The Use of Concept Maps as a Work Methodology in Online Learning Environment - an Exploratory Study

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Abstract

This study aimed to understand how the use of concept maps is perceived, as a working method in the construction of individual knowledge and in helping collaborative work. The participants were 21 postgraduates e-learning students from an educational field. This study and its preliminary results show the potential of the conceptual maps as a working tool, as well as the methodology adopted by us to promote not only individual learning but also collaborative work. As a general observation, concept maps were considered a tool that allows a better understanding and representation of the different theme contents. However, the construction of concept maps in group is a more complex process. In any process of education activities are a key element as mediators of the teaching-learning process. They can take different styles and meet different objectives depending on the competencies that you wish to achieve. Concept maps it's a multi-sensory tool that uses visuo-spatial orientation to integrate information helping students organize and retain it. This role is reinforced when we are working with students in online due to its ability to help organizing the knowledge and to facilitate the construction of collaborative work. At this level, it promotes discussion and negotiation among the participants of the team leading to a collaborative knowledge construction process.

1. Introduction

The e-learning contexts appeal to the autonomy of the learner in the construction of knowledge. The teacher has a very important role in designing environments that are appropriate for the development of this competence. Furthermore, the proposed tasks, and the methodologies as well, have a significant impact on the achievement of this goal.

The use of technology in education led to changes in how people learn. The e-learning method permits greater diversity and flexibility of strategies and tools in the teaching-learning process. This allows achieving in a more efficient way a greater variety of characteristics of each individual learner. Ie finding strategies that respond to students preferred methods of learning, and to the different learning styles of students. The e-learning contexts appeals to the autonomy of the learner in the construction of knowledge. Learning is mediated by two different sets of conditions: social and interpersonal and depends on social and material characteristics of the surrounding environment [1]. The learning process takes place in the subject's interaction with the environment, in this case with their learning environment. The teacher has a very important role in designing environments that are appropriate for the development of this competence. Furthermore, the proposed tasks, and the methodologies as well, have a significant impact on the achievement of this goal.

The virtualization of education systems requires the alteration of its models and practices. These formats involve actual changes from a methodological, pedagogical and psychological point of view. According to Mason & Rennie [2] the teacher's role is to design / conceive courses in such a way that these promote the exchange of meaningful interactions between learners and help them, individually and / or collectively, to build true knowledge. The contexts of e-learning develop learning opportunities, place the student at the center of the process, by promoting autonomy but at the same time lead to a greater challenge in the development of pedagogical models to face this reality [3].

Concept maps consist of nodes that represent concepts and links that represent relationships between concepts. It's a multi-sensory tool that uses visuo-spatial orientation to integrate information helping students organize and retain it. The use of different dimensions as images and colors facilitates memorizing and achieve several learning styles. Concept maps play a very important role to represent and to build knowledge. Ie, concept maps help in the construction of meaningful learning [4]. They aim to organize ideas, seeking to highlight the main concepts inherent to a particular topic, the connection between them, as well as the sense of hierarchy starting with a *focus questions* (p.4) [5]. Another advantage of concept maps is that they can be built over time allowing the incorporation of new ideas and concepts as a field is being studied and information becomes knowledge. This role is reinforced when we are working with students in e-learning due to its ability to help organizing the knowledge and to facilitate the construction of collaborative work. At this level, it promotes discussion and negotiation among the participants of the team leading to a collaborative knowledge construction process.

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2. Methodology

2.1 Objectives

Our study aimed to understand how the use of conceptual maps is perceived as a working method in the construction of individual knowledge and in helping collaborative work. Our study focused on postgraduate courses, taught entirely online.

2.2 Design and participants

Data collection was made through questionnaires and occurred at end of the semester. A total of 21 postgraduates' online students participated in the survey, as volunteers; 28,6% males and 71,4% females; the average age of the participants was 41, ranging from 27 and 58 years old (see Table 1) two students were in their 20s, 6 students were in their 30s, 8 students were in their 40s, 5 students were in their 50s.

Table 1. Descriptive statistics of participants' age

Variable	N	Min.	Max.	Mean	SD
Age	21	27	58	41.8	8.75

2.3 Material and procedure

The students worked over a semester in two ways: maps were either prepared in groups, or individually. At the end of the semester it was requested for them to answer a questionnaire regarding the relevance of the conceptual maps in different aspects, including the construction of knowledge. The questionnaire was composed of 3 parts. Part 1, subject identification; Part 2, set of 11 statements with a scale of 1 to 5; and Part 3, Design and Construction of maps (Individual, Team and Notes), open answer.

Table 2. Questionnaire

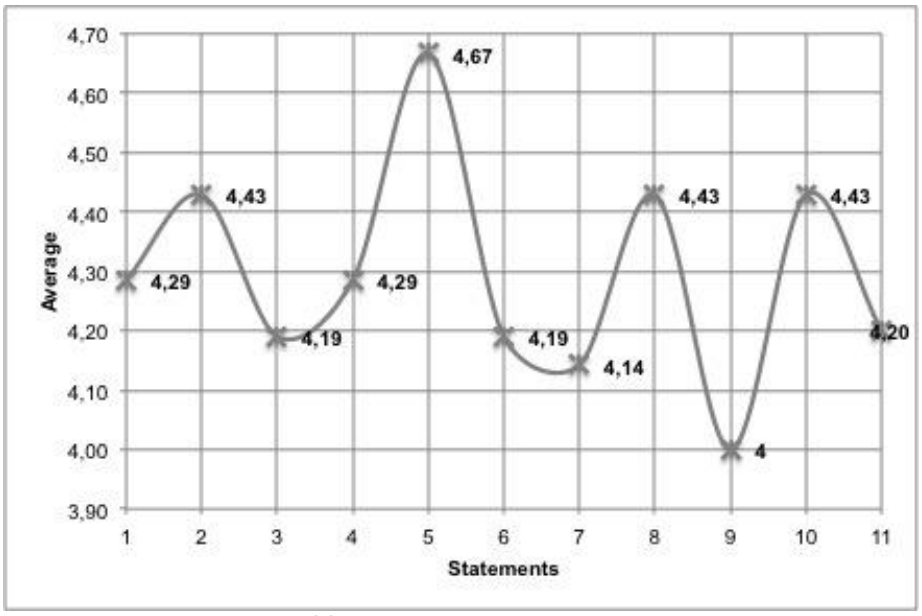
Parts	Objectives	Characterization
0. Identification	Sample characterization data	**Four** questions about Age/ Sex/ Type of training/ Experience in the use of maps
1. Relevance of their use …	Aspects related to the implications of the use of concept maps (*The Concept maps are relevant as a way to ...)*	**Eleven** statements Their opinion on scale 1-5 1 = Not relevant 5 = Very relevant
2. Design and Construction	Aspects related to the individual and teamwork. General aspects and evaluation	Four questions. Three of them are open questions about individual and teamwork. General observations. One about the general evaluation to this kind of instrument of work.

3. Results

We will present the results taking into account the objective of our research and following the two parts of our questionnaire.

3.1. Part 1- Relevance of their use …

Graphic 1 shows the mean obtained in each of the eleven sentences. The average found suggests a very high level of agreement with the ideas expressed in the sentences. That level of confidence is more evident in sentence 5 (*The Concept maps are relevant as a way to … Organize information / content*)



Graphic 1. Average per statements

Followed by this global analysis, table 3 shows the results by statement

Table 3. Results by statement

Statement	Scale (1 – Not relevant / 5 – Very relevant) %				
The Concept maps are relevant as a way to ...	**1**	**2**	**3**	**4**	**5**
1. … Building knowledge	0	0	9.5	**52.4**	38.1
2. … Represent knowledge	0	0	19	19	**61.9**
3. … Develop critical thinking	0	0	23.8	33.3	42.9
4. … Develop creative thinking	4.8	0	9.5	33.3	**52.4**
5…. Organize information / content	0	0	4.8	23.8	**71.4**
6. … Sharing information / content	0	4.8	14.3	38.1	**42.9**
7. … Compare the information / content	0	4.8	19	33.3	**42.9**
8. … Simplify complex realities	0	0	14.3	28.6	**57.1**
9. … Promote collaborative work	0	0	28.6	**42.9**	28.6
10. … Promote learning	0	4.8	9.5	23.8	**61.9**
11. … Learning online	0	0	20	**40**	**40**

Table 3 emphasizes the use of conceptual maps for this group of students as a tool to organize information / contents, represent knowledge, simplify complex realities and develop critical thinking, which promotes learning.

3.2. Part 2. Design and Construction

When asked to *List the main difficulties encountered in the realization of concept maps in terms ... Individuals*, selecting relevant information and systemizing ideas are the main difficulties. When asked about team work (*List the main difficulties encountered in the realization of concept maps in terms ... teamwork*), student's pointed out management of individual divergences, understanding ideas coming from different elements and create consensus.

In the space dedicated to observations that was a great consensus about the importance of using this type of tool and its consequent implication in the learning process. The visual aspect of conceptual maps is mentioned, ie

(…) the execution of a written plan of symbolic nature, signage, allowing quick viewing "mental" association and connection of concepts, allows absorb a "key" pictorial that easily stores, and serves as a starting point for any development issues with she related (student).

Agreeing with the information found in the observations section, the majority of the students considered the use of conceptual maps to be very useful - *On a scale 1-5 which is the classification that would assign this work tool…* (1 - Not helpful / 5 - Very useful) the avarege for global classification is 4,52.

Table 4. Global classification

Scale (%)					
1	*2*	*3*	*4*	*5*	Average (1-5)
0	0	9.5	28.6	61.9	4,52

As you can see only we find answers from point 3, but without much expression. The point scale with a higher percentage is 5 - Very useful.

4. Conclusions

Preliminary results indicate a positive evaluation of concept maps, particularly in the construction, representation and organization of knowledge. They help to simplify complex realities, promoting collaborative work and learning. However, its individual design and construction carries problems in identifying the key concepts and schematization of the ideas.

On a teamwork point of view, it requires management of individual differences and sets aside the subjectivity to give place the complementarity, and *promotes collaborative working, sharing, and consequently learning*. Thus 61.9% of students rated this working tool as "very useful". As a general observation, concept maps were considered a tool that allows a better understanding and representation of the different theme contents. However, the construction of concept maps in group is a more complex process. This study and its preliminary results show the potential of this work tool as a methodology, adopted by us, to promote not only individual learning but also collaborative work. This study indicates the potential of this tool, as well as the methodology adopted by us to promote not only individual learning, but also collaborative work. Based on this evidence, we will adopt the same methodology in other subjects and with other groups of students, in order to reinforce or find other work methods. Our results agree with previous studies about the importance of using conceptual maps as a tool for individual and collaborative learning [6] [7] [8] [9]. These studies highlight student's satisfaction in the use of conceptual maps, leading them to better understand, integrate and clarify the concepts, as well as develop their critical thinking.

The virtual space, by definition, allows new ways for students interact with information, and therefore new ways of learning. Teachers who work in this environment must help students while managing these situations. Students should know that it is more than just dominating a new knowledge representation instrument; it is a new learning culture. This assumes that professors have to do more than transmit the information, promoting competences of searching, selecting, and interpreting the information available [10].

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