

Concept Mapping as a Strategy to Enhance Learning and Engage Students in the Classroom

Charlene J. Erasmus
University of the Western Cape
Cape Town, South Africa

It has become increasingly important that students not only gain content knowledge, but also be exposed to strategies that foster development of problem solving, critical thinking, communication skills, and active learning. The focus of this study was to actively engage students with the concepts (knowledge, skills, and dispositions) related to the topic being learned during the contact time between the lecturer and the students through the use of concept maps. The purpose of this article is thus to explore the integration of concept mapping as a teaching strategy within a lecture.

Strategy to Enhance Student Engagement

The lecture method, which characterized my teaching style, cannot be effective on its own to stimulate thinking, to inspire interest in a subject, to teach behavioral skills, or to change attitudes (Newble & Cannon, 2002). Bligh (1972) indicates that the conventional lecture rewards passivity in students rather than active involvement, thus having a lesser chance of developing higher-level cognitive abilities. A weakness of the lecture method is that it allows students to be passive recipients of information (Hansen & Stephens, 2000), become dependent on the lecturer to tell them what they need to know and thus avoid taking responsibility for their own learning (Machemer & Crawford, 2007). According to O'Neill and McMahon (2005), students who value or have experienced more teacher-focused approaches, may reject the student-centered approach as frightening or indeed not within their remit.

Research suggests that, compared to the lecture method, methods that promote active learning increase student achievement (O'Sullivan & Copper, 2003; Christianson & Fisher, 1999), student participation and engagement of content (McClanahan & McClanahan, 2002), increased student satisfaction, better learning outcomes (Chilwant, 2012), and retention of concepts over time (Berry, 2008). As an interactive learning technique develops critical thinking, students are more likely to learn and retain information if they engage with it personally (Rao & DiCarlo, 2000; Saroyan & Snell, 1997).

Graphic organizers (GOs), an approach to teaching and learning, enables teachers and learners to present information in a graphic format (Alshatti, Watters & Kidman, 2011) that promotes visual representations of a person's structural knowledge or conceptual understanding of a particular topic (Novak & Gowin, 1984). Concept maps are graphical tools for organizing and representing knowledge (Novak & Cañas, 2008) and showing the relationship among terms (Vanides, Yin, Tomita, & Araceli Ruiz-Primo, 2005).

Concept mapping is the development of constructed and reconstructed knowledge represented graphically (Novak & Gowin, 1984). It facilitates active learning (Wilgis & McConnell, 2008), encourages student-discovery while learning (Caputi & Blach, 2008), and reflects students' experiences, beliefs and biases in addition to an understanding of a topic (Halford, 1993). Through the process of creating a map, related concepts are linked in a meaningful way that serves as a tool for assessing depth and breadth comprehension and knowledge and for reviewing of previously covered material (Croasdell, Freeman, & Urbaczewski, 2003; Heinze-Fry & Novak, 1990). According to Kinchin, Cabot & Hay (2008)

an important function of the map is to help make explicit complex topics where students may display a fragmentary understanding and are unable to integrate all the components to form a meaningful overview or conceptual framework. Identifying these fragments of understanding, termed ‘anchoring conceptions’ by Clement, Zietsman and Brown (1989), is vital as these form the foundations for future meaningful learning. In an interview with Cardellini (2004), Novak iterates this by stating that “meaningful learning requires integrating new knowledge with existing knowledge, and thus only meaningful learning can result in building more powerful knowledge structures and remediating misconceptions that may exist” (p.1305).

Additional benefits of concept maps include suitability to all learning styles and being an effective method to convey large amounts of information in a limited time (Burgess & Yaoyuneyong, 2010), improve students’ academic achievement, increase information recall and retention, and reduce cognitive overload (Gobert & Clement, 1999; Lee & Nelson, 2005). This is illustrated by Novak and Gowin’s (1984) statement that, “students and teachers constructing concept maps often remark that they recognize new relationships and hence new meanings or, at least, meanings they did not consciously hold before making the map” (p. 17).

Theoretical Framework

This research is based on the theory of constructivism where knowledge is not passively received but students become creators where they actively and creatively organize their experience to make sense of the world around them (Amundson, 2003; Brott, 2005). For meaningful learning to occur, students must actively engage with the to-be-learned subject-matter through such activities as discussion, hands-on activities, and problem solving (Hansen & Stephens, 2000). In the context of this study, individuals seek understanding of the world in which they live and work by the construction of conceptual structures through their engagement in self-directed tasks (Conole, Dyke, Oliver, & Seale, 2004).

The origin of concept maps stems from the constructivist theory where learning is characterized by the development of connections between new information and existing knowledge, leading to increasingly complex syntheses (Duffy & Jonnasen, 1992). Learners “construct their own understanding of concepts” (Trowbridge & Wandersee, 1994) by creating knowledge through a process of constructing and reconstructing the meaning of information acquired through their experiences (Novak, 1993). When encountering new material, learners determine, through evaluation and reflection, where and how it fits into their previous knowledge (Novak & Cañas, 2008). Through these cognitive structures, the development of more complex and multifaceted understandings that will, in turn, become an extended set of multi-conceptual systems upon which learners can build further learning (Novak, 1998).

The Teaching Event

Students are required to construct a concept map and through the use of visual representations students are able to categorize elements of information, analyze the relationships between the different elements presented, and critically evaluate those elements to discern the significance of all that is presented (Hipkins, Reid & Bull, 2010).

The teaching event (with third year Human Ecology students, in the subject of Housing) began with a discussion and demonstration of the process and strategy for drawing a concept map. An introductory lecture on the topic, *the process of acquiring a property* includes the financial and contractual responsibilities of home ownership. A demonstration of the concept map followed the lecture. The introductory lecture, accompanied by pre-class reading material, was followed by the showing of a video which provided good visual background information on the process of acquiring a property. Prior to viewing the video,

students were prepared for how they needed to listen and where to focus their attention. After the screening of the video, students were requested to draw a concept map covering the key concepts expressed during the video as well as the introductory lecture. Students worked in groups of two, choosing a partner of their choice, to assist with the construction of their concept map. They were able to assist one another, highlight the concepts they were struggling with as each student drew a concept map based on an understanding or view of the content. During the class, students were able to develop their concept maps with concepts and information acquired during the lecture as well as the reading material. This strategy was an attempt to encourage students to read, actively focus on and interact with the content, acquire knowledge and skills, and to make the student more aware of what they were doing and why they were doing it. The strategy focused also on transferring of skills (O'Neill & McMahon, 2005). During this lecture, students were provided with reading material that provided further information regarding the topic.

Students were required during a follow up lecture to expand their concept maps with the concepts and information acquired. The lecture consisted of a PowerPoint presentation and discussion, the pre-class reading material as well as further material handed out during the previous lecture. With new information added after the first and during the second lecture, students could see how their concept maps developed. At various intervals the lecturer provided the students with guidelines on how their concept maps should develop. This assisted students and ensured that they had the relevant information depicted on their maps. Mayer, (2004), Kirschner, Sweller, and Clark, (2006) indicated that for active methods to be effective, teachers must provide significant guidance and structure as students who are provided with minimal guidance do not obtain much learning. During the final session, students were given the opportunity to draw their concept maps on newsprint and present it to the class. The lecturer and students commented on each group's concept maps which led to interesting discussions. With this, we tried to clarify difficult or unclear concepts as well as ensure that the correct information was captured.

Evidence of Reflective Practice

Boud, Keogh, and Walker (1985) defined reflection as "a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to a new understanding and appreciation" (p. 19). Being a reflective professional requires you to take the time to consider your work, reflect on its objectives and evaluate its outcomes, learn from these experiences, and apply this newfound knowledge to future situations. Reflective practice is therefore "a revisiting of an event in order to understand it better" (Check & McEntee, 2003, p. xiii). Reflection was undertaken by the lecturer to determine whether the change in strategy had an improvement on student engagement.

Lecturer

I came to realize that my teaching style needs to change from a predominantly teacher-centered lecture approach, to approaches that engage students more actively. Through my lecture approach students have become complacent and disengaged as all the information is given through teaching media such as PowerPoint presentations. "If a teacher never questions the goals and the values that guide his/her work, the context in which he/she teaches, or never examines his/her assumptions, then it is our belief that this individual is not engaged in reflective teaching" (Zeicher & Liston, 1996, p.). Through reflection one reaches new found clarity, on which to base changes in action or dispositions.

At the beginning of the exercise, students were reluctant and hesitate to start. An interesting observation is that students have become so complacent and passive that they feel

annoyed if you ask them to do something. Hansen and Stephens (2000) indicated that one main weakness of the lecture method is that it allows students to be passive recipients of information that has been "pre-digested" by the lecturer. They thus become dependent on the lecturer to tell them what they need to know and can thus avoid taking responsibility for their own learning (Machemer & Crawford, 2007). I observed by some students an irritation with dealing with this new way of engaging in the classroom. Lecturers who expose students to a new method that will increase students' engagement and deepen their learning, are likely to be met with confusion by students who already believe they are getting these benefits from traditional lectures (Covill, 2011). Hansen and Stephens (2000), are furthermore of the opinion that students accustomed to being passive have a "low tolerance for challenge" (p. 46). According to active learning proponents, learning as a result of lectures is relatively superficial and transient (Phipps, Phipps, Kask, & Higgins, 2001; Moust, Van Berkel, & Schmidt, 2005).

When students had to start with the exercise they were hesitant and it took some encouragement from the lecturer to get them started. For active methods to be effective, lecturers must provide guidance and structure, as students left to their own explorations of a subject matter with minimal guidance from the lecturer, do not learn much (Mayer, 2004; Kirschner, Sweller & Clark, 2006). Students experienced difficulty at the beginning of the process extracting concepts from the content, and they could not consolidate information and struggled to make linkages. With appropriate guidance it became clearer to students what they were supposed to do. This in turn led to students becoming actively involved. When students were given the opportunity to draw their concept maps on newsprint, it was interesting to note how much more active and verbal they became. The classroom became lively with lots of discussion in groups and people who were normally quiet or passive began to engage with one another.

Distributing pre-reading material and activities, and communicating an understanding of what was expected assisted students understanding and willingness to partake in a new approach. The detail of the concept map suggested that students read or had done additional reading. This in turn enabled the lecturer to spend more time helping them explore the "hands on" techniques of new approaches, as well as critical reasoning and communication skills. Again, Novak indicated in an interview with Cardellini (2004) that any person can build good concept maps "with appropriate instruction, practice and constructive feedback" (p. 1305).

I observed that there were students who preferred the traditional lecture instead of the interactive methods used in class. I came to the conclusion that to be reflective about one's practice it is essential to step back from the immediacy of the situation and examine one's beliefs, attitudes, values, and behavior in a dispassionate manner (Jackson, 1990) and bring about necessary changes.

Reflection of Peers

Students divided themselves into groups and were given the topic for the concept map. Initially students struggled to start the concept map but were guided, individually and as the need arose, by the lecturer through questions that were posed to them. When students asked questions, the lecturer posed the questions to the class which allowed them to think about and engage with the content of the topic. The questions posed were thought provoking and the atmosphere in the class was engaging. During the session, the lecturer continuously gave students input to assist them in developing their maps.

At the beginning of the session students found it difficult to start drawing a concept map about the given topic. The longer students engaged with the topic the easier it became for them to draw the concept map. Probing of the topic through questions by the lecturer also

facilitated the ease at which students began drawing the concept maps. Working in groups of two allowed students to grapple with the difficult concepts together and this kept them motivated. Groups were able to work at their own pace and construct the concept maps according to how they understood the topic.

Reflection of Students

The best evidence of the power of a reflective activity is when the learning revealed can be seen to be beneficial to the personal growth of the student (Doel, 2009). Students were required to reflect on their experiences about concept maps. Here is what some of them had to say:

Write your opinion and feelings with regard to the changed approach in offering the lecture:

“I felt confused at first, but it helped us to engage with the content.”

“More interaction with classmates, engaging more with topic. I have learned more by getting information by doing research.”

“The interaction in class helps me to understand the work better. It is a good approach; it makes us engaged with the subject.”

On the question “What was your experience with regard to the video? Is it a good way of introducing a new topic/concept?” Students had the following to say:

“The video was a good way but for me it took time for me to understand it.”

“Interesting. Would have liked to have it played again. Reason: did not catch all the aspects and buying process in terms of home ownership.”

“Yes, the video provided new information.”

“Watching a video is interesting and makes class fun especially because it is not done a lot.”

“It was a different style, but a recap lecture would have been appreciated too.”

“Yes the video is good in engaging with the topic because we saw what the topic is about and not just words. Visuals also make things to be understandable because they are seen.”

An activity sheet was provided after the video was shown. Students were asked whether the activity sheet added more to their knowledge with regard to the topic which was covered with the video. The comments were as follow:

“Yes, it gave me more knowledge as I was stuck with the concept map.”

“Yes, it was a load of information, but provided more understanding. Yes, because I was then able to understand the work better.”

“It made me more confused, in terms of selecting the proper info from the many points given.”

Whether it was a useful exercise or not, the students expressed it this way:

“Indeed it is, because it helped us to engage more. It was in terms of getting to know and utilize concept maps; it also introduced us to another way of studying.”

“Yes, I learned new process to concept your ideas, to use in future.”

Not all students experienced the new approach the same way. Hansen and Stephens (2000) state that students accustomed to being passive have a "low tolerance for challenge" (p. 46).

"No need to do interactive activity every week. I prefer the normal lectures with PowerPoint presentations."

"Concept map was difficult at first to understand, but I got there."

"Concept maps were confusing, too many concepts to make the connection and selecting the relevant heading according to the topics."

I have noted that there are students who prefer the traditional lecture method instead of classroom practices that allow them to engage with the content. The students' reflections allow me to understand that many of them may resist, and are even hostile toward the lecturer's attempts to use active learning methods. Therefore, lecturers who want to use active learning methods must recognize that many students view the lecture method very positively in terms of engagement with the course and the quality of their learning. There are probably students who would see no advantage to switching to a method that forces them to be more independent and active (Covill, 2011).

This attempt at changing my teaching approach brought about a realization, that to enhance the traditional lecture method, I should use teaching strategies that engage students with the content while the lecture is taking place. With the introduction of a new classroom practice to students, I realized I have to give them an outline about the new content to be covered as well as a hand-out with step-by-step instructions about how to construct a concept map. This would have been a more useful resource which might have made the construction of a map easier.

Students' comments on the viewing of the video have indicated there are students who prefer a visual representation of content. It is also important, for those students who require more time, that I need to make provision for showing it a second time or place it on the eLearning management site where students can access it at a time convenient to them. Different teaching strategies need to be implemented as Simon (1999) indicated "If each child is unique, and each requires a specific pedagogical approach appropriate to him or her and to no other, the construction of an all-embracing pedagogy or general principles of teaching become an impossibility" (p.).

Conclusion

The aim of the change in my teaching style was to get the students to move from passively listening to being actively engaged with the lecture content and information. The exercise of constructing a concept map required students to pay attention to the video and lecture by forcing them to reflect interactively on the content of the lecture. In the way the objective of the lesson was achieved, to help students engage with the subject matter in an active way instead of only listening to a lecture or PowerPoint presentation. Students' responses to this method were different. Some students welcomed the concept mapping approach as it assisted in their learning. They perceived it as a tool to enhance the lecture and make it more meaningful for them. Even those who were resistant to the method were forced to think about the topic and respond to the content in a way that allowed greater discussion and interaction between peers and lecturer. Through this I hope another dimension/facet was added to their learning.

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About the Author

Charlene J. Erasmus is a lecturer in Human Ecology and Dietetics at the University of the Western Cape, Cape Town, South Africa.

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