



A Study On the Impact of Teaching Improvement on the Ability to Explain Historical Concepts

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Abstract

This study investigated the effects of an instructional improvement program on learners' ability to explain historical concepts through a quasi-experimental approach. Two units were considered, “British Industrial Revolution that Affected the World” (teacher-centred instruction) and “The Birth and Spread of Marxism” (student-centred instruction), and the pre-test and post-test performance of 76 high school students in Shenzhen, China, on three dimensions of richness, relevance, and structure were compared. The results showed that student-centred instruction significantly improved conceptual understanding in the unit “The Birth and Spread of Marxism” ($p < 0.05$), with significant enhancements in richness, relevance, and structure. In contrast, teacher-centred instruction in the unit “British Industrial Revolution that Affected the World”, combined with prior learning, did not show any statistically significant enhancement ($p > 0.05$), as expected from cognitive load theory, which emphasizes novelty to support deep learning. The results highlight the importance of instructional strategies to foster deep critical thinking in history instruction. This study provides empirical support for curriculum reforms that favour student-centred practices and has implications for combining instruction with prior learning in history instruction.

Keywords: Cognitive load, Historical concept explanation, Pedagogical innovation, Student-centered learning

1. Introduction

History is not only a carrier for imparting knowledge, but also an important field for cultivating students' critical thinking and in-depth interpretation ability. In East-Asian societies where high-stakes examinations dominate, history lessons are frequently reduced to the transmission of discrete facts and chronological narratives. Such a pattern has been repeatedly questioned by curriculum reformers, who argue that rote memorisation cannot satisfy the demands of an information-abundant and globally-connected world (Stoel et al., 2015).

However, traditional teacher-centered history classrooms rarely provide students with opportunities to practice questioning, argumentation, and debate, which are precisely the abilities valued by high-tech industries and the "double reduction" policy in China. Moreover, the Chinese Senior High School History Curriculum Standards (2017 Edition, revised 2020) explicitly lists "historical explanation" as one of the five core competencies, yet offers little guidance on instructional models that systematically foster this ability.

In recent years, the continuous development of educational theory and practice at home and abroad has gradually replaced the traditional teacher-centred model with the student-centred teaching concept. Maloy and LaRoche (2010) and Mascolo (2009) proposed that teaching is not only the inculcation of knowledge, but also a process of interaction between teachers and students and the joint construction of knowledge. This change has prompted teachers to pay more attention to the cultivation of students' independent inquiry, critical thinking and innovation ability in teaching. At the same time, the introduction of multimedia technology and interactive platforms, such as the oral history method English (2021) and the exploration of new teaching media Rezeki and Suranto (2023), has brought new perspectives and practical possibilities to history teaching.

This paper aims to explore the specific impact of teaching improvements on students' ability to explain historical concepts through empirical research, attempting to fill the gap between traditional teaching models and modern teaching needs. Through comparative experimental design and multidimensional data analysis, this paper not only focuses on the effectiveness of teaching strategies themselves, but also explores their long-term impact on the cultivation of students' historical thinking in different teaching situations. It is hoped that this study can provide empirical support for the reform of history teaching and provide new ideas and practical examples for the innovation of future teaching models.

2. Literature Review

2.1 Development of multiple strategies in history teaching

With the development of information technology and the popularization of multimedia technology, history teaching has gradually broken through the limitations of traditional classrooms (Candel et al., 2024; Chilton et al., 2025; Molina-Torres & Blázquez, 2024). English (2021) explored the application of oral history in middle school history teaching, and believed that through real historical voices and individual experiences, students can more deeply experience the emotions and meanings behind historical events. Rezeki and Suranto (2023) showed that new teaching media, such as flipbook media and interactive platforms, could visualize historical concepts and enhance students' intuitive understanding and memory of historical knowledge.

The traditional history teaching model is mainly teacher-centred, emphasizing the inculcation and memory of knowledge, while ignoring the cultivation of students' active exploration and critical thinking. Maloy and LaRoche (2010) pointed out that the use of student-centred teaching methods in history classes can stimulate students' interest in learning and enable them to build their knowledge system through discussion, cooperation and exploration. Mascolo (2009) further discussed the important role of teacher-student joint

participation and interactive collaboration in knowledge generation, and advocated transcending the single teacher-led model through guided participation and collaborative discussion. In recent years, this concept has received extensive attention and verification from scholars at home and abroad. Its core is to allow students to play a more active role in the classroom, thereby promoting in-depth understanding and autonomous learning. Brush and Saye (2000) further verified that designing student-centred learning units, can not only improve student participation, but also effectively promote the internalization of knowledge in practical activities such as situational simulation and role-playing. Pan et al. (2023) combined the concept of project-based learning, integrated creative thinking with historical knowledge, and constructed interdisciplinary teaching activities, proving that multiple teaching strategies have significant advantages in cultivating students' critical historical thinking and interpretation ability. Chilton et al. (2025) explores BYOD as part of student-centered learning and has indeed heightened an underlying constructivist approach to history teaching

In addition, Hattie (2009) emphasized in theory of visible learning that students often achieve better academic results through active participation, timely feedback and cooperative learning. This theory provides empirical support for student-centred teaching methods and also points out the direction for the reform of history teaching. Wilson (2002) further illustrates that the cultivation of historical thinking requires students to conduct critical analysis and independent judgment when facing historical materials, which is exactly the goal pursued by student-centred teaching methods.

2.2 Improvement of teaching strategies and elaboration of historical concepts

In the current history teaching reform, cultivating students' in-depth understanding of historical concepts and causal reasoning ability is regarded as an important goal of improving historical literacy. Traditional teaching models often focus on the memory of historical events and the statement of facts, ignoring the discussion of the connotation of historical concepts and the analysis of the causal relationship between events (Basri et al., 2024; Bussell, 2024). Therefore, modern history teaching emphasizes guiding students to have a multi-dimensional understanding of complex historical concepts to build their overall understanding of historical knowledge. In class, teachers should encourage students to discuss historical concepts with multiple meanings such as "revolution", "modernization" and "globalization", and gradually help students build an understanding of the rich connotations of these concepts through comparative analysis and text interpretation. As Barton and Levstik (2004) pointed out, the learning of historical concepts is not only about mastering their surface definitions, but also about understanding the social, cultural and political background reflected behind these concepts, so that students can discern the complex relationship between surface phenomena and deep structures.

At the same time, causal reasoning ability, as the core of historical thinking, requires students to be able to sort out the internal connections and logical chains between events when facing historical events (Tirado-Olivares et al., 2024). Research shows that designing open-ended questions and situational simulations can effectively stimulate students' awareness of the causal relationship of historical events (Stoel et al., 2015). In the class, with the introduction of plentiful historical materials, authentic materials and multimedia sources, the

teacher can propose such questions as "Why does an event bring about chain effect" or "For what functions do different social forces play at a specific turning moment in history", so that the students can form step by step an organic cause-and-result chain in the process of discussion. Such a teaching method does not only require the students to repeat the factual information about the event, but also emphasizes overall analysis of the event's background, driving forces and later development, so that the comprehensive and critical thinking ability of the students can be cultivated (Abrar et al., 2025).

Through project-based learning, case analysis and group discussion, students can not only effectively integrate scattered knowledge points when discussing historical events, but also exercise their causal reasoning ability in practice (Mutawakkil, 2024; Peña et al., 2024). For example, Popa (2021) and Pan et al. (2023) proved that when students were asked to decompose complex historical events into multiple sub-events and conduct a comprehensive analysis of the relationship between these sub-events, but they could not only accurately grasp the connotation of historical concepts, but also show higher logic and criticality in causal reasoning. When designing courses, teachers can guide students to analyze historical events in stages, thereby gradually improving their comprehensive analysis and logical reasoning abilities in explaining historical phenomena.

In order to verify the effect of teaching improvement measures on improving students' understanding of historical concepts and causal reasoning abilities, some studies have adopted a variety of evaluation methods such as quantitative questionnaires, open-ended essays, and classroom observations. The results show that students who have undergone systematic training can propose more detailed and hierarchical causal relationships when explaining complex historical events, and show higher sensitivity and depth in discerning the deeper meanings of historical concepts (Rapanta, 2021; Stoel et al., 2015). This evaluation method not only helps teachers understand students' learning progress on time, but also provides valuable feedback for the optimization of subsequent teaching strategies.

3. Method

This study adopts an experimental design to compare the effects of different teaching strategies on the construction of historical concepts among third-year junior high school students. The study selected Lesson 10 "British Industrial Revolution that Affected the World" (Abbreviated as "Industrial Revolution") and Lesson 11 "The Birth and Spread of Marxism" (Abbreviated as "Marxism") in "Outline of Chinese and Foreign History (Part II)" as teaching content, adopted different teaching methods, and asked students to write down the keywords about "Industrial Revolution" and "Marxism" before and after class to understand the basic situation of students' ability to explain historical concepts.

3.1 Participants

The participants of this study came from two classes A and B in a high school in Shenzhen, Guangdong Province. The two classes have the same teacher and the teaching progress is consistent. From the mid-term exam results of history (Table 1), there is a significant difference between Class A and Class B ($p < 0.05$), and the academic level of history in Class A is higher than that in Class B.

Among them, there were 39 students in Class A and 37 students in Class B, a total of 76 people. After removing invalid questionnaires, in pre-test, there were 38 valid questionnaires for "Industrial Revolution", accounting for 50% of the total sample; there were 36 valid questionnaires for "Marxism", accounting for 47.3% of the total sample. This is because, in order to avoid students cheating, teachers do not strictly require students to complete the test carefully, but only ask students to complete the test as much as possible.

Table 1: Independent sample t-test of midterm exam scores of Class A and B

	Class A (N=39)		Class B (N=37)		t	p
	Mean	SD	Mean	SD		
Scores	76.03	6.713	73.23	8.885	2.144	0.019

3.2 Process

Pre-test stage: students from Classes A and B are required to independently write the semantic characteristics of the target historical concepts without reference to materials. The same teacher taught every lesson; before the experiment she completed two two-hour training sessions that scripted timing, questions, materials, and transitions for both units

Teaching intervention stage: the teacher-led teaching model is adopted for the "Industrial Revolution", while the student-centred teaching method based on problem-driven dialogue and collaborative discussion is implemented for "Marxism". Total teaching time was held constant at four 45-minute lessons spread across two weeks, with identical content objectives, textbook pages, digital hand-outs, homework load, and classroom layout. Only the locus of control (teacher-centred versus students-centred) was allowed to vary.

Post-test stage: the evaluation tool isomorphic to the pre-test is used to measure the degree of concept mastery. By establishing a multidimensional concept analysis framework, the researchers coded and classified the semantic elements produced by the students according to the cognitive level (such as factual memory, causal analysis, and critical evaluation).

Quantitative methods are used for data analysis. First, the independent sample t-test is used to compare the differences in teaching effects between the two concept groups, and then the paired sample t-test is used to evaluate the longitudinal improvement between the pre-test and post-test within each group. This dual verification mechanism can not only identify the differential effects of different teaching modes on concept acquisition, but also track the evolution of individual cognitive structures.

3.3 Measurement

This study is based on the normative framework of the core literacy of the history subject in the 2013 edition of the National Curriculum Standards of the Department of Education of the United Kingdom (Department for Education, 2013), and constructs a three-dimensional assessment model for the ability to explain historical concepts. The curriculum standards clearly define "establishing conceptual associations", "building structured narratives" and "using professional terminology" as important indicators for the development of subject

capabilities, and its cognitive goals form a theoretical mapping relationship with the three dimensions of Richness, Relevance and Structure proposed in this study.

A four-step progressive evaluation scale (Likert-type Scale) is used, and each dimension is set with four ability levels from basic to proficient (1-4 points). The specific operational definitions are as follows:

Richness: represents the density of the learner's semantic network for a specific historical concept and reflects the breadth of information storage. Its measurement is based on information processing theory (Lockhart & Craik, 1990). The strength of memory traces is evaluated by extracting the number of keywords. It is specifically divided into: being able to write 1-2 keywords about historical concepts (1 point), being able to write 3 keywords about historical concepts (2 points), being able to write 4 keywords about historical concepts (3 points), and being able to write 5 or more keywords about historical concepts (4 points).

Relevance: Based on the theory of concept maps (Novak, 2010), it evaluates the recognition accuracy of concept features. The relevance is assessed by the number of associated words related to the historical concept, which is divided into: 0 (1 point), 1 (2 points), 2 (3 points) and 3 or more (4 points), reflecting the learner's grasp of the essential attributes of the concept.

Structure: Based on the historical narrative framework (White, 1984), a diachronic analysis model is constructed to examine learners' grasp of the temporal and spatial structure of historical concepts. Antecedents, processes, results and historical significance are used as elements to assess the logical completeness of the conceptual organization through element coverage. Specifically: the keyword does not mention or only mentions one element (1 point), the keyword mentions two of the elements (2 points), the keyword mentions three of the elements (3 points), and the keyword mentions all four elements (4 points).

4. Results

From the pre-test results (shown in Table 2 and Table 3), whether it is the "Industrial Revolution" or the "The Birth of Marxism", there is no significant difference in the historical concept explanation ability of the two classes in terms of structure, richness, and relevance (p value > 0.05). Therefore, the historical concept explanation ability levels of the two classes before the teaching intervention are the same.

Table 2: Independent Samples t-Test for Pre-test (Industrial Revolution)

	Class A(N=20)		Class B (N=18)		t	p
	Mean	SD	Mean	SD		
Richness	3.33	0.687	3.65	0.703	-1.886	0.071
Relevance	2.56	0.988	2.89	1.032	-1.631	0.133
Structure	1.81	0.771	1.84	0.646	-0.679	0.405

Table 3: Independent Samples t-Test for Pre-test (Marxism)

	Class A(N=18)		Class B (N=18)		t	p
	Mean	SD	Mean	SD		
Richness	3.33	0.687	3.65	0.703	-1.211	0.223
Relevance	2.03	0.891	2.45	1.220	-1.609	0.110
Structure	1.69	0.720	1.91	0.699	-0.787	0.389

For the unit "Industrial Revolution", the teacher-centred teaching method was adopted, and students mainly relied on receptive learning. After the course teaching, the scores of the three dimensions of the students were collected again and a paired sample t-test was conducted. Comparing the pre- and post-test data (shown in Table 4), it can be found that there is no significant difference in the level scores of the structure, richness, and relevance of the student's ability to explain historical concepts ($p > 0.05$).

For the unit "Marxism", the teaching is student-centered and students are encouraged to ask questions and discuss. The paired sample t-test between the pre- and post-tests shows (Table 5) that there are significant differences in the scores of Richness, Relevance, and Structure of students' ability to explain historical concepts ($p < 0.05$).

Table 4. Paired sample t-test for the pre- and post-test of the unit "Industrial Revolution"

	Pre-test		Post-test		t	p
	Mean	SD	Mean	SD		
Richness	2.71	0.813	2.77	0.776	-0.783	0.335
Relevance	2.69	0.872	2.98	0.815	-1.788	0.101
Structure	1.54	1.223	1.66	1.191	0.412	0.672

Table 5. Paired sample t-test for the pre- and post-test of the unit "Marxism"

	Pre-test		Post-test		t	p
	Mean	SD	Mean	SD		
Richness	2.91	0.925	3.12	0.928	-2.412	0.013
Relevance	2.32	1.123	2.69	1.228	-1.933	0.021
Structure	1.67	0.628	2.04	0.707	-4.389	0.006

As shown in Table 1, there are differences in academic performance between Class A and Class B. In order to explore whether there are differences in the historical concept explanation ability between the two classes, the three dimensions of the historical concept explanation of the units "Industrial Revolution" and "Marxism" were statistically analyzed after the two

classes adopted different teaching methods. As shown in Table 6, there is no statistically significant difference between Class A and Class B in the Richness, Relevance, and Structure of the historical concept explanation of the "Industrial Revolution" ($p>0.05$). As shown in Table 7, there is no significant difference between Class A and Class B in the Structure of the historical concept explanation of "Marxism" ($p>0.05$), but there is a significant difference in Richness and Relevance ($p<0.05$).

Table 6. Independent Samples t-Test for Post-test (Industrial Revolution)

	Class A(N=20)		Class B (N=18)		t	p
	Mean	SD	Mean	SD		
Richness	3.66	0.489	3.47	0.533	-0.424	0.682
Relevance	2.71	1.228	3.08	0.937	-0.711	0.428
Structure	1.69	0.714	1.78	0.685	-0.792	0.399

Table 7. Independent Samples t-Test for Post-test (Marxism)

	Class A(N=18)		Class B (N=18)		t	p
	Mean	SD	Mean	SD		
Richness	3.15	0.715	2.81	0.895	3.722	0.002
Relevance	3.01	1.212	2.43	0.984	2.643	0.023
Structure	2.54	0.659	2.08	0.681	0.625	0.552

5. Discussion

This study is rooted in the intersection of historical semantics and cognitive science, and aims to explore the impact of the dual reconstruction mechanism of concept representation on the development of historical subject literacy. The relevance analysis paradigm pioneered reveals the dynamic interactive nature of concept networks by deconstructing the diachronic evolution of cultural vocabulary (Williams, 2014). In the concept representation of "Industrial Revolution" and "Marxism", students show significant concept type preferences: some students use both universal concepts and single concepts (such as improved steam engine, factory system, great development of productivity; Marx, Engels, "The Communist Manifesto", workers' movement, socialism). Some students only use universal concepts (such as science and technology, development of productivity, environmental pollution, capitalism; capitalism, socialism, proletariat). Very few students only use single concepts (such as Marx, historical materialism, "Capital", Paris Commune, etc. are all single concepts; for "Industrial Revolution", no student only uses a single concept). This distribution feature confirms the stage hypothesis of Vygotsky's concept formation theory, indicating that most learners have not yet completed the qualitative change from context-bound complex thinking to decontextualized conceptual thinking. The historical explanations of users of singular concepts

have a stronger temporal and spatial anchoring effect, but their theoretical extensibility is significantly weaker than that of users of universal concepts, which is empirically consistent with Barton's discussion on the dual tension of historical thinking (particularity vs. generality). The current teaching system lacks guidance on concept typology, failing the structural dimension in the assessment to produce the expected discriminant validity, which suggests that a conceptual schema training module should be embedded in the course design to encourage learners to construct a dual cognitive framework with historicity and explanatory power.

Using the experimental design, the author contrasted the teaching modes, i.e., the teacher-centred mode and the student-centred mode, and proved the teaching time to be related to the distribution of the independent practising of the students and the metacognitive stimulation level. Hulstijn and Laufer (2001) introduced the "involvement load hypothesis" according to which with the increased rate of the students' questioning from 1.2 per class to 4.7 per class, the students' conceptual schema complexity also increases. The open-ended question generation strategy not only promotes diagnostic assessment, but also significantly improves the level of higher-order thinking activities (Ong et al., 2016). This is reflected in the pre- and post-test results of the unit "Marxism", where students have significant differences in conceptual richness, relevance and structure. It is worth noting that the novelty of the subject content, as a moderator variable, has a threshold effect on the teaching effect. In the "Industrial Revolution" unit, the pre- and post-test differences did not reach a significant level due to the repetition of knowledge in junior high school. This finding is consistent with the expectations of cognitive load theory (Sweller, 2010) - when the advance organizer is highly overlapped with the existing schema, the lack of novel stimuli will inhibit deep learning. In contrast, the unit "Marxism" has new knowledge points in the high school curriculum, which prompted students to learn more new content through class, so there are obvious differences in richness and relevance. Although there are differences in academic levels between Classes A and B, the relevance and richness of the historical concept explanations of students in both classes have been improved after student-centred teaching, which shows that teaching improvements can help students in different academic levels participate in active learning, thereby improving their understanding of historical concepts.

6. Conclusion

This paper experimentally examines the impact of student-centred teaching strategies on students' ability to explain concepts in history with the experimental design. Results indicate that student-centred pedagogical methods, exemplified by problem-led discourse, cooperative conversation, and active questioning, play an active role in the richness, relevance, and structure of students in explaining complex concepts in history. Especially for the unit "Marxism", which was new to the students, the performance on all three measures was found to be enhanced considerably following the intervention, validating the effectiveness of student-centred approaches in facilitating deeper intellectual engagement and internalization of the subject. On the other hand, the instructed guidance used for the unit "Industrial Revolution", aligning with prior knowledge, failed to bring about any improvement, consistent with cognitive load theory's position on the role played by novelty to initiate deep learning.

These suggest the need for pedagogical transformation in teaching history in the face of challenges presented by the incorporation of new knowledge. This research contributes to the literature with the empirical validation it offers to active learning methods for cognitive knowledge filling, as well as for coping with diverse academic capabilities, such as with Class A and Class B's performance gap.

However, this study still faces some limitations. This study only included two classes (76 students) from a high school in Shenzhen. This small sample size, combined with the single-city, single-grade study, makes it difficult to represent high school students nationwide or across other cultural backgrounds. Furthermore, although the two classes were taught by the same teacher, there was a significant difference in baseline academic performance (Class A > Class B), which may have distorted the estimation of the net effect of the teaching model. Furthermore, the comparison of only two historical topics ("Industrial Revolution" and "Marxism") in the short term, lacking longitudinal follow-up, makes it difficult to assess the long-term retention and transfer of students' historical interpretation skills. Subsequent research can enhance sample heterogeneity, incorporate longitudinal designs to follow cognitive development in the long term, and carry out comparative cross-cultural tests for determining such methods' universality.

In practice, this study advocates for curricular transformations with student-centred approaches at the centre, such as project-based learning and dialogical reasoning, to foster historical thinking. Teacher training programs should emphasize scaffolding techniques for concept schema construction and strategies to balance novelty with prior knowledge. By embedding these approaches, educators can better equip students to navigate the complexities of historical interpretation. Currently, provinces in China are conducting training on new textbooks, and teachers' most pressing need is to see classroom examples. This study proposes a student-centred historical concept teaching model that significantly enhances students' in-depth interpretation of newly taught historical facts without increasing class time or relying on extracurricular tutoring. This provides a directly replicable classroom script for the "double reduction" approach to history curriculum, aiming to reduce quantity and improve quality.

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