



Temporal thinking as a tool for the meaningful learning of historical time

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Abstract

The goal of this study, which employed the quantitative method of correlational design with temporal thinking and significant historical time learning as research variables, was to ascertain the relationship between the degree of temporal thinking and significant historical time learning as part of the competencies in the social sciences. The participants consisted of 178 Peruvian high school students. The research technique used was a survey with a questionnaire made up of 20 multiple-choice items, with reliability confirmed by sufficient Cronbach's alpha, and review by expert judgment. The results of the study revealed statistically that the level of temporal thinking is significantly related to the level of significant learning of the historical time. Also, Spearman's correlation coefficient with a positive relationship of low level is evidenced. In conclusion, the study's findings indicated that the understanding of historical time as part of temporal thinking acts as a cognitive organizer of historical knowledge, and therefore, determines the significant learning of historical time.

Keywords: Historical time; learning; meaningful learning; temporal thinking.

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1. INTRODUCTION

Education in the 21st century implies ensuring that students develop the ability to interpret their reality to understand social problems and propose alternative solutions to develop active citizenship that allows for achieving a historical identity (Llusa Serra, 2016a). However, there is still a predominance of content teaching, leaving aside the development of students' temporal thinking (Llusa Serra, 2016b; Llusa Serra, 2016a). In the teaching-learning of history, it is necessary to emphasize the development of temporal thinking that arises from the management and understanding of temporal concepts to understand historical time and achieve meaningful learning.

The challenge of social sciences lies in building a teaching-learning process that facilitates the interpretation of the past so that students can develop an awareness of future perspectives to achieve an understanding and temporal coordination (relationship: past, present, and future) at a personal, social and historical level that facilitates the creation of a historical identity (Cartes Pinto, 2020). This is actualized by having the right environment and inputting the right teaching techniques (Basdogan & Birdwell 2024; Candel, et al., 2024; Ye, 2022).

Studies such as those by Cartes Pinto (2020), Llusa Serra (2016b), Sáiz Serrano and López (2015) emphasize that students have difficulties in the development of temporal thinking as an influence of the teaching received with exclusive predominance in dating, chronology and memorization affecting the development of historical and critical thinking of students. In addition, Sayago (2020) concluded that students have little understanding of temporal categories and therefore have insufficient appropriation of historical time. On the other hand, Llusa Serra (2016a) points out that students give value to the understanding of the present and prospective of reality in a logical way, making evident the role of temporal notions in reaching a historical awareness of reality.

1.1. Conceptual background

Temporal thinking or understanding of temporal concepts is the structural basis of historical consciousness that allows us to understand historical time (Escribano Muñoz, 2019), facilitating the understanding of the experience of time to assume roles as historical subjects capable of temporal reflection (Cartes Pinto, 2020). Temporal thinking has several categories such as chronology, periodization, temporality, duration, and perspective, as well as temporal relations such as causality, simultaneity, change, and continuity (Trepát, 2006; Trepát & Comes, 2006; Oppong & Essiaw 2024), that allows access to significant historical information as cognitive operators (Mattozzi & Firenze, 1988). This favors the comprehension of historical time and the achievement of meaningful learning of historical content.

Historical time demands a dialectical relationship between the past, present, and future for the generation of the sense of temporality to possess the capacity to perceive, understand, and develop historical and social awareness from critical thinking (Heidegger, 1927; Lahera Prieto & Pérez Piñón, 2021; Pagés, 1989). Therefore, the teacher must know how to transmit the notions of time in a comprehensive, functional, and competent way to achieve temporal thinking to understand the information and data to make a critical reading of reality and analyze problems from the multicausality to achieve a better learning of history (Díaz Villafáñez, 2016; Llusa Serra, 2016b; Prats, 1997; Eshet & Margaliot 2022).

Meaningful learning focuses on the construction, processing, storage, ordering, and signification of information, to convert it into knowledge (Moreira, 1997); this should start from the student's previous knowledge to associate the information with the existing cognitive structures to favor its location in the long-term memory and make it meaningful, leading to the consolidation of new knowledge (García Rivera, 2022; Licerias Ruiz, 1997; Londoño Sánchez & Carvajal Guzmán, 2015).

Huerta (2001) proposes basic processes of meaningful learning that are interconnected and related to the activities during the learning process, these being the exploration of previous knowledge, cognitive conflict, integrative reconciliation, meaningful subsumption, assimilation, progressive differentiation, and the consolidation process; these processes of meaningful learning involve the evidence of mastery of new

knowledge as organized and hierarchical parts of the cognitive structure; therefore, this proposal will be used in this research.

The goal of teaching history should be to enable students to make sense of the past, present, and future. This will enable them to question temporality and develop a historical awareness with the support of historical content (Tirado-Olivares et al., 2024; Díaz Villafañez, 2016; González & Massone, 2004; Pagès, 2019; Prats et al., 2011). These approaches are related to the competence constructs historical interpretations of the field of social sciences, so managing temporal concepts as cognitive organizers is necessary to learn historical time meaningfully (Pages Blanch, 2009; Pagés Blanch & Santisteban Fernández, 2010; Prats, 1997; Santisteban Fernández, 2007; Trepát, 2006). Giving students the opportunity to consider different scenarios for society's development and to see themselves as change agents who use critical thinking from temporality to think and comprehend (Coudannes Aguirre & Alvarez, 2015; Hervás Avilés & Miralles Martínez, 2000; Llusà Serra, 2016a; Marzano & Pickering, 2005) are important ways to help students think critically. Teachers must perceive historical awareness of the importance of teaching temporality as an element that gives meaning to the teaching and learning process; in this sense, the temporal dimension must be considered as the backbone for the teaching of history (González & Massone, 2004; Santisteban Fernández, 2007).

1.2. Purpose of study

In this sense, the teaching of history implies understanding the representations of historical time to understand the past and present and learn how to intervene in the future (Pagés Blanch & Santisteban Fernández, 2010), but above all, to achieve meaningful learning of historical content oriented to historical awareness. The present research seeks to establish whether learning in the area of social sciences in regular basic education represents the development of meaningful learning of historical time mediated by temporal thinking since it seems that students mechanically assimilate historical concepts and interpretations without reflecting on the purposes and goals of such content. The question to investigate is: What is the relationship between the level of temporal thinking and meaningful learning of historical time? Since there are few studies linked to this problem, the contribution of the research will be elementary to understand the relationship between the variables under study.

2. METHOD AND MATERIALS

The research used the quantitative method, exploratory level, and correlational design; its objective was to determine the relationship between the level of temporal thinking and the significant learning of historical time, so the research hypothesis was: the level of temporal thinking is related to the significant learning of historical time. As research variables, the level of temporal thinking was counted as an independent variable, and the level of significant learning of historical time as a dependent variable.

2.1. Participants

The population consisted of 178 high school students, with an intentional census sample.

2.2. Data collection tool

The research technique used was a survey with a questionnaire made up of 20 multiple-choice items. To measure the reliability of the instrument, Cronbach's alpha 0.871 was used, as well as a review by experts from teachers of the main local universities. For the application of the instrument, authorization to carry out the research was requested from the director of the educational institution involved, then the informed consent form was distributed and finally, the questionnaire was applied to the students.

3. RESULTS

The Kolmogorov-Smirnov test for normality shows a value of $p < 0.005$, establishing that the data do not have a normal distribution (table 1).

Table 1
Normality test

	Kolmogorov-Smirnov ^a		
	Statistician	gl	Sig.
Temporary thinking	,461	178	,000
Significant learning	,492	178	,000

In the application of the non-parametric test, given that the p-value is less than 0.05, the null hypothesis was rejected; therefore, there is statistical evidence to affirm that the level of temporal thinking is significantly related to the level of significant learning of historical time (table 2). On the other hand, Spearman's correlation coefficient = 0.317, indicates a low-level positive relationship; the higher the level of temporal thinking, the higher the level of significant learning of historical time.

Table 2
Correlations

			Temporary thinking	Significant learning
Spearman's Rho	Temporary thinking	Correlation coefficient	1,000	,317**
		Sig. (bilateral)	.	,000
		N	178	178
	Significant learning	Correlation coefficient	,317**	1,000
		Sig. (bilateral)	,000	.
		N	178	178

** . Correlation is significant at the 0.01 level (bilateral).

Regarding the levels of temporal thinking, 2% of 178 students reached a low level, 79% a medium level, and 19% a high level, which shows that the variety and complexity of historical terms and/or temporal categories are not considered very important or useful for the student's learning of history due to the lack of consideration of the teacher to explain and demonstrate the usefulness of temporal concepts for historical awareness. In addition, students show difficulties in understanding temporal thinking about the concepts of duration, change, chronology, simultaneity, periodization, causality, prospective, continuity, temporality, and historical time (table 3).

Table 3
Level of temporal thinking

		Frequency	Percentage
Valid	under	4	2
	medium	140	79
	high	34	19
	Total	178	100

About the level of meaningful learning of the historical time, of 178 students, 2% reached a low level, 92% a medium level, and 6% a high level. These results (table 4) show the relative ease of high school students to execute some basic processes of meaningful learning of historical time such as the exploration of previous knowledge, cognitive conflict, integrative reconciliation, meaningful subsumption, assimilation, progressive differentiation, and consolidation. The teacher is responsible for the irregular application of meaningful strategies for the learning of historical time.

Table 4

Level of significant learning of historical time

		Frequency	Percentage
Valid	under	4	2
	medium	164	92
	high	10	6
	Total	178	100,0

4. DISCUSSION

Based on the results found, the hypothesis is tested, and a p-value of 0.05, showing statistically that the level of temporal thinking is significantly related to the level of significant learning of historical time, also about Spearman's correlation coefficient = 0.317, a low-level positive relationship is evident.

The previous section is corroborated by the studies. Llusá Serra (2016a) pointed out that most students give importance to the mastery of history to be able to apply it to their daily reality. In a similar vein, Cartes Pinto (2020) concluded that high school pupils lack an understanding of temporal notions since they have focused their attention on the past due to a curriculum that exclusively emphasizes memorization, chronology, and date. Similarly, Sáiz Serrano and López (2015) found that, of 117 students, 67% achieve a low level of historical thinking (relevance, causality, change, historical awareness), which affects their capacity for analysis and critical thinking; only 10% of students succeed in developing a critical narrative. Accordingly, Llusá Serra (2016a) asserts that students must be proficient in a variety of temporal operators to simultaneously identify facts, relate them to explain a historical reality, and form historical awareness since these skills will enable them to interpret the past, comprehend the present, and project the future. In the same way, Sayago (2020) concluded that students have little appropriation of historical time as a meta-concept; they also have little understanding of temporal categories.

In general, the research is consistent with previous studies that showed that students have difficulties in the development of temporal thinking and this affects the learning of historical time. The percentages achieved in the study showed a positive correlation between the level of temporal thinking and the level of significant learning of historical time, which proves what was said by Barton et al., (2004) when stating that the learning of these categories (temporal concepts) is associated with the opportunity to access significant historical information.

5. CONCLUSIONS

It is concluded that the significant learning of historical time is determined by the understanding of temporal concepts as a component of temporal thinking, which functions as a cognitive organizer of historical knowledge. Accordingly, historical time education must begin with prior knowledge of temporal issues to act in an inductive process that consolidates the general understanding of historical facts and processes. Another aspect to consider is the percentages of levels reached by the students that could be explained by the irregular application of teaching and learning strategies related to temporal concepts by the teacher; and by the lack of openness to strategies for the meaningful learning of historical time on the part of high school students.

A limitation of this study is that it was of correlational design; it is suggested that quasi-experimental studies be conducted to determine the influence of temporal thinking on the significant learning of historical time. In addition, the study was conducted on students, and studies could be considered to identify the strategies used by teachers about the variables. The results of this research study are vital for further investigation of the factors that influence meaningful learning in the area of social sciences, so it is necessary to continue research

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on the effectiveness of temporal thinking applied to education and its possible contributions to the formation of historical awareness and critical thinking.

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Ethical Approval: The study adheres to the ethical guidelines for conducting research.

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