MAKING FRAUD AUDITORS: INTRODUCING A COMPUTER MEDIATED TOOL DEVELOPED TO ENHANCE FRAUD DETECTION SKILLS.

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ABSTRACT
Given the inability of auditors to detect fraud, fraud education matters. This research describes an experiential learning activity developed to teach fraud auditing and reports a survey which evaluates audit students’ perception. Drawing from constructivist learning theory and Bonner’s (1999) integrative framework of teaching methods this paper describes a new online activity to teach fraud detection. A key design concept is that learning objectives involving cognitive skills require methods that promote active learning on the part of participants. An online environment with a confidential team discussion forum is the cognitive tool that enables critical thinking, reflection and problem solving. The research employed final year accounting students as surrogates for entry level accountants. Participants report an enhancement in knowledge and problem solving skills in the fraud domain after completing the online team activity. The contribution of this research is that fraud detection while a complex task can be learned using a computer mediated approach.

Key Words: audit teams, audit education, fraud detection
INTRODUCTION

Fraud detection is a complex task so not easily learned. Johnson, Grazioli et al. (2001 p. 355) found “approximately ten per cent of auditors are able to consistently detect the frauds in the cases submitted to them for review”. Additionally Wright (1987) offers that experience makes a difference in auditor judgments for complex audit tasks. In 1998, at the request of the Securities Exchange Commission chairman, the Public Oversight Board, an independent private sector body, appointed the Panel of Audit Effectiveness to undertake an extensive study. They reviewed and evaluated how independent audits of the financial statements of public firms are performed and serve the public interest. One recommendation was that auditors should perform some ‘forensic type’ procedures during every audit to enhance the prospects of detecting material financial statement frauds.

Krambia-Kapardis (2001) argues that the fraud domain, perhaps because of its complexity, is under-explored and often poorly understood. Recognisable patterns of behaviour or set of cues indicate a knowable theme or risk profile. The concept of knowledge and experience with ‘profiling’ or financial fraud themes is based on the argument that “neither a crime nor an offender is completely unique” (Jackson & Bekerian 1997 p. 2). Investigating a similar concept when identifying patterns and fraud risk, Ramos (2003 p. 29), notes the need to use “intuition, judgment, and experience to look for patterns in the identified fraud risks”. In other words, there are limits to the number of motives and the methods of carrying out fraud – there are always patterns to be identified and to be compared with those in other cases. This research confirms the importance of experience with fraud as the ability to recognise a pattern must involve the application of prior knowledge and experience.

Constructivist theories suggest that learner’s build new learning on their existing knowledge and experience. This new teaching tool is a knowledge and skill acquisition activity (KSAA) which aims to enhance audit students’ ability to detect fraud in three common fraud patterns (themes or models). The activity focuses on enhancing fraud detection skills by developing critical thinking skills, and pattern recognition of common frauds. Important elements of this activity are the online environment, the fraud detection life cycle (McCormack 2011), undergraduate audit knowledge, the experience of fraud detection using a problem-based learning case, and an expert tutor. The KSAA uses a slightly adapted problem-based learning (PBL) case published by Durtschi (2003). The online teaching delivery extends the case to a distributed PBL case (Zualkernan 2006). In the activity design, Zualkernan’s (2006) framework for developing an authentic constructivist online learning environment compliments Bonner’s (1999) framework. The participants are 54 undergraduate audit students at an Australian university in the subject Auditing Assurances Services. This online learning activity provides audit students with fraud detection experience in a ‘safe’ environment, that is, there are no consequences of failure to detect fraud as in the real-world.

KSAA FRAMEWORK AND CONCEPTS

Integrative framework for choosing teaching methods

Drawing on Gagne’s (Gagne & Medsker 1996) taxonomy that focuses on cognitive skills, Bonner (1999) espouses that a single teaching method cannot create all the conditions necessary for a given learning objective. The Bonner (1999) framework distinguishes Verbal, Intellectual and Cognitive learning and specifies teaching methods to employ for cognitive
skill learning objectives in accounting courses. Reading and lectures achieves Verbal learning (knowledge of rules and facts).

For higher levels of learning, Intellectual learning is the application of these skills to novel situations, a key challenge for students and a Cognitive Strategy draws meaning from seemingly unrelated information. Therefore, Bonner (1999) recommends active methods such as working cases which apply these skills to develop the more complex skills including Cognitive Strategies.

Constructivist learning theory
Constructivist learning theory is situated within a larger constructivist epistemology, or way of knowing, that acknowledges multiple, socially constructed truths, perspectives and realities versus a single reality (Lincoln & Guba 2000). Knowledge acquisition is contextual, situated, problem-based, social and authentic. The basic premises of constructivism are (Liu & Chen 2010):

- Knowledge is constructed, not received;
- Knowledge acquisition is a process, not a product;
- Participants’ prior knowledge affects knowledge acquisition;
- Knowledge acquisition requires effort and purposeful interaction with the environment.

Problem-based learning cases in accounting courses
The first researchers to suggest using PBL in an accounting curriculum were Johnstone and Biggs (1998). They used modelling in auditing research and showed how it is appropriate for final year accounting participants as a method to develop accounting skills and knowledge. PBL cases are suggested as supplemental materials in an auditing course or as ‘teaching vignettes’ in seminars designed to improve the ‘forensic type’ skills of professional auditors (Durtschi & Fullerton 2005).

In a traditional PBL curriculum, participants spend considerable amounts of time in face-to-face discussion with tutors in small groups, reading and discussing articles, reflecting on and responding to text-based case materials. In other disciplines there has been interest in considering ways in which technology might be harnessed to support a PBL approach to teaching and learning. Several theorists have discussed the connection between a constructivist approach to designing environments for student learning and problem-based learning (Koschmann et al. 1994; Savery & Duffy 1996; Grabinger, Dunlap & Duffield 1997; Jonassen 1998).

PBL instructors have made use of computer-mediated communication (CMC) to support reflective discussions with the PBL study groups, in both distance and blended educational settings (Barrows 2002; de Leng et al. 2006; Stromso, Grot tumt & Lycke 2007). Other researchers have harnessed web-based multimedia to enrich problem-based case material (Kamin et al. 2003; Balslev et al. 2005; de Leng et al. 2007). Hoffman and Ritchie (1997) argue that multimedia can be utilised in a range of ways to overcome some of the problems inherent in PBL based on text-based cases. They suggest that the use of multimedia case material can enhance the representational richness and authenticity of the stimulus case; offering a richer, more complex and ill-structured rendition.
The selection of the online medium to support the authentic, experiential activity enabled the group to participate from distributed sites. Zualkernan (2006) termed this innovation Distributed Problem-Based Learning (DPBL). He argues that DPBL augments PBL as the information presented during DPBL was more likely to be well thought-out and articulated than in face-to-face sessions with the added value of being able to review session transcripts from any time and place. This design was developed for authentic constructivist e-learning environments which require operative knowledge to solve complex problems in real-world settings. Zualkernan (2006) suggests these domains provide an ideal environment for developing authentic constructivist e-learning environments. The framework characterises dimensions of a typical constructivist environment in terms of pedagogical design, architecture, the environmental context and what is learned.

**Critical thinking skills and higher order thinking skills**

An often quoted definition of ill-structured problems by Kitchener (1983 p. 222) is, ‘conflicting assumptions, evidence, and opinion which may lead to different solutions’. Higher order thinking skills are required to solve ill-structured problems. However higher-level skills cannot be acquired until lower level skills are in place (Bonner 1999). ‘Cognitive presence’ Garrison and Anderson (2003) describe as the intellectual environment that supports sustained critical discourse and higher order knowledge acquisition in an online learning environment. This concept derives from Dewey’s (1938) reflective thinking model. Garrison and Archer (2000) believe most forms of thinking can be interpreted within this framework, creative, critical and intuitive. Critical thinking both authenticates existing knowledge and generates new knowledge.

Critical thinking is an inclusive process of higher-order reflection and discourse. These overlapping concepts associated with reflective and critical thinking derived from Dewey (1938), are offered in a generic model of critical thinking and intuition that considers imagination, deliberation and action (Garrison & Archer 2000). Their model is useful in making sense of related concepts such as creative thinking, problem solving intuition and insight. Creative thinking is a divergent process focused on the early stages of critical thinking whereas problem solving is mostly focused on convergent thinking leading to a goal focused solution to the problem. The four main stages are the trigger, a divergent process that necessarily must converge and then resolution.

Concepts and processes related to intuition and insight are important creative and subconscious inductive processes that according to Dewey (1938) are a product of deliberation. Intuition is a deep and integrated understanding of a phenomenon and is generally a vague, inexact awareness of the key to a problem that provides useful direction and arises from experience. Intuition differs from insight which is the classic ‘eureka’ experience where clear solutions appear. This arises as a result of reflection that is, being immersed in a well-defined problem. Researchers seek to understand these cognitive processes to recognise how individuals in teams create a new personal construction of knowledge as a result of social interaction and negotiation within the group. The collaborative (team) yet reflective (individual) process of e-learning has great potential for facilitating critical thinking that is core to the learning experience (Garrison & Anderson 2003). Dewey (1938) argues practical inquiry is grounded in experience and experiences are a resource for learning.

**Computer supported collaborative learning and higher order thinking skills**

The beneficial use of online communication and collaborative tools is well researched as providing a structured environment which allows team members to collaboratively generate
ideas, make decisions, and solve problems (Koschmann et al. 1994; Hedberg et al. 1998; Palkoff & Pratt 1999; McConnell 2000; Laurillard 2002; Salmon 2003; Beatty & Nunan 2004; Brett 2004; Murphy 2004; Kim & Bonk 2006). While much of this research has focused on best practice and engagement another identified benefit of teams communicating electronically is that it minimises most of the process losses associated with face-to-face communication in particular (Lynch, Murthy & Engle 2009). One such process ‘production blocking’ is a cognitive interference mechanism that inhibits idea generation productivity, well documented by psychological researchers such as Diehl & Stroebe (1991); Mullen et al. (1991); Nijstad et al. (2003).

Audit research has examined the effects of collaborative decision-making in a computer supported environment with respect to a going concern judgment (Ho 1999) and audit team effectiveness (Murthy & Kerr 2004). Additionally, Jones and Cooke (2006) researched the emerging area of what insights can be achieved from capturing the discussion threads of participants actively engaged in problem solving and thinking processes which is made possible by the monitoring and analysis of online interactions.

A full discussion of text-based communication is beyond the scope of this research. However, there is sufficient evidence to suggest that writing has some inherent and demonstrable advantages over speech when engaged in critical discourse and reflection. One obvious advantage of text based communication is the permanent record for researchers and collaborators compared to face-to-face discussion environments. Ong (1982) argues that speech is critical to the development of consciousness however writing fosters more conscious interaction between persons. The advantage of the written word suggests Blanchette (2001) is that interaction in the on-line context was more intellectually demanding than that found in face-to-face. It appears that because students have more time to reflect and be more specific in content and they can focus and reflect on higher-order cognitive questions and their responses. In summary, text-based communication in an online environment has advantages to support collaborative constructivist approaches to teaching fraud detection.

The results of meta-analysis on research that supports collaborative learning reveal that using collaborative techniques with technology could increase high-level thinking skills, social interactions, critical reflective capabilities, and creativity (Warschauer 1997; Smith & Robinson 2003; Vauras et al. 2003). While considerable attention has been paid to collaborative learning, less attention has been paid to issues of methodology and analysis methods to evaluate the quality of the collaborative learning community (Strijbos et al. 2006; Valcke & De Wever 2006).

In the United States, Lynch, Murthy & Engle (2009) found a difference between face-to-face and electronic brainstorming by audit teams. They found that brainstorming effectiveness is significantly higher for teams brainstorming electronically relative to teams using traditional face-to-face brainstorming.

**DATA AND METHOD**

The activity’s main purpose focuses on approaches that enable critical thinking skills. The online KSAA was an assessment task in the third year undergraduate audit subject. Fifty-four students chose to participate in the study. Students received a twelve page pack of background material that replicated authentic background company information and relevant financial documents. The reason for choosing the Durtschi (2003) case from the many published cases is that this one is based on a not-for-profit sector of the sporting club industry. The prevalence of fraud in the sporting sector is often highlighted in the media and
most participants were familiar with this type of organisation. The BDO Not-for-profit, Fraud survey, Clubs sector (2010) found eighty-eight per cent of respondents assessed fraud as problematic for the sector. Additionally, this sector comprises small organisations, mostly less than twenty employees, with few internal controls and variable governance (BDO 2010). Three of the four most common frauds identified; cash theft; theft of inventory; and payroll fraud are embedded in this activity.

This section discusses the teaching and learning methods selected which underpin the design of the constructivist online environment. The primary components of the framework contain four stages: specify accounting learning objectives, classify generic types of learning, choose teaching method(s) and select the medium. The development of the research design under these four stage subheadings is discussed below.

**Stage One: Specify accounting learning objectives**

The five intended participant learning outcomes from the online activity are;

1. Demonstrate that data is not accepted at face value and participant can decide on its reliability and value.
2. Reflect on own learning arising from the process of group communication and collaboration.
3. Report findings in a manner that can be understood by a wide audience.
4. Review and think critically about the information on the content areas in the activity.
5. Read and think about the information collected and form own opinion and questions.

**Stage Two: Classify generic learning types**

Learning objectives one to three relates to the ‘Intellectual skills’, Rules and Higher-Order Rules. Learning objectives four and five relate to ‘Cognitive strategies’ which is the last category in Gagne’s taxonomy.

**Stage Three: Choosing teaching method(s)/approach**

KSAA employs a blended teaching and learning approach (Thorne 2003) which integrates online and traditional teaching methods to teach fraud detection awareness including the strategic implementation of PBL.

**Traditional approach**

Firstly, traditional teaching methods of lectures, tutorials and a text book (Arens et al. 2007) introduced the relevant fraud audit knowledge. Participants read the textbook, worked-out example problems and scenarios, listened to lectures and answered short objective questions in tutorials. The traditional teaching provided the participants with the pre-requisite skills and knowledge to apply in the KSAA.

**Online teaching and learning approach**

The role play, a published text based case, developed by Durtschi (2003), was modified with permission as one element of the activity which is the educational tool. The most important content adaptations to this published case were to suit an authentic audit environment based on the researcher’s tax audit and internal audit experience, the Australian financial institutional environment, and the Australian cultural environment. Students then participated in a role play, working a long unstructured case discussing issues with other students. This published case was the educational tool that was adapted to the audit course materials and
used as one element in creating a real-world authentic audit activity. The PBL case was a supplemental teaching and learning method and formed part of the course assessment. In this instance, it replaced the previous essay assessment. The online activity was an important element for three reasons. Firstly, fraud detection is a complex task. Secondly, the case is an Iceberg case (Anthony 1974). This type of ‘iceberg’ case occurs in practice where most of the required information is not apparent or immediately available. Much of the information is secreted. The audit evidence has to be discovered, requested and evaluated. Thirdly, PBL is a commonly used pedagogical design paradigm for ‘authentic’ learning environments.

**Strategic implementation of PBL**

Before embarking on PBL methods in the accounting classroom, Johnstone & Biggs (1998) suggest the satisfaction of certain knowledge and teaching requirements to facilitate strategic implementation of PBL. Johnstone and Biggs (1998) suggest PBL methods should be implemented with four requirements. These are illustrated in Figure 1 below, i.e. only after basic technical knowledge has been acquired; then, appropriate problem solving strategies should be taught, along with innovative approaches for teaching problem solving skills, and faculty members should possess expert technical knowledge of the subject.

![Figure 1: Strategic implementation of PBL](image)

A discussion of the requirements (illustrated in Figure 1) to strategically implement PBL follows.

**Basic technical knowledge has been acquired**

The original case educational tool of the activity (Durschi 2003) suggests only one or two lecture periods will be needed to acquaint students with the red flag of fraud. The course prerequisites satisfy the financial accounting requirement.

In the subject outline the relevant knowledge was emphasised. The audit session delivery was a summer session which provided an intensive delivery mode with up to three lectures a week. The knowledge components, fraud audit and audit processes and procedures were acquired through lectures, tutorials, and the text book (Arens et al. 2007). Lectures were a two hour format with tutorials being a one hour format. Relevant fraud related material included in the text book were Chapter 5, *Audit Responsibilities & Objectives*, Chapter 8,
Materiality & Risk, and a dedicated fraud chapter - Chapter 10 Fraud Auditing. All of this lecture material was delivered either before or during the online role play.

Appropriate problem solving strategies should be taught
Johnstone and Biggs (1998 p. 416) offer, ‘these skills are introduced throughout the curriculum, but classes specifically designed to address these skills are sometimes included as well’. This researcher relied on the authentic experiential nature of the task which is specific to this type of problem solving task - fraud detection. The researcher did not believe it necessary to teach problem solving strategies as it these skills are enabled through undertaking this fraud detection task.

Innovative approaches for teaching problem solving skills
One approach for teaching problem solving skills is the use of the online environment. While the original Durtschi (2003) case study uses email as the requesting medium to gather information and documents, and face-to face meetings for collaboration this study employs online group communication and collaboration created in the university’s E-learning site. Therefore all communications in this inquiry are text based. Participant progress can only be made by making the correct request for information. If no correct requests are made, no progress occurs. A constructivist e-learning WebCT environment was developed based on the framework and methodology proposed by Zualkernan (2006), with the assistance of a UOW learning and design instructor. Distributed sites also allow participants equal opportunity to generate and respond to queries. For example, there is no dominating individual as may be the case in face-to-face environments and there is no waiting for a turn to speak. The case was conducted as an immersive scenario online role play. Internal questions to company personnel or external questions to relevant third parties were answered within a two-day turnaround.

Faculty members should possess expert technical knowledge of the subject area
The researcher, the expert tutor, has extensive deception detection experience as a Taxation auditor (16 years Federal Court jurisdiction, 6 years Queensland Supreme Court jurisdiction), 2 years as Chief Trust Account Inspector responsible for solicitor fraud on Trust Accounts, work experience with the corporate regulator, and internal audit experience with a large Commonwealth Government. At least 10 years of dedicated training and practice i.e. ‘deliberate practice’, is required to reach expert status (Ericsson et al. 2006). Therefore it can be argued that this requirement was easily satisfied in this instance in fulfilling the expert tutor role.

A role play facilitated by an expert tutor
The activity is an online role play where the expert tutor, who is the researcher and participant, plays all the roles and the participants are audit team members. The researcher is anonymous to the participants and not involved in the lecture delivery or tutorials. Principally the participants’ quest is the acquisition of relevant data, that is, to obtain sufficient and appropriate audit evidence which enables the participants to problem solve and therefore detect the embedded frauds. The expert tutor plays all roles (intra-company or external to company) online, and facilitates the conduct of the activity. There are no face-to-face meetings or discussions with the expert tutor offline, so this role remains anonymous to the participants. The participants are required to apply audit knowledge from the subject material and financial accounting knowledge learned in previous accounting subjects.
Stage Four: Select medium: An authentic constructivist online learning environment

An online medium was selected for the KSAA activity principally for the superior benefits written communication provides as compared to any other medium (Lynch, Murthy & Engle 2009). Firstly, there is a substantial participant benefit in using written communication to undertake the activity and secondly, the resultant text capture that is available for future research. Online written communication is shown in research to be superior to face-to-face collaboration in many contexts including, the fraud domain. Principally because of the beneficial verbalisation of participant cognitive processes while writing the texts and the capture of these communications. When a group of individuals use the network as a medium to work within and solve a common problem, this medium brings additional sources of information. Also, written communication facilitates the reflection-in-action process and enables the iterative-type process required in these types of complex tasks while capturing all communication for future reference and use by participants’ short term and for the researcher long term.

An online confidential team discussion forum

The team structure involved participants in small group collaborative learning which was facilitated through the interactive online discussion forum. This discussion forum was confidential to each team and available 24/7 during the conduct of the activity. This forum was an important instructional strategy and cognitive tool as discussed below.

Participants were randomly allocated to teams within the confidential online discussion forum. They discovered who their other team members were when they logged in to the activity. The allocated team size of three or four reflects a typical audit team. Each team’s confidential discussion forum was accessible by the expert tutor. No face-to-face meeting of participants was required.

The original case was assessed for validity and reliability in previous independent investigations and the adapted case satisfied those requirements.

Demographics of the Participants

The characteristics identified from the fifty-four participants were age, gender and domestic/international status (see Table 1).

<table>
<thead>
<tr>
<th>Table 1: Characteristics of study group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study group</td>
</tr>
<tr>
<td>Average Age</td>
</tr>
<tr>
<td>Median Age</td>
</tr>
<tr>
<td>Relation</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Relation</td>
</tr>
<tr>
<td>Domestic</td>
</tr>
<tr>
<td>International</td>
</tr>
</tbody>
</table>

On the masculinity-femininity dimension, there were thirty-four (62.96%) females and twenty (37.04%) male participants resulting in the group having twenty-five per cent more females than males, a significant gender difference. This gender difference may be relevant in this study as a study by Chin and Chi (2010) which uses partner data from Taiwan, reports
evidence that audits are of higher quality (based on earning quality metrics) when the engagement partner is a woman. There is also a large difference between the number of international and domestic students, thirty-two (59.26%) international students as opposed to twenty-two (40.74%) domestic students resulting in the group having 18.52% more international students.

**Survey questionnaire**
Participants evaluated the KSAA with Likert scale survey questionnaire adapted from McAlpine (2001). The McAlpine (2001) questionnaire evaluates an online PBL activity used to teach third year tertiary students, albeit in another discipline. This KSAA survey uses nine of the sixteen original questions. The scope of the nine questions chosen was limited to two categories; cognition and learning and the students’ subjective view of their own learning. The balance of the questions was not considered relevant to this inquiry. The Likert scale was based on a five-point scale from ‘strongly agree’ to ‘strongly disagree’. Questions one to five related to cognition, such as activation of prior knowledge, level of challenge, and development of new knowledge and skill (see Table 2).

**ANALYSIS AND RESULTS**

The survey findings break down into two further tables because of the large difference in gender and the domestic/international status of participants. These tables inform whether gender differences (see Table 3) and the domestic/international differences (see Table 4) impact the overall findings.

**Table 2: Questionnaire Combined Responses**
*(Questions relating to Cognition and Learning)*

<table>
<thead>
<tr>
<th>Percentage of participants answering Strongly Agree or Agree on a five-point Likert scale</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The best way to approach the case study was clearly explained in the online subject material.</td>
<td>81.48</td>
</tr>
<tr>
<td>2 The case study had some scenarios that were familiar to me.</td>
<td>62.26</td>
</tr>
<tr>
<td>3 I found the problem situations challenging.</td>
<td>88.68</td>
</tr>
<tr>
<td>4 The case study enabled me to develop my existing knowledge of the topic.</td>
<td>94.44</td>
</tr>
<tr>
<td>5 I gained greater understanding of how to audit for fraud detection situations from working on the problem solving tasks.</td>
<td>92.59</td>
</tr>
</tbody>
</table>

*(Questions relating to overall level of learning)*

<table>
<thead>
<tr>
<th>Percentage of participants answering Strongly Agree or Agree on a five-point Likert scale</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 The role play provided effective guidance and feedback</td>
<td>69.81</td>
</tr>
<tr>
<td>7 I felt I developed a deep understanding of the subject content from the case study</td>
<td>81.3</td>
</tr>
<tr>
<td>8 My participation in the case study helped me to develop problem solving skills that will be useful to me professionally.</td>
<td>87.04</td>
</tr>
<tr>
<td>9 I learned a method of approaching new problems by carrying out the problem solving tasks.</td>
<td>80.77</td>
</tr>
</tbody>
</table>
The responses were high for the “Strongly Agree & Agree” categories ranging from the lowest 62.26% for question two, to a high of 94.44%. The highest ranked question was question 4 “The case study enabled me to develop my existing knowledge of the topic”, where the combined rankings of “Strongly Agree & Agree” were 94.44%. The second highest ranked responses of “Strongly Agree & Agree” was 92.59% for question 5, “I gained greater understanding of how to audit for fraud detection situations from working on the problem solving tasks.” Both of these questions were from the ‘cognition and learning category’.

The outcome of breaking down questions four and five by gender is displayed below (Table 3). As reported the decomposition resulted in question four and five retaining these similar high rankings. The Males’ highest ranked response was for question five at 95.00%, while the Female highest ranking response was question four at 97.06%.

Overall the Males responded at a higher rating than the Females in two of the nine responses, question two and question five. These differences were small. With question six there was little difference on the Male/Female dimension. For the remaining six questions the Females ranking responses were higher than the Males. There were two questions which reported a large difference in response, questions one and seven. The Males responded to question one for “Strongly Agree & Agree” at 70.00 % while the Females responded much higher at 91.18%, a difference of 21.18%. This may indicate that Females more easily understood and comprehended the instructions than Males. There were twenty-two pages of instructions and suggested approaches to follow. Perhaps some of the Males did a ‘skim’ read while most Females undertook a more in depth read. Many Males may not have read the instructions completely and therefore commenced the case study without adequate knowledge.

Question three was a highly rated question overall. The Males rated the question at 80% while Females rated the question much higher at 93.94%, a difference of 13.94%. Overall this may indicate that Females found the problems more challenging than the Males, possibly because many Males are already better problem solvers than many Females.

In question seven, the Males responded for “Strongly Agree & Agree” at 65.00 % while the Females responded much higher at 94.12%, a difference of 29.12%. This difference was even larger than the difference in question one and was the largest difference. Overall this may indicate that Males developed their fraud knowledge from a novice or superficial level to an average/good level through undertaking the case study. By contrast the Female participant responses indicated a large increase in their development to the ‘deep understanding’ level.

The final question resulted in another large difference of 19.46% slightly below the difference in question one. Male responses at 68.42% may indicate that many Males are already quite proficient at approaching new problems. By contrast the Female response of 87.88% strongly indicated that there were problem solving learning outcomes achieved by most of the Females through undertaking the tasks.
Table 3: Male/Female Questionnaire Responses

<table>
<thead>
<tr>
<th>Percentage of participants answering Strongly Agree or Agree on a five-point scale</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The best way to approach the case study was clearly explained in the online subject material.</td>
<td>70.00</td>
</tr>
<tr>
<td>2</td>
<td>The case study had some scenarios that were familiar to me.</td>
<td>65.00</td>
</tr>
<tr>
<td>3</td>
<td>I found the problem situations challenging.</td>
<td>80.00</td>
</tr>
<tr>
<td>4</td>
<td>The case study enabled me to develop my existing knowledge of the topic.</td>
<td>90.00</td>
</tr>
<tr>
<td>5</td>
<td>I gained greater understanding of how to audit for fraud detection situations from working on the problem solving tasks.</td>
<td>95.00</td>
</tr>
<tr>
<td>6</td>
<td>The role play provided effective guidance and feedback</td>
<td>73.68</td>
</tr>
<tr>
<td>7</td>
<td>I felt I developed a deep understanding of the subject content from the case study</td>
<td>65.00</td>
</tr>
<tr>
<td>8</td>
<td>My participation in the case study helped me to develop problem solving skills that will be useful to me professionally.</td>
<td>80.00</td>
</tr>
<tr>
<td>9</td>
<td>I learned a method of approaching new problems by carrying out the problem solving tasks.</td>
<td>68.42</td>
</tr>
</tbody>
</table>

Table 5 shows that the domestic students responded at a higher rating than the international students in two of the nine responses question four and question eight. These differences are relatively small, 1.7% and 6.53%. For question eight the difference may indicate that many international students already held a higher level of problem solving skills regarding the fraud environment and that they may already be more sceptical than their domestic counterparts. This is consistent with the research from Johnson et al. (2001).

For the remaining seven questions the international students’ responses were higher than that of the domestic students. Question one, question three, question six and question seven reported the largest differences of 14.77%, 12.8%, 15.52% and 11.31% respectively. The difference in question one is understandable when interpreted as being a consequence of language, that is, the instructions to students were in English and for many international students English is a second language.

The difference in question two may be explained as occurring for similar reasons as question one, that is, the problem situations may have been more challenging for the international students because they were not as able as domestic students, to interpret the subtleties of language in the plausible explanations offered by the case fraudster. The next difference is question six at 15.52%. For the reasons, it is not intended to use this question in future evaluations. In hindsight it was considered that this question was too confusing and for similar reasons the difference can be explained as one of language.

Question seven is an interesting question difference at 11.31%. As discussed above, this question produced the largest difference on the Male/Female dimension of 29.12%. This difference of 11.31% may indicate that international students gained more from the subject content than their domestic counterparts because the focus of the case study required
cognition skills and was not reliant solely on oral and written communication skills regarding the English language.

**Table 4: Domestic/International Students Questionnaire Responses**

<table>
<thead>
<tr>
<th>Percentage of participants answering Strongly Agree or Agree on a five-point scale</th>
<th>Dom. %</th>
<th>Int. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The best way to approach the case study was clearly explained in the online subject material.</td>
<td>72.73</td>
</tr>
<tr>
<td>2</td>
<td>The case study had some scenarios that were familiar to me.</td>
<td>61.90</td>
</tr>
<tr>
<td>3</td>
<td>I found the problem situations challenging.</td>
<td>80.95</td>
</tr>
<tr>
<td>4</td>
<td>The case study enabled me to develop my existing knowledge of the topic.</td>
<td>95.45</td>
</tr>
<tr>
<td>5</td>
<td>I gained greater understanding of how to audit for fraud detection situations from working on the problem solving tasks.</td>
<td>90.91</td>
</tr>
<tr>
<td>6</td>
<td>The role play provided effective guidance and feedback</td>
<td>61.90</td>
</tr>
<tr>
<td>7</td>
<td>I felt I developed a deep understanding of the subject content from the case study</td>
<td>76.19</td>
</tr>
<tr>
<td>8</td>
<td>My participation in the case study helped me to develop problem solving skills that will be useful to me professionally.</td>
<td>90.91</td>
</tr>
<tr>
<td>9</td>
<td>I learned a method of approaching new problems by carrying out the problem solving tasks.</td>
<td>76.19</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Overall the nine question student questionnaire responses were extremely positive. Where there were differences regarding gender questionnaire responses these are discussed below with the relevant questions. On the international dimension there was no large difference in responses, however, on the gender dimension there were two responses with differences greater than 20%, question one and question seven. On these questions females rated both questions much higher than the males. The gender distribution of the study was reported in Table 1 Characteristics of Study Group which identified the gender distribution being thirty-four females and twenty males.

Question one was important to the activity as responses were critical to the validity of the activity. Question one said:

*The best way to approach the case study was clearly explained in the online subject material*.

It was important to include question one in the evaluation, and, to receive positive feedback. The reason being that if either the online subject material, or what was required of participants, was confusing, this confusion potentially would have corrupted both the findings and the actual process of task completion. Therefore, a potential issue would have been the reliability of the findings. Additionally both the task and the learning environment were complex and participants were unfamiliar with this cognitive tool. This activity was novel and participants had not completed an activity like this, to the researcher’s knowledge, in
previous University of Wollongong studies. With a response rate of 83.64% the clarity objective was achieved. Interestingly, there was a large difference in the responses to question one for males and females. Males responded at 70.00% while females responded at 91.18%. The reasons for this discrepancy were not clear. Perhaps females were more prepared to spend time reading the instructions about how to approach the case study. This is an opportunity for further research and is a finding from the inquiry to be aware of when the KSAA is repeated.

Question two relates to the application of material contained in the text book (Arens et al. 2007), which has a particular focus on financial wrongdoing. This text book contained similar examples and scenarios of actual cases. However 37.74% of responses did not report any familiarity with this material. As this specific material was contained in the prescribed text book, it can be concluded that these participants had not read and/or comprehended that material.

The responses to question three were the 3rd highest ranked response. Question three was:

‘I found the problem situations challenging’.

A challenging problem that is not easily solved is an important component of the constructivist PBL theoretical framework. For example, PBL requires an ill-structured, open-ended problem where the initial information is inadequate to solve the problem and seeking a solution requires higher order thinking, evaluation and reflection. It was expected that participants would find the problem challenging as it is a published case for this purpose but the high rating of 88.68% was not expected. However, this rating confirms that the activity did achieve the PBL theoretical framework requirement to a reasonably high standard.

The responses to questions three and five were considered to be very high responses and also were not anticipated. These response rates support the conclusion that the inquiry’s second aim has been met. This aim was: ‘To develop an online knowledge and skill acquisition activity to be used as a means for enhancing the fraud detection knowledge and skills of audit participants.’ The highest ranked response was question three which was rated at 94.44%.

Question three asked:

“The case study enabled me to develop my existing knowledge of the topic”.

The 2nd highest response was 92.59% for question five. Question five asked:

“I gained greater understanding of how to audit for fraud detection situations from working on the problem solving task”.

This question related to the application of audit processes and procedures to an authentic fraud detection task. Through applying theoretical knowledge to a case study participants indicated they appreciated the relevance of the audit theory studied. Possibly the activity provided a more in depth insight into this complex problem of fraud detection than they had previously known. As discussed earlier, problem solving is a cognitive skill that can be developed through learning a critical element of the KSAA. The perception of participants indicated strongly that they were engaged in those development opportunities provided by the KSAA. Even if the fraud was not resolved working through the processes provided participants with valuable experience. Given the high rating of 92.59% it is concluded that most participants responded very positively to this opportunity to apply new knowledge and to develop some fraud detection skills by attempting the KSAA.
By comparison with most of the questions above, question six was rated moderately at 69.09%. Question six is repeated below:

‘The role play provided effective guidance and feedback’.

The findings revealed similarities and differences when this question is deconstructed by gender and by the domestic/international dimension. There was similarity in responses on a gender basis. However there were differences on the domestic/international dimension, Table 4. The difference between domestic and international responses was 15.52% with the international group finding the role play guidance less effective, the highest domestic/international difference of all the responses. This finding may be due to the fact that domestic and international students have previously been exposed to different learning styles. The researcher was from the domestic environment. The inquiry may reflect more closely that learning environment culture and therefore a multi-dimensional activity which reflected this was more familiar to domestic participants. This finding indicates probably that at an individual participant level there was an issue for international participants. This is further discussed under section 6.5.4 below ‘Instructional strategies that worked’.

The responses to question seven were also interesting. Question seven asked:

‘I felt I developed a deep understanding of the subject content from the case study’.

While the overall response is high at 81.3%, there was a large difference noted in gender responses. The males responded to question seven at 65.00 %, while the females responded at 94.12%, a difference of 29.12%, the highest gender difference of any response. These findings indicated that the males did not feel that they had ‘developed a really deep understanding of the subject content from the case study’ while, the females felt they had, with the response of 94.12%. Question three and question seven both related to understanding. Question seven related to subject content in contrast to question five which related to application of knowledge and problem solving. While there was similarity on the gender dimension on question five there was a gender difference in question seven. Perhaps the males perceived that they already held a good understanding of fraud and the subject content was familiar from previous life experiences. Perhaps females have not had the same life experiences of fraud. Therefore, if the females had a less informed knowledge base they developed fraud knowledge to a greater degree by undertaking the activity.

Questions eight and nine related to participants’ evaluating problem solving aspects of the activity. Survey data of this kind provided a different perspective on the process of learning and problem solving. They cannot report what the cognitive processes were and how they operated, but instead they can report, how the student perceived the given problem-solving task. Question eight was rated at 87.04%. Question eight asked:

‘My participation in the case study helped me to develop problem solving skills that will be useful to me professionally.’

This evaluation question was a suitable method to assess whether skills and knowledge are being transferred to activities outside the classroom. Participants responded very positively to this question. The gender responses were males 80.00% and females 91.18%, while 90.01% of the domestic participants responded positively to the question, with international participants responding positively at 84.38%. A basic tenet of problem-based learning is that it helps make learning more relevant, and in turn more transferable, by engaging learners in activities that reflect life beyond the classroom. PBL, if implemented appropriately, is a
powerful method of bridging the gap between theory and practice as a unified exercise. These responses provide evidence that the KSAA has been beneficial to participants in developing the problem solving skills espoused by Hoffman and Ritchie (1997), and, reflect the contextualised setting that participants perceive they will encounter in future professional careers.

The final closed question, question nine, received a high rating of 80.77%, slightly below question eight. The question was:

‘I learned a method of approaching new problems by carrying out the problem solving tasks.’

This question differs from the problem solving skills acquisition focus of question eight in that it sought responses to the learning of a ‘method’ by carrying out the problem solving tasks. This question is more concerned with evaluating the learning of a new process or approach to problem solving. When the two question responses were interpreted together overall it was evident that an improvement in student problem solving had taken place through engaging in the KSAA.

CONCLUSION

It is argued that fraud detection though a complex task can be taught. The KSAA creates a positive learning environment which provides critical engagement with audit curricula and fraud detection on a twenty-four hour basis. The participants choose when they want to engage in thinking and problem solving at a time that is most suitable to their lifestyle commitments and/or when their thinking is enabled. Therefore, participation in the online activity is not place or time dependent. An important element of the team discussion forum was the capture of individual reflections. Reflection is critical in the fraud detection process. Emerging information cannot instantly be related to known information as initial connectivity is unclear as the information gathering process is non-linear, and, information provided is variable in importance. The auditor must make the relevant connections. The design of the KSAA attempts to employ an integration of the best available teaching and learning methods. Other disciplines and domains have been integrated into the framework to design an effective new teaching tool to enhance the fraud detection skills of audit students.

Typically fraud detection includes the ability to develop a rapport with team members and informants. This is an important professional socialisation element of the activity. Other traits include the close analysis of language and the ability to ask the right question that reflects a sense of logic. Other important traits include curiosity, discovery, creativity and imagination. Part of the discovery process includes the ability to recognise diversity as well as regularity leading to the confidence to take enquiry risks. Not all enquiries will result in a positive outcome as much information gathering requests result in disappointment. Once any request leads the participants to new information which leads to more anomalies there is a need to leverage those discrepancies. The KSAA was designed to assist participants in experiencing the appropriate application of these critical factors.

LIMITATIONS OF THE RESEARCH

The case is audit specific, customised to the textbook (Arens et al. 2007), lectures and tutorial content. While the case is fictitious, it has been authenticated and customised to Australian professional practice as far as was possible. It is the flexible and replaceable
educational tool in the KSAA framework. This distributed PBL case is not suitable for postgraduate cohorts where the participants have financial investigation knowledge or cohorts which do not possess similar homogenous financial knowledge.

The survey instrument McAlpine (2001) is not a widely known instrument. Although it does collect student feedback on the assignment and on their self-assessed learning a more rigorous instrument that focused on what was different in their understanding and learning between the beginning and end of the intervention would have been preferable. While feedback on the learning experience is valuable it only reveals student perceptions and does not prove what has actually been learned.

A limitation of the activity is the sole use of electronic communication to gather information. In a ‘real world’ scenario a range of communications would be used including interviewing.

In this role play participants were told in the instructions that they could ask questions of any person. The text book covers all types of auditors including financial statements auditors. In the ‘real world’ however regulatory auditors have specific powers that allow them to ask questions or demand the production of documents of any person. Private practitioners engaged in fraud audits would seek a court order to achieve the same level of access.

The fact that participants were told that fraud existed may be a limitation. Pincus’ (1990) research demonstrated that if an auditor believes fraud exists, s/he is much more likely to detect it. This may have led to more positive results than if participants had not been told that.

FUTURE RESEARCH

Future research could usefully extend this research to practising accountants and auditors in a variety of roles. In that research a different authenticated case would be used in the research framework and the case would be customised for professional practice with a research participant group.
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