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## Concept mapping to enhance student learning in a financial accounting subject

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## Abstract

The purpose of this paper is to raise awareness of the potential of concept mapping as an aid to enhancing students' understanding of the interrelationships between financial accounting concepts. The paper integrates student learning literature with an actual case study of a concept mapping exercise. Concept maps prepared by students are described and analysed, as is student feedback on the effectiveness of the exercise in increasing their understanding. While this is a first attempt at concept mapping, it shows promise of providing students with a deeper understanding of subject matter and a greater appreciation of the linkages between various financial accounting concepts and modes of delivery in the subject. Further studies of the refinement and application of concept mapping to accounting courses at tertiary level have the potential to add value to existing accounting education literature. Concept maps can assist accounting students in developing positive attitudes to life-long learning and in becoming self-directed learners, by enabling them to integrate new knowledge into the framework of their existing conceptual understanding. Future attempts will need to integrate improvements in technique on the part of teachers. The benefits of concept mapping will increase as students gain more practice in thinking conceptually. While concept mapping is a well accepted and widely used technique in other discipline areas at all levels of education, little or no research has been reported on its use by accounting educators. This paper addresses that gap.

## Keywords

Student Learning, Concept Mapping, Financial Accounting Education

## Disciplines

Business | Social and Behavioral Sciences

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# **Concept mapping to enhance student learning in a financial accounting subject**

A paper prepared for  
The Accounting Educators Forum  
2005

by

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## **Abstract**

*The purpose of this paper is to raise awareness of the potential of concept mapping as an aid to enhancing students' understanding of the interrelationships between financial accounting concepts. The paper integrates student learning literature with an actual case study of a concept mapping exercise. Concept maps prepared by students are described and analysed, as is student feedback on the effectiveness of the exercise in increasing their understanding. While this is a first attempt at concept mapping, it shows promise of providing students with a deeper understanding of subject matter and a greater appreciation of the linkages between various financial accounting concepts and modes of delivery in the subject. Further studies of the refinement and application of concept mapping to accounting courses at tertiary level have the potential to add value to existing accounting education literature. Concept maps can assist accounting students in developing positive attitudes to life-long learning and in becoming self-directed learners, by enabling them to integrate new knowledge into the framework of their existing conceptual understanding. Future attempts will need to integrate improvements in technique on the part of teachers. The benefits of concept mapping will increase as students gain more practice in thinking conceptually. While concept mapping is a well accepted and widely used technique in other discipline areas at all levels of education, little or no research has been reported on its use by accounting educators. This paper addresses that gap.*

**Keywords** Student Learning, Concept Mapping, Financial Accounting Education

*To be successful in learning, students have to take possession of knowledge actively, by seeking explicit, conceptual linkages between new concepts and those they already possess. This process of elaborating personal, meaningful knowledge takes place by restructuring the already existent conceptual frameworks (Regis et al, 1998, p. 1084)*

## **Introduction**

Financial reporting has undergone tremendous changes in recent years, due to corporate collapses, regulatory changes, and professional developments. For practitioners, these events have been confusing and challenging. For university accounting lecturers, preparing their students for the “realities” of business practice, the challenge is to equip them, not just with a toolbox of techniques, but with a deeper repertoire of understanding and a consciousness of the way what they have learned will impact and be impacted by the arena in which they practice as accountants.

Achieving this aim within a second year, second semester financial accounting subject stretches both staff and students. In this case, students were set a research project that required them to interact with a variety of terms and concepts which could only be understood and employed if a deep approach to learning were adopted. These terms and concepts would individually and jointly pose a significant intellectual challenge. The purpose of this paper is to outline the way in which concept mapping was used to enhance students’ understanding of how the practice of financial accounting interacts with the regulatory system, the corporate world, and academic insights.

The paper first outlines the aims of the subject, and the specific requirements of the research project. It then focuses on the students’ reactions to the project and the staff response. Literature on concept mapping is reviewed, and the conduct of a concept mapping exercise is then documented. The results of the exercise are discussed, with the depiction and critique of actual concept maps. Finally, suggestions are made about further concept mapping exercises, and the usefulness of the process for equipping the students with a deep, contextualised understanding of financial accounting.

## **Aims of the financial accounting subject**

This financial accounting subject consists of three strands: technical, contextual and theoretical. The technical strand incorporates the application of specific accounting standards and regulatory provisions to the preparation of financial reports, including Income Statement, Balance Sheet, Statement of Changes in Equity, Cash Flow Statements and group accounts. The contextual strand highlights the national and international environment in which financial reporting takes place. This aspect is addressed by referring to companies’ annual reports, with an emphasis on disclosure issues. Material from media sources, and from professional and regulatory bodies, is used to illustrate the practice of financial reporting. Academic literature provides the theoretical strand, in which students are given the opportunity further to develop their critique and reflection skills.

In particular, the students are assisted in using their theoretical understanding to develop links between the technical and contextual strands, and to challenge some of the taken-for-granted assumptions of much accounting education. Ravenscroft and Williams (2004, p. 8) believe that, particularly in the post-Enron era, it is “critical” for accounting educators to “de-mythologize” accounting curricula by challenging attitudes to corporations, the role of investors, the meaning of professional auditing, the purposes of accounting reports and the notion and teaching of ethics to accountants. This subject represents one attempt to open

students' minds to some of these challenging dimensions of accounting, rather than just presenting accounting as a technical body of knowledge that perpetuates the status quo.

Of the more than 300 students enrolled in this advanced second year financial accounting subject, almost all are intending to major in accounting. Few have much practical experience in accounting or business, and many are overseas students, for whom English is not their first language. The structure of the subject gives an advantage to students who take a deep approach to learning by reading widely, and attempting to draw together the various strands of the subject with the knowledge they have acquired from earlier study (Biggs, 1987, p. 11). It has been suggested that where learning in accounting centres on "knowledge acquisition and technique", it is more likely to be associated with "surface learning approaches and inferior outcomes", compared to conceptions where "learning is viewed as a search for meaning" (Leveson, 2004, p. 532).

Consequently, students who take a surface approach to learning, acquiring "only sufficient knowledge to complete the task" (Hall et al, 2004, p. 491) can usually handle the technical strand, and even the contextual strand, but are likely to struggle to understand the relationship of these two strands with the theoretical strand. Even in reading the set academic journal articles, the students' emphases on either an holistic approach or a segmented approach (Ramsden, 1992, p. 43) will have a bearing on how well they are able to absorb the material and apply it to the subject. If students see a journal article, for example, as putting forward a viewpoint, and they want to understand what that viewpoint is, as opposed to concentrating on its "constituent parts" rather than "the whole in relation to the parts" (Ramsden, 1992, p. 41), they are more likely to be able to take that journal article and apply its message to another piece of work.

Student learning can be viewed as partly a personal preference, partly an outcome of time pressures and the need to complete assessment tasks, and partly due to the nature of the material being studied. The tendency of accounting students to compartmentalise their learning and view the individual subjects which make up their degree as discrete units has been noted (Tant and Watson, 2005, p. 1), with accounting students showing more reliance on surface approaches to learning than students from other disciplines (Eley, 1992). They are also more inclined to use deep approaches to learning less as their university studies progress (Gow et al, 1994), and to rely increasingly on surface learning when they have "negative perceptions" of factors such as "their workload (excessive), assessment demands (surface), and teaching style (didactic)" (Leveson, 2004, p. 532, citing Gow et al, 1994). Unfortunately, the temptation is often for students to see their university work as simply a series of "discrete and unrelated" tasks (Biggs, 1987, p. 15). It is acknowledged that students who rely on rote learning lose their information in a short period of time, and hence do not retain "an understanding of important concepts" after their course is completed (Besterfield-Sacre, 2004, p. 105). Certainly, among students studying accounting at tertiary level in the UK, two learning "life-worlds" were identified: detachment and engagement (Lucas, 2000).

The teaching team, as did Leveson (2004, p. 545), believed that while the nature of accounting education necessitates covering "the factual and technical aspects of the discipline", the subject of accounting can still be dealt with at "an abstract/relational level" as well. Further, to promote students' understanding of the discipline of accounting requires an acknowledgment that such understanding is a "continuous function of the person's knowledge" (White and Gunstone, 1992, p. 7). Consequently, while technical knowledge builds with each successive topic covered in accounting subjects throughout a degree, so ought students' understanding of the entire discipline of accounting grow.

A number of strategies have been suggested for encouraging deep learning on the part of accounting students, such as the development of life-long learning skills, analytical thinking, and the ability to work in teams (Hall et al, 2004). The research project, worth 20% of the total assessment for the subject, was constructed in such a way that made it difficult for students either to understand or complete it using a surface approach. Rather than an emphasis, for this assessment task, on “technical and procedural aspects of the subject with an emphasis on subject delivery through transmission” (Leveson, 2004, p. 533, citing Fox, 1983), students were assisted in exploring accounting concepts and linking them with financial reporting regulatory requirements. The topic could definitely not be regarded as technical, although some technical knowledge was necessary in order to understand the topic. Students who usually relied on a “format” approach (Leveson, 2004, p. 544, citing Lucas, 2001) to studying would find that this project was not a formulaic one, but rather one that required a deep understanding of the subject matter and a willingness to think creatively.

### **Requirements of the research project**

The subject of the research project was earnings management. Students were required to select one of three forms of earnings management, one of: reinsurance contracts; subscriber acquisition costs or bandwidth/broadband capacity swaps; and restructuring charges. They were then required to prepare a 2,000 word report in which they linked their chosen earnings management topic with actual corporate examples, media texts, two specific academic journal articles, and regulatory responses to earnings management issues. The journal articles both related to financial reporting, within a philosophical framework, questioning the perceived objectivity of financial reports.

The first journal article, entitled “Financial Accounting: In Communicating Reality, We Construct Reality” (Hines, 1988), takes a narrative, creative approach, presenting a dialogue about financial reporting between a master and his apprentice. Abstract in nature, it nevertheless contains direct references to financial reporting, and challenges students to think about what is included in financial reports and the power accountants have in constructing those reports. Students were encouraged to recognize that the dialogue between the master and the apprentice had the power to carry them along and inform their thinking, but that they needed to reflect critically on the assumptions underlying the master’s speech<sup>1</sup>. The second article, “Institutional reality, financial reporting and the rules of the game” (Mouck, 2004) also uses a metaphor, that of a game of football which is played according to a set of rules. The author likens financial reporting’s rules to those of a football game, indicating that while financial reports are prepared in accordance with an objective regulatory framework, they are applied in a subjective manner. By their nature, the articles included concepts which were a challenge to the students’ understanding. Providing this challenge was intentional on the part of the subject coordinator, since the focus of the School has been to develop students’ awareness of the social, institutional and political setting in which financial reporting takes place. If students attempted to take a surface approach to learning, or a segmented approach to reading the journal articles, they would have difficulty in extracting the main point of both articles, and in applying that point to the corporate financial reporting context.

For second year students, both the language and concepts of these articles were challenging. While gathering media references to instances of earnings management was not a difficult task, linking those to the articles required a much greater degree of understanding and intellectual commitment. It was anticipated from the outset that students would find the

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<sup>1</sup> Manninen (1997, p. 281) identified postmodernism as providing new insights to accounting texts, and advocated critical reading was an important skill for university students, a way in which they could connect texts to an “external reality” (Manninen, 1997, p. 291).

project taxing, and a number of strategies were put into place in order to assist them with their research and completion of the project. These included a special lecture, workshop and tutorials on the journal articles, earnings management issues and actual corporate examples.

Recognizing that students ought to become observers of their own learning (Gibbs and Habeshaw, 1992, p. 177), the subject coordinator set reflective learning questions to be completed for tutorials each week. The superficial aim of this activity was to prepare students for a third year financial accounting subject, when they would have to do a lot more reflection about their learning style, but underlying this was a desire to encourage students to become self-directed learners, able continuously to “expand the limits of their knowledge” and assimilate new knowledge into “a preexisting conceptual framework” (West et al, 2000, p. 1105). These questions, together with a final reflective critique of their learning, carried a potential 5% of overall assessment, and encouraged students to think about how they learned. Some issues the students were asked to write about that were relevant to their completion of the research project were: what they saw as their responsibility for learning in the subject; whether they believed the topic covered by the research project was relevant to their studies, and would impact on them as qualified accountants; what actions they (or the teaching team) could have taken to improve their research project; whether they believed they met the requirements of the research project; and whether they were effective in managing their timetable and commitments while completing the project. Some of the responses to these questions identified issues of understanding that students were experiencing in trying to complete their projects.

### **Students’ reactions**

In spite of strategies designed to help students, and perhaps partly because of the learning reflections, the teaching team became aware that students were having difficulty, not with any individual sections of the subject, but with the manner in which the various concepts could be linked. The project required an understanding of the linkages, and made it difficult for students to compartmentalise their learning, if that was their usual pattern. Consequently, many were finding the challenge of the project quite overwhelming. Figure 1 below outlines the various dimensions of the subject that the students were struggling to come to terms with.

Take in Figure 1

Lectures covered material about fraud, earnings management, current regulatory structures, and the disclosure requirements of financial reporting; the emphasis of the textbook was heavily practical, with a concentration on regulatory requirements for disclosure, specifically in the preparation of the Income Statement, Balance Sheet, and Statement of Changes in Equity; tutorials and workshops combined practical exercises and theory, with their focus both on textbook questions and readings; readings (Hines, 1988; Mouck, 2004) stressed objectivity, subjectivity, and notions of reporting and creating reality within a regulatory structure; and the topic of the research project was earnings management and financial reporting. It became apparent that some response on the part of the teaching team was required.

### **The response of the teaching team**

A meeting of the teaching team was called by the subject coordinator, and representatives of the Learning Development centre on campus were asked to attend. During the discussion, various views were put forward about how the issue might be approached, and the two student learning specialists made some insightful observations and suggestions. One of these was to conduct a concept mapping exercise with the students, in order to encourage them to develop their own visual representations of how the various strands of the subject were related. A

number of terms were identified, and students were asked to find a way, by means of a drawing or diagram, of linking all the terms. The terms were chosen because they were used in the various delivery modes of which the subject consisted, as outlined above. In addition to completing the exercise, students were to be asked to evaluate their understanding of the linkages both before and after working on their concept maps.

## **Concept mapping**

“Invented” by Novak and Gowan (1984), and based on Ausubel’s (1978) theory of cognitive assimilation, concept maps can be described as “two-dimensional, hierarchical, node-link diagrams that depict verbal, conceptual, or declarative knowledge in succinct visual or graphic forms” (Quinn et al, 2003, p. 12). Concept maps, put simply, aim to show “how someone sees the relations between things, ideas, or people” (White and Gunstone, 1992, p. 15). A subset of graphic organizers (Passmore, 2004, p. 371), they are a “metacognitive learning strategy” (Daley et al, 1999, p. 47), in which related concepts can be connected (West et al, 2000, p. 1106). Once a concept map is established, it can be expanded to accommodate new concepts, thereby assisting students to link new knowledge with their existing knowledge frameworks (Gahr, 2003, p. 312, citing Wheatley, 1991; Harpaz et al, 2004, p. 28; Ferry et al, 1997; Passmore, 2004, p. 371).

Underlying the use of concept maps, Novak and Gowan (1984, p. 7) view concepts, and their related propositions, as “the central elements in the structure of knowledge and the construction of meaning”. This cannot be done in a piece-meal manner, so in contrast with rote learning, where students merely store facts and information without really understanding how they fit into a conceptual pattern (Pendley et al, 1994, p. 9; Gahr, 2003, p. 312), concept mapping enables students to engage in “meaningful learning”, as they continually refine their knowledge structures, ultimately constructing “complex frameworks of interrelated concepts with many levels of hierarchy, branching, and crosslinking” (Quinn et al, 2003, p. 12). The development of this kind of structural knowledge is believed to be related to problem-solving abilities (Passmore, 2004, p. 374), since concept mappers understand the complexities and interrelationships of concepts. Concept maps therefore enable teachers to gain an understanding of how students organize and structure their knowledge within a particular subject area, and also to assess how fluently and efficiently they are able to use that knowledge (Williams, 1998, p. 414).

Concept mapping can be used to generate ideas, to design a complex structure or communicate ideas that have complex linkages, to assist in the integration of new knowledge with old knowledge, and also to assess understanding (The Concept Mapping Homepage, 2005). It has been used as a teaching tool at various educational levels. At primary and secondary school level it has been used by science teachers (Regis and Albertazzi, 1996, pp. 1087 - 1088) for almost thirty years for teaching, learning and assessment (Quinn et al, 2003, p. 120). Concept maps have been found beneficial for university students studying chemistry (Pendley et al, 1994; Francisco et al, 2002), mathematics (Williams, 1998), engineering (Besterfield-Sacre et al, 2004), nursing (Daley et al, 1999; Harpaz et al, 2004), and teaching (Ferry et al, 1997), as well as for resident physicians (West et al, 2000).

The obvious use of concept mapping is to enhance students’ understanding of interrelated concepts, and it has been used mostly as “an intervention mechanism for improved learning” (Besterfield-Sacre, 2004, p. 113), a means of encouraging students to move out of a rote-learning mindset where subject matter remains “opaque”, into constructing their own meanings for the subject matter being studied (Pendley et al, 1994, p. 9). Educators have used concept maps for planning curricula (Ferry et al, 1997), evaluating learning, identifying erroneous thinking, and making judgements about how well students understand (Passmore,

2004, p. 371). Assessments can be made of how effective concept maps are in teaching students to develop critical thinking skills.

Concept maps also have potential as an assessment tool, and have been used for those purposes (Besterfield-Sacre, 2004, p. 113; Passmore, 2004, p. 370; Quinn et al, 2003, p. 12; Rye and Rubba, 2002, p. 34), although there are challenges in how to score the maps (Rye and Rubba, 2002, p. 34), since students' knowledge structures are "highly idiosyncratic" representations of their knowledge (Regis and Albertazzi, 1996, pp. 1087 – 1088). One study, undertaken in a nursing education unit, tracked students' completion of three concept maps during a semester, and used the development of those maps to indicate an increase in those students' "conceptual and critical thinking" (Daley et al, 1999, p. 42). This emphasised the development of concept maps over time, which is believed to be a preferable use of the technique (Regis and Albertazzi, 1996, pp. 1087 – 1088).

Some of the advantages of concept mapping are readily apparent. From the students' point of view, where they are encouraged to design their own concept maps, they find "new meanings" in the subject and are able to mesh new knowledge with their existing knowledge structure (Novak, 1991, p. 48). Hence subject matter, instead of being "a mass of definitions to be memorized or problems to be solved by the routine plugging-in of numbers or symbols into abstract formulas" (Novak, 1991, p. 48), becomes meaningful to the students, and over time, they actively construct their own knowledge (Regis and Albertazzi, 1998, p. 1088). Many students actually find it easier to rote learn, since this can become an established learning habit, but moving into a new mode of learning can bring great rewards, since it means students can develop "powerful knowledge structures" (Canas et al, 2001, pp. 49 – 50, citing Novak, 1991). Concept maps enable students to see the "big picture" (Quinn et al, 2003, p. 15; Gahr, 2003, p. 311), and to construct an "easily recognizable mental skeleton" (Gahr, 2003, p. 314). These skills emphasise quality of knowledge over quantity of knowledge (Quinn et al, 2003, p. 15), help students to think independently (Harpaz et al, 2004, p. 30), increase their ability to find connections between the different areas of their knowledge (Harpaz et al, 2004, p. 30), and help to develop critical thinking skills, which, in the "outcomes-oriented" emphasis of tertiary education, are highly valued (Daley et al, 1999, p. 42).

From the teaching point of view, concept mapping is an effective and creative way of identifying student understanding (Brown, 2002, p. 58), providing information not readily available from "traditional pen-and-paper tests" (Williams, 1998, p. 421). Teachers, by assessing students' improvement in successive concept mapping exercises, are able to identify knowledge gaps and weaknesses in programming (Besterfield-Sacre et al, 2004, p. 105). Particularly in professional training, where critical thinking skills are required, concept mapping makes it possible for educators to both teach and evaluate those skills (Daley et al, 1999, p. 42).

In spite of the potential of concept mapping, it is not a "magic bullet", but requires persistence if teachers are to learn how to offer constructive criticism and students are to learn how to construct good concept maps (Novak, 1991, p. 48). The constructivist approach, of which concept mapping is an example, is challenging and time-consuming initially, but if the approach is continued, it has the capability of providing students with "powerful instruments" with which to construct future knowledge more easily and quickly than in traditional teaching (Regis and Albertazzi, 1998, p. 1088). While it can be a valuable resource even in traditional teaching, concept mapping does confront students with the necessity of adopting a new strategy, moving out of their comfort zone, and giving up some of their rote learning habits (Quinn et al, 2003, p. 15).

Ideally, a first concept mapping exercise will consist of direct instructions, and modelling to the students, with assistance in constructing links and hierarchies of concepts (White and Gunstone, 1992, p. 29; Ferry et al, 1997). A number of alternatives are available, including presenting blank maps which students can complete, or maps with labelled concepts into which the students have to insert linking terms, or alternatively, concept maps the students design themselves (Harpaz et al, 2004, p. 29). Sometimes discerning whether links exist or not is difficult and students may struggle with coming to terms with the relationships between various concepts. There is no one correct answer for any concept mapping project, with layouts showing considerable variation (White and Gunstone, 1992, p. 29). The approach we took was to itemise several concepts, and ask the students to construct their own map using every one of those terms, i.e. to express the relationships between them.

### **The concept mapping experiment**

The two readings set for students have already been mentioned, as has the fact that students found reading and understanding them a challenge. Both readings were to illustrate the point that earnings management per se is neither fraud nor inherently inappropriate. Apart from understanding what each paper was saying, students also seemed to struggle with the idea that earnings management could be a legitimate exercise of judgment in the interpretation and application of accounting standards. The concept mapping exercise was therefore designed to assist students in their understanding of the distinction between earnings management, fraud and the use of accounting to create a particular reality.

The key issue arising from both papers was the distinction between reporting reality versus creating reality. Mouck (2004, p.526), for example, notes the “widely accepted” view by academic accountants that net income and owners’ equity are “crucial to the practice of financial accounting” even though both terms “have no empirical referents in the ‘real world’”. In other words, net income and owners’ equity are not objective. Net income is determined by reference to the matching concept, whereby revenues and expenses such as depreciation and cost of goods sold are determined by “analytically defined formulas”. These “analytically defined formulas”, according to Mouck (2004, p. 528) are the “rules of financial accounting” (p.528). He likens these rules to the rules of football. Like the terms “net income” and “owners’ equity”, rules of financial reporting and football have no real world referents but are accepted and are, therefore, taken as an objective reality, even though they have been subjectively constructed. Where the rules of financial reporting provide alternative treatments for the same or similar transactions, subjectivity is introduced.

Workshop leaders were instructed how to conduct the concept mapping exercise: students would be asked to form groups of 3 or 4, and each group would prepare their own drawing or diagram in which they linked the terms outlined for them. Instructions provided are shown in Figure 2.

Take in Figure 2

Students were given the option of presenting the linkages between concepts either diagrammatically or pictorially. The emphasis was to be on linking the various terms into one framework. Figure 3 below is a pictorial depiction made by a group of three students.

Take in Figure 3

This is not a concept map in the strict sense of the word, and in many respects does not capture the relationships between the specified terms provided to the students as part of the exercise. Nonetheless, it is interesting in that it demonstrates a perceptiveness of which the students themselves may not have been aware. The layers of the regulatory framework, regulatory structure, disclosure requirements and financial reporting, are depicted as ribbons

of a rainbow, an optical illusion. This is consistent with Mouck's (2004) contention that the regulatory framework is epistemologically objective, in that the components of the framework have been determined by society and no one makes a subjective judgment about their truth or otherwise. However, unlike rules of football, the regulatory framework governing corporations is highly political and changes in response to any number of environmental factors including interest group pressure and corporate scandals. Measurement and accounting methods prescribed by accounting standards are subjectively determined and influenced by interest groups and, as such, have no more substance than a rainbow. The lightning strike is a fair representation of the impact of the discovery of fraud, or even earnings management. Such discoveries are often disclosed to the public suddenly and with great fanfare. As with lightning, the fanfare, the flash of light and accompanying thunder, may be spectacular but benign in that no substantive action is taken against the perpetrators or to prevent the recurrence of the fraudulent and/or earnings management activities. On the other hand, those who are unfortunate enough to be 'struck' by lightning/fraud may suffer immense and irreparable harm. Earnings management is rightly separated from fraud as it can be a legitimate part of the accounting and regulatory process. Fraud, on the other hand, is outside that framework.

Figure 4 below is more consistent with concept mapping than Figure 3, in that the terms are all linked and connections are clearly indicated.

Take in Figure 4

In Figure 4, the regulatory framework is shown as a circle in which financial report and the regulatory structure are visually linked suggesting that one influences the other. The objective nature of the regulatory structure is clearly shown and, as with Figure 3, is shown as a succession of layers, with the regulatory structure leading to disclosure requirements, which in turn leads on to reporting reality in the form of objective financial reports. These are the Balance Sheet, Statement of Changes in Equity and the Income Statement. At the other extreme is Financial Reporting. As proposed by both Mouck (2004) and Hines (1988), accounting both reports reality and creates reality. The creation of reality in Figure 4 is achieved by earnings management and reflected in the same three financial reports. In other words, financial reports contain both objective and subjective elements. Figure 4 also shows fraud as being outside the regulatory framework but arising from subjectivity and earnings management. Both subjectivity and earnings management, however, are within the "objective" regulatory framework.

Figure 5 below is consistent with Mouck's view that the regulatory structure and disclosure requirements form an epistemologically objective framework.

Take in Figure 5

This framework feeds into financial reporting that is not identified as either objective or subjective. However, the link between financial reporting and the income statement, statement of changes in equity and balance sheet is stated to be a subjective process. Earnings management and fraud appear outside the direct linkages between the regulatory requirements and the financial statements. On the other hand, earnings management is linked back to disclosure requirements but identified as subjective and used to create reality. There is also an indicated link between earnings management, creating reality, the financial statements and reporting reality. This seems to imply that even though earnings management is "subjective", it is permissible within the regulatory structure when disclosure requirements are "met". Conversely, fraud is clearly outside the regulatory structure. This occurs when the form of earnings management adopted "fails to meet" disclosure requirements. However, the dotted

connector identifies that there is often a “fine line between” earnings management that meets disclosure requirements and that which does not.

Figure 6 demonstrates a lack of understanding of Mouck’s objective, subjective dichotomy. There is no clear recognition of the links between the regulatory structure, disclosure requirements, being accounting standards, and financial reports other than the bracket indicating that all are subjective.

Take in Figure 6

The concept map depicted in Figure 6 also indicates that the balance sheet, income statement and statement of changes in equity are purely subjective. No relationship is shown between earnings management, fraud, subjectivity, and objectivity and reporting reality. Objectivity, reality and reporting reality are clearly shown as related. However, there is no recognition that the application of accounting standards can be “objective” even if judgment (subjectivity) is used in selecting between competing but equally acceptable accounting alternatives incorporated in accounting standards.

Feedback from the workshops initially was mixed. Some workshop leaders’ impressions were dominated by one or two negative but insistent responses from students. It was difficult to discern exactly what occasioned some of the negative responses: was it our lack of expertise in planning and executing the concept mapping exercise, or dissatisfaction about feedback, or the fact that students were required to engage at a deeper level with the material, and that was an intellectual challenge to them? Other workshop leaders experienced some positive feedback, but it was not until the results of the surveys were analysed, and the concept maps studied, that a clearer picture began to emerge.

### **The outcome of the exercise**

Students were asked to rank their present understanding of the linkages on a scale of 1 to 5 “before” the workshop, where 1 represented “I don’t have a clue” and 5 represented “I get it”. Table 1 below portrays the ranking scale that was used. The diagnostic question focused on the various delivery modes, and challenged students to think about how well they understood the linkages between the various modes, and consequently the content covered in each of those modes, with which they were familiar.

Take in Table 1.

The concept mapping exercise was then conducted, and afterwards, students were asked once again, on the same page, to rank their understanding on the same five point scale “after” the workshop. This enabled an assessment to be made of how students believed their understanding changed as a result of the exercise. Concept mapping was therefore to be used both as a diagnostic tool for the teaching team and a learning tool for the students<sup>2</sup>. There were 138 participants in the concept mapping workshops. The average rating of their understanding about the way the topics fitted together before the presentation of the concept mapping workshop was 2.87, with a standard deviation of 0.8. After the exercise the average rating increased to 3.57 with a slightly increased standard deviation of 0.87. There were 5 (3.6%) who registered a decline in their level of understanding and 40 (29%) who indicated

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<sup>2</sup> Several purposes of concept mapping have been identified (The Concept Mapping Homepage, 2005): brain storming, designing a complex structure, communicating complex ideas, aiding learning (by explicitly integrating new and old knowledge), and assessing understanding or diagnosing misunderstanding.

that their understanding had not altered. Figure 7 below indicates the level of understanding of all students before and after the class.

Take in Figure 7

There are several reasons possible for these statistics. Those who have registered a decline may be experiencing the learning curve process, where understanding initially declines as they realise that they have more to learn (all those who registered a decline initially rated their level of understanding at a level of 4 or 5). This group may also be using their ratings to express their dislike for the concept mapping as they had been expecting to have a normal workshop, where they worked through a practical textbook example.

While there was a general increase in the understanding of the group, although not high, the disturbing statistic of 29% registering no change in their understanding, suggests that the process did not achieve the improvement that was anticipated. This may have been from the way in which concept mapping was presented, or that the students were unable to see the benefit of the process, or simply that it was a challenge and one that will take some time for students to learn. This is consistent with literature already reviewed (Novak, 1991, p. 48; Quinn et al, 2003, p. 15).

### **The next step**

The benefits of concept mapping have been outlined, for students, in terms of their understanding, and for teachers, in terms of being able to assess students' understanding of concepts being taught, whether simply for feedback on content or teaching style, or for formal assessment. The students' maps in this case certainly revealed some questionable understanding of the concepts they were required to connect. Research points to the need to persevere with concept mapping. Teachers need to become more practised at conducting mapping exercises, modelling concept maps and providing constructive feedback. Students need practise in grappling with possible changes to their learning style, thinking deeply about what they know and how it is connected, and forming their own knowledge structures. This can be a challenging experience.

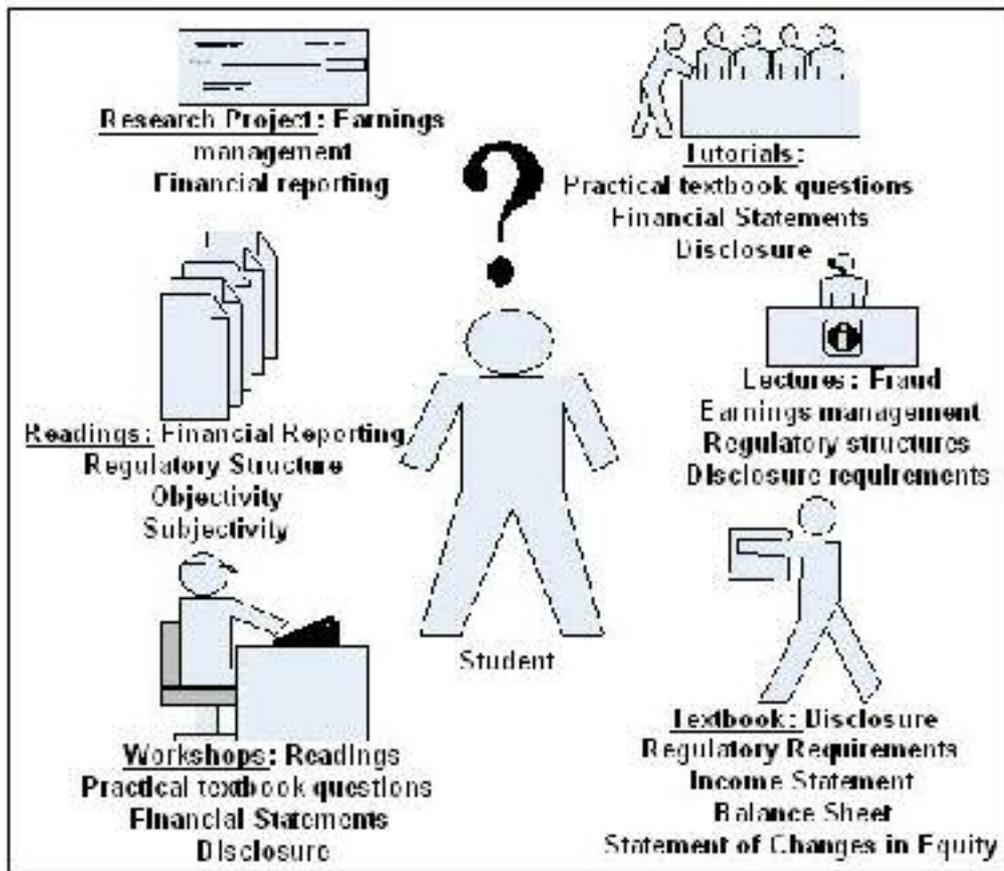
Our first concept mapping exercise has been a learning experience for both the teaching team and the students, and our plan now is to extend the exercise to the next topic in the financial accounting subject, consolidated accounts. Not only will we be seeking to assist students in their understanding of the concept of consolidations, but also to fit it into their existing understanding of the regulatory structure and financial reporting requirements. We believe the initial improvements in students' understanding, coupled with the potential benefits of the technique, make further experimentation worthwhile.

### **Reference list**

- Besterfield-Sacre, M., Gerchak, J., Lyons, M. R., Shuman, L. J., Wolfe, H., 2004, "Scoring concept maps: an integrated rubric for assessing engineering education", *Journal of Engineering Education*, 93 (2), April, pp. 105 – 115.
- Biggs, J., 1987, *Student Approaches to Learning and Studying*, Australian Council for Educational Research, Melbourne.
- Brown, D. S., 2002, "Creative Concept Mapping", *The Science Teacher*, ?? March, pp. 58 – 61.
- Canas, A. J., Ford, K. M., Novak, J. D., Hayes, P., Reichherzer, T. R. and Sur, N., 2001, "Online concept maps. Enhancing collaborative learning by using technology with concept maps", *The Science Teacher*, 68 (4), pp. 49 – 51.

- Daley, B. J., Shaw, C. R., Balistrieri, T., Glasenapp, K., and Piacentine, L., 1999, "Concept maps: a strategy to teach and evaluate critical thinking", *Journal of Nursing Education*, 38 (1), January, pp. 42 – 47.
- Eley, M. G., 1992, "Differential adoption of study approaches within individual students", *Higher Education*, 23, pp. 231 – 254.
- Ferry, B., Hedberg, J. and Harper, B., 1997, "How do preservice teachers use concept maps to organize their curriculum knowledge?", a paper presented at the Ascilite conference, December 7 – 10, Curtin University of Technology, Western Australia.
- Fox, D., 1983, "Personal theories of teaching", *Studies in Higher Education*, 8 (2), pp. 151 – 163.
- Francisco, J. S., Nakhleh, M. B., Nurrenbern, S. C. and Miller, M. L., 2002, "Assessing student understanding of general chemistry with concept mapping", *Journal of Chemical Education*, Vol. 79, Issue 2, p. 248.
- Gahr, A. A., 2003, "Cooperative Chemistry. Concept mapping in the organic chemistry lab", *Journal of College Science Teaching*, 32 (5), February, pp. 311 – 315.
- Gibbs, G., and Habeshaw, T., 1992, *Preparing to Teach*, Technical and Educational Services Ltd, Bristol, UK.
- Gow, L., Kember, D. and Cooper, B., 1994, "The teaching context and approaches to study of accountancy students", *Issues in Accounting Education*, 9 (1), pp. 118 – 130.
- Hall, M., Ramsay, A. and Raven, J., 2004, "Changing the learning environment to promote deep learning approaches in first-year accounting students", *Accounting Education*, 13 (4), December, pp. 489 – 505.
- Harpaz, I, Balik, C., Ehrenfeld, M., 2004, "Concept mapping: an educational strategy for advancing nursing education", *Nursing Forum*, 39 (2), April – June, pp. 27 – 36.
- Hines, R. D., 1988, "Financial Accounting: In Communicating Reality, We Construct Reality", *Accounting, Organizations and Society*, Vol. 13, No. 3, pp. 251 – 261.
- Leveson, L., 2004, "Encouraging better learning through better teaching: a study of approaches to teaching in accounting", *Accounting Education*, 13 (4), December, pp. 529 – 548.
- Lucas, U., 2000, "Worlds apart: students' experiences of learning introductory accounting", *Critical Perspectives on Accounting*, 11, pp. 479 – 504.
- Lucas, U., 2001, "Deep and surface approaches to learning within introductory accounting: a phenomenographic study", *Accounting Education: an international journal*, 10 (2), pp. 161 – 184.
- Manninen, A., 1997, "Critical reading in accounting", *Accounting Education*, 6 (4), pp. 281 – 294.
- Mouck, T., 2004, "Institutional reality, financial reporting and the rules of the game", *Accounting, Organizations and Society*, 29, pp. 525 – 541.
- Novak, J. D., 1991, "Clarify with concept maps. A tool for students and teachers alike", *The Science Teacher*, 58 (7), October, pp. 45 – 49.
- Novak, J. D. and Gowin, D. B., 1984, *Learning how to learn*, New York: Cambridge University Press.

- Passmore, G. J., 2004, "Extending the power of the concept map", *Alberta Journal of Educational Research*, Winter, 50 (4), pp. 370 – 390.
- Pendley, B. D., Bretz, R. L., Novak, J. D., 1994, "Concept maps as a tool to assess learning in chemistry", *Journal of Chemical Education*, Vol 71, Iss 1, January, pp. 9 - ?
- Quinn, H. J., Mintzes, J. J. and Laws, R. A., 2003/04, "Successive concept mapping. Assessing understanding in college science classes", *Journal of College Science Teaching*, December/January, 33 (3), pp. 12 – 16.
- Ramsden, P., 1992, *Learning to Teach in Higher Education*, Routledge, London.
- Ravenscroft, S. and Williams, P. F., 2004, "Considering accounting education in the USA post-Enron", *Accounting Education*, 13 (Supplement 1), Conference Address, December, pp. 7 – 23.
- Regis, A. , Albertazzi, P. G., and Roletto, E., 1998, "Concept maps in chemistry education", *Journal of Chemistry Education*, 73 (11), pp. 1084 – 1088).
- Rye, J. A. and Rubba, P. A., 2002, "Scoring concept maps: an expert map-based scheme weighted for relationships", *School Science and Mathematics*, 102 (1), January, pp. 33 – 43.
- Tant, K. G. and Watson, J. R., 2005, "Technology and innovation in accounting and finance teaching practice: a fishing exercise?", in Kent, J., (editor), *Proceedings of the Accounting Educators Forum 2004*, Charles Sturt University.
- The Concept Mapping Homepage, 2005, [Online], Available on: [http://users.edte.utwente.nl/lanzing/cm\\_home.htm](http://users.edte.utwente.nl/lanzing/cm_home.htm), [Accessed 29 August 2005].
- West, D. C., Pomeroy, J. R., Park, J. K., Gerstenberger, E. A., Sandoval, J., 2000, "Critical thinking in graduate medical education. A role for concept mapping assessment?", *Journal of the American Medical Association*, 284 (9), September, pp. 1105 – 1110.
- Wheatley, G. H., 1991, "Constructivist perspectives on science and mathematics learning", *Science Education*, Vol. 75, pp. 9 – 21.
- White, R. and Gunstone, R., 1992, *Probing Understanding*, London: The Falmer Press.
- Williams, C. G., 1998, "Using concept maps to assess conceptual knowledge of function", *Journal for Research in Mathematics Education*, Vol. 29, Iss. 4, July, pp. 414 – 421.



*Figure 1. Student perceptions*

Financial Accounting Subject Concepts Workshop Week 5	
<p><b>Financial Accounting Subject content:</b> includes lectures, readings, research project, textbook, tutorials and workshops</p> <p><b>Objective:</b> to clarify the relationship between the various components of Financial Accounting's subject content</p> <p><b>Activity:</b> In a group, find a way of linking <u>ALL</u> the following words and phrases in either a drawing or a diagram:</p>	
Objectivity	Balance Sheet
Subjectivity	Statement of Changes in Equity
Earnings management	Creating reality
Fraud	Reporting reality
Regulatory structure	Disclosure requirements
Income Statement	Financial reporting

Figure 2. Concept mapping workshop instructions



Figure 3. A pictorial representation

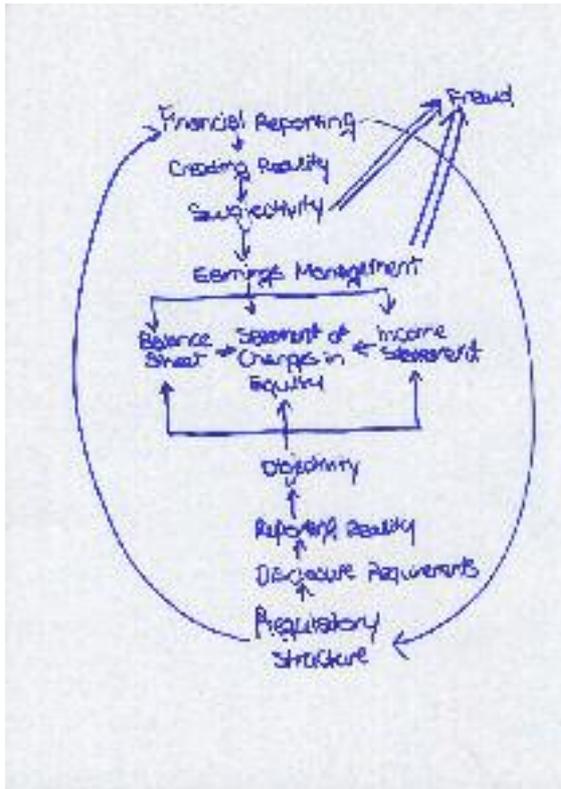


Figure 4. A concept map

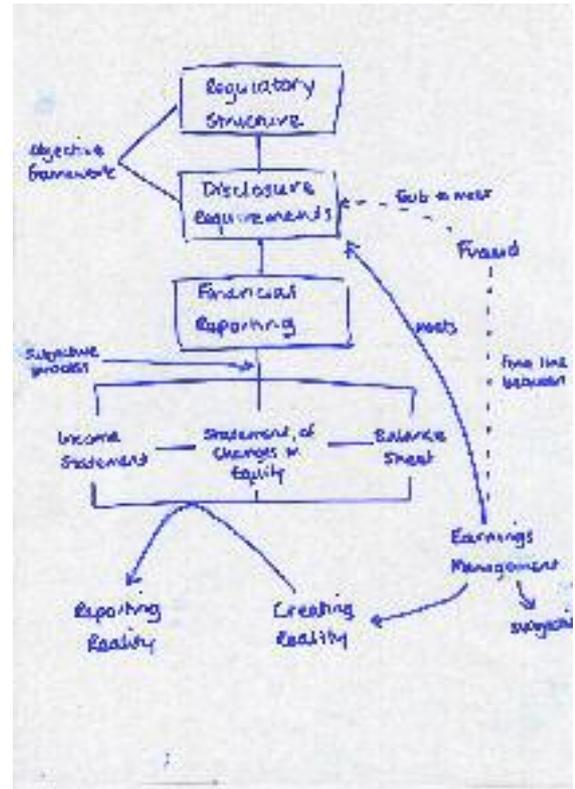


Figure 5. A concept map

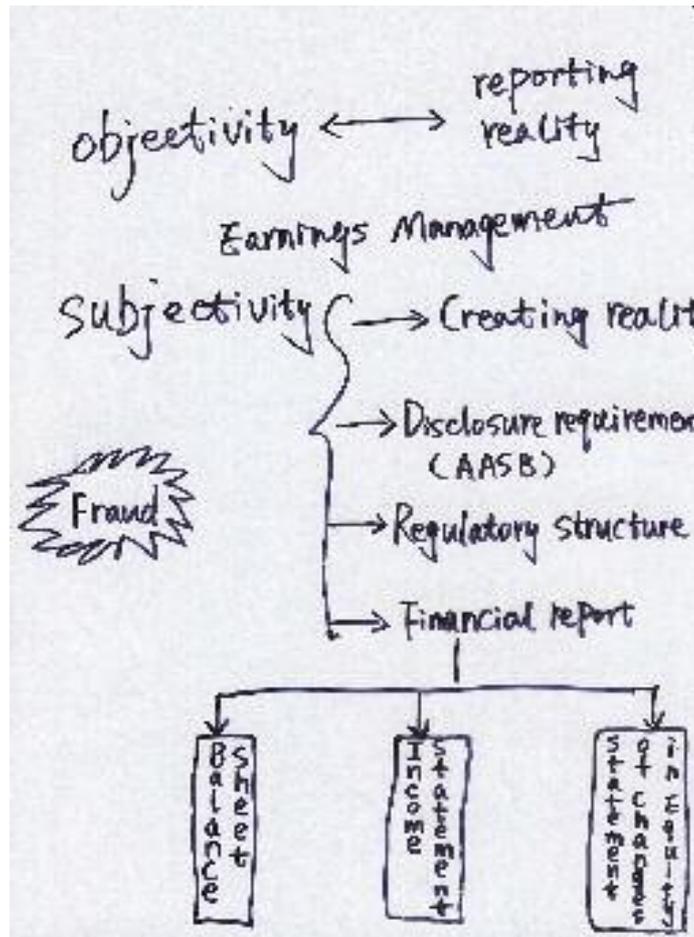


Figure 6. A concept map

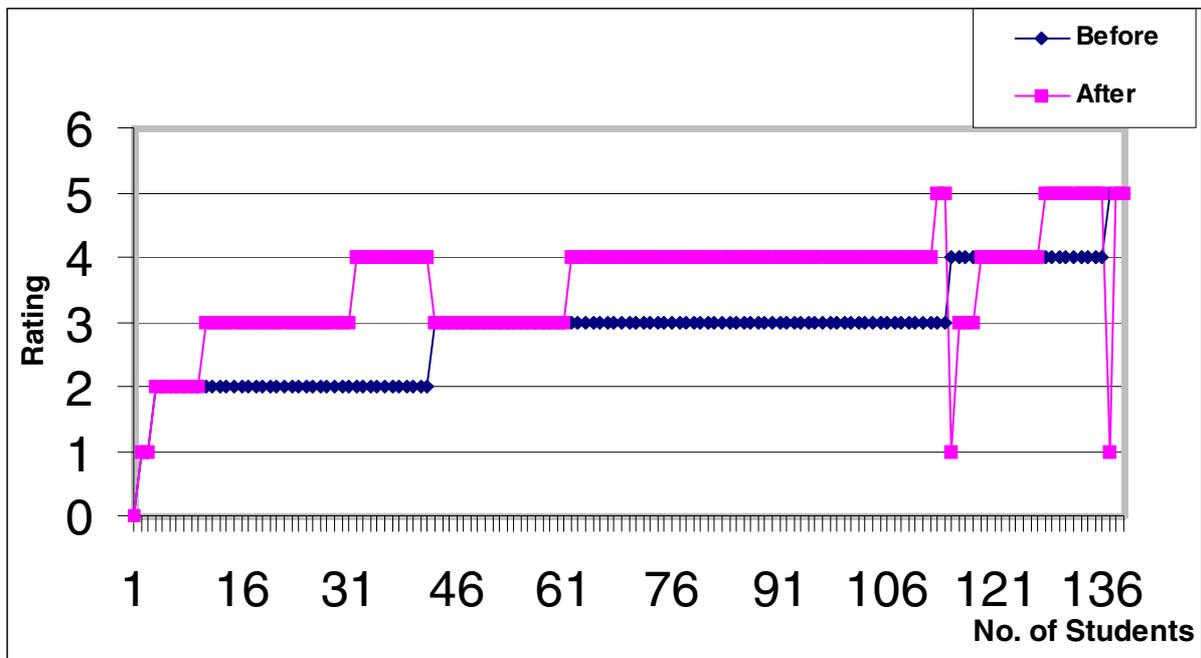


Figure 7. Changes in level of students' understanding

<b>Student Survey</b>				
Financial Accounting Subject. Semester 2 2005. Student survey (1).				
BEFORE (AFTER) THE WORKSHOP:				
Circle the number that best describes your understanding of the way Financial Accounting's lectures, readings, research project, textbook, tutorials and workshops relate to each other				
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Not a clue</b>	<b>Very limited understanding</b>	<b>Some understanding</b>	<b>Reasonable understanding</b>	<b>I get it</b>

*Table 1. Student Survey*