DE GRUYTER OPEN

DOI 10.1515/ptse-2016-0010 PTSE 11 (2): 71-82

The Use of Concept Maps in Creating a Short Video with Students

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Received: 31.03.2016; Accepted: 16.05.2016

Abstract: *This paper presents the results of an experimental project in which media students created a short video. The students in groups of 4 or 5 used concept maps for collected their ideas about organizing the project. The analysis of the concept maps revealed that two groups were product-oriented, one group was workflow-oriented, and two groups used concepts that belonged to both categories. The contents of the concept maps also reflected students' prior knowledge and skills related to the task. In a joint discussion of the concept maps, students created a to-do list for shooting the video, which was an important activity to build common knowledge. This project confirms that the use of concept maps is a useful tool for developing students' professional skills.*

Keywords: concept map, project, video, students

The Use of Concept Maps for Creating a Short Video with Students

Diagrammic representation of ideas is a well-known method in teaching. Application of this method uses concepts, topics, elements, which are placed around a central concept, and form a tree-like structure (Molnár & Kárpáti, 2009). They have three main variations: mind mapping, concept mapping, and argument mapping (Davies, 2011). Despite the similarities, there are clear differences between them. Mind mapping is less formal, focuses on associations of any ideas, and may include images and colours. The aim of concept mapping is different: it focuses on relations between ideas, including super-ordinate and subordinate parts, and is usually more

formal and structured than a mind map. When creating concept maps, students are also expected to explore propositional relationships (Maas & Leauby, 2005; Jin & Wong, 2010) and can better understand cause-effect relations and judge the importance of the elements from the perspective of the whole (Molnár & Kárpáti, 2009). Thirdly, the aim of an argument map is to display the inferential structure of arguments, i.e. joining propositions, supporting claims and objections together.

Uses of mind maps and concept maps

Mind maps and concept maps can support learning processes in a variety of ways. Jármai (2008) states that concept maps can be integrated into different stages of the learning process and can develop several types of skills. She provides a number of examples in which a concept map can be used in a way it makes the lesson more interesting, and encourages students' activity and creativity. Such examples include:

- ✓collecting words
- ✓elaborating on a topic
- ✓summarizing a topic or a text
- ✓a better understanding of the content of a text
- ✓to organize a topic or a text from different points of view
- ✓collecting ideas for an activity (writing, presentation)
- ✓repeating or memorizing words or a topic
- ✓to present a topic orally or in writing on a conference or a meeting
- ✓to make notes (of a read or heard text).

Another list representing possible applications is provided by Molnár & Kárpáti (2009):

- o creating new knowledge
- o preserving institutional knowledge
- o modelling knowledge in a collaborative way
- o creating a commonly shared vision and knowledge of a team or an organization
- o instructional design: a starting conceptual framework for further information and knowledge
- o promoting meaningful learning
- o transferring complex knowledge.

Similarly, there is a broad range of advantages that mind maps and concept maps can provide in an educational situation. Mind maps are extremely effective tools for learning, as they offer opportunities for association, spatial stimulus, grouping, and creating a whole. Thus, they open perspectives for a better exploitation of the brain and can be used in any field where learning and clear thinking is required Gyarmathy (2001). Óhidy (2005) states that mind maps facilitate the collection of creative ideas and associations related to a topic, i.e. brainstorming, and secondly, they help students organize knowledge by a visual representation of logical links and relationships. In a project, Béres (2014) used mind maps in the development of students' critical thinking skills. On discussing equal opportunities, mind maps were used for making their thoughts

transparent and systematic as well as recalling their prior knowledge on the topic. Dancsó (2007) also states that creating a concept map helps students organize information and therefore facilitates an easier learning process. Jármai (2008) adds that all of the students can be activized because they can work in groups or pairs and all of them can feel the joy of creation and thus can have positive emotions. Or, it can be an useful tool for the development of students' problem solving skills in engineering design (Dixon & Lammi, 2014) or even for testing their knowledge (Tsai, Lin & Yuan, 2001).

Concept maps and mind maps can be used for teaching virtually anything at any level. Nemoda (2008) presents a teaching technique that use a concept map for teaching the concept of the verb in a Hungarian class. Makk (2010) reports on the use of mind maps on History classes in discussing events and processes in history. Bíróné (2005) assessed students' understanding of the concept of culture. She found that those students who had been familiar with concept mapping demonstrated a more systematic way of thinking about culture than the others. She concluded that concept maps, especially those related to culture, are worth using in language teaching.

A literature review by Trentinné Benkő (2013) suggests that concept maps can be used in a variety of fields in teacher education as well, for example, for assessing students' and their mentors' beliefs about education, students' development, researching the process of becoming a teacher. She also used this method for assessing students' beliefs about a bilingual teacher's competences. The development of concepts in students can also be traced by concept mapping. Fűzné Kószó (2013) reports on a research in which the development of the concept of 'environmental education' was assessed. She found that a one-year training considerably developed students' knowledge on the topic, however, there was a relatively low amount of connections between the concepts indicating students' poor ability of thinking in structures.

The mind mapping method

Application of the mind mapping and concept mapping requires a thorough preparation of the students, as most of the examples in the literature highlight. Novak & Cañas (2008) defined several aspects that need to be considered. As they suggest, for achieving a meaningful learning, rather than rote learning, three conditions need to be met when concept maps are used. First, the material itself must be conceptually clear and presented in a language that is relatable to the learner's prior knowledge. Second, the learner needs to have a prior knowledge, and third, the learner must choose to learn meaningfully, i.e. he or she should be motivated to attempt to incorporate new meanings into the existing knowledge. This is achieved indirectly by the teacher.

The method itself also may need some explanation and practice. One possibility is that at the beginning of the class when it is applied, students receive a short training. Jin and Wong (2010) reported on a 15-minutes long explanation in three Grade 8 groups before the application of concept map, and an extended preparation took 50 minutes, including the

demonstration of good and poor quality concept maps as well. Another possibility is that drawing a concept map with concepts familiar to the students is a homework assignment so that they can understand easier and practice the idea of this way of learning (Maas & Leauby, 2005).

The process of drawing a mind map or a concept map consists of several steps. Óhidy (2005) outlines a three-step method for the application of mind maps. In Step 1, students in groups or 3 or 4 create their own mind maps, using concepts and ideas previously collected. In Step 2, each group present their mind map to the whole group. Finally, one mind map is created of the smaller groups' mind maps which is visible to the whole group until the end of the session. Another approach suggests different methods focussing more on details. Szivák (2010) outlines the four main steps and aspects of the mind mapping method. First, the students (or anybody else who create the graph) are asked to write every possible concept around a central concept that occur to them, and link those concepts to the central concept with a line. Second, relations such as part and whole or subordinate and superior are also displayed by the graph. Third, those conducting such a research project record comments on tape or in a written form. And finally, fourth, the mind maps are analysed in terms of the complexity of the concepts. If several mind maps are created, similarities can be examined and there are other perspectives for analysis as well. Details for the qualitative and quantitative analysis of mind maps were provided by Fűzné Kószó (2013). Such aspects include the identification of the number of concepts, identification of key concepts (those concepts directly connected to the central concept), identification of concepts connected to the key concepts, identification of the number and arrangement of the levels.

Students' satisfaction with this method was also researched and positive experiences have been reported. D'Antonioni and Pinto Zipp (2006) found that 10 physical therapy students of 14 found mind mapping useful in organizing or integrating their course material.

Although mind maps and concept maps are usually drawn on paper, a mention must be made of the fact that there is an increasing interest in using the computerized versions of this method, among other digital educational technologies (Molnár & Horváth Cz, 2010; Molnár, 2013). The many examples of such applications include extending students' English vocabulary (Al-Jarf, 2015) or even using it for designing a project (Bystrova & Larinova, 2015). The present paper is, however, limited to using this method in the traditional way.

Objectives

It has been shown that graphical representation of a wide range of objects or concepts has a great potential in teaching. This paper presents an experimental project in which students used concept maps to collect ideas for creating a video. The general aim of the project was the development of student competences in organizing a project, but the aim of the present paper is limited to demonstrating and analysing the different approaches students used for drawing the concept maps. For the students, the objective of the project was the creation of a short video about the naming

ceremony of a newly built research institute in Pécs, Hungary. The ceremony took place in October, 2012, when the new research building in Pécs was named after Professor János Szentágothai, the late professor of the University of Pécs.

Method

Participants

21 first-year media students of the University of Pécs, Pollack Mihály Faculty of Engineering and Information Sciences (Hungary) were involved in the project. The students had already had some training in newsmaking, so they had some prior knowledge necessary for the successful implementation of the method. A few of them were more experienced than the others. However, only two of the students were familiar with concept maps or mind maps. In groups of 4 or 5, the students used concept mapping for collecting their ideas for organizing the project. Altogether, 5 groups were formed and they worked parallel. The project was led by a full-time senior lecturer of education, who had received training in video making.

Procedure

Before the implementation of the project, a preparatory session was held, which covered three topics. First, the goal of the project was identified, i. e. creating a news-like video material about the naming ceremony of the research institute. Second, since the majority of the students were not familiar with mind maps or concept maps, the project leader explained the use of such maps by demonstrating examples. Third, the sequence of the activities was also discussed as follows:

- drawing concept maps in groups of 4 or 5
- each smaller group presents their concept maps to the whole group
- creation of a to-do list using the presented concept maps
- creation of the video
- evaluation of the project and the video.

The drawing phase was implemented following the steps mentioned above (Szivák, 2010). The students collected the concepts they thought relevant to the central topic, i.e. news about the Szentágothai Research Centre. Students were encouraged to write down anything that they think may be relevant to the central topic. Due to the parallel work of the groups, there was no possibility to record the oral remarks and comments so crucial information may be missing, as in Fűzné Kószó (2013). During the drawing phase, the project leader only helped students clarify the task, and provided no hints about the contents or the structure of the concept maps to be drawn. The concept maps are included in Annex 1.

After the concept maps were created, each group presented their own work to the whole group, followed by a discussion, which resulted in a to-

do list. The video was created following the listed steps. Since there was no possibility for all of the students to take part in the actual recording, three students from three different groups volunteered to create the video, with the participation of the project leader. Finally, the project was evaluated in another session, which is out of the scope of the present paper. The video is available at https://youtu.be/Gw6zDzQTg4s [05.03.2016]

Results

Based on a study by Fűzné Kószó (2013), for this analysis, 'nodes', 'levels' and 'concepts' are defined. Concepts are elements of the concept map which are connected to a node or the central concept, but lead to no other nodes or concepts. This means that concepts in this definition are the end-points of the concept map. Nodes are intermediate elements of the concept map, i.e. they are connected to the central concept or another node and lead to a concept or to another node. And finally, level refers to the steps taken from the central concept to get to a node or a concept. If a concept is directly connected to the central concept, it is a Level 1 concept. If there is first a node and then a concept, then we have a Level 1 node and a Level 2 concept. In some cases, concepts were linked, but they were treated as concepts and not nodes when such connections did not provide a higher level branch in the concept map.

Based on the numbers included in Table 1, the most complex concept map, including 9 nodes, was created by Group 4. The simplest solution was provided by Group 2, with 7 concepts and two Level 1 nodes. Although Group 4 had less concepts than Group 3 and 5, their concept map was more complex, as the level and the number of the nodes suggests.

Table 1. A quantitative analysis of the concept maps. Numbers in cells represent the quantities of nodes and concepts

	Level 1 nodes	Level 2 nodes	Level 3 nodes	Level 1 concepts	Level 2 concepts	Level 3 concepts	Level 4 concepts	nodes	concepts
Group 1	4	0	0	0	9	0	0	4	9
Group 2	2	0	0	5	2	0	0	2	7
Group 3	6	1	0	1	12	2	0	7	14
Group 4	2	4	2	1	0	10	2	9	12
Group 5	5	1	0	1	11	1	0	6	13

For an analysis of the contents of the concept maps, categories were defined. After studying all nodes and concepts, the definition of two larger

categories seemed reasonable. One category of the concepts were related to the workflow of the production, i.e. getting equipment, identification of staff, post-production etc., while the other was linked to the final product as an object, i.e. what it includes, what it tells about the building etc. In some cases, there was a dilemma with categorizing the concepts. If the word "interview" appeared, it was considered as part of the video, however, if it occurred in the context of preparation, it was categorized as part of the workflow. Table 2 demonstrates what nodes each group used for drawing the concept maps.

Table 2. Categorization of nodes

	Workflow		Product	
	nr. of nodes	nodes	rnr. of nodes	nodes
Group 1	1	post-production	3	● interviews ● presentation of the building ● opening ceremony
Group 2	0		3	● why this name is given ● where it is located ● its structure
Group 3	0		7	● who designed it ● where it is located ● who it is named after ● why it was created ● what advantages it has ● its structure ● interior
Group 4	4	● items needed for production ● picture ● sound ● camera	3	● cutaway pictures ● inside ● outside
Group 5	6	● crew ● studying the location ● definition of the theme ● shooting ● post-production ● interviews	0	

In a similar manner, the concepts, i.e. end-point elements of the concept map can be categorized. Since concepts were grouped by nodes, the relevant nodes are also indicated in parentheses (Table 3).

Table 3. Categorization of concepts. Nodes in parentheses

	Workflow		Product	
Group 1	2	● editing ● narration	7	● (interviews): students, architects, leaders, guests, ● (the building): finction, showing around ● (opening ceremony): special guests
Group 2	0		8	● how it was financed ● why it was built ● who designed it ● what they deal with in the institute ● (where it is located): why it was built there ● (why it is named so): who was Szentágothai ● (its structure): capacity, features
Group 3	0		15	● (who designed it): when, why ● (where is it located): why there ● (name): why it is named after Sz., who was he ● (why it was created): vision, supporters ● (benefits): education, people, state, ● (structure): outside, features ● (inside): rooms, capacity ● technical equipment
Group 4	6	● (pictures): cameraman, lighting technician, reflectors/lamps ● (camera): tape ● (sound): reporter, microphone	7	● interviews ● (internal pictures): visitors, interiors, ceremony, technologies ● (outside). people getting together ● (building): environment
Group 5	13	● (crew for shooting): sound engineer, cameraman, reporter, assistant ● (knowing the location): place, environment ● (shooting): editing ● lighting ● (post-production): editing, montage, improvement of pictures ● (interviews): choosing subjects, preparation of interviewer	0	

The to-do list and the implementation of the project

Since the main focus of the present article is only the analysis of the concept maps, the further steps of the project are discussed only in brief. As per the schedule of the project, after each group presented their concept maps, the next step was the creation of a to-do list. The list included the following items, indicating primarily which groups contributed to the specific item of the list.

- Preparation tasks:
  - assigning people: cameraman, reporter, editor, speaker
    - Groups 4, 5
  - getting equipment: camera, microphone, lamps, tape for the camera, tripod
    - Groups 1, 4, 5,
  - finding available information about the location and the event
    - Groups 2, 5

- Production tasks:
  - shooting: the building, inside, outside, wide-angles, close-ups, participants, groups of people, special moments of the event
    - Groups 1, 3, 4
  - interviews with special guests
    - Groups 1, 4, 5,

- Post-production tasks:
  - writing and recording voiceovers
    - Group 1
  - editing, finishing
    - Groups 1, 5

As can be seen from the list, there are some extra items that were not mentioned in the concept maps. This is because the to-do list is a result of a discussion in the whole group, which revealed some more details.

After the to-do list was prepared, three students volunteered to shoot the footage and finish the video, which the group discussed in another session and also evaluating the project.

Discussion

The concept maps created by the groups demonstrate significant differences, reflecting different approaches to the task. Group 2 and Group 3 were clearly product-oriented. Their concepts present the information content of the video to be presented to the viewers. This can be interpreted as an early stage of professional development: the emphasis is not on what they, as professionals, will have to do to achieve their goals, but is on what the viewers will see. This is not to say though that such ideas are not necessary for a project like this. For the preparation of an editor or an interviewer for such a task, they are crucial. Of the two concept maps, the

one created by Group 3 was more complex and elaborate, providing more different types of details on the topic itself, but again, their concept map included mainly references to facts to be presented by the video. Group 5 provided a concept map from a very different point of view. All of their concepts were related to the workflow, indicating a more mature approach to the professional's role. Group 1 and Group 4 created mixed concept maps: including concepts related to both the workflow and the product. Of the two, Group 2 provided a more complex and elaborate approach in drawing their concept map.

Conclusion

Concerning final conclusions, there are several aspects that need to be mentioned. First, the main result of the present study is that a comparison of concept maps revealed different approaches to the problem that students used in the project. The differences do not only reflect different thinking strategies, but also highlight their prior knowledge about the profession, in a way similar to what is mentioned by Béres (2014). So, this project confirmed that mind mapping can be used for assessing students' knowledge and skills relevant to the main task. Possessing such information may help the teacher plan his/her further teaching activities. Second, collecting ideas for a larger project did have a contribution to exploring understanding part and whole type relations in the given profession. Third, discussion within and between the groups provided an opportunity to learn from each other and was also an opportunity to synthesize different ideas and experiences to achieve the final goal. Thus, students explored and built common knowledge related to creating a video. The final to-do list shows that each of the groups had an important contribution to the final to-do list, so, all of the students had a chance to experience success and responsibility for the joint project. As a general conclusion, this project another proof that the application of concept maps in teaching is beneficial in many ways.

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