Analysis indicators of the networks of collaboration for learning in environments virtual

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ABSTRACT
This paper presents the importance of collaborative learning in current education, mainly in higher education, which is where the least research has been done on the use of ICT in the classroom. The experience and use of networks in virtual learning spaces was analyzed in an exploratory way, in order to verify the real advantages of their use and how they favor learning. The research was considered from the training framework of the graduate programs of the Virtual University System. The methodological procedure carried out was to analyze collaboration networks in virtual environments and how they influence the learning of postgraduate students, dimensions and categories were determined. Its approach was both qualitative and qualitative, an intentional sampling was chosen, the dimensions of analysis included collaboration for learning as a central axis.

Keywords: collaboration networks, collaborative learning, virtual environments.

1 INTRODUCTION
The knowledge society requires that all actors and institutions know how to work and learn in a network. Online learning occurs in the framework of links aimed at the collaborative construction of
knowledge. Sloep and Berlanga (2011) define networks as technology-mediated environments that help participants develop their skills by collaborating by sharing information. In this sense, learning networks seek to enrich new experiences of collaborative learning and collective construction through interaction.

The use of networks in virtual spaces for this purpose is not easy, if what is intended is to go beyond the mere exchange of information, which requires knowledge, practices and methodologies that, although they are known, can hardly be verified and validated in the distance education, since due to the characteristics of this training modality, it is complex to be able to determine the scope and impact on learning in the subjects that collaborate in the network.

Carrying out such verification of the real advantages of the use of social networks implies that the efforts to make students work in permanent interaction in order to achieve cognitive goals that require collaboration are endeavors that really favor their learning and, therefore, should be taken finished. The problem that students and teachers face when interacting in collaboration networks in the formal space is limited by establishing as a point of reference that sharing implies collaborating and that posting their arguments, ideas or messages implies learning.

At first, it was necessary to analyze from the research context itself the scenarios that represent collaboration networks for learning, determining as a necessary condition that only these spaces are taken into account as learning nodes, once these nodes have been delimited, an attempt will be made to answer the following questions: "Is it possible to generate and manage knowledge through collaboration networks? How do collaboration networks contribute to the construction of learning and under what conditions are they generated?

The research was considered from the training framework of the postgraduate programs of the Virtual University System, which will allow to analyze the processes that occur in networks that support and create teaching and learning communities, to observe if the structure and processes created allows share experiences and knowledge between teachers and students.

What will also allow to analyze the processes involved, with the purpose of specifying and validating categories of analysis of the processes of collaboration networks for network knowledge management.

2 THEORETICAL APPROACH TO COLLABORATION NETWORKS

Virtual collaboration networks are considered a relevant tool to promote learning, since they are available to a large student population of all educational levels and have the ideal characteristics to make communication processes and tasks of collaboration and interdependence exercises objectively analyzable and valued for the continuous improvement of the participants (Castañeda, 2010); (Suarez and Gross, 2013).
As a tool, networks allow us to confirm the explanatory and prescriptive proposals of social learning promoted by great researchers such as Lev Vigotsky, Jerome Brunner, Gail Ross and Albert Bandura, to name some of the most renowned promoters of social education.

Research has shown that technological mediation allows knowing the benefits of social interaction through the creation of networks, teamwork and dialogue (Francesc, 2011). Studies agree with the benefits of networks as isolated experiences in specific contexts (Henry-Meadows, 2008; Francesc, 2011; Panckhurst et al, 2011). The implementation of collaborative network experiences for learning in virtual environments encounters some obstacles. Gros (2011) refers that, at an individual level, students usually have difficulties when approaching the type of pedagogical proposals focused on network collaboration. The author points out that the very design of the activities, and communication problems, make collaboration more complex. On the other hand, from a technical perspective, the software of the social web has not been designed to be used in formal learning situations (Gros, 2011), although currently the networks that were originally social have enabled in their applications and software adapted for use with educational purposes.

Collaboration is articulated with the structure on which the Internet is based: the network (Suarez, 2009). Collaboration is even seen as a key feature of online learning (Badia & García, 2006; Garrison, 2006; Gunawardena & Zittle, 1997; Harasim et al., 2000; Majó & Marqués, 2002). In this sense, Dillenbourg (2003) points out that mediated collaborative learning has been well accepted by technology in education. Collaboration even appears in the conceptualization of teaching-learning processes in the virtual environment. In this line McConnell (2006), refers to the "network collaborative e-learning".

The collaborative model finds its roots in socio-constructivism. According to Ovejero (1990), Vygotsky adopted the term "collaboration", pointing out the importance that resides in the close connection that is postulated between intellectual and cognitive development, on the one hand, and social interaction on the other. The theoretical, psychological and mainly psychosocial foundations that explain the effectiveness of learning are in Vygotsky and GH Mead. However, from the incorporation of ICT, online learning (Romeu, 2011) and joint learning processes between students (Romero, 2008; Pérez-Mateo, 2010), they make it clear that they speak of the term collaboration. When collaborative learning takes place in virtual environments, the student has a set of technological tools that favor the achievement of this process. According to Román (2003), collaborative work in virtual environments is a qualitatively better task than that proposed by the traditional organization schemes.

This type of collaboration in networks is transferred to another scenario, a virtual scenario, forming collaboration networks, understanding these, according to Maldonado and Serrano (2008) as communities based on communication in order to build knowledge and, thus, as Velásquez and Laity (2007), creating
flows of information without borders, which, supported by the use of the Internet and ICT tools, have shown a great capacity to generate knowledge.

Adell (2010, cited in Díaz2013) approached the concept of collaboration networks in the classroom, pointing out that students from physically distant classes use the network as a means of communication to carry out collective projects, collect and exchange data on different aspects of their environment or study the cultural differences and similarities between communities in different countries.

In this new virtual scenario, where the so-called social networks are based, the "collaboration networks" are configured. These networks can be taken to all kinds of fields, both professional and educational, among others, and in the same way creating an interconnection between these different types of fields, linked by a common interest and with the aim of staying connected to collaborate, work and help each other. Likewise, as Van Aalst (2003) states, the systematic, methodical and organized establishment and development of internal and external connections (communication and coordination) between people can improve the work or academic performance of these people and of the group to which they belong. And it is that, as Castañeda says, "almost any person in training, whether or not immersed in formal educational models, is called to maintain connections with other equals, through new and innovative models of interaction that appear available through the Networks" (2007. p.2).

The possibilities of these collaboration networks, included in their base by the so-called social media, available thanks to web 2.0, such as social networks, blogs, hypertexts, shared documents, collective editing programs, collaborative templates, etc., suppose new means of communication and collaboration, characterized by the possibility of creating great conversations where, in the same way, the users of these networks know and relate to others through hyperlinks (Rojas et al., 2006), thus allowing the configuration of a network of contacts, social network, or collaboration network (Solanoy Bernal, 2011, Díaz,2013).

3 METHOD

The methodological procedure that was carried out to analyze the collaboration networks in virtual environments and how they influence the learning of postgraduate students allowed to determine dimensions and categories that allowed to establish the relevance, the relationships, and the conditions that are generated in the networks. of collaboration a virtual training environment to promote learning.

In this sense, the methodological procedure is a combination of quantitative and qualitative approaches as recommended by Cook and Reichardt (2000). For this reason, the study is framed in a model that can be called mixed (Hernández, Fernández and Baptist, 2014), since the problem is analyzed from different methodological and interpretive intersections, considering the two perspectives of reasoning; the deductive and inductive method.
Regarding the sample, Cea (2001) refers that the selection of the observation units constitutes a primordial state in all research, for this reason he recommends first delimiting the population to be studied and then extracting the sample. In this sense, in this research an intentional sampling was chosen that considers scenarios in collaboration networks in virtual environments, where learning situations are created that allow answering the research question and recovering new and valuable information on the subject. As well as reaching the verification or modification, if applicable, of the initial hypothesis.

Once various sources and analysis models for collaboration and use of the network were reviewed, 4 dimensions of analysis were determined, where each of them describes in a list of indicators aspects related to knowledge, use, management, approach and to the ways of working and learning on the net, which included collaboration for learning as the central axis, in this sense, the instrument was a questionnaire applied to 49 postgraduate students where they answered 79 questions.

4 RESULTS

The results of the piloting lead to the following dimensions and categories of analysis:

C) ICT training.

D) Technological tools for collaborative learning.

E) Perception of collaborative learning online.

F) Use of ICT for collaboration.

The application of the instrument allowed to establish the correlation between the dimensions and the indicators of each one of them exposed in the applied questions, for its analysis the Spearman coefficient study was carried out.

Since Sig is less than 0.01, the data of the variables do NOT follow a normal distribution, therefore the Spearman coefficient will be used. In the other interactions, the Sig is less than 0.01, therefore a non-parametric test is taken into account with the Spearman coefficient determining the correlation coefficient.

*Interpret the value of “Rho”*

a) From 0.00 to 0.19, very low correlation

b) From 0.20 to 0.39, low correlation

c) From 0.40 to 0.59, moderate correlation

d) From 0.60 to 0.79, good correlation

e) From 0.80 to 1.00, very good correlation

The correlation between E6 and E7 shows a Spearman coefficient of 0.798, for which there is a good correlation between both questions.
The correlation between E6 and E21 has a Spearman coefficient of 0.811, denoting a very good correlation between them.

The correlation between E20-E21 shows a Spearman coefficient of 0.778, with a good correlation. The correlation between F4-F5 shows a Spearman coefficient of 0.804, with a very good correlation.

The correlation between F6-F13 shows a Spearman coefficient of 0.709, with a good correlation.

Table 1 shows the correlation between questions and between variables:

<table>
<thead>
<tr>
<th>Independent question</th>
<th>Independent question</th>
<th>Spearman's correlation value</th>
</tr>
</thead>
<tbody>
<tr>
<td>E6. The process of interaction and collaboration with my classmates, through collaborative tools, favors the construction of new learning and improves my academic performance.</td>
<td>E7. The use of collaborative tools favors and facilitates the development of activities, the construction of products and contributes positively to my learning process and problem solving.</td>
<td>0.798</td>
</tr>
<tr>
<td>E21. I think it is useful to learn in a group:</td>
<td>E6. The process of interaction and collaboration with my classmates, through collaborative tools, favors the construction of new learning and improves my academic performance.</td>
<td>0.778</td>
</tr>
<tr>
<td>E21. I think it is useful to learn in a group:</td>
<td>E21. I think it is useful to learn in a group:</td>
<td>0.778</td>
</tr>
<tr>
<td>E21. I think it is useful to learn in a group:</td>
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<td>E21. I think it is useful to learn in a group:</td>
<td>0.811</td>
</tr>
</tbody>
</table>

Table 2 shows the results of the use of ICT for collaboration dimension.

<table>
<thead>
<tr>
<th>Independent question</th>
<th>Dependent question</th>
<th>Spearman's correlation value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you use ICT to do banking procedures?</td>
<td>Do you use ICT to make sales or other commercial transactions?</td>
<td>0.804</td>
</tr>
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<td>Do you use ICT to do banking procedures?</td>
<td>0.804</td>
</tr>
<tr>
<td>Do you use ICT to play video games?</td>
<td>Do you play on the computer?</td>
<td>0.709</td>
</tr>
<tr>
<td>Do you play on the computer?</td>
<td>Do you use ICT to play video games?</td>
<td>0.709</td>
</tr>
</tbody>
</table>

Based on the results, it can be stated that the indicators present in the development of collaborative networks for learning are the following:
IN CONCLUSIÓN

This research allowed to analyze the processes that occur in networks that support and create teaching and learning communities, in this section determined by the perceptions and results applied to students, it was possible to observe if the structure and processes created allow sharing experiences and knowledge between teachers and students.

Of particular interest, these data will allow those who carry out educational work in virtual or online programs to contrast their strategies with the proposed dimensions and indicators of collaborative networks for learning in virtual environments. It will be very useful for all of them to have information that allows them to support their efforts to encourage group and network cooperation of their students with the purpose of satisfying their knowledge interests or finding a solution to their need to find the resolution of a problem of understanding about its reality. As well as guiding the efforts of the teachers themselves and of the educational programs in order to use collaborative networks for learning.

Although the collaboration networks are created based on the interests of the students, it is necessary that from the educational function of the teacher and establish a direct relationship with the projects required in the training of the students, generating a new vision and conception of the collaboration networks as spaces that are associated with the definitions and results that have been given here.

It is important to remember that collaboration for learning through telematic networks, with groups on Facebook, Twitter, etc… facilitate the creation of topics and large threads of conversation and collaboration, blogs, spaces where documents are shared and built, etc. , are part of these networks that sometimes seem almost invisible but exist and are increasingly complex due to their increasingly flexible

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicators</th>
<th>Category coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological tools for</td>
<td>Inform: Groups in social networks where WhatsApp and Facebook stand out</td>
<td>• HTAC-In</td>
</tr>
<tr>
<td>collaborative learning</td>
<td>Share: Email</td>
<td>• HTAC-Co</td>
</tr>
<tr>
<td></td>
<td>Build: Docs in Google Drive</td>
<td>• HTAC-Cr</td>
</tr>
<tr>
<td></td>
<td>Dialogue: Discussion forums</td>
<td>• HTAC-DL</td>
</tr>
<tr>
<td>Perception of collaborative</td>
<td>Focused on learning:</td>
<td>• PAC-CA</td>
</tr>
<tr>
<td>collaborative learning online.</td>
<td>a) Build new learning</td>
<td>• PAC-CI</td>
</tr>
<tr>
<td></td>
<td>b) Improve performance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Build products</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d) Solve problems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>focused on interaction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Interest</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Utility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Likings</td>
<td></td>
</tr>
<tr>
<td>Use of ICT for collaboration</td>
<td>Recreational use</td>
<td>• UTIC-Re</td>
</tr>
<tr>
<td></td>
<td>Everyday use</td>
<td>• UTIC-Cot</td>
</tr>
</tbody>
</table>

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This research allowed to analyze the processes that occur in networks that support and create teaching and learning communities, in this section determined by the perceptions and results applied to students, it was possible to observe if the structure and processes created allow sharing experiences and knowledge between teachers and students.

Of particular interest, these data will allow those who carry out educational work in virtual or online programs to contrast their strategies with the proposed dimensions and indicators of collaborative networks for learning in virtual environments. It will be very useful for all of them to have information that allows them to support their efforts to encourage group and network cooperation of their students with the purpose of satisfying their knowledge interests or finding a solution to their need to find the resolution of a problem of understanding about its reality. As well as guiding the efforts of the teachers themselves and of the educational programs in order to use collaborative networks for learning.

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and numerous forms of interaction and communication from ubiquity and temporality, offering a multitude of uses and functions for education and social life of the various actors.
REFERENCES


