressions woven within the territory.

In this sense, the concept of place becomes a central element within the classroom and expands Escobar’s proposal by inviting reflection on the marginal role to which this territorial category (place) is often relegated, giving greater importance to the concept of the global:

“Why place? Because place continues to be not only a crucial dimension in the configuration of local and regional worlds but also in the articulation of hegemonies and resistance to them. The current trend is to argue that globalization has rendered place irrelevant, insignificant, or at least secondary in the constitution of localities and regions.” (Escobar, 2010, p. 49)

Thus, redirecting attention toward place validates the reciprocity of changes from societies to territory and vice versa, highlighting the configuration of regions that resist the global

homogenization of the landscape, thereby strengthening the identity that imparts a unique imprint to places.

Along these lines, the proposal of geohistorical sentipensante cartography is presented as an invitation to embrace the territory, observe the place of enunciation, and rediscover identities, without ignoring the waves of cultural hybridization captured in the following definition of place:

“If place is understood as the commitment to, and experience of, a particular location with some measure of rootedness (although unstable), boundaries (although permeable), and connections to everyday life, even when its identity is constructed and never fixed, place continues to be important in the lives of most people.” (Escobar, 2010, p. 49)

Thus, following the elements outlined by the authors for applying what goes beyond a method and presents a new way of understanding and engaging with the territory, the development of the strategy begins with Geohistorical Map Number One (pre-test).

The maps were named “sentipensantes,” a concept adapted from the works of master Orlando Fals Borda, who introduced “sentipensante” as the connection of “heart and mind for being and acting,” a method used by the riverine communities of Bajo Sinú and amplified throughout Fals Borda’s work.

According to Fals Borda (2008), within the Colombian continental territory, culturally different communities are grouped, and respect for indigenous cultures is neglected under economic logics; thus, he proposes constructing a map that reflects the social and cultural reality of the country. “Finally, regarding the macro vision of territorial organization, I have invited the construction of a new map of Colombia, with rational and socioeconomically demarcated internal divisions among regions, provinces, municipalities, and districts...” (Borda, 2008, p. 63).

This is not far from revolutionary thought and constitutes a valid critical sociological perspective to be discussed in the classroom and proposed in the carried-out research, serving as input for the analysis of factors converging in the demarcation of Colombian territory across different contexts and periods studied. In this regard, with the intention that students replicate this action, this category was added to the methodology, expecting to obtain more sensitive and conscious results in their work.

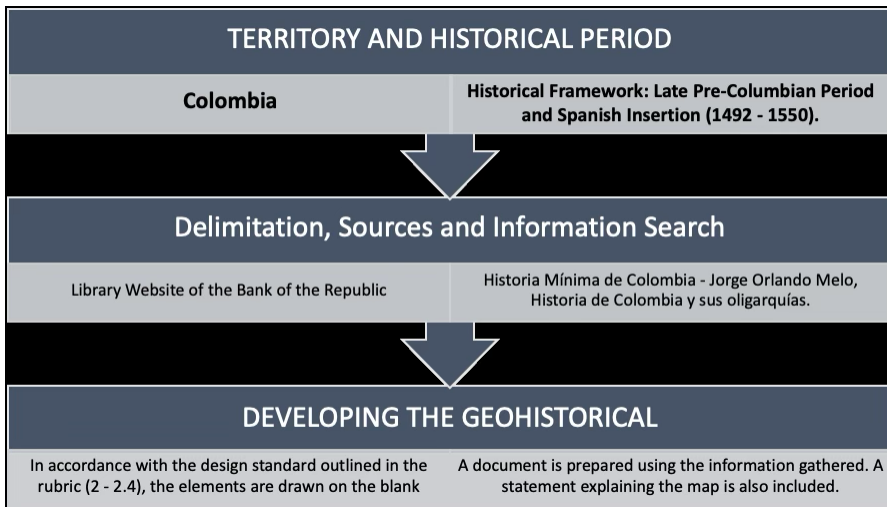
Development of Geohistorical Sentipensante Maps

To introduce the topic, objectives related to the rubric were proposed, the Colombian territory was delimited to the Late Pre-Columbian and Spanish Insertion period (1492–1550), and sources used to explain the events of this period included Caballero (2014) History of Colombia and Its Oligarchies and Melo (2017) A Brief History of Colombia.

The classroom teaching categories for the four maps were: diseases, wars, identity elements of each culture, and social, political, and religious organization. From these categories, students had to choose the ones that interested them most and, following the rubric items, conduct deeper research on the selected topics.

Subsequently, students shaped their maps using conventions and finally established a design on a sketch of the Colombian territory, creating alongside a narrative a “geohistorical sentipensante map”.

Table 2. Example of the model used to address the thematic areas.



Source: Own elaboration.

Under this framework, the following section presents the evolution and development of the geo-historical sentipensante map strategy, created by one of the students in the course:

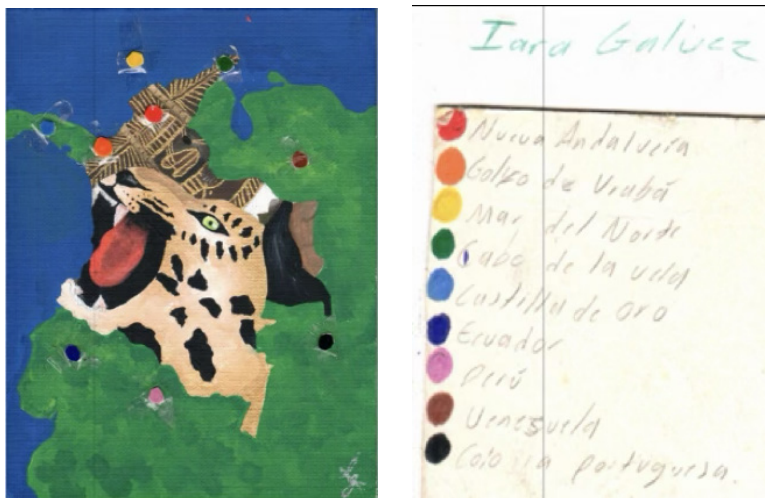


Figure 1. *Geo-historical Sentipensante Map*

Source: created by Lara Gálvez Gómez on May 5, 2023.

To describe the map in Figure 1, the student states that the anthropomorphic whistle drawn in the Caribbean region represents the musical instruments used in rituals and ceremonies by pre-Columbian cultures. In the south, the jaguar stands out as a symbol of one of the higher deities of Indigenous communities, which can be confirmed through their statuary, ceramics, and paintings. Finally, the colored dots placed in different parts of the map are conventions indicating the places through which the Spanish named the territory as the insertion process progressed.

The second map (Figure 2) was created through an analysis of the cultural categories of present-day Colombia in order to examine the changes in relation to the late pre-Columbian period and the Spanish insertion. It explores the location of Indigenous communities in the territory, miscegenation, cultural traditions, crops, and climatic zones, among other subtopics. At this stage, the results obtained from the first map were also revisited, with an emphasis on the importance of reviewing the rubric—marking a first step toward understanding the strategy.



Figure 2. *Geo-historical Sentipensante Map*

Source: created by Iara Gálvez Gómez on June 2, 2023

In the map in Figure 2, the student drew a coffee symbol in the north of the sketch of Colombia and a bunch of plantains in the south. To the east, she placed an orchid—Colombia’s national flower—which symbolizes current traditional festivities such as the Feria de las Flores and cultural syncretism. In the central and southwestern regions of the sketch, she painted a woman who, according to her narrative, represents miscegenation and the processes of conquest and colonization. Finally, the colored dots remain as conventions representing territorial boundaries.

For the third map (Figure 3), the theme of the Colonial Period and the Viceroyalty of New Granada was addressed. The processes of conquest, colonization, and the administrative and social organization from 1550 to 1789 were explained, introducing various categories from which students could choose the ones that most interested them and explore them in greater depth.



Figure 3. Geo-historical Sentipensante map

Source: created by Iara Gálvez Gómez on June 2, 2023

In this third map and second stimulus, significant changes are observed in the interaction with the sketch representing the territory. The student integrated the countries that today make up Ecuador and Venezuela, identifying that the borders and boundaries during the historical period under study were not the same as those of today. Her interest focused on the theme of slavery, represented by an African woman (palenquera) in the center of the map. In the southwest, she painted a drum. To the west and east, she drew wooden keyboards resembling a marimba—two musical instruments that arrived in New Granada and found refuge in Colombia's Pacific and Caribbean regions.

Additionally, the blue color in the north of the map reflects arrival via the Caribbean Sea, while the golden circular figure in the northeast represents mineral extraction—an activity that, it is worth noting, has opened deep wounds in both the land and the history of African-descendant communities, who contributed to the miscegenation and hybridization of the Colombian territory. In this third map, more conventions were added, including the real audiencias (royal courts), and a small flag with a yellow stripe suggests a symbol of identity that recognizes the New Kingdom of Granada.

Finally, the fourth map—post-test—focused on the Independence process of the Viceroyalty of New Granada from Spain. It addressed key antecedents such as the Comunero Revolt of 1781 and the independence movement that took shape around 1810, with its main figures and events extending up to 1821. The following map illustrates the results of this analysis (Figure 4).



Figure 4. *Geo-historical Sentipensante map*

Source: Iara Gálvez Gómez on June 13, 2023.

The student chose as the topic for her map the relevance of communication media during the independence process. The rumors spread among different groups and the letters carrying news or warnings from spies are represented by the dove located at the center of the sketch, mainly covering the Andean region of Colombian territory and part of Venezuela.

The role of the newspaper is highlighted in the southwestern part of the map, with the emphasized date being July 20, 1810—a milestone in the independence process of what is now Colombia.

The map presented is a visual image of the strategy that references the vehicle for understanding its effectiveness in developing critical thinking and metacognitive awareness. Therefore, the 116 geo-historical sentipensante maps designed by the 29 students between the pre-test and post-test will be the subject of a separate study, as they are considered a valuable resource deserving a dedicated chapter for their interpretative frameworks.

Results

The research applied a quasi-experimental design with a single-group time-series approach (Hernández et al., 2014) involving sixth-grade students from the daytime shift at a private school in Villamaría (Caldas). The instrument was implemented during the first semester of 2021 over a nine-week period. A total of 29 students participated, 14 from class 6A and 15 from class 6B, constituting the study population.

As an exclusion criterion, the sample only included students who attended all the stimulus classes from the pre-test through the post-test, and who completed the MAI Junior at both the beginning and end of the process.

Table 3. *Research Variables*

Variables studied in this research	
Variable	Type of variable
Age	Quantitative
Map 1 Pre-test	Quantitative
Map 2	Quantitative
Map 3	Quantitative
Map 4 Post test	Quantitative
Declarative knowledge - Pre test	Quantitative
Declarative knowledge - Post test	Quantitative
Procedural knowledge- Pre test	Quantitative
Procedural knowledge- Post test	Quantitative
Conditional knowledge- Pre test	Quantitative
Conditional knowledge - Post test	Quantitative
Planning - Pre test	Quantitative
Planning - Post test	Quantitative
Organization - Pre test	Quantitative
Organization - Post test	Quantitative
Monitoring- Pre test	Quantitative
Monitoring - Post test	Quantitative
Debugging - Pre test	Quantitative
Debugging - Post test	Quantitative
Evaluation - Pre test	Quantitative
Evaluation - Post test	Quantitative

Source: Own elaboration.

The study involved 29 students: 14 from class 6A and 15 from class 6B, including 18 girls (62.1%) and 11 boys (37.9%), aged between 11 and 13 years, with a mean age of 12.2 years and a standard deviation of 0.6 years.

The data showed that the average score increased from Map 1 (pre-test) to Map 2, decreased slightly for the third map, and then rose again in the fourth map (post-test). The scores from this last map were the most homogeneous in terms of variability. Approximately 50% of the students obtained a score of 225 or higher.

In all MAI variables—except for conditional knowledge and debugging—an increase in scores was observed from the pre-test to the post-test, which will be analyzed further in the inferential section. For most variables, the coefficient of variation was below 30%, indicating high homogeneity of the data (Table 4).

Table 4. *Descriptive Statistics for the Variables Studied*

Descriptive Statistics for the Variables Studied in This Research				
	Variable	Median	Mean	Standard deviation.
				Coefficient of variation (%)
Age	12,0	12,2	0,6	4,5 %
Map 1 Pre test	180,0	182,1	63,8	34,4 %
Map 2	210,0	200,0	58,1	28,5 %
Map 3	195,0	194,7	61,7	31,1 %
Map 4 Post test	225,0	222,4	53,5	23,6 %
Declarative knowledge - Pre test	4,1	3,9	0,7	16,9 %
Declarative knowledge - Post test	4,3	4,0	0,7	16,1 %
Procedural knowledge- Pre test	3,3	3,3	0,8	24,2 %
Procedural knowledge - Post test	3,8	3,6	0,8	22,1 %
Conditional knowledge - Pre test	4,0	3,7	0,7	18,4 %

Conditional knowledge - Post test	4,0	3,8	0,7	16,8 %
Planning - Pre test	3,0	3,0	0,9	28,4 %
Planning - Post test	3,3	3,4	0,8	22,2 %
Organization - Pre test	3,3	3,3	0,8	22,1 %
Organization - Post test	3,7	3,7	0,6	16,2 %
Monitoring - Pre test	3,1	3,2	0,7	22,1 %
Monitoring- Post test	3,3	3,5	0,7	20,0 %
Debugging - Pre test	3,8	3,7	0,8	20,2 %
Debugging - Post test	3,8	3,9	0,7	17,6 %
Evaluation - Pre test	2,5	2,8	0,8	28,4 %
Evaluation - Post test	3,2	3,2	0,7	22,4 %

Source: Own elaboration.

The percentage of students at each performance level during the different stages of the map implementation indicated an overall improvement in performance over time. As shown in Table 5, the “Insufficient” level disappears from Map 1 to Map 2 and again from Map 3 to Map 4, while the other performance levels increase. However, there was a decline from Map 2 to Map 3, which can be explained by a serious incident related to bullying that occurred at the institution, requiring the intervention of student counselors for secondary-level students.

This highlights the intrinsic connection between human beings and their immediate context. Emotions influenced the decisions made by students and, consequently, impacted on the metacognitive dimensions addressed in this research. It is also worth noting that in Map 4, shown in the table and created after the incident (and considering that classroom interventions were carried out with the support of the psychosocial and counseling team), there is a renewed upward trend in student performance. This reflects students’ capacity for resilience and their ability to transcend unavoidable circumstances within school contexts.

Table 5. Percentage of students at each performance level, by map.

Percentage of students at each performance level, disaggregated by map.				
Performance Level	Map 1 Pre- test	Map 2	Map 3	Map 4 Post test
Insufficient	3,4 %	0,0 %	3,4 %	0,0 %
Low	34,5 %	17,2 %	20,7 %	10,3 %
Basic	31,0 %	41,4 %	37,9 %	41,4 %
High	31,0 %	41,4 %	37,9 %	48,3 %
Total	100,0 %	100,0 %	100,0 %	100,0 %

Source: Own elaboration.

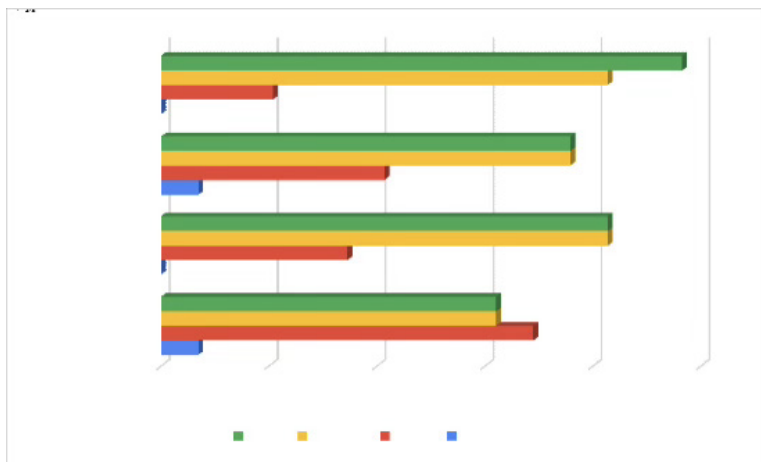


Figure 5. Percentage of students at each performance level, broken down by map

Source: Own elaboration.

Normality test: The Shapiro-Wilk test indicated that age, declarative knowledge (pre-test and post-test), and conditional knowledge from the pre-test do not follow a normal distribution (Table 6). Therefore, for these variables, statistical inference was performed using non-parametric tests. As shown in Table 6, declarative, procedural, conditional, and planning knowledge increase as students become more familiar with the strategy—that is, with the rubric designed and the stimuli provided for its development. This is reflected in the p-values presented on the table.

Table 6. Shapiro-Wilk Normality Test (Pvalor)

Shapiro-Wilk Normality Test (Pvalor)	
Variable	Pvalor
Age	< 0,0001
Map 1Pre test	0,733
Map 2	0,391
Map 3	0,517
Map 4 Post-test	0,114
Declarative knowledge - Post-test	0,016
Declarative Knowledge - Pre-test	0,006
Procedural knowledge - Post test	0,188
Procedural knowledge - Pre test	0,386
Condicional knowledge test- Post test	0,260
Conditional knowledge - Pre test	0,025
Planning - Post test	0,471
Planning- Pre test	0,228
Organization - Post test	0,629
Organization - Pre test	0,737
Monitoring - Post test	0,270
Monitoring - Pre test	0,222
Debugging - Post test	0,326
Debugging - Pre test	0,289
Evaluation - Post test	0,422
Evaluation - Pre test	0,058

Source: Own elaboration.

The variables involved in this study were compared using the Student's t-distribution, which was the chosen method to compare the means between the pre-test and post-test. In this regard, Table 7 shows that students began the investigative process under similar conditions in terms of the average score on Map 1 and the MAI items. Additionally, the table indicates that students in class 6A are younger than those in 6B; however, this does not pose a problem since the comparison is not between groups but rather the application of the strategy from pre-test to post-test.

Table 7. Comparison of groups at the start of the research.

Comparison of groups at the start of the research.	
Variable	Student's T test (p value)
Age	0,044
Map 1	0,074
Declarative knowledge*	0,508
Procedural knowledge	0,124
Conditional knowledge*	0,878
Planning	0,663
Organization	0,279
Monitoring	0,489
Debugging	0,574
Evaluation	0,073

*Mann-Whitney Test

Source: Own elaboration.

When performing the ANOVA table to compare the scores obtained by the students across the four maps, a statistically significant difference was found between the average scores of maps 1, 3, and 4 (p-value = 0.00038), with the mean score of map 4 being higher than that of map 1 (p-value = 0.00018) and the mean score of map 4 also exceeding that of map 3 (p-value = 0.0167).

Likewise, the average score increased from the pre-test to the post-test in procedural knowledge, planning, organization, monitoring, debugging, and evaluation (Table 8).

Tabla 8. *Comparison Pre - Post*

Comparison Pre - Post	
Variables compared	Student's T test (p value)
Declarative knowledge Pre test -Declarative knowledge Post test*	0,111
Procedural knowledge Pre test - Procedural knowledge Post test	0,010
Conocimiento Condicional Pre test - Conditional knowledge Post test*	0,200
Planning Pre test - Planning Post test	0,002
Organization Pre test - Organization Post test	0,001
Monitoring Pre test- Monitoring Post test	0,009
Debugging Pre test - Debugging Post test	0,041
Evaluación Pre test - Evaluation Post test	0,002

*Wilcoxon Signed Rank-test.

Source: Own elaboration.

Age does not correlate with any of the variables (p-values of 0.021 or higher), but the maps indicate that once the score increases in any of them, the scores in the others also increase (Table 9). The same applies to the MAI items in both the pre-test and the post-test (Tables 10 and 11).

Table 9. *Correlation Between Maps (p-values)*

Correlation Between <i>sentipensantes</i> Maps (p-values)			
Variable	Map 1-Pre test	Map 2	Map 3
Map 2	< 0,0001		
Map 3	0,002	< 0,0001	
Map 4-Post test	< 0,0001	< 0,0001	< 0,0001

Source: Own elaboration.

Table 10. Correlation Between MAI Items (Pre-test), p-values

Correlation between MAI items (Pre test), Pvalues							
Variable	Procedural knowledge	Conditional knowledge	Planning	Organization	Monitoring	Debugging	Evaluation
Declarative knowledge	0,001	< 0,0001	0,021	<0,0001	<0,002	<0,0001	0,022
Procedural knowledge		<0,0001	< 0,0001	< 0,0001	< 0,0001	< 0,0001	< 0,0001
Conditional knowledge			0,001	< 0,0001	<0,0001	< 0,0001	0,003
Planning				< 0,0001	< 0,0001	< 0,0001	< 0,0001
Organization					< 0,0001	< 0,0001	< 0,0001
Monitoring						< 0,0001	< 0,0001
Debugging							< 0,0001

Source: Own elaboration.

Table 11. Correlation between MAI items (Post test), Pvalores

Correlation between MAI items (Post test), Pvalores							
Variable	Procedural knowledge	Conditional knowledge	Planning	Organization	Monitoring	Debugging	Evaluation
Declarative knowledge	0,011	< 0,0001	< 0,0001	< 0,0001	< 0,0001	< 0,0001	0,497
Procedural knowledge		< 0,0001	< 0,0001	<0,0001	< 0,0001	< 0,0001	0,591
Conditional knowledge			< 0,0001	< 0,0001	< 0,0001	< 0,0001	0,492
Planning				< 0,0001	< 0,0001	< 0,0001	0,640
Organization					< 0,0001	< 0,0001	0,640
Monitoring						< 0,0001	0,705
Debugging							0,594

Source: Own elaboration.

Likewise, higher scores in the MAI pre-test correspond to higher scores in the MAI post-test (Table 12); and when comparing the scores of the maps against the MAI pre-test and post-test (Table 13), it is observed that Map 1 is associated with pre-test monitoring; Map 2 with pre-

test declarative knowledge, pre-test conditional knowledge, pre-test monitoring, post-test declarative knowledge, post-test conditional knowledge, post-test monitoring, and post-test debugging. Map 3 shows no correlation with the MAI, while Map 4 correlates with pre-test conditional knowledge, post-test decla

rative knowledge, post-test planning, post-test monitoring, post-test debugging, and post-test evaluation. All correlations mentioned in this paragraph are positive, meaning that as the value of one variable increases, the other variable also increases.

Table 12. Correlation Between MAI Items (Pre-test, Post-test), p-values

Correlation Between MAI Items (Pre-test, Post-test), P-values							
Variable	Procedural Knowledge Post test	Conditional knowledge Post test	Planning Post test	Organization Post test	Monitoring Post test	Debugging Post test	Evaluation Post test
Declarative knowledge Pre test	<0,066	< 0,0001	<0,010	< 0,0001	<0,023	<0,009	<0,013
Procedural Knowledge Pre test	<0,000	< 0,0001	< 0,0001	< 0,0001	0,002	<0,001	<0,008
Conditional knowledge Pre test	<0,001	< 0,0001	0,001	< 0,0001	< 0,0001	< 0,0001	<0,003
Planning Pre test	<0,000	< 0,0001	< 0,0001	0,000	< 0,0001	< 0,0001	<0,002
Organization Pre test	<0,001	< 0,0001	< 0,0001	< 0,0001	< 0,0001	< 0,0001	<0,000
Monitoring Pre test	<0,001	< 0,0001	< 0,0001	< 0,0001	< 0,0001	0,000	<0,000
Debugging Pre test	<0,002	< 0,0001	< 0,0001	< 0,0001	< 0,0001	< 0,0001	<0,003
Evaluation Pre test	<0,011	0,001	< 0,0001	0,000	< 0,0001	0,007	<0,002

Source: Own Elaboration.

Table 13. Correlation between the maps and MAI items (Pre test – Post test), Pvalores

Correlation between the maps and MAI items (Pre test - Post test), Pvalores				
Variable	Map 1 Pre test	Map 2	Map 3	Map 4 Post test
Declarative knowledge Pre test	0,232	0,048	0,247	0,053
Procedural Knowledge Pre test	0,535	0,343	0,682	0,427
Conditional knowledge Pre test	0,350	0,005	0,151	0,032
Planning Pre test	0,090	0,107	0,578	0,078
Organization Pre test	0,226	0,117	0,663	0,074
Monitoring Pre test	0,025	0,047	0,546	0,095
Debugging Pre test	0,532	0,146	0,397	0,186
Evaluation Pre test	0,352	0,358	0,777	0,537
Declarative knowledge Post test	0,180	0,016	0,283	0,018
Procedural Knowledge Post test	0,198	0,115	0,336	0,105
Conditional knowledge Post test	0,120	0,013	0,330	0,089
Planning Post test	0,140	0,101	0,387	0,046
Organization Post test	0,509	0,052	0,422	0,082
Monitoring Post test	0,059	0,005	0,121	0,006
Debugging Post test	0,137	0,007	0,059	0,002
Evaluation Post test	0,078	0,164	0,220	0,005

Source: Own elaboration

On the other hand, when analyzing the data yielded by the evaluation item, a phenomenon within the instrument stands out. A decline in interest in monitoring the evaluation process was found in the post-test of the MAI. This is justified by the lack of correlation with declarative, procedural, conditional knowledge, or any of the regulations stipulated in the variables. One possible explanation might lie in the stimulus generated by the maps (mediated by the metacognitive relationship evaluated in the MAI test).

The maps motivated a process of research, design, and creation as a result of learning; that is, a “work” through which the student relieved pressure amid the creative and artistic process, regulating their progress detached from grades and other phenomena of the evaluation process, since they had the rubric to guide their performance.

In this sense, reviewing some of the questions corresponding to the Evaluation item in the MAI reveals some clues that account for the anomaly in the result. Specifically, question seven: “When I finish an evaluation, do I know how I did?” This may lead the student to interpret the map not as an evaluation but as a progressive construction that demonstrates a learning process. In question nineteen: “When I finish a task, do I ask myself if there was an easier way to do it?” Here, the guiding directive of the map alongside the rubric might have indicated that this path to create the map was not necessarily the easiest but the most appropriate. Finally, in question twenty-four: “When I finish studying, do I make a summary of what I have learned?” it is evident that the student does not perceive the need to make a summary after the research process, reducing their investigation to the declaration and conventions described for the map.

Discussion and Reflections

This strategy replaced standardized evaluation, opening a discussion about other, more reflective grading methods that foster the development of critical thinking skills focused on creativity and the construction of alternative narratives as a product of addressing geohistorical themes. This was expressed in the Delphi expert report where it is stated:

“Given the growing importance of creativity and the need to maximize its potential, it would be valuable to deepen its integration or collaboration with the PC competence so that they work together in all applications, increasing the scope and consistency of their use.” (Moreno, 2021, p. 48).

A revealing aspect of the study is that the idea of competition seems to have diminished among the students, as it was observed that they stopped competing for grades and began focusing on their work and self-regulating based on the rubric. There was another kind of dialogue, more appreciative of different understandings rather than focusing on grades, which in many cases only reflect outstanding memory processes.

Regarding the *sentipensante* concept, the invitation is to continue connecting reason with the heart to address objectives in the teaching and learning of social sciences. By intervening in the maps, students can construct many stories, create realities inspired by their research, accepting Master Fals Borda’s invitation to generate “other codes and new technologies” “to stimulate counterpowers and act successfully in postmodernity” (Fals Borda, 1998, as cited in Moncayo, 2015, p. 309).

Finally, the research confirms that it is time to explore, continue breaking paradigms, foster tools to think critically, guide students in decision-making, and create proposals to critically redesign the territory they inhabit.

Conclusions

This research represents an innovation for pedagogy and didactics in social sciences education, as the “geohistorical sentipensante maps” strategy was effective in developing critical thinking skills and metacognitive awareness in the students who participated in the study.

In all variables, except for evaluation in the post-test, an upward correlation can be seen from the pre-test to the post-test, both in map performance and in knowledge about cognition and regulation, which was assessed through the MAI Junior.

Following the postulates of Saiz & Rivas (2008) on stimulating critical thinking, it was found that the maps enabled students to seek knowledge through reasoning processes and learning regulation, from which they solved problems in design and decision-making to effectively meet rubric standards.

The rubric’s design supports Panadero and Tapia (2017), who affirm that when students have access to evaluation criteria, their performance improves.

It also demonstrates a correlation among the variables that evaluated the metacognitive dimensions of knowledge, regulation, and the “geohistorical sentipensante maps”; thus, when a student scores high in declarative knowledge, they tend to score similarly in other variables. Likewise, when performance on Map 1 is high, it will also be high in subsequent maps, showing an upward trend as students gradually assimilate the strategy, as evidenced by the result in Map 4 (post-test).

In Map 3, a decline was observed due to an external event that emotionally impacted students. It is proven that unforeseen events can alter teaching and learning processes, as students’ emotional states affect their performance — that is, academic performance is linked to mood. Thus, sensitivity and empathy toward the surrounding context will be decisive for the declarative knowledge and procedural regulation demanded by the strategy.

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