Engaging distance online students through active methods: the example of concept maps

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Abstract
Distance learning gained publicity and exposure with the pandemic context, attracting more students and the interest of research, consolidating its position of relevance, namely in higher education. This study seeks to reflect on the use of the conceptual map as an active learning strategy, with a view to greater student involvement in a distance university. From the context of a curricular unit with different strategies, which includes, in addition to the traditional reading of documents, the inclusion of videos and or activities in which each student participates in a committed way, it was proposed to use concept maps as powerful tools to engage students. This strategy was aligned with peer feedback. The testimonies left by the students who participated in this case study prove what the literature has said: that the active learning approach based on concept maps positively achieves the objectives and results that aim at successful learning and that the feedback from peers reinforces student self-regulation, enabling insights that improve their learning as a whole.

Keywords: Conceptual Maps, Active Learning, Distance Education, Higher Education

1. Introduction

In higher education, we know that student-centered learning requires the use, in a meaningful and self-regulated way, of the available learning resources, based on printed, digital, multimedia, or other information. Therefore, among the objectives to develop skills in these students are: to improve the way of dealing with information in multiple supports, train in the correct and ethical use of information in different contexts, and also make this learning work both in the context of the classroom or throughout life.

This study addresses the implementation of an active teaching method, in the Curricular Unit "Information Organization and Management" included in the study plan of the Master in Information Management and School Libraries, offered by Universidade Aberta, based in Lisbon. Teaching is entirely online, with students being taught at a distance. Preferred students are professionals qualified for teaching who intend to exercise coordination functions in school libraries and other professionals who intend to intervene and develop projects in the area of school libraries. Future information professionals and school librarians must be aware of the general principles and characteristics of information organization, description, and provision of access points to information, following international standards for cataloging, bibliographic description, indexing, and classification. Through this referencing and technical description, fundamental to efficient management of collections in libraries, it becomes possible to retrieve information at the time of research. Technical operations thus allow the fulfillment of a double objective: to give a rationale to the internal organization, adopting explicit rules for all who work in the description of information, and to provide effective means of localization, so that the documentation acquires a tangible value for its users, which manifests itself exactly through its possibility of recovery and use. The understanding of this value, together with the understanding of the evolutionary processes of library science and of the current methods of organization and document description, is the basis for the curricular purpose of this disciplinary area.

The teaching of these future professionals presupposes, on the part of the teacher, knowing the emerging pedagogical changes that can be used for the design of courses, integrating this knowledge in a more segmented, clear, and objective training offer (Sanches, 2018). This is intended to mirror a spectrum of skills, practices, and mental habits that broaden and deepen learning through engagement with the information ecosystem. The opportunity for reflective discovery of information, understanding of how information is produced and valued, as well as the use of information in the creation of new knowledge and ethical participation in learning communities (Association of College and Research Libraries, 2016) echoing students' experiences, must be provided.

This study aims to describe and explain a training activity that uses an active learning method - the concept map - in this subject area, analyzing and understanding how students adhered to this methodology in distance learning.

1.1 Pedagogical strategies and active methods

A recent study on the responsibility of teachers in pedagogical innovation underlines that achieving student-centered focus requires deliberate planning. Focusing on the role of teachers as creative professionals calls for a highly deliberate form of teaching that promotes student-centeredness and active participation (Paniagua & Istance, 2018, p. 18). A systematic review of meta-analyses (Hattie, 2015) which analyzed the impact of learning strategies on higher education students details 105 variables with a significant influence on student success. Student success achievement includes peer assessment, self-efficacy, preparation and organization, clarity and understanding, guidance for grades, and class attendance. Additionally, teacher behavior includes preparation, clarity, encouragement of discussion, availability, intellectual challenge, and the encouragement of independent thinking. Likewise, in another systematic review of meta-analyses about higher education students success, the authors (Schneider & Preckel, 2017) stated that achievement is strongly associated with the stimulation of meaningful learning by clearly presenting information, relating it to the students, and using conceptually demanding learning tasks; also, instructional method and how it is implemented in detail strongly affects achievement. The authors also underline that teachers with high-achieving students invest time and effort in designing the microstructure of their courses, establish clear learning goals, and employ feedback practices. Finally, they suggest that students with high achievement are characterized by high self-efficacy, high prior achievement and intelligence, conscientiousness, and the goal-directed use of learning strategies.

Thus, we can say that autonomy and self-efficacy, as well as self-directed learning and experiential learning, seem to be suitable strategies for different contexts, including distance learning. These strategies converge with the goals of active learning methodologies. “Active learning is an umbrella term that encompasses the many teaching methods that are student-centered and that engage students in some kind of activity and it is based on research documenting that people learn better when they are actively involved in an activity than when they passively receive knowledge” (Danver, 2016). Furthermore, active learning is also iterative, dialogical, and mostly collaborative; it is about the doing of understanding and, hence, about the application of knowledge in new and authentic situations (Christersson & Staaf, 2019). Several studies have advocated the introduction of active learning in learning strategies at all levels of education, including higher education. (Christersson & Staaf, 2019; Clarke, 2012; Meyers & Jones, 1993) and in various disciplinary areas (Beichner, 2014; Freeman et al., 2014; Langley & Guzey, 2014), affirming the purposes of knowledge co-creation through collaborative practices, conscious and focused on learning. A meta-analysis on the impact of active learning (Freeman et al., 2014) demonstrated that active learning leads to increases in exam performance, increasing average grades and that failure rates in traditional classes are 55% higher than those observed in active learning.

1.2 Conceptual Maps

There is already an understanding of how student-centered approaches, particularly active learning methods, benefit their learning, significantly improving understanding and retention of knowledge. Concept maps are one of these methods and can be a strategy to be considered in the teaching of information sciences, since the construction and reconstruction of knowledge in which the involvement of students is best achieved, involves the use of active learning strategies. Concept maps have been asserting themselves as important teaching tools that use metacognitive strategies, that is, they help individuals to learn about the nature and production of knowledge as they graphically illustrate a given subject, enabling a clearer observation of its structure, including the hierarchies of dependent concepts and other relationships between concepts, thus being an ideographic representation. In a seminal study (Novak, Gowin, & Johansen, 1983, p. 627) it is explained: "we see schematically the multidimensionality of cognitive structure organization which parallels the complex organizational potentials available in any area of knowledge". In other words, given the human being's innate ability to detect regularities and group them, concept maps seem to be appropriate to adapt well to any individual and discipline.

The advantage of these representations is the segmentation of knowledge, which implies a schematization and synthesis of a specific topic, facilitating the understanding, memorization, assimilation derived from the significant organization of this knowledge, which facilitates the entire cognitive process (Sanchez Cabaco, 2004). Taking into account the intrinsic characteristics of concept maps, namely hierarchy, selection, and visual impact, it is possible to understand their application as a learning strategy, namely taking into account the diagnostic objectives - understanding the relationship with the students' previous ideas; inclusion – what they consider relevant or accessory; of progressive differentiation – that is, how knowledge was reorganized; and integrative reconciliation - allowing the incorporation of new learning (Ontoria et al., 1994). Thus, teaching students to build, interpret and use concept maps can help them organize information about a subject, as well as make learning more meaningful, as it allows them to visualize how a given subject is organized and understood (Silva, Lopes, Catarino, & Payan-Carreira, 2019).

Working with concept maps can represent yet another path for teaching practices marked by authorship, autonomy, and co-responsibility, and by the advances and achievements in the path of learning, teaching, and training. Proposing new places for the teacher implies, among other challenges, the construction of knowledge that enables a critical, ethical performance committed to meaningful learning. Among this knowledge, some cover the didactic-pedagogical dimensions, reflecting, discussing, and proposing different perspectives for education (Ruiz-Moreno, Sonzogno, Batista, & Batista, 2007).

1.3 Teaching future teacher librarians with conceptual maps

The curricular unit "Information Organization and Management" addresses the technical issues of the document chain, that is, the entire path of the document, since it reaches a library until it is available for use and user request. These aspects relate to the organization and processing of documentation and information retrieval, with application to the context of school libraries. It also focuses on the importance of these areas in supporting and encouraging the effective use of documentation and the impact of technology in this domain. In terms of distance learning strategies for this curricular unit, before starting the subject, the working scheme for teaching is presented, explaining the general and specific objectives, as well as the evaluation criteria, expectations, and operating rules, clearly.

At an early stage, evaluation is also addressed. This should be able to demonstrate whether students understood the key concepts, analyzing the different resources available and whether they will know how to

apply given alternatives, managing to adapt their thinking to different practical cases. As it is a course entirely taught at a distance, teaching cannot use some traditional strategies, for example, based on synchronous interaction. Although a basis and a synthesis of the subject is provided, the deepening will have to count on the committed participation of each one and the discussion will be based very much on the students' participation and on what they can write and share, as well as on their out-of-school practice. Hence, it is important to make an intense connection between curriculum content and practice, through real cases and examples.

To allow a comprehensive and meaningful understanding of the matters, a global notion of the way information is presented is given, namely the type of formats that are subject to librarian treatment in which it manifests itself. It is also important to observe common points related to information in structurally similar systems and organizations, such as archives or museums, including examples and analogies and highlighting the differences and specificities in the field of librarianship and information and documentation science. There are already international regulations that point to new ways of describing documents, interconnecting, and researching them. Future professionals who will work in libraries will have to adapt to these new professional requirements and must be available for continuous training and future learning in new technical routines. On the other hand, integrated platforms that can manage various information resources in a virtual environment are increasingly a reality within your reach, a situation that should also deserve our best attention.

In the first approach, it is important to verify the understanding of the concepts in a transversal way, that is, to see if the students understand their practical applicability. It will also be important to do the opposite exercise, that is, to try to analyze examples that students can give, usually in their doubts or questions, which can be extracted and generalized, leading them to the presentation of the rule. With this type of activity, it is possible to improve the understanding of the whole, not confining ourselves to formats or technical specificities (although they have to be addressed), but to explain the concepts that occur based on these specificities. This anticipates that, in a real work context, the skills acquired can be applied transversally, even if the examples are different, the types of tools used are different, and the contexts, which are necessarily different, can take advantage of the constructed learning. It is in this context that the use of the conceptual map as a learning strategy seems pertinent.

Active learning methodologies, in particular the use of concept maps in the context of Library and Information Science teaching, are not completely new (Colosimo & Fitzgibbons, 2012; Normore & Garrett, 2007). The information sciences themselves recurrently use concept maps, lists, tables, and classifications to represent knowledge as a professional strategy (Åström, 2002; Estrada, 2009).

2. Methods

This paper presents a case study on the application of active learning methodology, based on the use of concept maps, for teaching information organization and management to future school librarians, within the scope of Library and Information Sciences. Case studies allow us to analyze concrete contemporary situations and to consider their contextual influences (Yin, 2009). Their main advantage is that they provide the analysis of reality, allowing reflection and decision-making about future perspectives.

The works and testimonies of students from the 2020/2021 academic year are considered. The Universidade Aberta is headquartered in Lisbon, Portugal, and provides online courses for the Portuguese and Portuguese-speaking population around the world. Being exclusively distance learning, there is an effective concern with the involvement of students. The class under study is composed of 10 students, of both sexes, from the first year of the master's course. In the curricular unit "Information Organization and Management" it is intended

that students get in contact with the main notions and concepts associated with Information Science, learn to treat and systematically manage information, organize information, and adequately support library users. Each thematic module begins with an introductory instructional video, which is supported by selected texts for reading. There is also an online discussion forum for students to ask questions. Finally, an evaluation activity follows.

The structure corresponding to the first module is presented below, which contains the exercise of concept maps.

Table 1: Curriculum contents and activities associated with module 1 – Introduction to concepts.

Contents and objectives	Information, knowledge, document, sources, standardization, document description, document chain, are current concepts in Information Science, but sometimes they are not properly clarified. In this first module, we will familiarize ourselves with the terminology applied, seeking to understand the processes and methods related to the organization and management of information. At the end of the module, students should be able to describe and explain, using the appropriate professional language, the processes, and procedures that involve technical document handling, from the arrival of the document to the library until it is available on the shelf for the loan. These processes are based on standardization. Standardizing is fundamental both for the production and management of bibliographic data and for its interoperability and sharing in the domain of libraries and beyond. This is what enables direct access to the document, providing research and information retrieval in multiple databases, catalogs, or repositories. The School Library, as a gateway to knowledge, must understand the information ecosystem in which it is located and the knowledge networks of which it is part, for its success, indispensable to the teaching-learning process and the educational/cultural policy.
Stages	1st phase - Main Concepts - Individual study of the materials provided - from March 5th to 15th. 2nd phase - Collaborative work (participation in the concepts forum) - from March 16th to 26th. 3rd phase - Involve students in the work of the school library - Individual study of the materials provided and consolidation of the study of materials from the previous phases - from April 5th to 12th. 4th phase – Reflection - Collaborative work (involving the student, sharing knowledge, retrieving information) – from April 13th to 19th.

The aim would be for students to read the texts independently and to record the main concepts so that they can then understand, with successive steps, how they are related. The main idea of applying a methodology in this disciplinary field has a goal of meta-learning: that they understand and incorporate the concepts in their learning, but also understand how they are related and how logical reasoning about these concepts can be done. This is because, in the case of information science, which includes theories, techniques, and systems for organizing libraries, it is important to assume that this matter is based above all on a practical understanding of the processes and mechanisms for organizing and processing information. Thus, concept maps are an interesting strategy to verify the learning of these subjects, because they encourage the visual explanation of their understanding, accommodate different learning styles, involve students with practical activities, and help to develop high-level skills, like critical thinking or problem solving, in a situated way. Thus, the following exercise was proposed:

Table 2: Proposed activity with conceptual map.

Activities	This is the forum you will use to present your work. It has an individual and a collaborative component. After viewing the introductory video to the theme and carefully reading the texts, they should create a concept map with the Gitmind tool https://gitmind.com/, GoConqr https://www.goconqr.com/pt-PT, or similar - save it in pdf and make it available here (until March 22). Then, they should comment on two concept maps of their peers, paying attention to differences found, strengths, and what could be improved. If a colleague already has two comments, they should choose another one to comment on (until March 26th)

This activity was designed to fulfill the following matters:

- Learning through understanding (which makes sense at each moment and in a contextually framed way)
- Underline the importance of understanding the concepts, structures, and functions associated with them, so that information transfer can occur, regardless of the situation
- Understand prior knowledge, as well as the learning needs at each moment, to adapt the contents, providing, while these needs are assessed, opportunities to put metacognition strategies into practice
- Provide opportunities for students to challenge their beliefs and habits, challenging their initial understanding of the subjects
- Seek that they are specialists, training planning, reasoning, argumentation, and exposition skills so that a deep

3. Results

In line with other works (Rutherford, 2012) a process for applying the methodology was designed, in which the following steps were developed:

- Students were asked to create a mind map of what they already know or remember about the concept or Information they are learning, mainly based on the selected readings;
- After the students have worked individually, they shared their work and observed other students build on what they recalled on their own;
- As a third step, students choose another map and worked to give peer feedback in the forum discussion;
- Finally, to complete the exercise, students reviewed the work of other students and note patterns and trends. The teacher also commented on the exercise and used the student-created work to point out significant information, to gather formative assessment data about to re-teach or extend.

Examples of the maps and related comments are given below.

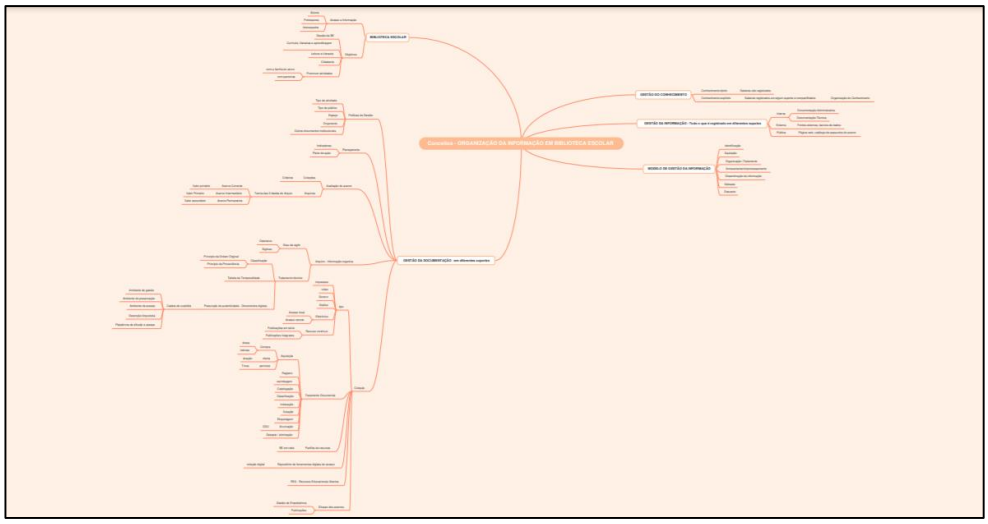

Figure 1: Conceptual Map from student 1.

Several students commented on this map:

Dear colleague R.,
first of all, I would like to thank you for sharing your concept map. I think it presents an interesting reading dynamic, also demonstrating a clear knowledge of the topics covered. The division of concepts into two axes structures the reading of the map, clarifying the concepts related to the organization of information in the library, which guides (the reader) to the literature indicated in this theme. Personally, to clarify the different levels of information I would have used more colors. Once again, thanks for sharing, and see you soon.

Good evening,
I'm glad we meet again, I've been looking at your map with all the care and attention it deserves and I really liked it. Naturally, you felt some difficulty because it was your first concept map, but in the next ones, you'll feel more at ease. The same thing happened to me initially, but as I had already done some Educational Research, now it was easier and funnier and they are addictive to do. The essential is present, from the management of documentation in its various branches and its different supports to the management of knowledge and information, as well as the various models of information management. I believe that your map contributes a lot to the general understanding of the subject and helps us a lot to understand this whole process with great technical precision. As less-well achieved aspects, I point out, similarly to what I also said in J.'s map, the explanation of one or another concept or the detail of one or another chain in the relationship of concepts with each other, but that, perhaps, is a matter for another job.
Thank you, I can only wish you good luck and a good period of Easter rest,

Dear R.,
I must say that I really enjoyed your Concept Map. It is quick to read due to its logic and clarity.
No relevant point was forgotten. Greetings.

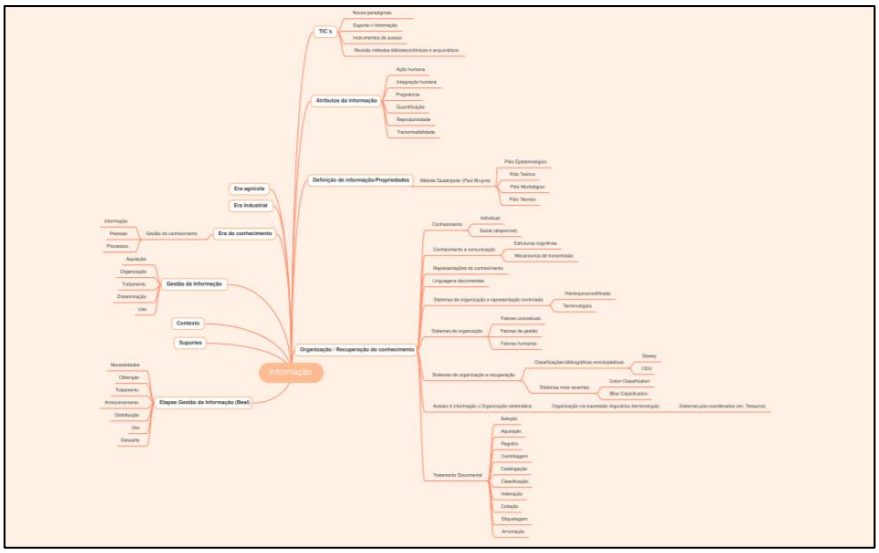

Figure 2: Conceptual Map from student 2.

Comments of other students on this map:

Colleague A., I liked the presented map.
Strong points:
The map presented was built based on the readings carried out and with emphasis on "Information", it manages to offer to understand and addresses the theme proposed for study.
It's a map:
· Informative;
· Addresses the documentation handling process;
· Addresses the Information Management Steps;
· Addresses Document Organization;
· Addresses Knowledge Retrieval;
· Addresses ICT's.
Weaknesses
In my opinion, the inclusion of the bibliographic reference would help a lot in the credibility of the concept map.
Best,

Dear colleague A.,
In my opinion, your map was good in terms of organization and structure. The interrelationships between the concepts were very clear and easy to read. I really liked the breadth given to the concepts of the theme concerning the texts provided. The only suggestion for improvement that I can observe is the addition of a bibliographical reference, in agreement with our colleague P.
Thanks for sharing your map.

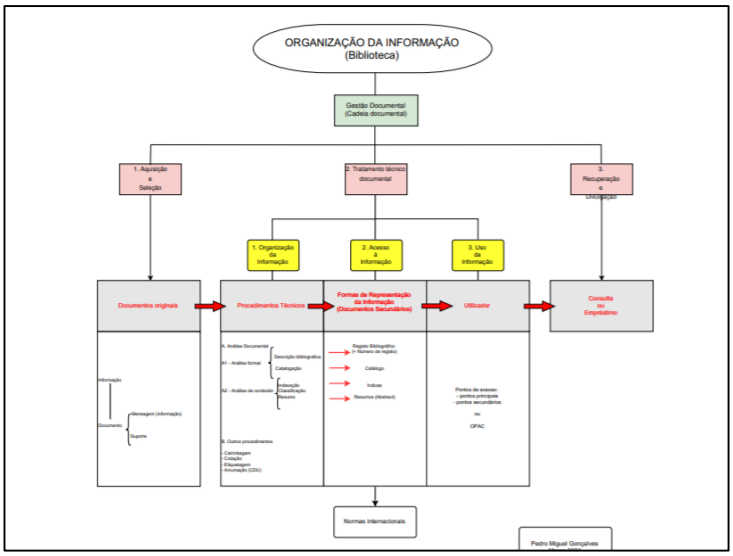

Figure 3: Conceptual Map from student 3.

Comments of other students on this map:

Good afternoon, P. and teacher!
Hope everything is alright. About the concept map, it is quite informative, pragmatic, it demonstrates the successive phases of the "document chain" and its interlinked relationships. I particularly like the classic style of that map.
In my opinion as a learner, perhaps to improve the dissemination of information, as it is one of the relevant and final objectives of document processing and, consequently, of a library.

Good afternoon dear P., teacher, and colleagues,
One of the most interesting points of this work has been being able to see the different ways in which we apprehend and visualize the same information; P.'s concept map is a great example of this, presenting the document chain in a way that would never occur to me. Like V., I also appreciated the classic style of the map and found it interesting how he presented the relationship between the concepts. However, I think that some relevant information is lacking, namely on the forms of acquisition and selection criteria. Furthermore, the order of document processing procedures is not clear, making it difficult to follow the process linearly.
Best,

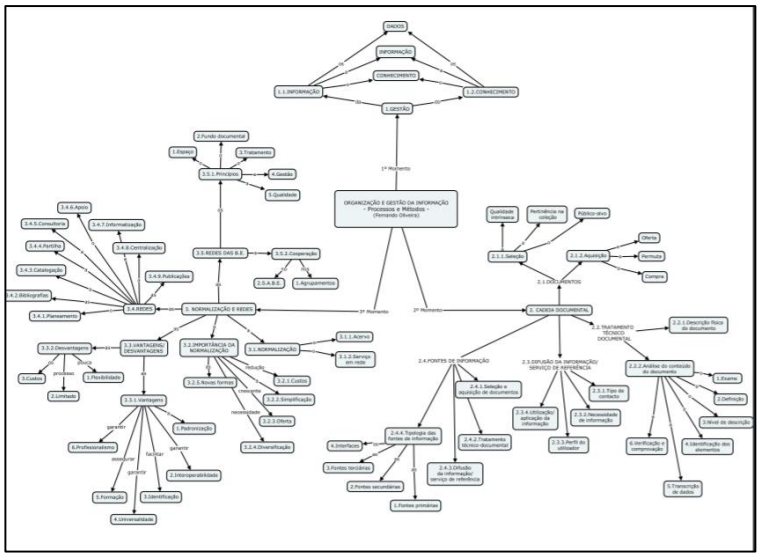

Figure 4: Conceptual Map from student 4.

Comments of other students on this map:

I must confess that I think F.'s Concept Map is very complete and spectacular. I think this map, as well as H.'s, are the best maps presented so far. With these maps, I feel that I am truly learning (as the information is organized) and it is noticeable that he has the baggage of other readings and experience. Congratulations!

STRONG POINTS
1 – This is a very elegant map that creates an effective way of globally viewing information.
2 – A very complete map, well thought out, well structured, which reveals a very systematic knowledge of the subject. So complete that it goes beyond, I believe, what was asked for.
IMPROVING
There are no relevant criticisms to point out, other than ridiculous details.
1 – The first phase of the Document Chain is "Acquisition and Selection", that's why in point 2.1. of your scheme, I would not write "Documents".
2 – I question the relevance of associating point 2.4. (Sources of Information) directly to the Documental Chain. It should perhaps be integrated into point 2.1.
3 – It is not possible to unveil a clear movement in this map, a circuit that reconstitutes the processes through which the flow of information passes through, as there seems to be no point of arrival. The traffic is lost, however, in the middle of the arrows, without getting anywhere. And I would say, with a literary twist: labyrinth addiction.

Good evening, P.
Thanks for your comment, it's extremely motivating. I'll improve the aspects you point out, this map was just the first sketch to try to understand the ins and outs of this CU. Concept maps are very important (and addictive to make) because they help us to systematize information, especially the most technical. They always helped me a lot in Educational Research, for example. Hugs, FO. [Answer of the author of the map]

Good evening, F.,
I agree: concept maps are addictive.
Formally, I would have placed the three titles of the themes (management/documental chain/standardization) in different colors, to highlight. I think that writing the 1st/2nd/3rd moment is unnecessary because you already put the number. But overall, you focused on three essential topics of this theme, the map is visually pleasing and very complete. I don't know if I wouldn't call point 3 just standardization, because the existence of networks stems from standardization. Without standardization of procedures, there could be no centralized cataloging services or common catalogs, for example. I agree with Pedro's observation. The stages of the document chain are identified and we must maintain the terminology. In addition to point 2.1., I would also amend point 2.3., calling it "information retrieval and dissemination". I think that the objective of technical-documentary processing is to facilitate the retrieval of information by the user. Maybe split the document chain into documents | phases. In the documents, I would put the sources of information. I would take points 2.4.1/2.4.2/2.4.3 from the sources of information (they refer to the steps in the document chain).

Good evening, H.
Thanks for your feedback, it's great that we learn from each other and have other perspectives that help us improve. Your observations are very assertive and I will follow the recommendations to balance the work more. I also thought about color differentiation to make it easier to read visually, but time has been a constant struggle that has led us to leave some important details behind. I'm still at that stage of the first look, the first reactions, trying to better understand the entire UC chain, which is not an easy task. Have a good weekend and a good Easter rest, FO. [Answer of the author of the map]

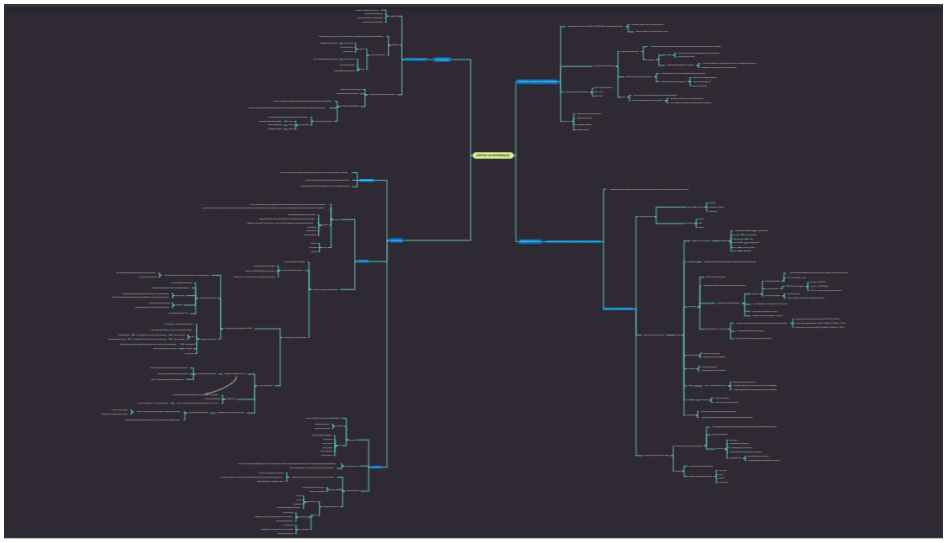

Figure 5: Conceptual Map from student 5.

Comments of other students on this map:

Good morning dear H., teacher and colleagues,
I have to start by congratulating H. for having the most complete concept map of the entire class; I think she managed to synthesize all the information from this first theme on her super map. I particularly liked the way she not only indicated the concepts but explained them, which makes the map a great study resource.

The only negative aspect I can point out is its size, which, despite being one of the elements that enrich the map, also makes it difficult to see. Any of the sub-themes that Helena presented (antechamber, processes, foundations, artificial memory) could be the main theme of a concept map, with a more direct and less confusing reading. Still, I kept the map in my course folder as a reference, so clearly, the dimension does not impede the consultation.
Best,

Good morning H. and colleagues
Not wanting to seem like an imitation, I echo the words of my colleague S., your map, in my view, is the most complete of the maps presented. My first reaction when looking at your map was of some dislike with its complexity and size, but when I started reading it, I ended up thinking that it could only be like that, the contents and procedures to be addressed are many, but you managed to systematize, the processes inherent to information management in a very fluid way. This map, by the way, synthesizes and explains each step, allows, as Sara says, the creation of "sub-maps" that can explain, separately, each of the different parts.
I wanted to congratulate you and ask permission to save this map in my files.
Thanks for sharing,

Good evening A. and S.,
Thanks for your comments. Yes, I also realized later that I had created four sub-maps that would work in isolation. I also realized that the map would be difficult to consult after turning it into a pdf. I even tried submitting it as an image because it would make browsing easier, but (strangely....) it was too heavy. As I made the map, I noticed the connections between the concepts. I still inserted some arrows, but I didn't insert them anymore because I thought it made the reading more complex. [Answer of the author of the map]

4. Discussion

Conceptual maps emerge as a technique that can be successfully applied to the disciplinary sphere in the information sciences improving motivation and engagement. It was found that the students perfectly matched the objectives of the proposed task. It is also verified that with concept maps, students become aware of their cognitive process since coding is one of the components of the learning strategies underlying this technique. In this case, it was intended to help students to learn significantly and explicitly, the nature and role of concepts and the relationships between concepts, as they exist either in their mental representation or as they theoretically understand them. Therefore, the representation of concepts and ideas and their cognitive representation were taken into account. Finally, the process of drawing up the maps, making them, and evaluating them by peers constituted a good participatory exercise, as mechanisms for the relationship between the task and learning were stimulated through the relationship between the learning of concepts and their explanation, and evaluation (Ontoria et al., 1994).

As a teacher, it was with great enthusiasm that I witnessed this task, carried out with great merit by all students, not only in the main aspect of reading, interpreting, and explaining the concepts, but above all in the interactions derived therefrom. The strategies used resulted positively, as the evaluation moment was used to give positive reinforcement feedback to the students. In this context, the strengths and weaknesses of the submitted works were highlighted, which are mainly based on the intersections of the subjects with the students' real-life experiences. This allowed for the personalization of learning and better memorization, but also the practical application of what is intended for them to know.

Resulting from the thematic forum activity, feedback from peers was requested as part of the exercise and this resulted very positively, generating more critical interactions between students. It was then a matter of creating a social presence, converted into an authentic learning community, which promoted the learning

experience (Garrison, Anderson, & Archer, 2015). Thus, cognitive presence, in which students can appreciate the work of their colleagues and at the same time assert their identity, is a strategy to be repeated.

Opportunities for feedback can be created at all times (Anderson, 2004) during learning in a virtual environment, reinforcing and underlining the main topics, but also checking to understand and valuing the ability to reason and think about new situations (in training moments), although the most critical moment to give this feedback, in a very personalized way, is the summative assessment (Nicol & MacFarlane-Dick, 2006).

In the case under analysis, it was found that the process of drawing up concept maps favored the organization of ideas and the emergence of relationships that were not initially evident, since the meanings are, to a large extent, personal, and the schematic representation of the map stimulates creativity in the new relationships that are established, allowing new levels of integration. In line with previous studies (Ruiz-Moreno et al., 2007), it became evident that the possibilities of schematization reside in the organization of the set of contents studied; also, most important conceptual aspects worked as a guide for new interconnections to emerge. At the same time, this work provided evidence regarding the involvement of students with the discipline, based on the meanings established between the concepts and the interaction between peers.

5. Conclusions

Using concept maps as an active learning strategy seems to make the learning experience more meaningful for the learner. In the collected testimonies, there was general satisfaction with the task of elaborating the maps and the resulting learning of concepts. As elicited in a previous study (Silva et al., 2019), also here, with this strategy, it was possible to relate knowledge and consolidate learning, improve problem-solving skills, facilitate the understanding of the indicated bibliography, benefit the individual and cooperative construction of knowledge, develop metacognitive processes and facilitate the study and general review of matters.

All maps, each in its style, had their merits, more than weaknesses, and showed above all that knowledge was consolidated in this introduction to the concepts of the Curricular Unit. The attentive observations, constructive and accurate comments, and encouragement to colleagues did not go unnoticed. I think we achieved a very interesting exercise with the committed participation of students. The main objectives are fulfilled. It is concluded that students are very receptive to using interactive methods in the question-answer strategy and other active learning strategies, as online peer interaction and feedback enhances participation. These interactive methods allow you to create a friendlier and more relaxed environment, in which students are not uncomfortable with making mistakes.

Studies like this, although specific, demonstrate how active methods are essential in distance learning. Concept maps, particularly, as a pedagogical strategy, prove to have merit in the teaching of library and information sciences.

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