The Five-dimensional Reflective Cycle Framework for Designing Financial Information Management Systems Courses

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Abstract: Financial Information Management Systems (FIMS) or Accounting Information Systems (AIS) is a cross-discipline subject, often taught by Computing and Accounting disciplines. In recent years, demand for this subject has grown. However, educators have lamented high failure rates among AIS students; professional bodies have reported that graduates lack sufficient meta-cognitive knowledge of information systems to perform their tasks. Students have reported that their knowledge of databases, enterprise resource planning and relevant technology topics is lacking. Quality teaching of FIMS or AIS requires instructors to actively update their knowledge of accounting systems and information technology as well as to reflect on their teaching techniques. Reflection and reflective practices are taught within the education discipline, and have grown in popularity among many other disciplines. Yet little has been written about how accounting and IT professionals reflect on their practice and how they apply their reflections to their teaching. Through our case study at an Australian university, we discuss (1) the rationale for the importance of constructivist theory, cognitive load theory, reflective and action-research in teaching and learning, (2) Bloom's Revised Taxonomy, (3) the application of Bloom and the reflective concept for the design and delivery of FIMS courses, (4) reflection on our strategies for applying these concepts (5) how reflective professionals can assist instructors in the design and delivery of FIMS courses and, (6) how the proposed five-dimensional reflective cycle framework can assist academics in the design of AIS courses. Our study supports the view that reflection, within the proposed framework, is an effective strategy; and that Bloom's Revised Taxonomy and the PEER Model are tools which can assist instructors to teach FIMS and AIS courses in a way that enhances participant's learning abilities. We present a five-dimensional reflective cycle framework that facilitates reflective practice among academic and professional instructors for designing, delivering and evaluating FIMS and AIS courses.

Keywords: constructivist theory, Bloom's Revised Taxonomy, active learning, five-dimensional reflective cycle framework, evaluation, financial information management systems (FIMS), accounting information systems (AIS)

1. Introduction

FIMS or AIS is a cross-discipline subject, often taught by Computing and Accounting disciplines. The standard of the courses must meet the requirements of professional bodies. The American Institute of Certified Public Accountants and the International Accounting Education Standards Board have specified that new accountants should be sufficiently familiar with technology to assess risk and automated business processes (IFAC, 2007; Harrast, Strong and Bromley, 2010). FIMS or AIS is required as one of the core units for admission as an associate member of the Certified Practising Accountant (CPA) Australia and is included within the Commerce degree programs in many universities in Australia and the US (Lenard, Wessels and Khanlarian, 2010; Badua, Sharifi and Watkins, 2011; Essayyad and Ortiz, 2011; Zhou, Djatej, Chen and Senteney, 2011).

FIMS or AIS is a relatively new area in the Accounting discipline; in recent years, demand for it has grown (Ragan et al. 2006; Harrast et al. 2010; Lenard et al. 2010; Badua et al. 2011; Vatanasakdakul and Aoun, 2011; Zhou et al. 2011). However, it has been reported that the integration of technology into the curriculum has been slow (Roberts, Kelly, and Medlin 2007; Harrast et al. 2010). Students have reported a lack of database knowledge, Enterprise Resource Planning and relevant technology topics including business accounting systems, spreadsheets and encryption (Harrast et al. 2010; Kearns, 2010). Educators have lamented high failure rates among accounting information systems students (Yong and Aoun, 2008; Vatanasakdakul et al. 2011). Professional bodies, employers and academics have voiced concern that graduates lack sufficient meta-cognitive knowledge of information systems to perform their tasks or are ill-equipped to meet the challenges of working in modern organisations (Velayutham and Perera, 2008; Harrast et al. 2010; Rai, Vatanasakdakul et al. 2011; Tan and Sedera, 2010; Badua et al. 2011*)*.

Quality teaching of FIMS requires instructors to actively update their knowledge of accounting systems and information technology as well as to reflect on their teaching techniques. Reflection and reflective practices are taught within the education discipline (Birenbaum and Amdur, 1999; Carlo, Hinkhouse and Isbell, 2010),

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and have grown in popularity in other disciplines e.g. health education (Thorpe 2004; Plack and Greenberg 2005; Mann, Gordon and MacLeod 2009). Reflective studies have been introduced in engineering (Kelly, 2008), computing (Hazzan, 2002; Hazzan and Tomayko, 2003) and accounting disciplines (Samkin and Francis, 2008; Hancock et al. 2009, McGuigan and Kern, 2009, 2010). However, accounting students have found the concept of reflection difficult to comprehend and educators are warned about additional workload to staff (Samkin et al. 2008). Schön (1983), an influential thinker in developing the theory and practice of reflective professional learning, recognised the significant contribution of critical reflection in the development of professional knowledge. Schön provided examples of how other professions reflect, however he did not include accounting and IT professionals in his books. Little has been written about how accounting and IT professionals reflect on their practice and how they apply their reflections to the teaching of FIMS or AIS.

This paper explores the question: how can a five-dimensional reflective cycle framework assist educators in the design of FIMS or AIS courses? We discuss (1) the rationale for the importance of constructivist learning theory, cognitive load theory, reflective and action-research in teaching and learning, (2) Bloom's Revised Taxonomy, (3) the applications of Bloom and the reflective concept to design and deliver FIMS courses, (4) reflection on our teaching strategies in applying these concepts, (5) the application of the proposed five-dimensional reflective cycle framework in designing AIS courses and, (6) conclusions about the possible benefit of the framework to computing and accounting academics in the design and delivery of FIMS or AIS courses.

2. Literature review

Constructivism's perspectives on the role of the individual, on the importance of meaning-making, and on the active role of the learner have had great impact on instruction and curriculum design (Jones and Brader-Araje, 2002). Constructivist learning theory states that learning is an active process of creating meaning from experiences based on the learner's current or past knowledge (Dalgarno, 1996; Denton, 2012). Learners interpret concepts and principles in terms of the 'schemata' that they have already developed (Biggs and Tang 2011, p.22). The interpretation of concepts adds to learners' cognitive load. The cognitive load can be high when students are doing a task in a new domain as they have to learn new skills while performing the task. Cognitive Load Theory (CLT) states that human memory consists of sensory memory, working memory - where schemas are generated during learning - and long-term memory where knowledge is stored in the form of schemas (Sweller, Merrienboer and Paas 1998). The working memory is limited to holding about seven items (Miller, 1956). To overcome the limitations of working memory, schemas which help to systematically store and access information are created during the learning process (Sweller et al. 1998). A well designed instructional material would present the new information such that the schema generation is within the working memory of a learner (Sweller et al. 1998). Instructional strategies that encourage deeper thought and further consideration of course topics lead to robust discussions and heighten student interest and motivation levels. Deep learning occurs when students are able to connect with course topics, find value in them and see how to apply them to real-world situations (Delotell, Millam and Reinhardt, 2010). The performance of students in carrying out novel tasks will depend on their abilities and trainings in a similar domain, as well as their motivations (Maslow, 1987). To motivate students, it is important that students view AIS subject as being relevant to their needs (Kearns, 2010). To enhance relevance, Shulman and Luechauer (1993) recommended that educators use real-world problems, provide examples of the importance of information to the students' careers and encourage students to ask questions about the material. Roberts et al. (2007) called for accounting students to be actively involved in the learning environment in order to acquire the skills demanded by the profession.

Schön (1983) introduced the terms 'reflection-in-action' and 'reflection-on-action'. He describes reflection-in-action as 'thinking on our feet', the thinking and reflecting that happens in the midst of activity and, reflection-on-action as the thinking and reflecting that occurs after an event. Killion and Todnem (1991) extended Schön's concepts to include reflection-for-action which is to review what has been accomplished and identified constructive guidelines to follow to succeed in the given task in the future. The importance of reflection is noted in the literature and reflective capacity is regarded by many as an essential characteristic for professional competence (Mann et al. 2009). There are four key dimensions of reflection: *describe, analyse, transform meaning and action* (McGuigan et al. 2009). Biggs et al. (2011, p.45-46) introduced the term transformative reflection and defined it as a multi-stage process: reflect-plan-apply-evaluate.

Reflective practice requires action-research. Action-research is when teachers perform research on themselves, their students, classrooms, etc. for the purpose of improving teaching and learning (Carlo et al.

2010).Through action-research, the teacher is self-monitoring the improvement of their decisions and actions. Action-research involves changing the teaching practice using whatever on-the-ground evidence that the teacher can obtain and use to inform the right action (Biggs et al. 2011, p.51). The one-minute paper is a technique whereby students write brief answers to questions such as: What do I most want to find out in this class? What was the main point left unanswered in today's session? One-minute papers have been used in varied courses e.g. chemistry, art history, multicultural seminars, accounting, economics (Stowe, 2010). One-minute papers benefit students and instructors by providing feedback on what was clear and what may need further attention through the use of reflection (Johnson and Aragon, 2002).

3. Bloom's revised taxonomy

Bloom initiated a taxonomy of education objectives. Bloom's Revised Taxonomy incorporates the Knowledge Dimension and the Cognitive Process Dimension (Anderson and Krathwohl, 2001).
The Knowledge Dimension is grouped into four categories as follows:

- *Factual knowledge* is knowledge of discrete elements of content, including knowledge of terminology or of specific details or elements;
- *Conceptual knowledge* is knowledge of more complex, organised forms such as classifications, categories, principles or generalisations, theories models and structures;
- *Procedural knowledge* is the knowledge of how to do something, including the use of skills and algorithms, techniques and methods. This category also includes knowledge of 'when to do what';
- *Meta-cognitive knowledge* is a meta understanding; that is, the learner knows what they know and don't know and knows what to do to come to know. It is both self-knowledge and strategic knowledge (Anderson et al. 2001).

The Cognitive Process Dimension, which refers to learning processes, is grouped into six categories (Krathwohl, 2002):

- *Remember is to retrieve relevant knowledge from long-term memory;*
- *Understand is to construct meaning from instructional messages: oral, written or graphic;*
- *Apply is to carry out or use a procedure in a given situation;*
- *Analyse is to break material into parts and determine how they relate to each other and to the overall structure or purpose;*
- *Evaluate is to make judgments based on criteria and standards;*
- *Create is to pull elements together into a new pattern or structure.*

These categories differ in complexity, with Remember being the least complex and Create being the highest rung of the Cognitive Process (Krathwohl, 2002).
Table 1 lists examples of the verbs (actions) that can be used for each Cognitive Process to develop course materials and to assist in devising methods to teach at any level of the Knowledge Dimension. The verb that relates to a particular category of the Knowledge Dimension depends on the topics of the course. This list has been adapted from the diagram of the "task-oriented question construction wheel" from St Edward's University, (2004), based on the Bloom's original taxonomy.

Learners exhibit different capabilities in learning new tasks or transferring learnt abilities from one domain to a similar domain (Anvari, Tran and Kavakli, 2013; Lohman, 2006; Winner, 2000). In teaching methods that use a linear presentation of materials (e.g. textbooks, lectures) students gain knowledge at the most basic level and memorise scientific facts without understanding the underlying concepts (Cepni, Tas and Kose, 2006). By taking into account participants' cognitive process dimension instructors can design course materials that match users' cognitive processes (Anvari and Tran, 2013).

Table 1: Example of verbs used to describe each category of the cognitive process dimension

KNOWLEDGE DIMENSION	COGNITIVE PROCESS DIMENSION					
	Remember	Understand	Apply	Analyse	Evaluate	Create
FACTUAL KNOWLEDGE	Memorise Name Recite	Match Confirm Restate	Choose Collect Discover	Compare Contrast Distinguish	Compare	Add to
CONCEPTUAL KNOWLEDGE	Define Describe Identify State	Change Compare Paraphrase Express	Classify Draw Interpret	Analyse Categorise Classify Construct Differentiate	Apprise Assess Consider Relate Summarise	Combine Construct Organise
PROCEDURAL KNOWLEDGE	Locate Recognise Select	Explain Extend Relate Distinguish Illustrate	Apply Change Draw Make Modify Report Show	Analyse Examine Infer Select Investigate Point out	Judge Recommend Summarise Solve	Create Develop Formulate Role-Play Plan Produce What if?
META-COGNITIVE KNOWLEDGE	Draw Label Write	Defend Generalise Infer Predict Summarise Transform	Dramatise Draw Model Paint Prepare Produce	Research Separate Subdivide Survey Take apart	Criticise Critique Judge Recommend Weigh	Create Design Invent Hypothesis Originate

4. The applications of Bloom and reflective concept in designing and delivering FIMS courses

At a research-intensive metropolitan Australian University, FIMS courses have been offered to professional staff since 2007. FIMS consisted of five three-hour face-to-face interactive learning workshops, spanning a nine-week period which covered General Ledger, Purchase Requisitions, Financial Information Management Reports and Accounts Receivable modules. Participants were administration and finance staff, department and faculty managers, post-graduate students and academics.

4.1 Reflective practices

To reflect-on-action (Schön, 1983) and reflect-for-action (Killion and Todnem, 1991), the author, Tran, kept a reflective journal in which she described her teaching and learning environments, analysed theories and techniques (such as constructivist and cognitive load theory), summarised action-research findings, noted her reflection and self-evaluated her teaching methods. Reflection was her teaching strategy and the reflective journal was a tool for her reflection.

To address the needs of a diverse group, participants provided expectation forms prior to the first hands-on workshop. To engage participants in the course materials, Tran reflected upon their expectations and prior knowledge and incorporated these into the training program. A few days prior to each training workshop, participants emailed Tran one-minute papers (Stowe, 2010), answering two questions: 'what did you find useful in the last training workshop?' and 'what questions remain on your mind?' The one-minute papers encouraged participants to raise queries and provided Tran with a means to follow up. From participants' expectation forms and one-minute papers, topics that needed to be addressed were identified. Issues were reflected upon, action-research was conducted and remedial actions were carried out. For example, various methods of delivery were adapted to suit participants' special needs (e.g. more theory or more practice; more financial reports or more procedures). Training documents were regularly updated to enhance participants' learning abilities. If the questions raised in one-minute papers were private Tran answered them via email. Questions that were general in nature, were answered in the workshops. Tran demonstrated how to resolve them using real-world scenarios.

4.2 Teaching and learning resources and activities

Bloom's Revised Taxonomy Knowledge Dimension was used to identify the Factual, Conceptual, Procedural and Meta-cognitive knowledge parts of FIMS curriculum. Table 2 shows the application of Bloom's Revised Taxonomy Knowledge Dimension to identify teaching and learning processes. Table 2 contains samples of two Knowledge Dimension categories (Conceptual and Procedure) listed in order of the Cognitive Process Dimension from the lowest to the highest rung.

Table 2: Samples of the application of Bloom's Revised Taxonomy Knowledge Dimension into the learning and teaching of FIMS

TEACHING AIMS: **KNOWLEDGE DIMENSION**	LEARNING OUTCOMES	LEARNING PROCESSES	TEACHING PROCESSES & LEARNING ACTIVITIES	**COGNITIVE PROCESS DIMENSION**
Conceptual Knowledge of FIMS reports.	Module 1: Identify the various types of reports that are used by managers and business analysts and run some simple reports.	Memorising key terms. Understanding concepts.	Explanation; Practice with feedback.	**Remember** This is an example of the lowest level of the Cognitive Process Dimension.
Conceptual Knowledge of the University's Accounting Ledgers.	Module 1: Compare and contrast the various account components and selection codes of various ledger accounts.	Recognising, understanding rules and concepts; Interpreting ledgers' account codes; Understanding how the account codes work within FIMS context.	Explanation; Reading; Practice with feedback.	**Understand** This is an example of the second lowest level of the Cognitive Process Dimension.
Procedural Knowledge of Purchase Requisitions Processing.	Module 2: Generate Purchase Requisitions, reports and interpret the data.	Raising Purchase Requisitions; Understanding Purchase Requisitions Processes; Interpreting Purchase Requisition reports.	Case Studies; Exposure to Real-life worked-examples and processes; Modelling by instructors; Practices with feedback.	**Apply and Analyse** This is an example of the mid-level of the Cognitive Process Dimension.
Procedural Knowledge of Tax Invoices.	Module 3: Monitor the status of processing of Tax Invoices.	Understanding cause and effect in relation to certain functions; Distinguishing transactions in various scenarios.	Case Studies; Exposure to Real-life worked-examples and processes; Modelling by instructors; Scaffolded exercises; Practices with feedback.	**Evaluate** This is an example of the second highest level of the Cognitive Process Dimension.
Procedural Knowledge of AR Tax Invoices.	Module 4: Create an AR scheduled Tax Invoice and, interpret the features and components of a Recurring Documents Tab.	Recognising rules, analytical reasoning to be able to discriminate between different processes in various scenarios; Developing meta-cognitive, self diagnosed strategies.	Explanations; Case Studies; Exposure to Real-life worked-examples and processes; Modelling by instructors; Scaffolded exercises; Repeated practices with feedback.	**Create** This is an example of the highest level of the Cognitive Process Dimension.

The cognitive load on the memory and the learn-ability of learners depend on the training materials (Sweller et al. 1998). The cognitive load on participants was considered, in particular the participants' expectations and prior knowledge; worked-examples and scenarios were used as the modelling technique; training documents were illustrated with pictures and descriptions of real-world scenarios. All participants had access to the university financial system to practise. Participants actively learnt during the three-hour workshops then independently practised worked-examples documented in the course materials within the training environment.

4.3 Evaluation and assessments

To develop questionnaires for evaluation, Tran used the Peer Review of Learning and Teaching model – also known as the PEER model (Macquarie University, 2012). This model consists of templates and check list forms with questions *Why; What; Who; How; Reporting; and Follow up*. Questionnaires suggested in the PEER model were adapted. Twenty-five questions were developed under five headings:

- Planning and organisation;
- Documentations and contents;
- Training strategies and resources;
- Presentation and management;
- Feedback and follow up of participants.

Tran employed self-assessment techniques. Participants' feedback and surveys confirmed the benefits listed by Falchikov and Thompson (2008) in involving students in assessment.

Empowering learners: Participants actively engaged in learning during the three hour workshop. Active learning with technology had positive effects on student learning; real-world application of the materials heightened students' interest and enhanced their learning abilities (Ragan et al. 2006).

Encouraging attention: Through one-minute papers we encouraged participants to raise queries and provided constructive and practical feedback. By involving participants, we were able to empower them, encourage dialogue and attract attention.

Creating partnerships: Through expectation forms and one-minute papers we encouraged participants to raise questions that would not otherwise have been raised in the class.

Fostering proactive strategies in teachers and students: Constructivism emphasises development of learner's ability in solving real life problems (Huang, 2002). One-minute papers and surveys helped to identify topics to be addressed and strategies to deliver them.

Reflection: By asking participants to submit one-minute papers and to reply to the survey questions, we encouraged them to reflect-on-action.

Enhancement of learning: Prior knowledge significantly influence the ways individuals make meaning out of instruction (Jones and Brader-Araje, 2002). Novices (e.g. non financial staff) remember the facts but the experts (e.g. finance managers) evaluate existing methodologies and create new ones as the information presents meta-cognitive knowledge (Anvari and Tran, 2013). By recognising participants' prior knowledge from their self-assessments, we were able to develop course materials that challenged them.

Performance: Participants were more engaged in class discussions when challenged to perform at the higher rung of cognitive processes. This is consistent with research results by Arum and Roksa (2011) that when high-order thinking is included in the coursework students perform better on tests measuring critical thinking.

Personal development/autonomy: Our case supports prior studies that a hands-on approach motivates students which subsequently increase their understanding of the business processes (Draijer and Schenk, 2004). Participants confidently use the university's FIMS after attending FIMS courses. Those at managerial levels have sent new staff to the courses.

5. The reflection of our teaching strategies in applying these concepts

Tran and Anvari (2013) proposed the five-dimensional reflective cycle framework that can be used to facilitate reflective practice among academic and professional instructors for designing and delivering high quality FIMS and AIS courses. The reflective cycle consists of five dimensions: Describe, Analyse, Transform, Act, and Evaluate. For every process or issue identified by the instructor these five dimensions should be considered in a cycle as illustrated in figure 1.

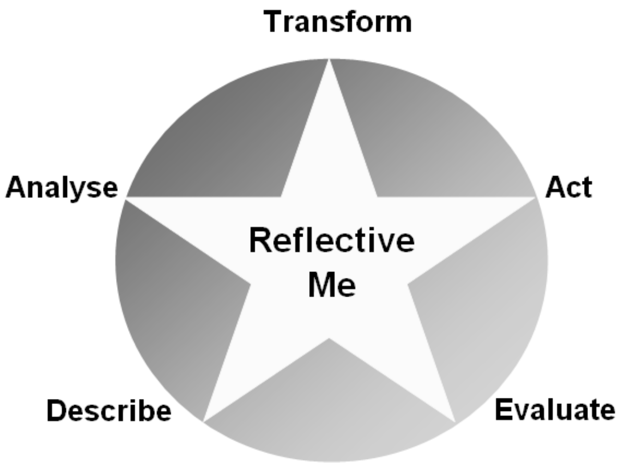

Figure 1: The five-dimensional reflective cycle framework

- **Describe**: This dimension is to describe the process or the issue requiring reflection. The instructors use reflective journals or diaries to describe it. For example, when the instructors design course materials, they first describe who the learners are and what they want to learn; what contents the instructors need or wish to include; what survey or research questions the instructors need to formulate. Another example is that the instructors reflect on their teaching methods after each class then describe an event or an incident which they wish to reflect-on-action in their journals. *A reflective journal enables a teacher to take regular notes of events and observations, record a tentative hypothesis and develop new understandings similar to a scientist keeping laboratory notes* (UTS 2007).

- **Analyse**: This dimension is to analyse the process or the issue which the instructors have described in dimension one. The instructors analyse the methods which they plan to act or how they go about to obtain the necessary information and gain the required knowledge. Moon (cited in McGuigan et al. 2009) defines the analysis dimension as '*a mental process with purpose and/or outcome in which manipulation of meaning is applied to relatively complicated or unstructured ideas in learning or to problems for which there is no obvious solution.*' For example, the instructors use the Bloom's revised Taxonomy to analyse how to design course materials that encourage critical thinking from the learners or to analyse the intended learning outcomes in comparison with the participants' learning outcomes to identify issues. Another example is that the instructors reflect on their actions or on the questions raised by learners in the one-minute papers to determine what they could have done better.

- **Transform**: This dimension often requires action-research or reflect-on-action to transform meaning of the above analysis. *Action-research is about creating awareness and understanding, in order to improve a certain practice* (Mahani and Molki, 2012). For example, the instructors conduct action-research to find possible solutions to an issue and, develop examples that they can use to illustrate the issue. Another example is that the instructors introduce innovative teaching methods to effectively transmit new techniques to inspire learners personally engage with learning materials or design training materials that keep the cognitive load on the working memory within the limits of a person.

- **Act**: This dimension is to act on issues that the instructors have decided in the transform dimension. For example, the instructor conducts a literature review and learns that for deep learning to occur students need to connect with course topics and apply them (Delotell et al. 2010). The instructor then decides to use real-world applications and hands-on approach to address issues raised in the one-minute papers and involves learners in making decisions on the learning activities that are applicable to them.

- **Evaluate**: This dimension is to evaluate whether the instructors' actions in the act dimension indeed enhances learning and teaching experiences of the instructors and the participants and, to monitor their actions to gauge their success. Expert teachers evaluate their teaching methods to more effectively motivate students to solve their own problems (Biggs et al. 2011, pp 45-55). For example the instructors employ the PEER model to evaluate the effectiveness of their teaching strategies and methods. Another example is that the instructors practice reflection to self-evaluate and commit to continuous improvement that enhances teaching and learning experiences.

The above five-dimensional processes are repeated continually. Biggs et al. (2011, p.45) emphasises that expert teachers continually reflect on their teaching.

6. How the five-dimensional reflective cycle framework can assist educators in the design of AIS courses

The reflective cycle framework consists of five processes: Describe, Analyse, Transform, Act and Evaluate. Following is a practical example of how the five-dimensional reflective cycle framework can assist educators in the design of AIS courses.

6.1 DESCRIBE the issue requiring reflection

At a research-intensive metropolitan Australian University, AIS is a 2nd year accounting subject taught over a 13 week semester. Topics covered are Information Systems fundamentals, database concepts, businesses processes, controls, ethics, systems development methodologies and documentation. Tutors had about half-an-hour to explain database concepts to students in a traditional face-to-face teaching and learning class. The time allocated was insufficient as explanation is not enough for students to comprehend a complex topic such as database. Vatanasakdakul el al. (2011) reported that majority of the students could not see the relevance of AIS subject for their future accounting careers and urged that students' needs and perceptions be seriously considered in the design and review of AIS curricula.

6.2 ANALYSE the issue

Many AIS students do not understand how accounting concepts are integrated within an accounting system nor do they perceive the importance of this understanding (Normand, 2011). Relational databases are the dominant technology for storing financial information; '*an understanding of relational database technology unlocks a higher level of knowledge*' (Harrast et al. 2010). It is essential for accounting students to have an understanding of databases (Harrast et al. 2010; Zainol and Nelson, 2011; Zhou et al. 2011). However the results of the surveys of accounting students at three accredited Association to Advance Collegiate Schools of Business (AACSB) and Midwestern university business schools revealed that learning database technology is a moderate priority for accounting students; databases are highly complex and teaching database technology presents a major paradigm shift from other office suite applications such as spreadsheets (Harrast et al. 2010). Despite the call for databases to be included in accounting education, from literature review and the authors' interaction with accounting and business students and graduates, only a small percentage of accounting and business students have a limited conceptual knowledge of databases.

Active learning with technology has the ability to bring outside resources into the classroom and has a positive impact on students (Ragan et al. 2006). An active learning approach takes maximum advantage of the benefits derived from socio-constructivist learning designs (Bower, Hedberg and Kuswara, 2010). Socio-constructivist theory states that interaction between learners and their peers is a necessary part of the learning process (Vygotsky, 1978). Harrast et al. (2010) reported that '*students have a strong preference for practical applications of the concepts they are learning in accounting*'. At Pepperdine University AIS students were required to complete a project covering data normalisation and Microsoft Access implementation; Vician et al. (2012) reported that during the implementation of the projects, students gained deeper understanding of the concepts they learnt in the lecture theatre.

6.3 TRANSFORM meaning of the analysis

Based on the above analysis and reflecting on our own experiences, we recommend a direct instructional approach and an active learning approach to teach database concepts to accounting and business students.

According to the direct instructional approach model, a new body of knowledge can be broken into small steps with clear objectives which are based on known knowledge, providing learners with opportunity to practise with feedback on each step learnt; a direct instructional approach is appropriate when students are yet to form understandings about a particular topic (Magliaro, Lockee, & Burton, 2005).

An active learning approach, takes into the account students' strong preference for practical applications. It facilitates interaction between educators and students by making educators' guidance and feedback available during class. This is a preferred learning style of the current generation of students, known as NetGen learners (Walters, 2011). By integrating real-life worked-example scenarios into teaching, students can see the relevance of AIS subject to their needs and future careers, thus they are motivated (Kearns, 2010) and are encouraged towards deep learning (Delotell et al. 2010).

The blend between direct instructional and active learning approaches has been successfully implemented at a research-intensive metropolitan Australian University to deliver FIMS courses to professional staff (Tran and Anvari, 2013).

6.4 ACT on the decisions decided in Transformation dimension

6.4.1 A direct instructional approach:

The direct instructional approach teaches students subject matter, underlying concepts, thought processes and problem solving (Bower et al. 2010). The purpose of this approach is to teach students factual and conceptual knowledge of database concepts. Even though students learn at the low rung of the cognitive process dimension, it is essential that they remember and understand essential terms and concepts before they can move to the higher level of the cognitive process dimension.

To design course materials we have successfully used the Bloom's Revised Taxonomy as a framework (Tran and Anvari, 2013). Table 3 shows the application of the Bloom's Revised Taxonomy Knowledge Dimension in teaching database concepts to accounting and business students. It contains examples of learning outcomes, samples of teaching and learning processes and learning activities. The Knowledge Dimension categories are listed in order of the Cognitive Process Dimension from the lowest to the highest rung.

Table 3: Samples of the application of Bloom's Revised Taxonomy Knowledge Dimension in teaching database concepts to accounting students.

TEACHING AIMS: **KNOWLEDGE DIMENSION**	LEARNING OUTCOMES	LEARNING PROCESSES	TEACHING PROCESSES & LEARNING ACTIVITIES	**COGNITIVE PROCESS DIMENSION**
Factual Knowledge of database.	Identify database key terms such as tables, fields, rows, columns, attributes, normalisation, relationships and entity.	Memorising key terms. Understanding concepts.	Explanation; Listening; Reading; Memorising.	**Remember**
Conceptual Knowledge of database components.	Compare and contrast the various database components such as tables, queries, reports.	Understand key database components. Understand how tables work. Express the differences between tables, queries and reports.	Explanation; Worked-examples used as modelling by educators; Reading; Thinking; Practice on using worked-example with	**Understand**

TEACHING AIMS: **KNOWLEDGE DIMENSION**	LEARNING OUTCOMES	LEARNING PROCESSES	TEACHING PROCESSES & LEARNING ACTIVITIES	**COGNITIVE PROCESS DIMENSION**
			feedback.	
Conceptual Knowledge of relationships normalisation.	Interpret and differentiate various table components such as rows, columns, fields, attributes, normalisation, relationships and entity.	Construct various tables; Classify and label key components such as rows, columns, fields and attributes.	Case Studies; Exposure to Real-life worked-examples and processes; Modelling data structures by educators; Practices with feedback.	**Apply and Analyse**
Procedural Knowledge of first, second and third normalisations.	Solve a normalisation problem.	Understand cause and effect in relation to remove or add certain fields to a table; Distinguish transactions in various tables.	Case Studies; Exposure to Real-life worked-examples and processes; Modelling by educators; Scaffolded exercises; Practices with feedback.	**Evaluate**
Meta-cognitive Knowledge of Relational Database concepts.	Interpret the features and components of a small Relational Database. Create tables and interpret their relationships. Create queries to query a simple database.	Recognise rules and analytical reasoning to be able to discriminate tables' components; Creating tables and queries; Recognise the various applications of Relational Database for accounting and business processes.	Explanations; Case Studies; Exposure to Real-life worked-examples and processes; Modelling by educators; Scaffolded exercises; Repeated practices with feedback.	**Create**

Video snippets and PowerPoint slides, used worked-examples of real-world scenarios as the modelling technique to introduce key concepts such as normalisation, table, relationships and entity to students is in line with direct instructional approach and students can practise the subject on their own. At the end of the direct instructional approach session, students write one minute papers. Through one-minute papers educators encourage students to stop, focus their thoughts and pinpoint their questions (Stowe, 2010).

6.4.2 An active learning approach:

The purpose of active learning approach is to teach students procedural and meta-cognitive knowledge. We have found that three-hour intensive hands-on workshops on real-world scenarios benefit the learners and maximises their learning abilities (Tran and Anvari, 2013). Hands-on approach motivates students and supports their understanding of business processes (Draijer and Schenk, 2004). Students would learn at the higher rung of the cognitive process dimension as they apply, analyse, evaluate and create tables and queries using a database. To teach database concepts to 2nd year AIS students, educators can implement Information and Communication Technology (ICT)based active learning in the computer laboratory, integrating real-life worked-examples that demonstrate the usefulness and importance of database knowledge into course materials.

To implement ICT-based solutions, we will discuss:

1- ICT applications;

2- reasons for selecting the application and its suitability;

3- how the proposed applications can enhance students learning abilities;

4- design the proposed applications;

5- how to use ICT applications to integrate real-life worked-examples into teaching.

6.4.3 ICT applications

Two interactive workshops of three hours each would be sufficient for teaching database concepts to accounting and business students. Relational databases are the dominant technology for storing financial information. Microsoft Access has been used as a tool for students to practise database concepts learned (Vician et al. 2012). Students learn to design and create tables and query financial information based on real-life worked-example scenarios modelled by the educators.

6.4.4 Reasons for selecting the application and its suitability

Microsoft Access database is easy to learn as it utilises a visual query language, Query By Example (QBE) which bypasses the need for users to learn SQL programming language (Pillsbury and Wang, 2011). Loraas and Searcy (2010) used Microsoft Access to teach students how to analyse a complete general ledger that consists of a year's worth of transactions. From our own professional experiences, we have found that Microsoft Access is an effective and efficient tool to design prototype financial applications and it is not difficult to learn.

6.4.5 How the applications can enhance students learning abilities

Due to a small amount of time allocated to teach database concepts in traditional face-to-face tutorial classes, video snippets and PowerPoint slides will help students to learn before and after classes. The direct instructional approach is considered more appropriate when students are yet to form an understanding of the topic (Magliaro et al. 2005). The active learning approach allows students to implement theoretical discussions in a meaningful way (Harrast et al. 2010). Active learning with technology has positive effects on students learning; real-world application of the materials heighten students' interest and enhance their learning abilities (Ragan et al. 2006).

6.4.6 Design the applications

The ICT resource-based solutions contain examples and instructions that are related AIS topics. The active learning approach is designed to engage students by asking them to apply course concepts to real world environments and learn-by-doing. Database topics taught during the later weeks of the course would facilitate worked-examples to reflect the examples from other topics of the AIS. Students can view the video as many times as they need. They can capture the screens and make notes.

6.4.7 How to use ICT applications to integrate real-life worked-examples into teaching

Using real-life scenarios to teach database concepts and integrate the teaching of database with other AIS topics such as Revenue Cycle or Expenditure Cycle would benefit the students by reinforcing topics learnt in the AIS subject. For example for the Revenue Cycle, educators could develop worked-example models that consist of Customer, Sales person, Product, Order, Inventory, Shipment and Invoice tables and use these tables to teach integration of revenue cycle and transactions into a system. By getting students to solve problems that they will meet in their professional careers, educators help students to see the relevance of the AIS subject for their future careers, thus heighten their motivation. By integrating the teaching of database concepts with other AIS topics, students gain procedural and meta-cognitive knowledge.

6.5 EVALUATE

The blend between direct instructional and active learning approaches to teach database concepts can be evaluated in several ways: a students' perception survey questionnaire; pre- and post-test measures of students' knowledge of database concepts before and after the three-hour workshops; and students' results at the completion of their assignments and exams. Perception surveys cover questions about relevance, motivation, understanding, perceived difficulty and effort in learning database concepts. Pre- and post-test measures of students' knowledge of database concepts cover questions which test all levels of the knowledge dimension and the cognitive process dimension. Comparison of the past and future exam results are measured to evaluate and analyse the effects of teaching database concepts using blended teaching.

7. Conclusions

High quality teaching of FIMS or AIS requires instructors to actively update their knowledge of accounting systems and information technology and to reflect on their teaching techniques. Constructivist Learning theory and Cognitive Load theory help instructors to design course materials that assist learners to absorb new information.

Systematic reflection, within the proposed framework, is an effective strategy. Furthermore Bloom's Revised Taxonomy, the Peer model, one-minute papers and expectation forms are tools that can assist instructors to reflect, and ultimately to design and deliver courses that enhance participant's learning abilities. Being a reflective instructor enables teachers to learn about themselves and to improve their teaching techniques.

We have provided insights into the application of constructivist theory and reflective practice strategies in teaching FIMS. The constructivist framework adopted in our case is a blend of the participants' personal and developmental position as well as a blend of ICT-based solutions and hands-on activity workshops. The implication of our study is that three-hour intensive hands-on FIMS workshops on real-world scenarios will benefit the learners and maximises their learning abilities. We outlined a combination of a direct instructional approach and an active learning approach that promotes deep and active learning among FIMS and AIS students. We presented examples which apply Bloom's Revised Taxonomy to design materials for teaching relational database concepts to accounting students. We proposed the five-dimensional reflective cycle framework and demonstrated its application as reflective practices among academic and professional instructors.

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