Computer supported collaborative learning. A peer-to-peer experience at the Ph.D. level*

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ABSTRACT

Learning, as a social phenomenon, is enhanced when it is achieved in a collaborative manner, such as through Computer supported collaborative learning, which involves interaction, communication, and collaboration among a group of people – mediated by technology – to achieve a common learning goal or to resolve a situation which requires a creative response. This paper includes a compilation of doctoral-level students' learning experiences and is written autonomously by two participants enrolled in an online course on comparative education. The objective of this paper is to describe the experiences and difficulties of implementing computer-based collaboration as a didactic strategy at the postgraduate level, intending to test its pedagogical use. The research found that when information and communication technologies (ICT) are applied to educational processes, they induce transformations which affect both how individuals learn and the digital and informational competences they acquire

CCS CONCEPTS

• CCS→Human-centered computing→Collaborative and social computing→Collaborative and social computing theory, concepts and paradigms→Computer supported cooperative work

KEYWORDS

Collaborative learning, Educational innovation, Computer supported collaborative learning (CSCL)

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1 Introduction

The educational process is based on the idea that participants adhere to a certain protocol, but it is undeniable that learning is a social activity. This is demonstrated by increasing collaboration as a way of solving diverse educational problems in which success depends on the team members [1, 2]. For Schmuck et al. [3], the immediate reference is learning mediated by others or group learning, since it is based on the reciprocal influence between the members. More than physical proximity, what influences the members of a group is the interaction between them and this manifests as changes in behaviours, beliefs, values, or opinions [4]. Interaction is considered the foundation of collaborative learning, which is when 'two or more students learn together to achieve a common goal or solve a task, mostly through peer interactions' [5]. Computer-supported collaborative learning (CSCL) refers to collaborative learning that relies on the use of information and communication technologies in such a way that they facilitate the group learning process and the construction of learning [6]. CSCL among peers is becoming increasingly popular because of its ability to overcome the barriers that time and place impose on distance education.

This document summarises the CSCL experience of Ph.D. students enrolled in an online course on Comparative Education in the period between January and May 2019. This collaborative learning experience took place spontaneously and voluntarily since it was not included in the course syllabus. The objective of this paper is to present the results of students' experiences so that the CSCL strategy be considered in the syllabus of postgraduate online courses, especially in virtual contexts.

The present work is integrated by a conceptual framework that helps to identify the most relevant definitions of the topic. Next, the methodology used to achieve the research objective is described, and the results obtained in light of the comparisons of other investigations, and the results obtained are described. To end with the conclusions that collaborate with new knowledge on the subject.

2 Conceptual framework

Collaborative learning, whether manifested directly or indirectly, is one of the oldest strategies in educational processes. Collaborative learning refers to a situation in '*which two or more students learn together to achieve a common goal or solve the task at hand, mostly through peer-directed interactions*' [5]. These interactions are a significant part of traditional education, but they are even more important in online education because, in this case, schools are obliged to transform their infrastructure '*into dialogical and access to information spaces*' [7].

The learning process, as a social activity, requires the individual to understand that more effective results are achieved from collaboration, since coming up with solutions to diverse educational problems requires teamwork [1, 2].

An immediate reference in this regard is group learning, which is based on the interactions between members. According to Díaz-Barriga et al. [4], more than physical proximity, what influences the members of a group are the interactions between them, which manifest themselves in changes in members' behaviours, beliefs, values, or opinions. It is in these educational interactions that the value of collaborative learning lies, particularly for distance education.

Educational interactions, framed in a particular context and on a specific task with more or less defined objectives, substantially favours the construction of shared knowledge [8]. This idea is supported by sociocultural psychology which postulates that learning occurs mediated by the influence of others [9]. According to Arievitch et al. [10], educational interactions become significant when the individual can theorise concepts, establish explanatory frameworks, or solve problems. CSCL refers to collaborative learning which is supported by the use of information and communication technologies, which facilitate the group learning process [6]. The incorporation of information and communication technologies in educational processes helps overcome the time and space restrictions caused by a lack of communication, which is necessary to collectively build knowledge in both face-to-face and remote interactions [11, 12]. Therefore, for the purposes of this research, CSCL will be understood as technology-driven interactions, communication, and collaboration between a group of people to achieve a common learning goal or resolve a situation that demands a creative response.

It should be noted that this research is based on collaborative learning, not cooperative learning, which is limited to groups formed expressly for the performance of a specific task in formal settings, and which highlights the elements of motivation, reward, participation, and interdependence and their incorporation into instructional models which promote the transmission of skills [1, 2]. Collaborative learning, on the other hand, refers to symmetrical interactions between peers, whether in formal or informal settings, with reciprocal awareness and with a common learning objective, so that degrees of responsibility may vary during the process, based on negotiations and communicative exchanges [13, 1].

2.1 State of the art on comparative education: an assignment

The experience described in this paper was part of the online course called Comparative Education, specifically one of the assignments corresponding to its module 1, Nature of Comparative Education, which was developed as part of an integrating project called State of the Art of Comparative Education. Table 1 shows in detail the competences and sub-competences, both disciplinary and transversal, which this activity seeks to transmit to the student.

Table 1. Competences to be developed in the assignment State of the art on comparative education

Assignment	Competence	Sub-competence
Integrative Project. State of the art on Comparative Education	Disciplinary analysis of the educational event, carried out in an interdisciplinary manner to create educational projects based on Comparative Education, which considers the relationship between the local and global contexts.	Analyses the different educational systems which exist.
		Establishes comparative relationships between different systems at a given educational level.
	Transversal Depending on the context, different languages, resources, and communication strategies are used effectively in interactions in different professional and personal multicultural networks, which have different purposes.	Communicates conclusions from the comparative analysis.
		Interacts with colleagues from different backgrounds in a constructive way in an environment of tolerance and respect.

This activity was to be developed on an individual basis and counted as 15% of the final grade. From the development of the transversal sub-competences, two of the students enrolled in the subject shared their results using the CSCL strategy. Thus, the objective of this study is to present the students' results with the aim that CSCL among peers is considered in the syllabus of online postgraduate subjects. This is considered particularly relevant since almost 70% of courses worldwide are online [7].

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3 Method

This document records the experience with collaborative work, particularly CSCL, of two students from a doctoral program at a higher education institution in northeastern Mexico. This postgraduate degree is considered one of the highest standards of quality and relevance by the National Council of Science and Technology (CONACYT) and is included within its National Quality Postgraduate Program (PNPC). The experience recorded here is with the subject of comparative education, which involves comparing the educational systems of different countries, while addressing the nature of comparative education, studying worldwide benchmarks in education, as well as the social, economic, and political implications that affect the comparison of such systems. It is necessary to specify that the course in comparative education follows the competency-based approach and is taught online.

The state of the art is understood as a research strategy that allows students to determine how a subject has been treated, how the advancement of its knowledge is going at the time of research, and what the existing trends are [14]. This task involves reviewing the titles and abstracts of one of the five suggested Comparative Education journals published in the period from January 2013 to December 2018, completing 20 references in total. The journals chosen were Comparative Education Review and Comparative Education since they are considered reliable sources of analysis as they are both located in the best quartile, Q1, of the Scimago Journal & Country Rank. The state of the art was obtained from answering the guiding questions, such as:

• Who are the authors who have published the most in this period in the journal?
• How have they defined Comparative Education?
• What are the similarities and differences between each of their definitions?
• What are the most recurrent topics being studied in Comparative Education in the last five years?
• Which countries are used the most in the comparisons?
•What are the predominant trends in researching Comparative Education? Are there any significant changes in these methodologies?

When the students individually completed their state of the art, they proceeded to integrate it, autonomously and voluntarily, through the CSCL strategy, placing emphasis on the most relevant results in terms of criteria and determining factors in the comparison processes of the last five years.

4 Results

For the development of the state of the art, based on the Comparative Education Review journal, a total of 20 articles were randomly chosen. In the case of the Comparative Education journal, the most visited articles, as indicated by the source's metric, were selected in each quarterly publication; and a total of 23 articles were chosen. The results of the analysis are presented in six sections, as Table 2 shows.

Table 2. Results of the analysis of the state of the art

Section	Results
Trends of Authors and Affiliations	Studies are still usually carried out alone rather than by research teams. Higher education institutions as the main generators of research in comparative education.
Definitions, Similarities, and Differences in Comparative Education	No single definition of comparative education, but it always favours a deep understanding of society and culture
Recurring Themes in Recent Comparative Education	Analysis of the results of standardised tests. Educational reforms which are currently being carried out in various countries
Countries and Trends in Comparative Education Research	Two regions which stand out: The United Kingdom and East Asia. Most of the research in comparative education uses a quantitative approach.
Aspects, Criteria, and Comparison Factors in Comparative Education Research	Exposing and understanding the different contexts in which any educational activity occurs as the fundamental role.
Ranking and classification systems	Increasingly being considered because they meant to make the quality of educational centres more transparent.

In the first section – Trends of Authors and Affiliations – it is observed that studies based on the comparative methodology are still usually carried out alone rather than by research teams since more than 60% of the articles are signed by a single author. Likewise, it can be noted that higher education institutions position themselves as the main generators of research in comparative education.

The second section – Definitions, Similarities, and Differences of Comparative Education – highlights that a single definition of comparative education does not exist, but rather, it varies depending on the topic and focus of the research. Furthermore, comparative education seeks to reveal tensions and

ambivalences in the phenomena studied, which is why it always favours a deep understanding of society and culture [15, 16].

Regarding the third section – Recurring Themes in Recent Comparative Education – two articles were identified. One is on the analysis of the results of standardised tests implemented by international organisations. The other concerns the educational reforms which are currently being carried out in various countries [17, 18].

Regarding the fourth section – Countries and Trends in Comparative Education Research – there are two regions which stand out: The United Kingdom and East Asia. It is noteworthy that most of the research in comparative education uses a quantitative approach, highlighting the regression analysis for the study of educational and social practices and policies. However, there has been an increase in the use of mixed and qualitative methods in comparative research. This is largely due to the fact that qualitative methods allow an analysis which usually escapes positivist views views [19, 20].

In the fifth section – Aspects, Criteria and Comparison Factors in Comparative Education Research – the political character present in the design of comparative education is emphasised. The fundamental role which defines comparative education on a large scale is the one which refers to exposing and understanding the different contexts in which any educational activity occurs [21].

The sixth section focuses on ranking and classification systems, which are based on international indicators and are increasingly being considered in the different educational structures. These systems are meant to make the quality of educational centres – especially universities – more transparent. Classification systems are usually presented through a table of positions and can be seen as a consumer guide, since they outline all the work each institution undertakes on a daily basis. Thanks to the ability to transmit a complex idea through a simple image, it is increasingly important to examine the rankings of institutions and educational systems in general [20].

5   Discussion

Based on the results, certain aspects of this experience can be viewed as a specific exercise of CSCL. It is important to reiterate that the task, as designed in the course, is individualistic and circumscribed to a single journal. However, in the spirit of building participants' knowledge in an area of knowledge in which they have no experience, a CSCL exercise is shown to facilitate meaningful learning.

The ability for graduate-level peers to interact and communicate despite the space–time barriers, makes CSCL an educational innovation [22], which can become a common educational practice among peers. Especially because CSCL increases the quality of the learning process. An added value to this exercise as a formal practice would be to consider, as Lerís et al. [23] do, personalised learning designs generated from the analysis of learning objects. Thanks to the nature of CSCL as an

active learning methodology, it is important to highlight the facilitating role which the computer played in this exercise. By handling different types of files, the computer allowed for the possibility of discussion and decision-making regarding the points of convergence and divergence between the authors.

6   Conclusions

In light of this research, this paper argues that CSCL should be incorporated into the didactic designs of all subjects, especially those online so that students can get used to working collaboratively. This means that when information and communication technologies (ICT) are applied to educational processes, they induce transformations that affect both how individuals learn and the digital and informational competences they acquire. Furthermore, technology can help personalise teaching and get students actively involved in their learning [24].

Thus, it is observed that derived from the collaborative interaction in a research process mediated by technologies, the imposed barriers of time and physical distance are overcome by the interaction, disposition, and collaborative work of both parties. However, regarding the limitations of this research, it is only based on an experience at the postgraduate level in a specific discipline or field of knowledge such as education, therefore, the conclusions or recommendations derived from research for other disciplines such as engineering or medicine, because the profile of the participants is different. Also, it could be relevant for future studies to compare computer-mediated collaboration through the interaction of a group of people or a couple of them but of different gender, to know how the number of people and gender affect learning. collaborative.

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