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Evaluation of didactic units on historical thinking and active methods

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The purpose of this study is to evaluate the effects of an implementation of eight didactic units on historical thinking and active methods as part of a teacher training programme. All this with four specific objectives that try to find out changes in the methodology, motivation, satisfaction and learning of the students. To this end, the research is carried out by means of a mixed method using quantitative data, obtained from a pretest/posttest, and qualitative data, obtained from a focus group and interviews. The target groups of the teaching units are secondary and high school students aged between 13 and 18 years. A total of 114 students of these students participated in the data collection with a pretest/posttest, six master students in the focus group, and three teachers and three secondary and high school students were interviewed. The results obtained indicated that significant differences of medium effect were found in the pre and post phase factor in learning and satisfaction, and of large effect in methodology and motivation. As for the gender factor, significant differences of small effect were found in motivation and satisfaction, with higher values for women. The positive statements of both master's students and high school students and teachers were quite striking, although the limitations and difficulties must be highlighted. It is concluded that the design of this type of didactic units has meant a significant improvement, achieving that the students have developed a notorious improvement in their perception of the objectives studied.

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Introduction

Research in history didactics has distinguished two types of historical content. On the one hand, substantive or first-order content. These are those which refer both to concepts or principles and to specific historical dates and events. On the other hand, strategic, second-order content or historical meta-concepts as methodological concepts. These are related to the historian's skills, the search for, selection and treatment of historical sources, empathy or historical perspective, related to the definition of historical thinking (Sáiz and Gómez, 2016). This didactic approach aims for students to learn to think historically by deploying different strategies and competences to analyse and respond to different historical questions and to understand the past in a more complex way. These competences and strategies are related to the search for, selection and treatment of historical sources, empathy, multi-causal explanation, or historical perspective; in short, the functions of a historian (Peck and Seixas, 2008; Seixas and Morton, 2013). These concepts are variable and do not form a closed and invariable list, but each author gives greater importance to certain aspects (Gómez Carrasco et al., (2017)).

Since the late 1980s, an effort has been made in the British field to analyse second-order concepts in students' argumentation. Here the Concepts of History and Teaching Approaches project (Lee et al. 1996) stands out, which investigated the historical concepts that students should acquire. At the same time, in the USA, through Wineburg (2001), work began with cognitive psychology techniques (experts and novices) to investigate the skills that students should acquire, with the well-known historical thinking and its competences finally being developed by mainly Canadian and American authors (Ercikan and Seixas, 2015; Seixas and Morton, 2013; VanSledright, 2014; Wineburg et al., 2013). For their part, the work of Chapman (2011) and the Constructing History 11–19 project (Cooper and Chapman, 2009) delve deeper into this line of reasoning in the use of sources, a thematic field also addressed in other countries such as the Netherlands (Van Drie and Van Boxtel, 2008) and Chile (Henríquez and Ruíz, 2014).

The importance of teaching historical thinking in the classroom lies in the fact that historical thinking does not develop naturally, but needs explicit teaching (Wineburg, 2001). To develop these competences, the introduction of the historian's method and techniques and historical awareness are key elements, with appropriate techniques and instruments to assess them (Domínguez, 2015). To develop them, a methodological change in the classroom is necessary, as is already being proposed and discussed in countries such as Portugal (Gago, 2018), Spain (Navarro and De Alba, 2015) or the United Kingdom (Smith, 2019). This change implies moving from the current dominance of expository teaching strategies to a greater presence of enquiry strategies that help to promote the development of independence, critical thinking, and autonomous learning in students.

Working with historical sources, which can begin even earlier, is valued positively by students in upper secondary education, as it promotes a research experience in which students construct their knowledge about the past (Prieto, Gómez and Miralles, 2013), however, this type of experience is not usually abundant in classrooms at this stage in Spain. The abuse of the lecture and the passive role reserved for students ends up making them, for the most part, limit themselves to studying what is offered in class by not seeking information from other sources and memorising the information they receive (Sáiz and López-Facal, 2015). Consequently, it is very difficult to create critical citizenship in students, as they may believe everything the teacher tells them, as they are not familiar with enquiry (Guirao, 2013).

When it comes to identifying teaching models, it is worth highlighting the line of research developed by Trigwell and Prosser (2004) based on interviews with teachers and a questionnaire called Approaches to Teaching Inventory (ATI) (Trigwell et al., 2005). They identified four different conceptions of teaching and three methodologies, establishing five approaches which can be grouped into three broad models or ways of teaching. In the first model, the role of the teacher is greater, since the importance lies in the transmission of content, students assume a passive role, limiting themselves to receiving and memorising the knowledge transmitted by teachers, thus establishing a unidirectional relationship, without considering their experience, previous knowledge, characteristics or context. The most used methodological strategy is the master class and the main resources used are the textbook and class notes. In addition, a final examination of the learning contents is usually established (Hernández et al., 2012; Guerrero-Romera et al., 2022).

On the other hand, there is learner-centred teaching which differs from the previous one in that the teacher's intention is to provoke conceptual change and intellectual growth in the learner. Thus, the teacher acts as a guide, guiding students in the process of constructing their own knowledge, encouraging their conceptions, and providing them with opportunities to interact, debate, investigate and reflect. The aim of this model is for students to learn content by questioning and reflecting on it. The strategies employed are active and inquiry based. In contrast to the previous model, which encourages competitiveness and individualism, this approach favours interaction and cooperation between the individuals involved in the teaching and learning process and prioritises continuous assessment (Vermunt and Verloop, 1999; Kember and Kwan, 2000; Trigwell et al., 2005; Henze and van Driel, 2011). Finally, there is a third, intermediate model based on teacher-student interaction, although it should be noted that there is a hierarchical relationship between the different approaches, with each including elements of the previous one (Guerrero-Romera et al., 2022).

Evaluative studies of formative processes such as this one are seeing an increase in the field of history education especially in terms of changing the conceptual model of history teaching (Carretero et al., 2017; Metzger and Harris, 2018). Some work, such as that being carried out in the Netherlands, focuses on evaluative research that is more focused on teaching practice (De Groot-Reuvekamp et al., 2018; Van Straaten et al., 2018). Regarding the evaluation of historical thinking effects, we can recently highlight Tirado-Olivares et al. (2024) relating it to academic performance, or Bartelds et al. (2020) highlighting the importance of historical empathy. It is also worth highlighting the research carried out by the University of Murcia (Gómez et al., 2021a; Gómez et al., 2021b; Rodríguez et al., 2020), which implemented training units focused on historical thinking skills and changes in the way of teaching. This research therefore seeks to be a significant improvement compared to traditional methods used in the teaching of social sciences, as it seeks to develop essential skills for critical thinking and citizenship training, and to evaluate its effectiveness through rigorous methods and a scientific approach. All this to encourage a critical spirit and autonomous learning and therefore the formation of critical and independent citizens who know how to judge for themselves the vicissitudes that civic life in democracy demands of them.

Objectives

The main objective of this article is to detect if there are significant changes in students after the design and implementation of eight didactic units (DU from now on) to promote the learning of historical thinking skills through active teaching methods. To

achieve the objective, it has been divided into the following specific objectives:

- O1. To analyse whether there are differences in the students' perception of the methodology of teaching history, after the implementation of the DU that promotes historical thinking through active methods Table 1.
- O2. To identify if there are differences in the students' perception of motivation during the teaching process, after the implementation of the DU that promote historical thinking through active methods Table 2.
- O3. To find out if there are differences in the students' perception in relation to the level of satisfaction with the teaching process, after the implementation of the DU that promote historical thinking through active methods Table 3.
- O4. To find out if there are differences in the students' perception in relation to the level of effectiveness and transfer of the learning achieved, after the implementation of the DU that promote historical thinking through active methods.

Methods

Research design. This is an evaluative type of DU research of historical thinking and active methods with a mixed explanatory approach and a quasi-experimental A-B design. The research method is therefore mixed, qualitative, and quantitative data have been collected and analysed in a rigorous way in response to the research objective, organising them into specific research objectives and integrating the two forms of data and their results into conclusions framed in the theory and scientific production studied (Creswell & Plano Clark, 2017). The selection of the eight DU was made at random, as we have worked with the students who have been tutored by us during the internship period. On one hand, a quantitative analysis of the data obtained by means of a Likert-type questionnaire (1–5) was carried out. Questionnaire designs are extremely common in the field of education, as they can be applied to a multitude of problems and allow data to be collected on many variables and outcomes to be measured (Sapsford & Jupp, 2006). On the other hand, the decision was to apply a qualitative exploratory method through a focus group with master's students who applied the DU and interviews with practising teachers and students who witnessed these units (supplementary material, Figs. 1–3). Interviews are useful when you want subjects to describe complex phenomena and facts that are the object of study (Pérez-Juste et al., 2012), as well as focus groups. The focus group was recorded via an online Zoom meeting (Archibald et al., 2019) and then transcribed using artificial intelligence (Notta AI), while the interviews were answered on the spot individually in writing.

The quantitative analysis (R Core Team, 2023), a repeated measures mixed factorial design with one within-subjects factor (the time of assessment) and one between-subjects factor (gender) was used. The within-subject factor has two levels (pretest and posttest) and the between-subject factor has three levels (female and male). The dependent variables were the scores obtained in each of the subscales of the questionnaires *Secondary school students' assessment of History teaching* and *Secondary school students' opinion of the implementation of the History training unit* (supplementary material Figs. 4 and 5). For the qualitative analysis, a descriptive analysis was carried out using the qualitative research software Atlas.Ti 23, which is widely used in research in the field of Social Science Didactics (Rüssen, 1997; Sánchez-Ibáñez, Martínez-Nieto (2015)). As a complement to this software, the ChatGPT tool has also been used to improve the accuracy of the codes and data analysis, as an aid both in designing the codes of the transcripts, organising the main conclusions obtained from the coding of the participants' responses (Lopezosa & Codina, 2023), and finding out the percentage of occurrence of words. All codes are open and non-exclusive, so that the same response can be associated with more than one code.

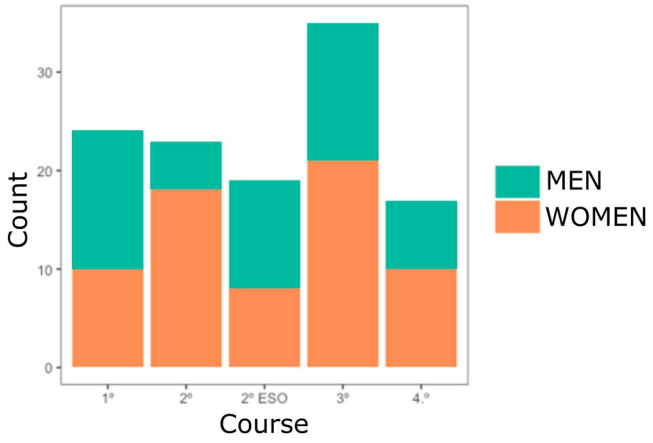

Fig. 1 Distribution by gender and grade of the participants of the cuantitative data. Distribution by Gender and Grade.

Participants. This is a non-probabilistic convenience sample composed in the quantitative analysis of 114 young people aged between 12 and 20 years (M = 15.63, SD = 1.54). Fifty-one males (44%) and 65 females (56%) participated in the pre-test. In the post-test 50 males (44%) and 64 females (56%) participated. Of these, 14 men and 10 women were from the first year of high school, 5 men and 18 women were from the second year of high school, 11 men and 8 women were from the second year of ESO, 14 men and 21 women from the third year of ESO and 7 men and 10 women from the fourth year of ESO (Fig. 1). As for the focus group, 6 students of the master's degree in teaching, 2 men and 4 women aged between 22–45 years, participated. The interviews were conducted with 3 secondary school teachers, 2 men and 1 woman aged 40–60 and 3 pupils aged 13–17 respectively.

Instruments. For the collection of quantitative data, two closed-response questionnaires based on a Likert-type scale (1–5) were used. The questionnaires given to pupils were entitled *Assessment of Secondary School pupils on the teaching of History* (pretest) and *Opinion of Secondary School pupils on the implementation of the History unit* (posttest). The questionnaires have 37 items divided into four categories corresponding to each of the specific research objectives: Assessment of the implementation of the DU in the teaching/learning process; Assessment of student motivation in an innovative DU; Analysis of student satisfaction with an innovative DU; Analysis of student learning and its results to check whether the DU has been effective (supplementary material Figs. 4 and 5). For its part, the qualitative analysis was used to complement the quantitative research by relating its questions to the objectives and thus elucidating the impact of the OD. It consists of both a focus group with trainee teachers consisting of nine questions and interviews with classroom tutors and students with a total of sixteen questions (supplementary material Figs. 1–3).

Validation of these instruments has been essential to ensure that the data collected are accurate and reliable, through peer review and pilot testing on a small group of participants to assess the effectiveness and relevance of the questions and observation procedures (Gómez et al., 2021a; Rodríguez et al., 2020; Miralles-Sánchez et al., 2023).

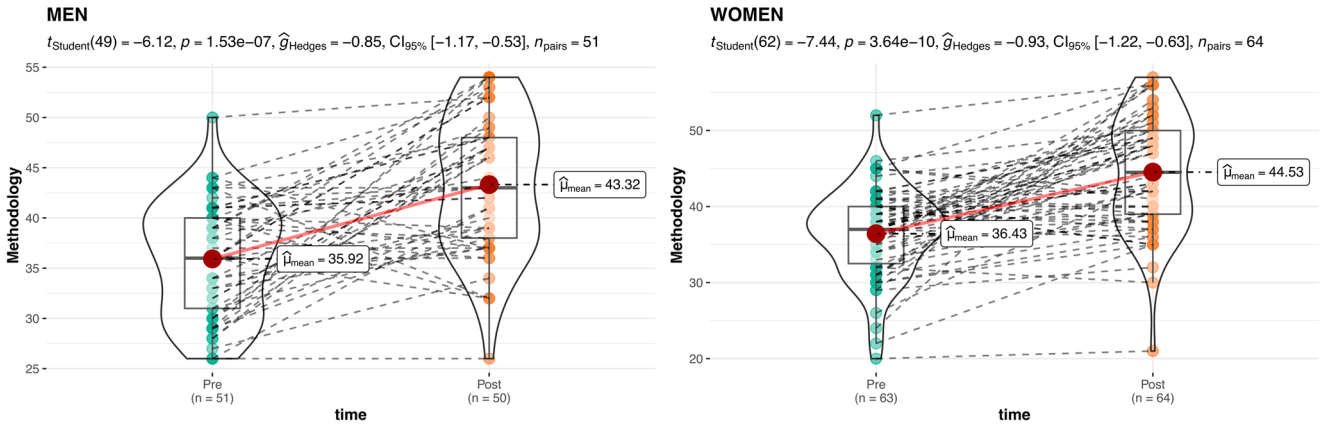

Fig. 2 Graphical representation of the differences in methodology scores by gender and phase in the cuantitative data. Differences in Methodology Scores by Gender and Phase.

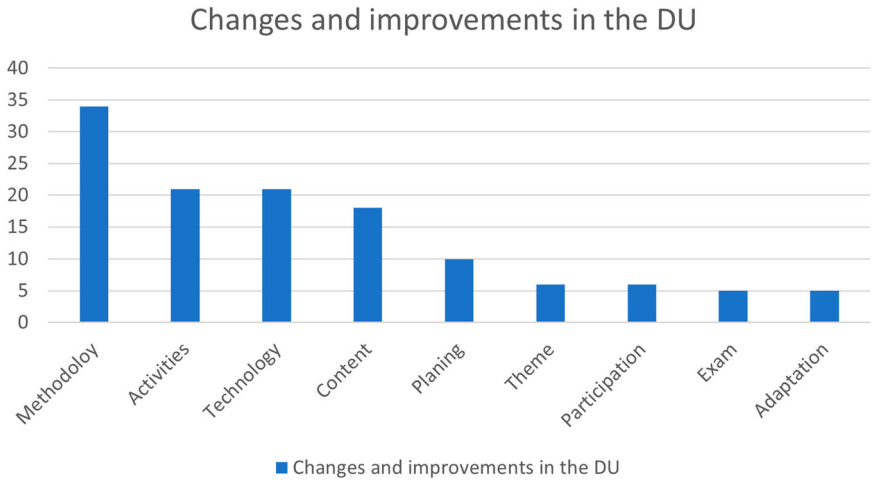

Fig. 3 Literal and derived mentions made by master's students in the focus group about changes and improvements in the didactic units. Changes and improvements in DU according to master's students.

Procedure. This research is based on a research project consisting of four phases: prior observation of the classroom (December 2022-February 2023), design of training units (March-April 2023), implementation of training units (May-July 2023) and evaluation of results (September 2023-July 2024). The design of the DU and the data collection were thanks to a training programme implemented during the academic year 2022/23 in a Spanish university for students of the Master's degree in teacher training in the speciality of Geography, History and History of Art. Held from 10 January to 17 March 2023, the duration of the activity involved a total of 18 face-to-face hours where students attended a series of lectures given by expert lecturers in Didactics of Social Sciences with the aim of helping students to carry out a Master's Final Project (MFP) based on the implementation and evaluation of a didactic DU on historical thinking and active methods during the internship period of the Master's. The activity consisted of 6 sessions: presentation and approach of the MFP, concepts of historical thinking, teaching methods and active evaluation processes, quantitative and qualitative analysis of data in educational research, and guidelines for the presentation and bibliography of the MFP.

Results

O1. To analyse whether there are differences in the students' perception of the methodology of teaching history, after the implementation of the DU that promotes historical thinking through active methods. In relation to this objective, the data obtained from the quantitative instruments show an approximately normal distribution of methodology scores. No significant differences were observed between sexes (MH = 35.93, SD = 5.60; MM = 36.43, SD = 5.83) in the initial (pre) assessment (F (1,112 = 5.83). 83) at baseline (pre) assessment (F (1,112) = 0.21, p = 0.64) and no gender differences between groups (MH = 43.32, SD = 6.91; MM = 44.53, SD = 7.58) were observed at posttest (F (1,112) = 0.77, p = 0.38).

The repeated measures analysis of variance did not produce a significant interaction effect result between sex (Female, Male) and phase (Pre vs Post) (F (1,108) = 0.08, p = 0.77). However, a significant effect of the phase (Pre vs Post) factor was observed (F (1,108) = 91.88, p < 0.01) with a large effect size (partial η2 = 0.26). Figure 2 shows the result graphically.

The master's students emphasise that none of them were previously familiar with the theory of historical thinking, having recently learned it in class, although some had experience of teaching with active methods. They emphasise the importance of interactive and participatory methods, as well as the crucial role of the teacher in the educational experience, recognising positive changes in current teaching, although with divergent opinions on the influence of students on methodology. The positive experience with students and the inclusion of relevant points in teaching are highlighted, but the persistence of traditional methods that are not very active and the

resistance of some students to participatory methods are criticised, representing a challenge in contemporary teaching Fig. 3.

Significant statements.

- "So I think that the figure of the teacher will always be…. All that helps, all the technique, everything we learn and all that, but I think that the figure of the teacher is fundamental, it is important." - He emphasises the importance of the role of the teacher and the relationship that the teacher establishes with the students.
- "I think it's changing a lot because before you went to class and the teacher would give you a lecture or whatever and the students were very dispersed, but I think that is changing now, and as we bring in new generations, I think it's going to change a bit more." - He sees a positive change in the way history teaching is approached.
- "No, I think so, in a certain sense it has changed, because it is true that at secondary school, when you are a teenager you see two types of teachers, a teacher who practically limits himself to lecturing you and that's it, and others who question you more." - He expresses that teaching has not changed completely, suggesting that there are still teachers who adopt fewer interactive approaches.
- "I've had bad history teachers all my life, you know, the kind that came in and talked to me unfunnily about things that had happened and that was it." - Reflects a past negative experience with less committed history teachers.
- "So, it's true that when I was a student, I felt that sometimes history classes were very theoretical and so on, but it's true that when I came to class as a non-student, I saw that sometimes teachers have to adopt this methodology because otherwise it's impossible." - She acknowledges that sometimes teachers are forced to adopt fewer interactive methods due to student resistance.
- "My internship tutor said that students are not used to any of this and that in reality many are comfortable in this role of going to the institute like someone who goes to the cinema, to see the teacher or tell the story and then I'll study and do the exam and that's it." - He points to the resistance of some students to more participatory methods as a challenge in today's teaching.

On the other hand, they stress the crucial role of an active and engaging methodology to enhance the learning experience, with the consideration that there is no single methodology effective for all groups. However, they also mention the importance of dosing or reducing content to avoid information overload, as well as the need for continuous observation and analysis to determine the most effective methods, with a willingness to adapt according to the results. While some participants emphasise the relevance of methodology over content, others argue that both are crucial and should be tailored to each group. In general, there is convergence on the difficulty in achieving active student participation, attributing this to a lack of empathy or resistance towards interactive activities, recognising the importance of adapting methodologies to the needs of each group and constantly evaluating their effectiveness. The need to simplify teaching and focus on relevant aspects of the curriculum is mentioned, as well as the need to face technological challenges with alternative plans. Their commitment to quality teaching, willingness to learn and adapt is also highlighted, although areas for improvement such as more detailed planning, time and classroom management are mentioned.

Literal and derived mentions of relevant words in the code "Changes and improvements in interventions": Methodology: 34 times (5.53%), Activities: 21 times (3.43%), Technology: 21 times (3.43%), Content: 18 times (2.94%), Plan: 10 times (1.63%), Topic: 6 times (0.98%), Participate: 6 times (0.98%), Exam: 5 times (0.82%), Adapt: 5 times (0.82%).

As far as secondary school students are concerned, in general, there is a diversity of opinions among students regarding the methodology of teaching history. Some prefer more dynamic and visual approaches, while others are happy with the traditional way of teaching. The perception of motivation also highlights the importance of active participation and discussion in the learning process. This variability may be attributable to personal experiences, levels of interest in the subject or perceptions about the purpose of history education. To gain a deeper understanding, it would be useful to further explore the reasons behind students' responses. Students' ratings of the current teacher's experience suggest that teaching experience and ability are considered important factors in teaching effectiveness.

While Teacher 1 and Teacher 3 recognise aspects of the competence-based approach to historical thinking in teaching practice, Teacher 2 is not familiar with the specific term. Regarding the development of historical competences in pupils, Teacher 1 highlights the importance of adapting materials to children's understanding from an early age, while Teacher 2 suggests interdepartmental collaboration and family involvement to improve outcomes. Teacher 3 recognises the need for continuous improvement and stresses the importance of learning from mistakes. In relation to teaching perspectives and approaches, Teacher 3 emphasises the connection between historical events and social, economic and political contexts over time, highlighting the importance of 'historical empathy'. Finally, teachers agree on the challenges and complexities of teaching historical competences, highlighting the need to make them understandable for students and to avoid reducing them to mere memorisation.

Regarding active learning methodologies such as project or problem-based learning, there are differences in its implementation between Teacher 1, who uses it more in lower grades due to exam preparation, and Teacher 2, who offers a short answer. Teacher 3 shows experience in educational innovation projects, indicating a predisposition towards more innovative approaches. The commitment and dedication required is highlighted, as well as the lack of detail on implementation by Teacher 1, which may limit its wider application due to the associated stress and workload. Several challenges and limitations in the implementation of active teaching methodologies are highlighted. These challenges include existing workload, loneliness among colleagues, lack of digital resources both at school and at home for students, limited time in the classroom, language barrier in understanding concepts, lack of teacher training, distrust of new methodologies, and the complexity of catering for diversity in the classroom. In addition, it is stressed that the impact of the methodology on student learning requires adequate assessment and collaborative work to generate significant changes.

Finally, it should be noted that the three teachers agree that active methodologies and historical thinking are not widespread in secondary classrooms. The reasons mainly point to lack of training, time constraints, lack of resources and mistrust on the part of teachers. Inertia in the education system, resistance to changing traditional pedagogical practices and a preference for safe and rote approaches are also mentioned. We can see that resistance to change seems to be a significant barrier. Lack of training and institutional support is highlighted as a key problem. The importance of satisfying studious learners through traditional methods is mentioned as a potential barrier to adopting more creative and reflective approaches.

O2. To identify if there are differences in the students' perception of motivation during the teaching process, after the

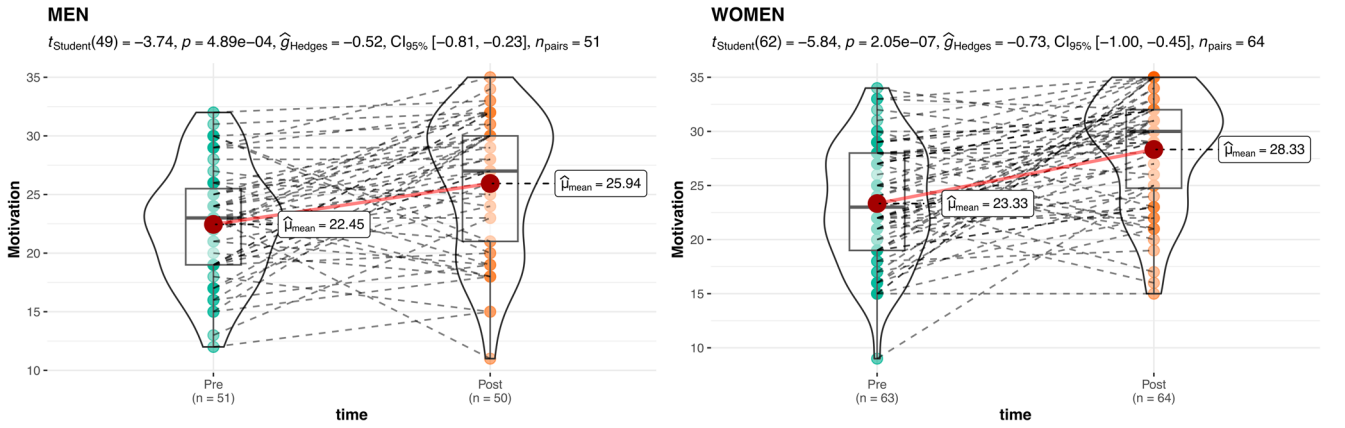

Fig. 4 Graphical representation of the differences in motivations scores by gender and phase in the cuantitative data. Differences in Motivation Scores by Gender and Phase.

implementation of the DU that promote historical thinking through active methods. In relation to this objective, the data obtained from the quantitative instruments show an approximately normal distribution of the motivation scores. No significant differences were observed between sexes (MH = 22.45, SD = 4.86; MM = 23.33 SD = 5.40) in the initial (pre) assessment (F (1,112) = 0.82, $p = 0.36$). However, significant differences were observed at the posttest as a function of gender (MH = 25.94, SD = 5.85; MM = 28.33, SD = 5.27) (F (1,112) = 5.26, $p < 0.05$) with a small effect size (partial η2 = . Significant differences were observed in the posttest as a function of gender (MH = 23.94, SD = 3.95; MM = 25.75, SD = 3.24) (F (1,112) = 7.23, $p < 0.05$) with a small effect size (partial η2 = 0.06).

Repeated measures analysis of variance did not produce a significant interaction effect result between sex (Female, Male) and phase (Pre vs Post) (F (1,108) = 1.08, $p = 0.30$). However, a significant effect of the phase (Pre vs Post) factor was observed (F (1,108) = 48.83, $p < 0.01$) with a large effect size (η2 = 0.144). Similarly, a significant effect of the Sex factor (F (1,108) = 4.63, $p = 0.30$) with a small effect size (partial η2 = 0.026) was observed. Figure 4 shows the result graphically. Therefore, motivation increased in both groups after the intervention, but especially in the female group.

Master students highlight a higher motivation (8 positive occurrences in the code "Improvements and difficulties in the DU" 1.23%) and satisfaction (4 positive occurrences in this code 0.61%) among students despite facing difficulties. Some participants noted an improvement in their teaching skills after applying the DU, highlighting the importance of practical experience and the application of theoretical concepts in lesson planning and execution. The implementation of gamification and flipped classroom was mentioned to make teaching more attractive, showing the ability to adapt to challenging situations and look for alternative solutions. The importance of the teacher in the learning experience was highlighted and difficulties related to the implementation of technology in the classroom and the resistance of some students to participate in interactive activities were pointed out.

Significant statements.

- "Overall it did increase a lot of satisfaction and their motivation regarding the subject."
- "In general what I planned worked and it worked more than anything else in the time I had planned."
- "Well, I think that yes, it worked for them, that it was something they had never given before and it was totally different and they liked it."
- "I mean, yes there are digital whiteboards, yes there are projectors, but it's complicated, especially to apply, in this case, a didactic unit."
- "So, the cooperative work part is fine, the inverted classroom, fatal."
- "But I also think that it was more or less the same as what they were doing with their teacher."
- "But yes, on the days when they were in the classroom, it was more or less the same as what they were doing with their teacher."
- "But yes, on the days when it was two hours, it was noticeable because just before break time I was already tired".

On the other hand, in general, the perception of the secondary school students interviewed on the effectiveness of the trainee teachers' teaching method is ambiguous and could benefit from more specific details on the perceived changes. As an analysis we can indicate that the introduction of these DU seems to have had a positive impact on students' attention and motivation, the use of audio-visual methods and interactivity are prominent aspects of the new methodology that students appreciate. The relationship between the way of teaching and the retention of information for exams is highlighted as an important point for student satisfaction, and resources such as slides, and short videos are specific elements that students find useful. Therefore, the new way of working of the trainee teacher seems to have generated a positive experience for the students, improving participation, motivation, and information retention.

Teachers in this regard highlight positive results, such as improved motivation and reduced student boredom, as well as increased class participation. However, they recognise that the effectiveness of techniques may vary and that training in new active learning methodologies is needed to address student diversity and to keep up to date. In addition, they highlight a shift towards a more active and participatory approach to learning, which can benefit the development of critical skills and student engagement. The importance of adaptability of methodologies is emphasised, as their effectiveness depends on factors such as the subject matter, the group of learners and the resources available. It is pointed out that student motivation can influence their adaptation to the methodologies, and the use of visual and playful techniques to engage less motivated students is suggested. In addition, it is emphasised that the aim of teaching history is to enable students to interpret the world today, thus encouraging critical thinking. The effectiveness of diversity intervention programmes is acknowledged, highlighting the importance of making the content relevant to each learner.

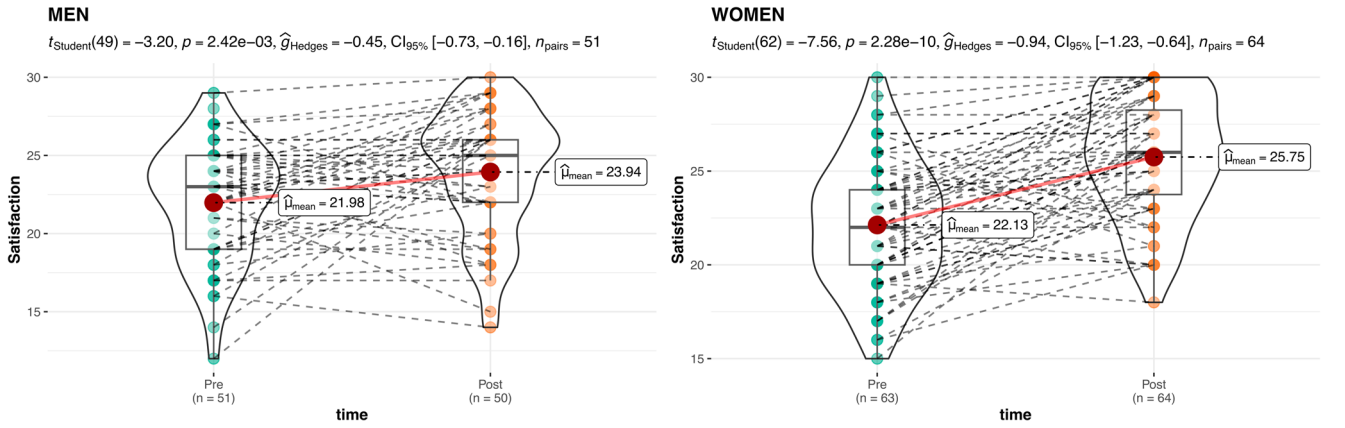

Fig. 5 Graphical representation of the differences in satisfaction scores by gender and stage in the cuantitative data. Differences in Satisfaction Scores by Gender and Stage.

O3. To find out if there are differences in the students' perception in relation to the level of satisfaction with the teaching process, after the implementation of the DU that promote historical thinking through active methods. An approximately normal distribution of satisfaction scores is observed. No significant differences were observed between sexes (MH = 21.98, SD = 3.72; MM = 22.13 SD = 3.43) in the initial (pre) assessment (F (1,112) = 0.05, $p = 0.83$). However, significant differences were observed at the posttest as a function of gender (MH = 23.94, SD = 3.95; MM = 25.75, SD = 3.24) (F (1,112) = 7.23, $p < 0.05$) with a small effect size (partial η2 = 0.06).

The repeated measures analysis of variance did not produce a significant interaction effect result between sex (Female, Male) and phase (Pre vs Post) (F (1,108) = 3.04, $p = 0.08$). However, a significant effect of the phase (Pre vs Post) factor was observed (F (1,108) = 51.6, $p < 0.01$) with a medium effect size (η2 = 0.13). That is, the intervention had a significant effect on students' satisfaction with the subject. Figure 5 shows the result graphically.

As a general observation we can indicate that all three secondary school pupils interviewed have positive perceptions of the usefulness of history. The definitions of history are varied, but they share the central idea of past events, and the pupils' responses show a basic understanding of the importance of history in understanding the present and developing critical skills. Their interest in learning about the past is highlighted and it is noted that the content of lessons and the amount of work for exams are important considerations for some students. Students' comments suggest that there are aspects of history teaching that could be improved, such as the presentation of information, the length of language and the possible lack of connection between memorisation and understanding of content. Diversifying teaching methods and incorporating more dynamic approaches could help to address these concerns and improve student motivation. It would be beneficial to delve deeper into the responses to better understand the underlying reasons behind their perceptions and to gain a more complete picture of their experience with the subject.

O4. To find out if there are differences in the students' perception in relation to the level of effectiveness and transfer of the learning achieved, after the implementation of the DU that promote historical thinking through active methods. An approximately normal distribution of perceived learning scores is observed. Table 4 presents the results for perceived learning on a scale of 13 to 65. No significant gender differences were observed (MH = 40.27, SD = 5.40; MM = 40.67, SD = 5.14) at the initial (pre) assessment (F (1,112) = 0.16, $p = 0.69$). There were also no significant sex differences at posttest (MH = 43.94, SD = 6.32; MM = 45.39, SD = 6.38) (F (1,112) = 1.46, $p = 0.23$).

The repeated measures analysis of variance did not produce a significant interaction effect result between sex (Female, Male) and phase (Pre vs Post) (F (1,108) = 0.82, $p = 0.37$). However, a

Table 1 Means and standard deviations for methodology as a function of a 2(Time) X 2(Sex) design.

	Sex					
	MALE		FEMALE		Marginal	
Time	*M*	*SD*	*M*	*SD*	*M*	*SD*
Pre	35.92	5.60	36.43	5.83	36.20	5.71
Post	43.32	6.91	44.53	7.58	44.00	7.29
Marginal	39.58	7.27	40.51	7.87		

Note. M and *SD* represent mean and standard deviation, respectively.

Table 2 Means and standard deviations for motivation as a function of a 2(Time) X 2(Sex) design.

	Sex					
	MALE		FEMALE		Marginal	
Time	*M*	*SD*	*M*	*SD*	*M*	*SD*
Pre	22.45	4.86	23.33	5.40	22.94	5.16
Post	25.94	5.85	28.33	5.27	27.28	5.63
Marginal	24.18	5.63	25.85	5.87		

Note. M and *SD* represent mean and standard deviation, respectively.

Table 3 Means and standard deviations for satisfaction as a function of a 2(Time) X 2(Sex) design.

	Sexo					
	HOMBRE		MUJER		Marginal	
Time	*M*	*SD*	*M*	*SD*	*M*	*SD*
Pre	21.98	3.72	22.13	3.43	22.06	3.55
Post	23.94	3.95	25.75	3.24	24.96	3.66
Marginal	22.95	3.94	23.95	3.79		

Note. M and *SD* represent mean and standard deviation, respectively.

significant effect of the phase (Pre vs Post) factor was observed ($F(1,108) = 52.71$ $p < 0.01$) with a medium effect size ($\eta 2 = 0.12$). That is, the intervention had a significant effect on students' perception of learning. Fig. 6 shows the result graphically.

Master's students recognise the usefulness of the theory of historical thinking in the planning and execution of classes, as well as the importance of the ethical dimension of history and the need to connect history with citizenship education. The use of primary sources and active methodology to involve students in historical analysis is highlighted. Furthermore, the importance of contextualising history teaching in the immediate environment and addressing social, cultural, and political issues to develop critical thinking in students is emphasised. However, there are divergences among the participants in terms of the perceived novelty of the theory of historical thinking, the depth of ethical exploration in the historical context and the inclusion of themes. Finally, the importance of connecting history with current affairs is mentioned, although this may present challenges in the handling of sensitivities and emotions during the teaching of certain historical topics.

For their part, teachers seem to agree that history teaching should not be limited to the transmission of historical facts, but should also encourage critical thinking, reflection and active participation in social problems. Citizenship education is seen as a process that goes beyond the acquisition of knowledge, including the development of analytical skills and the ability to question and criticise social and political reality.

Discussion and conclusions

If we look at the first objective, we can see that a significant effect of the phase factor (Pre vs Post) was observed in the methodology ($F\ (1,108) = 91.88$, $p < 0.01$) with a large effect size (partial $\eta 2 = 0.26$). In turn, we can see corroboration of this change as master's students highlight in their statements the importance of interactive and participatory methods, as well as the role of the teacher in the educational experience. They recognise positive changes in current teaching, highlighting the positive experience with children and the inclusion of relevant points, but they criticise the persistence of traditional methods that are not very active and the resistance of some students to participatory methods. This represents a challenge in contemporary teaching, with difficulties in achieving active student participation attributed to a lack of empathy or resistance to interactive activities. The importance of adapting methodologies to the needs of each group and constantly evaluating their effectiveness is therefore highlighted, although some also point out the need to dose the content and adapt according to the results.

For their part, high school students emphasise the importance of visual resources, discussions and the connection between past and present in history teaching, as well as teaching experience and skill, reflecting diversity in preferences and learning styles. The effectiveness of the trainee teachers' teaching methods is ambiguously perceived and may need more specific details on perceived changes. On the other hand, high school teachers recognise the need for training in new methodologies to address student diversity and to keep up to date, highlighting a shift towards a more active and participatory approach to learning. This coincides with the results of Sánchez et al. (2020) where they note an advance in teachers' perception of a methodology oriented towards fostering historical and critical thinking in students. However, these teachers face various difficulties and limitations in the implementation of these methodologies, such as workload, lack of digital resources and the language barrier. The impact of the methodologies on learning requires adequate assessment and collaborative work to generate significant changes, being one of the main challenges for education in the future. Consequently, we believe it is crucial that educational administrations encourage the motivation and training of both new and old teachers in order to achieve the necessary methodological improvement in the teaching of history. Teachers suggested that the use of visual and playful techniques engage less motivated students, and the aim of fostering critical thinking through history teaching is highlighted, so the effectiveness of the intervention programmes for diversity is recognised, emphasising the relevance of the content for each student.

This may lead us to see that the generalised perception of students in the pre-test denotes the persistence of the traditional teaching model with the absence of active methods, digital resources, and historical thinking skills. Monteagudo-Fernández et al. (2020) obtain

Table 4 Means and standard deviations for perceived learning as a function of a 2(Time) X 2(Sex) design.

	Sex					
	MALE		FEMALE		Marginal	
Time	*M*	*SD*	*M*	*SD*	*M*	*SD*
Pre	40.27	5.40	40.67	5.14	40.49	5.24
Post	43.94	6.32	45.39	6.38	44.75	6.37
Marginal	42.09	6.13	43.05	6.24		

Note. M and *SD* represent mean and standard deviation, respectively.

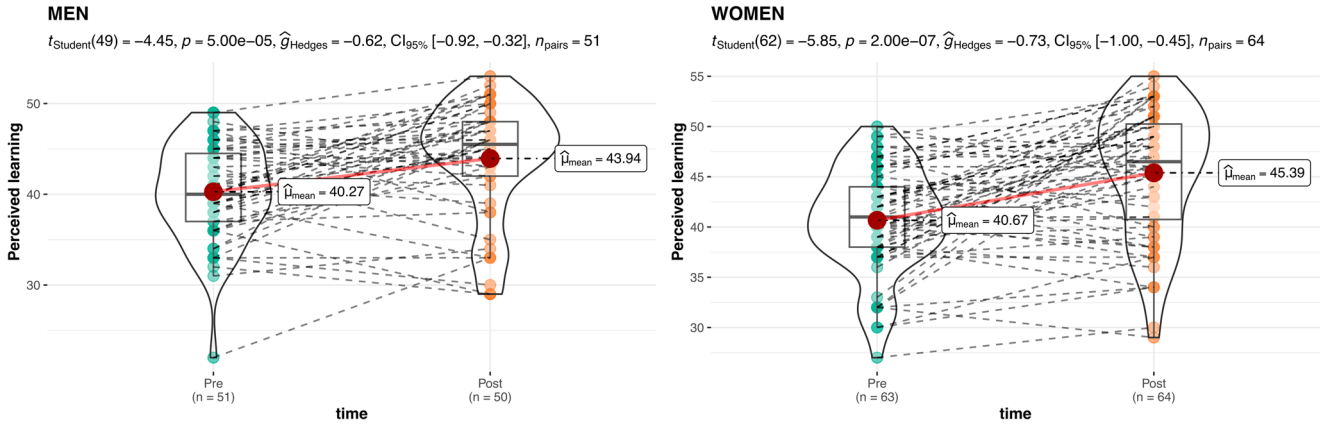

Fig. 6 Graphical representation of the differences in perceived learning scores by gender and stage in the cuantitative data. Differences in Perceived Learning Scores by Gender and Stage.

similar results in a study with secondary education and baccalaureate students, confirming the existence of a traditional model in the teaching of history that excludes cooperative and inquiry-based methodologies. This reality must point towards a didactic model that prioritises competence learning and student activism in their learning process, highlighting advocates such as Carretero et al., (2017) or Metzger & Harris, (2018), who are committed to a methodological change that moves away from the predominant conceptual model for teaching history.

In terms of motivation, we can see that a significant effect of the phase factor (Pre vs Post) was observed ($F(1,108) = 48.83$, $p < 0.01$) with a large effect size ($\eta 2 = 0.144$). Similarly, a significant effect of the Sex factor ($F(1,108) = 4.63$, $p = 0.30$) with a small effect size (partial $\eta 2 = 0.026$) was observed. Thus, motivation increased in both groups after the intervention, but especially in the female group. The master's students corroborate this by highlighting a higher motivation and satisfaction among students despite facing difficulties, while for high school students, in general, the new way of working of the trainee teacher seems to have generated a positive experience, improving participation, motivation and retention of information. The importance of active participation and discussion in the learning process is particularly emphasised by the high school students. Teachers highlight positive results, such as improved motivation and reduced student boredom, as well as increased participation in class. However, there is no significant statement regarding a difference in motivation with respect to gender, which may suggest that this is a change that is little perceived by teachers and students, but which is present and should be considered when applying these active and historical thinking methods.

These results are similar to those presented by several authors (Gómez et al., 2021a; Gómez et al., 2021b; Rodríguez et al., 2020), who also highlight as the most important factor that motivation is due to the use of resources other than the school textbook, which is very good news for continuing to take steps towards methodological complementarity, so that the students themselves are aware that by using all kinds of resources to learn, they can and should be more motivated. In these studies (Gómez et al., 2021a; Gómez et al., 2021b), they also found that the item with the lowest score in their pretest is the one that states that students are motivated because they can contribute their points of view and knowledge, something that clearly does not occur in traditional classes where the students' role as receivers predominates. For his part, Singer (1996) considers gender to be one of the most significant predictors in relation to teaching approaches. In this sense, Maquilón, Sánchez and Cuesta (2016), in their study of active Primary School teachers, point out that men tend to opt for an approach based on the transmission and reproduction of information, while women are inclined towards a more student-centred approach.

In satisfaction, significant differences were also observed in the posttest as a function of gender ($MH = 23.94$, $SD = 3.95$; $MM = 25.75$, $SD = 3.24$) ($F(1,112) = 7.23$, $p < 0.05$) with a small effect size (partial $\eta 2 = 0.06$), as for motivation ($MH = 25.94$, $SD = 5.85$; $MM = 28.33$, $SD = 5.27$) ($F(1,112) = 5.26$, $p < 0.05$) (partial $\eta 2 = 0.04$). However, repeated measures analysis of variance did not produce a significant result of interaction effect between sex and phase ($F(1,108) = 3.04$, $p = 0.08$). A significant effect of the phase factor (Pre vs Post) was observed ($F(1,108) = 51.6$, $p < 0.01$) with a medium effect size ($\eta 2 = 0.13$). In other words, the intervention had a significant effect on students' satisfaction with the subject, in agreement with what was stated by the master's students and teaching staff on the improvement of student motivation and satisfaction. They highlight the relationship between the way of teaching and the retention of information for the exams as an important point for their satisfaction. High school students highlight that there are aspects of history teaching that could be improved, such as the presentation of information, the length of language and the possible lack of connection between memorisation and comprehension of content. Diversifying teaching methods and incorporating more dynamic approaches could help to address these concerns and improve pupils' motivation.

Finally, on learning, a significant effect of the phase factor (Pre vs Post) was observed ($F(1,108) = 52.71$ $p < 0.01$) with a medium effect size ($\eta 2 = 0.12$). That is, the intervention had a significant effect on students' perception of learning. Master's students highlight the importance of the teacher in the learning experience and difficulties related to the implementation of technology in the classroom and the reluctance of some students to participate in interactive activities were noted, although the crucial role of this methodology in enhancing the learning experience is highlighted, with the consideration that there is no single methodology effective for all groups. Students suggest that there are aspects of history teaching that could be improved, such as the presentation of information, the length of language and the possible lack of connection between memorisation and understanding of content. Diversifying teaching methods and incorporating more dynamic approaches could help to address these concerns. Teachers for their part highlight the shift towards a more active and participatory approach to learning, which can benefit the development of critical skills and student engagement. However, this requires adequate assessments and collaborative work to generate significant changes, as well as continuous training in active learning methodologies and strategies, considered essential nowadays.

There is still an overuse of textbooks and the expository strategy by teachers who teach History (Carretero and Van Alphen, 2014; Colomer et al., 2018). However, more and more teachers in Spain are in favour of a teaching model in which the student acquires a greater role through the implementation of innovative resources (heritage, written and oral sources, new technologies) and educational strategies that encourage the active participation of students in the teaching and learning process (project-based learning, gamification, flipped classroom) (Gómez et al., 2018; Gómez et al., 2021a; Sánchez et al., 2020). It is therefore important to be aware of developments in the incorporation of competence-based social sciences teaching and a learner-centred model at all levels of education.

We can conclude from the above that the programme was quite effective in the objectives studied. In the quantitative data we observed an improvement in the students' perception of all the variables studied after the intervention, especially the change in methodology and the improvement in motivation had a large effect size. Moreover, it can be noted that the DOMs applied most of the methods, techniques, and resources we proposed in the training programme (supplementary material Fig. 6). On the other hand, we found quite positive statements about the programme from both master's students and high school students and teachers as we have seen in the different points. However, it is important to point out the limitations and difficulties reported by teachers and students when implementing this type of unit, as well as the fact that there were some weaknesses in this study, such as the small quantitative and qualitative sample group. As a possible future improvement when carrying out the interviews and organising the focus group, it is possible to point out that it could be organised with more time and written commitment from the participants, as the initial intention was for 8 teachers, secondary school students and Master's students to participate, respectively, one for each unit applied. The limitations of their availability played a negative role in the collection of more qualitative data, as participation was voluntary and, in the case of high school students, parental approval was required.

Data availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Author contributions
RSI and JR-M: conceived and designed the project and doctoral thesis of which this study is part. PMS and JR-M.: have made methodology, data collection and formal analysis. PM-S and JR-M have co-written the manuscript and RSI contributed to revisions, having read and approved the submitted manuscript. All authors have read and agreed to the published version of the manuscript.

Competing interests
The authors declare no competing interests.

Ethical approval
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Informed consent
Informed consent was obtained from all participants and/or their legal guardians during data collection (April–May 2023). Participants were informed about the objectives and procedures of the study and how their rights were going to be protected. Participation in the research was voluntary and anonymous.

Additional information
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