

USING FREEMIND SOFTWARE TO TEACH PATHOLOGY TO MEDICAL STUDENTS

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ABSTRACT

The use of new pedagogical methods seems necessary in medical learning especially in fundamental specialities like pathology. This research aimed to assess the utility of using mapping techniques in the training of medical students in a pathology laboratory. We conducted a study about 20 students that were trained in our department over a period of sixteen months. The students were surveyed using a questionnaire about the feasibility and the accessibility of this method. As well, we compared the results of this subset of students, who were tutored using concept maps, with a second subset of 20 students who learnt without concept maps, using the same tests. The results showed that a total of nineteen students considered the method of concept mapping useful and worth being applied in other medical specialities. As well, the results of the students tutored with concept maps were statistically significantly better than those of the students that were not tutored with this technique. It is concluded that despite the small number of students in the study sample, the utility of using the mapping techniques in order to contextualize a challenging speciality like pathology was identifiable. On the other hand, we noticed that the success of such a method is also dependent on the motivation of the students and the availability of the tutor.

Keywords: Concept maps; Educational semiotics; Medical learning; Pathology training; Tutoring techniques

INTRODUCTION

Even if classical methods of learning have been useful in scientific medical teaching, new changes in the curricula have created the necessity to use new methods that improve the reflexive attitude, since it plays a key role in the learning process (Zier, Wyatt & Muller, 2013; Irby, Cook & Brown, 2010). Teaching pathology may seem too theoretical and challenging for medical students but this knowledge plays a key role in the understanding of the different diseases. Inculcating the students in this knowledge is a necessity. Involvement of students in their learning in this regard is central to the socio-constructivist approach. According to this approach, students are the main actors of their own learning and their development of concept maps illustrates the building of new memory-operating packages (MOPs) that they can use when facing similar situations in practice. Thus, this research aimed to evaluate the acceptability and the efficacy of the use of concept maps in the specialist area of pathology in one author's department of pathology.

DESIGN AND METHODOLOGY

Since 2013, the pathology department had received uppermost of 14 third-year students every year for their medical training. The training period was intended to be 2 to 3 weeks' duration according to the university's recommendations. Training targets are indicated in their university portfolio. These targets were implemented by the university pathologists and validated by the pedagogical committee of the University. They are divided into objectives related to technical skills, resolution of problems and ethical attitudes. During the training period, the tutor validates achievement of the different objectives for each individual student. Some objectives are related to common pathologies that include lung cancer, pulmonary and lymph node tuberculosis, colorectal cancer, breast cancer, uterus cancer, hydatidosis, sarcomas and Hodgkin lymphoma. Other objectives are related to the various technical procedures in a pathology laboratory.

Sample selection

The sample for this study involved two cohorts of 20 students each in the third year of medical studies that pursued their training during the period from January 2015 to April 2016. The students' assignment to the researchers' department was managed by the University of Medicine of Tunis, based on their ranking and scores.

Planning of the activities in the department

A diary about the daily activities of the students was available in their e-portfolios from the first day of their arrival. It contained their planning activities in the department and the different learning activities.

Scope of practicum

As trainees, the students were dispatched to one of the following six sectors: reception room, gross examination room, inclusion and special stain room, cut room, unit of cytology and bronchoalveolar lavage, and the room of immunohistochemistry.

Learning activities

The following four different methods of learning were available in the department:

1. Clinical reflection performed approximately once a week.
2. Resolution of problems.
3. Review of the literature about a consensual subject chosen by the tutor and the students according to the objectives of their training.
4. Lesson of critical analysis of a scientific article chosen during the review of the literature, which was studied in English.

During their training, students' learning experience was followed and recorded in an e-portfolio that was presented on the first day and explained to them by the tutor (Mlika, Ben Hassin, Braham & Mrabet, 2015).

Use of the concept map

The use of concept maps enables students to construct MOPs that they can use when they face similar situations in practice. These MOPs enable them to make links between

different the concepts and ideas being taught. The researchers aimed to assess the feasibility and utility of using such concept maps in pathology learning.

A free concept map was used four times during the training period when the students were learning about how to resolve a problem about lung cancer, colorectal cancer, Hodgkin lymphoma, general techniques, special techniques and special stain and/or extemporaneous exam. All these subjects were explained in detail in an e-portfolio that the researchers, in their capacity as tutors, created for students to access from the start of the practicum. Thus, the keyword and the address of the e-portfolio were delivered to the students on the first day of different sections, including introduction and presentation of the portfolio, objectives of training, practicum curriculum plan clarifying the scope of the students', who were interns, learning experiences and program, the presentations, the items to be completed by the students, the learning in relation to clinical reflection, the resolution of health problems, review of the literature and the chosen articles, and the students' self-assessment tasks.

The students were required to complete their concept maps according to Novak (1990; 1991; 1993) and Novak and Cañas (2006) recommendations. In fact, the study topic was placed in a box or bubble at the top of a page. Related concepts were then placed below the study topic ranking them from most general, which were positioned closer to the top of the page, to those most specific positioned toward the bottom of the page. Linking lines with linking phrases were used to connect the concepts to the study topic and also to one another. This technique results in a graphical representation of knowledge, which both defines concepts related to the study topic and demonstrates the relationships between concepts through the use of linking words (Novak & Cañas, 2006). This was achieved through the uploading of the free version of FreeMind (2015) software. All the students during the training period accessed this software and used it to develop concept maps. An example of a concept map performed by the students is illustrated in Figure 1.

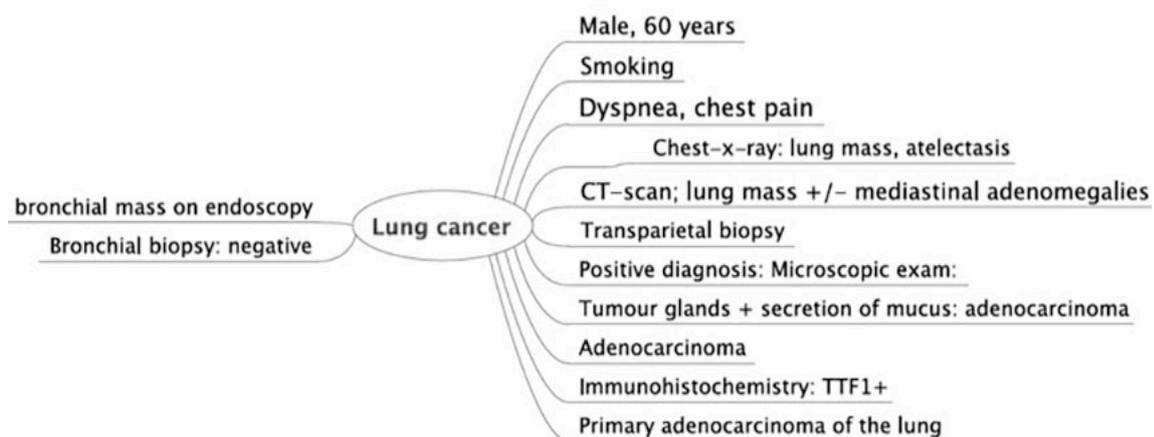


Figure 1: Application of FreeMind concept mapping software to pathology learning

On the last day of the training, the students were required to present a power point presentation with an audience composed of different doctors of the department, the chief of the department, the tutor and technicians. This was quite demanding for the students although their learning was well supported through the e-portfolio and practical requirements and the demands of the concept mapping.

Data collection and analysis

A questionnaire containing seven yes/no questions concerning the concept map activity was completed by all the students. These questions reflected the students' satisfaction results (see Table 1). In addition, the knowledge achievement of the students that used the concept maps was compared to that of the sample who did not use them based on the common course assessment, which comprised a multiple-choice questionnaire related to the training objectives.

RESULTS

Knowledge achievement test

The mean results of the tests of the students who were supervised without concept maps in 2015 (M=50) were compared with the mean results of the 2016 student cohort (M= 75) who were tutored using concept mapping through the application of the parametric t-test for independent samples (two-tailed), where alpha levels were set at 0.05. As shown in Table 1, significant statistical results were found showing that the students who learnt from the concept mapping pedagogy were statistically significantly more successful on the course assessment test than those who had learnt without the demands of concept mapping ($p < 0.001$).

Table 1: Pathology course module test results: Students not using concept mapping to learn versus students using concept mapping

Year	N	Mean	Median	Concept Map	Test type
2015	20	50.01	53	Not used	MCQ and fill in the missing word
2016	20	75.02	79	Used	

Students' satisfaction with their 'concept mapping' as a pedagogy

The results of the analysis of the students' views of the use of concept maps in their learning in pathology are shown in Table 2. The questionnaire was completed anonymously by the students on the last day of training.

Table 2: Satisfaction questionnaire results: Students' views on their 'concept mapping' learning experiences

Questions	Yes	No
Do you find the concept mind card session useful?	20	0
Should we continue the activity in the future?	20	0
Did it help you to work with the other students?	19	1
Did it highlight important concepts of the work?	18	2
Did it give you a good summary from which to study?	17	3
Did it help you to understand the work better?	16	4
Did you generate concept mind map before?	0	20

All the students answered the questionnaire, which was administered in French, the language of instruction. It was shown that from this 2016 cohort, all but one of students' ratings showed that they found the concept mapping useful; and all the students advised that the use of concept mapping as a pedagogical strategy be continued in the future. In addition, 19 of these students found that the different sessions helped them to work together. These results also show that the students had not previously used concept mapping and the majority

viewed it as ‘highlighting important concepts’, providing a ‘good summary from which to study’ and ‘help . . . to understand the work better’.

DISCUSSION

Our experience is quite recent and short and involves few students but it highlights the potential of the concept maps to improve the students’ results. These results are similar to those reported by Kotzé and Mole (2015). In fact, they reported an improvement of the students’ results when using mapping techniques. These authors tried the techniques in order to teach histology to medical students. In the present study, we used mapping techniques for problem solving. This technique can also be used in note taking, teaching, learning, assessment, curriculum design, and development (Buzan & Buzan, 1995; Dearmon, Lawson & Hall, 2011; Eppler, 2006; Jonassen et al., 1997; Hunter & Revell, 2012; Novak, 1990; Novak & Cañas, 2006; Pottier et al., 2010). The theory of concept maps was first conceived by Novak and is grounded in Ausubel’s assimilation theory of learning (Ausubel, 1960; Ausubel & Fitzgerald, 1962; Novak & Cañas, 2006). Learning is defined as a qualitative transfer that takes place from a state of ‘not-knowing-how’ to the state of ‘knowing-how’ (Pikkarainen, 2011). The use of concept maps represents a ‘big bang’ in the pedagogical sphere, in that, it illustrates the social constructivist approach. This approach advocates the fact that the student is the actor of his learning and that concept mapping illustrates the different MOPs that are constructed by the students and which they can use when facing similar situation during their work and careers.

The process of constructing a concept map helps to achieve the contextualization and decontextualization of knowledge. In addition, it helps to create and reinforce MOPs in the assimilation of new knowledge (Fang, 2011; Jonassen, Reeves, Hong, Harvey & Peters, 1997). Although we used concept maps, the mapping techniques also included mind maps. The latter are essentially a study technique in which information from a variety of sources is summarized in a centered radial diagram representing the important key words associated with a study topic (Buzan & Buzan, 1995). The former, which is the technique used by our students in Figure 1 above, represents different concepts that are connected and the student tries to explain the different concepts and connections. The encouragement of the students to reach mindfulness was also emphasized in this study, which included the need to work together rather than in adhering to the rule of mapping techniques per se. This active participation is also encouraged by many others (see Eppler, 2006; Davies, 2011; Fang, 2011; Schmidt, 2004). The advantages of using mapping techniques in educational contexts is also well established (Farrand, Hussain & Hennessy, 2002; Wheeler & Collins, 2003; Wickramasinghe, Widanapathirana, Kuruppu, Liyanage & Karunathilake, 2007; D’Antoni, Zipp, Olson & Cahill, 2010; Qadir, Zehra & Khan, 2011). Moreover, Tochon (2013) and O’Neill (2016) link this to the importance of semiotics in education and their use as a vehicle for deepening students’ learning. Importantly, this activity moved students away from the passive-learning to an active approach. The major disadvantage was that the motivation of the students relied on their relationship with the tutor and also their personal motivations. In fact, a regular face-to-face meeting between tutors and students was found to be necessary in order to maintain their motivation but this was very time-consuming (Schön, 1983). Thus, the motivation, the training and the availability of the tutor were found to be mandatory to creating a successful learning experience. While the researchers note the major limitations of the study in the small sample of students enrolled, the research does represent a first-step in a longer process and provides a basis upon which to build in the future.

CONCLUDING

The use of mapping techniques seems useful in the training of medical students and particularly in relation to studies related to the work involved in pathology laboratories. These techniques help to contextualize such knowledge, which seems generally challenging to students. The contextualization of this knowledge through concept mapping improved the students' summative assessment results. On the other hand, the efficacy of such a technique seems dependent on the motivation of the students and the availability/participation of the tutor. Nevertheless, the research also allowed the following practice points to be formulated, which are valuable for others wishing to introduce concept mapping in the same way in their practicum or other courses:

- Using mapping techniques is useful in the learning of fundamental specialities like pathology.
- Mapping techniques help the contextualization and decontextualization of medical learning.
- The success of mapping techniques depends on the motivation of the students and the availability of the tutor to deeply engage with the students.
- A regular face-to-face meeting between the tutor and the students is necessary to maintain the motivation of the students.
- Using mapping techniques during the training period encourages the students to work together and engage in deeper learning.

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Notes on contributors

Mona Mlika is the tutor of the students in the department of pathology. She supervised and surveyed them.

Mehdi Ben Khelil helped to conceive the questionnaire and the test.

Charfeddine Amri is interested in new methods of learning and trained Mona Mlika to use the mapping technique in her daily practice. Besides, he supervised the different sessions of mapping techniques held in the department.

Ali Mrabet performed the statistical analysis and helped to highlight the major limitations of this study.

Faouzi Mezni is the chief of the department and supervised the work, and helped to sustain the motivation of all collaborators.

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