

Using concept maps to improve the quality of learning law at a distance

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Abstract: Concept maps have been used in many disciplines (Kremer & Gains, 1996) to structure information and express relationships between them. Their holistic approach, with multiple pathways through the learning resource making relationships and linkages between topics and subtopics obvious, has contributed to a meaningful learning experience. This chapter outlines the formative evaluation of two hypermedia concept maps developed to enhance the quality of the learning experience in a first year undergraduate business law course. Two concept maps developed together with supporting multimedia resources were trialled on the learners. Feedback was also obtained from technical staff. The formative evaluation phase discussed in this chapter was designed to assess and control the quality of resources developed and to use as a basis for future materials development.

Key words: concept maps, learning experience, undergraduate business law, quality

1. USING CONCEPT MAPS TO TEACH

In considering quality within education, the focus has shifted from teaching to learning, and especially to the quality of the learning experience. In contrast to the earlier behaviourist view of teaching as transferring knowledge, cognitive scientists view learners as processors of information who employ different strategies to remember and use information (Weinstein & Macdonald, 1986).

Quality learning experiences should be engaging and provide learners with opportunities that assist them to organize, acquire and remember in order to utilize and build on that knowledge. Research has indicated that

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concept mapping is an example of such a strategy (Novak & Gowin, 1984, Novak, 1998). Graphic organizers that arrange key ideas or concepts in a hierarchical set of nodes with lines or arrows that indicate linkages and relationships between them have been found to be effective learning tools as they parallel human cognitive structure. Concept maps of this nature have a history of use in many disciplines – linguistics, artificial intelligence, management, education (Kremer & Gains, 1996) to structure information and express relationships between them. They were used in a business law course by the educational designer as a strategy to elicit the important relationships in the subject from the teaching academic and then provided to the students to assist them with the structuring of their knowledge.

This report is about the introduction of concept maps or graphic organizers to a web based first year tertiary unit that is taught internationally in order to improve the overall quality of the learning experience. In courses delivered internationally where the language of instruction is not the learners' first language, graphic organizers provide a quick and convenient overview far more efficiently than discursive text that is in a learners' second language. Also, providing these graphic organizers in an online environment allows for wider access by all learners including off-campus learners, depending, of course, on students having web access. These concept maps in hypermedia environments are also an effective navigational tool which provide a method of organizing and browsing through information (Carnot, Dunn & Canas, 2001). For all learners, off-campus and on campus, hypermedia concept maps make the course more navigable and simultaneously make the inter-relationships between concepts apparent in ways not otherwise readily perceived. In addition, Alpert and Grueneberg (2000) argue that human cognition is not limited to describing knowledge through a verbal text-based medium only and that sound and visual imagery also form a part of a person's knowledge and cognitive processing. Therefore, the concept maps were so designed to complement the textual information with auditory and visual support, again to enhance the quality of the learning experience and make it more memorable.

The architecture of any hypermedia system supports concept mapping. As explained by Gaines and Shaw (1995) diagrams can be made into hypermedia objects linking them to text and diagrams and from within these to other texts, diagrams and hypermedia objects, a feature that this project was desirous of exploiting. Providing the concept maps online also allows the possibility to respond faster to formative evaluation.

Though information represented through concept maps is easy for learners to understand, their development is iterative and time consuming. It is necessary that the quality of this iterative development is appropriately monitored through formative evaluation by stakeholders and experts if quality outcomes are to be achieved.

2. CONCEPT MAPS FOR A FIRST YEAR UNDERGRADUATE BUSINESS LAW SUBJECT

2.1 The background and rationale

It is mandatory that undergraduate business students at Monash University take a business law subject. Taught across several Monash campuses, including the overseas campus in Malaysia, this 13-week first-year subject uses a conventional lecture+tutorial mode, a textbook, supporting print materials and a basic site on the university's chosen learning management system, WebCT. It is also offered via flexible delivery to off-campus learners who make up a significant proportion of those enrolled (35% in semester 2 2002, of whom 58% are off-shore). The unit content covers legal requirements and consequences for choosing different business structures and also for the topics of contract and negligence.

Many students find this unit complex and the required reading tedious because learners enrolling in this unit are new to the rigours of tertiary study. They complete the unit *knowing* at least the key legal principles but the learning exercise achieves a far superior quality if learners *understand* the relationships between those principles. Understanding the links between legal concepts and topics is particularly important in business law as learners need to see and understand clearly all of the relationships and links between alternative and competing arguments before they go on to analyse and evaluate arguments and counter arguments.

In short, what had to be designed was an integrated and meaningful mode of learning (Novak & Gowin, 1984, Okebukola & Jegede, 1988, Novak, 2001 which was an empowering metalearning strategy (Novak, 1998) that would assist learners to 'learn how to learn' (Wandersee, 1990, p 927). Part of students' difficulty in learning was thought to be due to their being novices to the discipline area which led to a linear, blinkered, rote-mode learning approach (Ausubel, Novak & Hanesian, 1978). The linear presentation of material did not assist the holistic learners and made it difficult for learners to see the important links between topics and concepts until the end of semester, if at all. Acknowledging their lack of experience in the study of business law, the introduction of concept maps was an attempt to move them towards a more meaningful mode of learning through a holistic approach to the body of knowledge. It was thought that this could improve the quality of learning by

- conveying effectively the overall structure of the unit and assisting with the assimilation of facts;

- making business law more accessible and understandable and making the relationships between key concepts transparent in a visual image;
- assisting learners to summarise and consolidate the information;
- providing an approach to note-taking which is different to the list or linear format of conventional note-taking;
- providing a way of relating, remembering and reviewing information;
- providing a method of building on existing information by developing new linkages;
- offering a non-linear method of accessing and navigating around the body of information, which in turn assists flexible and self-directed learning; and
- providing a graphical representation of information and linking other media to a very text-based and discourse oriented discipline.

2.2 The development process

It was decided that the concept maps would be on the WebCT site and would also operate as a navigational tool within the site. The plan involved developing an overall parent concept map (Figure 1) that indicated the structure of the unit and presented its key topics as hyperlinked nodes which take the learner from the parent concept map to other maps depending on the selected concept thus allowing learners to make their individual pathways through the learning resource.

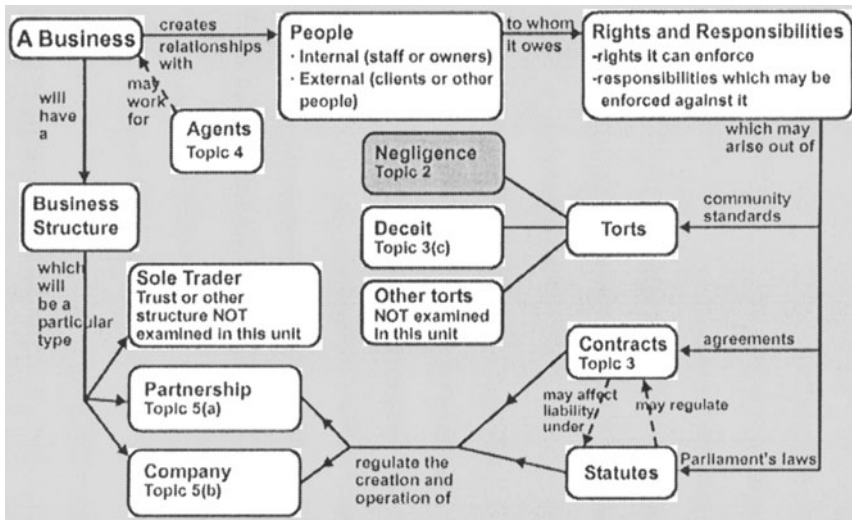


Figure 1. The main map of the unit (parent map)

This approach would be potentially useful for off-campus learners and those approaching materials non-sequentially to search for interrelationships

between the many topics and the plethora of (legal) concepts and rules. Each of the remaining maps covers the information for one topic or sub-topic which are approximately a week's worth of work for the learner. Multimedia elements of the maps include audio clips and mouse roll-overs activating pop-up boxes to add further clarification and/or direct learners to relevant sections of their textbook. This was intended to allow the learners to relate and integrate the textbook with concepts in the map while building their detailed knowledge and developing a more meaningful-mode learning pattern (Novak & Gowin, 1984).

The maps were developed by the academic teacher and the educational designer on a conventional whiteboard. The draft maps were then circulated among others teaching the unit for feedback and further refinement. The resulting diagrams with accompanying text for roll-overs and multimedia components were then developed as multimedia files by the University's Centre for Learning and Teaching Support.

As concept maps were new to the learners and to the teaching staff, it was decided to trial a sub-set of the maps and use feedback to improve the quality of the entire set. Consequently the parent map of the unit (Figure 1) and the concept map of topic 2 (Figure 2) were developed. The topic 2 map carries an audio file and links to further information.

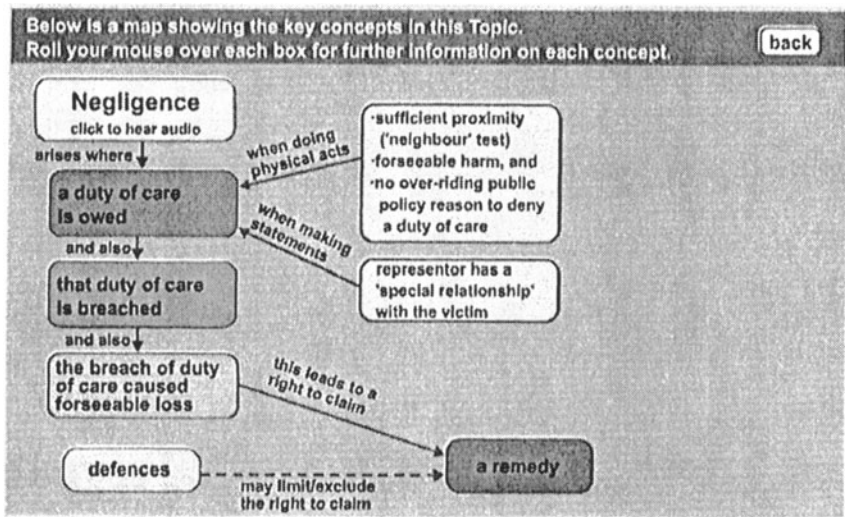


Figure 2. Map of topic 2

3. EVALUATION AND RESULTS

Evaluating work in progress is crucial to the quality of the materials developed. In order to obtain formative evaluation, these two maps were trialed prior to developing the maps of other topics. A prototype WebCT site for topic 2 was developed and currently enrolled students were invited to visit the site by the academic teacher, and asked to respond to the online survey.

Feedback from technical staff prompted changes to the colours and contrasts used in the maps, which were not merely aesthetic but related to the user-friendliness of the maps. Also, feedback from the same group led to repositioning of the rollover text to facilitate easier viewing or greater user-friendliness.

Student feedback was received initially through an anonymous online survey. Since the learning experiences, particularly of off-campus students were seen as essential in the evaluation, telephone interviews were conducted on 10% ($n = 15$) of those independent learners. Interviewees were mostly from urban and rural Australia and two were based overseas.

In general, students' comments were positive and suggested an improved quality of learning which validated the introduction of the concept maps. They believed 'the flow charts worked well to link all the theory together'. Similar observations offered were: 'It told me where everything was; I referred back to it quite a bit. You could understand things much better because it sort of gave a relationship. It helped to enhance my understanding'.

Their comments also indicated that the maps provided guidance through the study process. 'I go through the diagram to see all details. Then I come back to the diagram from time to time.' The maps also gave an alternative approach to note-taking: 'They were useful. I printed the main diagram and took notes on the info in the boxes'. The visual and auditory support which complemented the concept maps was positively received. 'It's [concept maps] a good way to assist students with videos, diagrams etc rather than just reading a textbook and doing tute questions'.

The maps proved to be also useful in revision. 'Was able to follow it better once you get into it, then it becomes clearer. Particularly when you do your reading and return to it, it becomes clearer. It helped me to understand where everything stood'. Despite the very positive feedback, the one disappointment was that the diagrams were not easily printable, a technical problem that needed to be addressed.

4. DISCUSSION AND CONCLUSION

While these responses came from a small sample of students, they show that for these students the two concept maps provided a worthwhile and useful resource that significantly contributed to the quality of their learning. For most students interviewed, the concept maps were a functional enhancement to the learning materials.

As in any innovation, there were some problems, hence the need for formative evaluation. Problems detected in printing the diagrams, were incorporated into the technical specifications for the multimedia experts for building future maps. Also, the comment by one student 'I'm not a diagram person so I didn't use them' was a useful reminder of learner differences in preferences and styles (Kolb, 1984, Felder, 1996) and therefore the need to build in alternative strategies so that all learners have a quality learning experience.

Developing, trialing and evaluating a smaller number of concept maps has enabled the team to pause, reflect and reconsider feedback about quality instead of progressing through all the maps and supporting multimedia components and focusing on quantity. As with any innovation, the quality should be improved through closely monitored iterative development. The smaller scale trial was a way to gain meaningful feedback at a useful stage, while providing the trial maps to students via WebCT allowed last-minute edits and access to all students in a way that avoided the unreliability of limited 'test' groups or the possible inequity of depriving 'control groups' of access to the new resources.

The next iterative step in the process would be to develop the remaining maps and multimedia resources and trial it with the students and stakeholders such as senior faculty decision makers, independent experts and peer reviewers. Their information would provide the valuable depth as well as the breadth on the quality of the resources (Le Brun, 2001).

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