

South African students' perceptions of the usefulness of an audit simulation

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Abstract

The South African Institute of Chartered Accountants and the International Federation of Accountants require Information Technology (IT) to be integrated with the professional subjects, including Auditing, qualified chartered accountants need. Internationally, people want changes to Auditing teaching. The Accounting Department of Stellenbosch University developed an audit simulation of the whole audit process from client acceptance to completion. Students must prepare working papers, using substantive procedures focusing on stock and a database large enough for students to use IT. The simulation's learning objectives are integrating auditing with IT, and exposing students to as authentic an audit as possible. A questionnaire tested students' perceptions on the simulation. Responses were favourable. Respondents felt that the simulation helped them to understand auditing and showed them the practical application of IT functionalities. However, respondents complained that the simulation took too long. The principles and findings apply to simulations and the use of case studies in any environment.

Key words

Audit simulation

Auditing education

Information systems

Information technology

Integration

Students' perceptions

1 Introduction

Internationally, many have argued in favour of changing the manner in which Accounting programmes are presented to students (Accounting Education Change Commission 1990; Massey, Poli & Proctor 2002:1; Stewart & Dougherty 1993:9). These calls for change have included suggestions that Information Technology (IT) should be integrated into Accounting and Auditing curricula (Johnson *et al.* 2003:242) and should involve students

more actively in the learning process (Adler & Milne 1997:192; Hassall, Lewis & Broadbent 1998:327). Albrecht and Sack (2000:43) argue that Accounting programmes¹ do not prepare students adequately for the 'ambiguous business world they will encounter upon graduation', due to the absence of concrete experience. Another critique on tertiary education relates to the approach in which students are passively lectured to and written examinations are used to assess knowledge (Siegel, Omer & Agrawal 1997:217). Botha (2001:50) added to the debate by stating that the aim of the education process for Accounting programmes might become primarily the passing of examinations, because a written exam is the method used to assess professional competence. This might lead to a strong theoretical base, but not necessarily to a good skills base, which is needed in the workplace.

Students in general have not been exposed to the business world and are not familiar with transactions and the usual activities that form the basis of auditing (Siegel *et al.* 1997:218). This makes it difficult for students to understand the field of auditing. A symposium of Auditing faculties was held in America in January 1986 to discuss the development of teaching aids for Auditing. The participants in this symposium all agreed that students exposed to vacation work were able to understand auditing concepts and procedures much more easily than those who did not get any such experience. May (1992:29) commented that students exposed to vacation work understood the 'big picture' better. This was empirically proven by Ferguson, Richardson and Wines (2000:139), who found that students' academic performance benefited if they started their Auditing studies after some work experience.

The market also expects its auditors to be proficient in the use of IT (Borthick & Curtis 2004:5). With this in mind, accounting education is increasingly required to integrate IT skills with professional subjects such as Financial Accounting, Management Accounting and Finance, Taxation and Auditing (Wessels 2005:90), and students are required to illustrate the ability to apply theoretical knowledge to 'real-world' scenarios during their studies (Horsfield 1995:298). One of the main attributes of simulations is that it affords students the chance to 'learn by doing' (Wynder 2004:231). Students realise the need to be prepared for the 'real-world' working environment and they indicated this as a suggestion for improvement in a first-year Accounting module (De Wet & Van Niekerk 2001:98).

In an effort to achieve the abovementioned goals, the Department of Accounting at Stellenbosch University developed an audit simulation in which IT skills are used to perform sections of the audit of a hypothetical company selling toys. This article reports on the perceptions of students of the usefulness of this audit simulation for the development of their skills and knowledge.

The article explains the research objective, and then presents a review of existing international research literature on related topics. The research design and method are discussed, followed by a description of the development and content of the audit simulation. The results of the questionnaire are then presented, followed by a conclusion.

¹ In this article, the term 'Accounting course' refers to the subject-specific course, while the term 'Accounting programme' refers to all the courses students have to complete to qualify as accountants. Where the terms 'Auditing' or 'Accounting' are capitalised, they refer to subjects; if they are not capitalised, they refer to the general field or activity of auditing or accounting.

2 Research objective and contribution

The key learning objectives of the simulation are to integrate auditing with IT and to expose students to an audit that simulates real life in the classroom. The primary objective of the article is to determine whether these learning objectives have been met. This study investigates students' perceptions of the usefulness of the audit simulation as a tool to develop knowledge and skills as part of their Information Systems² studies at final-year level. The article therefore endeavours to answer the following questions:

- Which competencies are developed by the audit simulation?
- What were the most important perceived benefits derived from the simulation?
- What were the main constraints to the simulation?

This article contributes to the field of knowledge related to the use of simulations in auditing education and is valuable in developing similar teaching aids. It adds to the ongoing discussion about changes needed in accounting and auditing education in a South African context. The study is relevant to educators because the principles and findings are applicable to a simulation in any environment, as well as to the use of case studies.

3 Literature review

A review of international studies on audit simulations and students' perceptions of these simulations are presented in this section. The existing literature on audit simulations is limited. However, there are many studies on the use of case studies in audit education, including a study by Barkman (1998) and business simulations in fields other than auditing, such as those discussed by Gopinath and Sawyer (1999) and Wolmarans (2005). Similar South African studies on audit simulations are limited.

Arens, May and Dominiak (1970) developed a simulated case for audit education, because they argued that it is 'difficult to relate the important ideas [of Auditing] to students because they have not clearly established in their own minds an adequate frame of reference to analyze and understand Auditing concepts' (Arens *et al.* 1970:573). They attributed this to the students' lack of exposure to accounting systems, source documents and evidence accumulation. The simulation developed by Arens *et al.* (1970) differs from the one used in this study, in that it focused on discussions of factors relevant to the simulated audit case, rather than the performance of audit procedures. Moreover, the simulated case was constrained by the technology of the time and the limited use of personal computers. Nevertheless, their findings are still relevant today, because the idea or central premise of their study was to expose students to a real-world audit as far as practically possible. In their study, two-thirds of the students indicated that they found the project valuable and that it helped them to understand the problems and importance of defining errors. The main criticism raised by students was the lack of supervision given by the faculty. Arens *et al.* (1970:574) concluded that the aims of the project were achieved by improving the students' comprehension of the relationship between audit objectives and audit procedures.

Walgenbach and Frank (1971:588) also conducted an early audit simulation and found that students benefited because they gained a better understanding of the planning

² Information Systems refers to the course in which the audit simulation is presented.

requirements involved in sampling, and because students were placed in a realistic decision-making situation and were able to apply statistical knowledge in a practical scenario.

Hoyle (1975:232) reports on his use of an audit simulation on the whole set of accounts of a company, not only one account or sub-set (inventory) as is used in this study. However, his findings are also relevant and can be summarised as follows:

- students understood the complexities of a real-world audit and the relationships that exist between different accounts better;
- they understood the whole audit function better;
- students found the simulation enjoyable and thought it was an interesting learning tool; and
- the main constraint was the time it took to complete the simulation.

The *Simulated Case for Audit Decisions* (SCAD) is an audit simulation developed in the early 1980s using the IT of the time with the aim of 'providing a means of learning the operational implication of audit concepts' (Felix *et al.* 1985:5). The simulation covers an entire audit in which only one transaction cycle is audited, and in which students are provided with detailed documentation, for example, invoices and orders. SCAD was well received by students and most of the participants felt that it contributed positively to their studies. However, more than 50% felt that the workload required to complete the whole simulation was too high. This finding is similar to that of the other studies in this section.

Siegel *et al.* (1997) reported on a video simulation of an audit, *The CableCo Chronicles*. The set of four videos, supported by written materials, takes the students through the audit process – from acquiring a new audit client to the concluding stages of the audit. These videos were developed by the Coopers & Lybrand Foundation in the USA as part of their 'Excellence in Audit Education' programme in 1985. The study was conducted among students in two separate groups. Siegel *et al.* (1997:233) found that students in the group exposed to the audit simulation performed significantly better than the students taught by means of traditional teaching methods. They concluded that the simulation improved class performance, teaching effectiveness and students' understanding of the initial phases of the audit, including risk assessment. These findings confirmed early findings by Groomer, Mohrweis and Ward (1992:48), who also used *The CableCo Chronicles* videos. Where the videos were implemented during the pilot phase of the 'Excellence in Audit Education' programme, results showed that these videos 'provide an effective integration, helping students form an understanding of the complete process of Auditing' (Ward 1992:12-13). Siegel *et al.* (1997:233) did, however, note that 'the videotape does not teach Auditing. Other classroom activities must still be carried out in order for students to understand the development of an audit.' An audit simulation would therefore 'supplement rather than replace classroom work' (Hoyle 1975:231).

Norwood Office Supplies, Inc is an audit simulation developed by Gelinas, Levy and Thibodeau (2001). It uses Audit Command Language (ACL) audit software. The simulation covers risk assessment in performing audit procedures with ACL. The goal of the simulation is to address technological, strategic and critical-thinking skills. Students gave positive feedback on this integration of IT with auditing and viewed the simulation as an integral part of their course, not merely as an onerous add-on. The majority (82%) of the respondents to a questionnaire on the simulation felt that the simulation should continue to

be used in the course. In contrast to the findings in a number of the other studies discussed in this section, the respondents in Gelinas *et al.*'s (2001:633) study did not perceive the time invested in the simulation to be an impediment.

Massey *et al.* (2002) introduced a team-based audit simulation in their introductory Auditing courses. Students completed surveys before and after the audit simulation. These authors found that the simulation improved students' auditing knowledge and they therefore argued that it would help the students to 'hit the ground running' (Massey *et al.* 2002:2).

Dennis (2003:418) implemented an audit simulation with the objective of enabling students to understand the rules of auditing better by applying theoretical auditing concepts or rules to a practical financial statement audit. As in Siegel *et al.*'s (1997) earlier study, Dennis's (2003) simulation not only attempted to teach auditing concepts, but also to apply and implement them. The students were required to prepare reports and working papers. The students felt that it gave them insight into a real audit and the opportunity to apply theory to practice, but suggested that it made their course load heavier than for other courses. Some students were of the opinion that the learning outcomes of the course had not been met. However, the simulation was conducted in a practical Auditing course, separate from the theoretical course, which led to an improvement in students' marks, indicating that the course objectives had indeed been achieved.

Weidenmier and Herron (2004) studied the use of generalised audit software packages (GASs). They found that simulation helped the students to understand which audit tests needed to be performed, as well as the reason for performing the audit tests.

From the above discussion it appears that a number of benefits may be derived from using an audit simulation, *inter alia*, a better understanding of auditing concepts and real-world audit complexities. The main concern students raised were related to the time needed to complete the simulation. This article addresses the same topics, but also attempts to test students' perceptions, amongst other things, of the benefits derived from the simulation as discussed in Section 6 of this article.

4 Research design and method

4.1 Overall research design and method

A wide-ranging review was undertaken to identify existing literature on the subject of audit simulations and students' perceptions thereof, after which a questionnaire was developed to survey the opinions in the audit simulation used in this study. Additional fields of study, such as studies on business and other simulations and case studies, were also considered in preparing a questionnaire that was completed by students taking part in the audit simulation. After the responses had been received, the results were analysed to draw conclusions on students' perceptions of the usefulness of the audit simulation.

4.2 Development of the questionnaire and data collection

In addition to the literature discussed in Section 3, wide-ranging literature, *inter alia* on simulations other than audit simulations, were considered in preparing the questionnaire, for example, studies by Wynder (2004) on a business simulation and by Baker-Eveleth,

Stone and Pendegraft (2005), who dealt with programming skills. It might be argued that simulations are a specific form of case study (Wynder 2004:233). In a study by Stewart and Dougherty (1993:2) on the use of case studies in teaching Accounting they stated that '(T)he case study approach... is *not* intended to replace the textbook, but rather to provide students with a background in the problems of physically requisitioning the data needed'. The goal of case studies is to apply theoretical knowledge to 'real-world' scenarios (Horsfield 1995:298).

The audit simulation has a similar goal, in that a real-world scenario or situation is used to illuminate theory. Horsfield (1995) classifies audit simulations as computerised case studies. With this in mind, several studies, for example, by Stewart and Dougherty (1993), Weil *et al.* (2001), Ballantine and Larres (2004), Cullen, Richardson and O'Brien (2004) and Hassall and Milne (2004), on the use of case studies and students' perceptions of case studies were consulted in preparing the questionnaire, as the literature on simulations is limited. Other studies, such as one by Friedlan (1995) on non-traditional teaching methods similar to the use of case studies were also consulted.

To avoid bias in the answers, an effort was made to distribute potentially related questions throughout the questionnaire and to include open-ended questions. The questionnaire was reviewed by three Auditing lecturers and three Information Systems lecturers in order to evaluate the validity, unbiased nature and completeness thereof. To ensure that all ambiguity was removed from the questionnaire, it was distributed to a sample of students from the potential population. Minor adjustments were made in response to their feedback. (The questionnaire is available from the authors on request.)

The questionnaire contained 75 questions on the following areas:

- demographic information (ten questions);
- students' experience of the simulation and the Information Systems course (six open-ended, 11 multiple choice and four Likert-type questions);
- the competencies developed by the simulation (one open-ended and 29 Likert-type questions);
- the perceived benefits of the simulation (two open-ended, eight multiple choice and two Likert-type questions); and
- the perceived drawbacks of the simulation (one open-ended and one Likert-type question).

4.3 Data collection and cleaning

The questionnaire was made available electronically on WebCT to all 394 students in the Information Systems 372 course. (WebCT is an e-learning teaching tool that allows surveys to be conducted electronically.) Completion was voluntary, but students were given an incentive to complete the questionnaire in that they could earn 1% towards their final mark for completing the questionnaire. The incentive was small enough for the researchers to believe that it would not influence the results. Because of the incentive that was granted to the participating students, it was necessary to collect identifying information from the students. However, students were given the assurance that their responses would be dealt with anonymously and would have no influence on their marks, other than the incentive. From the total population of 394 students, 321 useful responses were obtained, giving a

response rate of 81.5%. The electronically completed results were exported to Excel, where they were processed to draw conclusions. The data was cleaned by removing instances where students clearly did not attempt to answer the questionnaire. Due to the use of WebCT as a vehicle to complete the questionnaires, every instance of opening the questionnaire was logged as an attempt. This meant that there were five questionnaires with no answers. These were of no value and had to be discarded. The answers to the open-ended questions were analysed and the answers were summarised in similar categories. The results of the questionnaire are discussed in Section 6 of this article.

4.4 Limitations of the study

The study has a number of limitations:

- the questionnaire tested students' perceptions of the usefulness of the audit simulation and not the actual benefit derived;
- the questionnaire contained 75 questions, including questions relating to demographics, benefits, competencies developed and constraints to the simulation, which might have led to a lack of diligence in students completing it;
- information related to gender and previous academic performance in Information Systems and Auditing was not analysed and could form the basis for future research;
- students have different learning styles (Boyce *et al.* 2001), which could have had an impact on the results (this falls beyond the scope of this article); and
- neither the effect of prior work experience (for example, vacation work at an auditing firm), nor prior experience of similar practical teaching methods was tested or analysed.

5 Background to the audit simulation

This article reports on the audit simulation conducted in two years (2005 and 2006) as part of the Information Systems 372 undergraduate course, in the final year of study towards an Accounting degree at the University of Stellenbosch. All these students were full-time students who had previously completed two full Information Systems courses in which Excel techniques were covered. The majority of the students were students with a first time registration as undergraduates and no previous work experience. Two groups completed this module, namely Bachelor of Commerce (BComm) Management Accounting and Bachelor of Accounting (BAcc) students. The objective of many of the students registered for the BComm degree is to write the Chartered Institute of Management Accountants' (CIMA's) examination after completing a post-graduate degree, while the goal of the students registered for the BAcc degree (after completing a post-graduate course) is to pass the Qualifying Examination of the South African Institute of Chartered Accountants (SAICA), conferring the right of the CA (SA) designation upon registration. One of the core focus areas of the BAcc degree is Auditing. It is not the core focus of a BComm, but forms part of the programme in the students' final year. Final year BAcc students at Stellenbosch have had Auditing in the previous year of their studies, and took it in the year in which they performed the simulation. It was deemed appropriate that both groups of students be exposed to the audit simulation, as it gives them with insight into the workings of both external and internal auditors, and the basic skill of processing data (especially in large databases) in order to draw meaningful conclusions. The Information Systems course

integrates the professional subjects with IT and the simulation contributes to that integration.

This article is based on a project consisting of an audit simulation of a hypothetical toy merchandising company. The objective of the simulation is to integrate theoretical auditing knowledge with practical IT skills and to make Auditing more practical by exposing students to an audit that approximates real life. An audit simulation was deemed to be a good way of integrating these two disciplines. The students were provided with background information on the purpose of the simulation, as well as on the hypothetical company. The simulation can be divided into three stages:

- Performing pre-engagement and planning activities for the audit. Most of the information for this stage of the simulation was provided during class discussions. The deliverables for this part of the simulation were pre-engagement and planning working papers.
- A significant part of the simulation consisted of an assignment requiring students to perform substantive procedures to meet the audit assertions in accordance with statement *ISA 500* paragraph 17(b) (IAASB 2004) on the company's inventory. Students were provided with an inventory list, an inventory count list and a price list with selling prices in Microsoft Excel. All three of these databases exceeded 3 500 lines in Excel, thereby forcing students to use IT and providing a chance to illustrate the relevance of Information Systems as a subject. The databases included various errors and omissions to illustrate a number of auditing and IT concepts, skills and methods. Five lectures were spent on explaining, discussing and illustrating the procedures to be performed on this data. The audit procedures to be performed on inventory were discussed with the students in the lectures, after which efficient and relevant spreadsheet techniques were illustrated on the databases. These techniques included basic spreadsheet techniques such as filters and data tables. A typical procedure would, for example, be to identify unusual items in the stock list using Excel. Students then had the chance of performing these procedures themselves under the guidance of the lecturer during the tutorial periods. At this stage, the simulation focused in equal parts on auditing and information systems knowledge and the integration of these different fields of study, thereby addressing the goals of the simulation. The deliverables for this section were detailed working papers for the substantive procedures on inventory, together with a report to management indicating problems and errors identified during the audit of the inventory. The working papers had to be prepared in Excel. The students were required to design both the substantive procedures and the working papers themselves.
- Lastly, the simulation consisted of a lecture relating to the additional procedures that would be performed during the concluding stages of the audit.

The assessment of the simulation (with the weighting of the final mark in brackets) consisted of the working papers for the pre-engagement and planning stages of the audit (2.5% of the final mark), the working papers for the substantive procedures on inventory (4%) and the report to management on problems and errors in inventory (2.5%). Because of the limited time available and the pressure on the students to start preparing for their examinations, they were not required to hand in working papers for the completion stage of the audit. They also had to complete an electronic test (2.5%), where new inventory lists (similar to the ones used in the simulation) were provided to the students. They had to

process these lists as they did in the simulation in order to answer a number of questions. This test assessed whether they were able to perform the necessary procedures in Excel themselves. A semester test contained a question related to the simulation (4%) and half of the examination consisted of work directly related to the simulation (25.5%).

The simulation has a number of limitations. It was neither possible to provide the full scope in experience that a real financial statement audit would provide, nor could a full set of financial statements be audited, as was done in the study by Hoyle (1975). This limitation was compounded by the time limitation – hence, only one element, namely inventory, was addressed. It was felt that the analysis of the inventory records would provide ample opportunity to illustrate the most relevant IT and auditing tools and principles. An actual inventory count could not be performed; and invoices were not provided to students, as was done in the study by Felix *et al.* (1985). It should also be borne in mind that the simulation was conducted as part of the Information Systems course, with the dual goals of (1) making auditing more practical and (2) integrating auditing and IT techniques and skills. Consequently considerable time was spent on the IT aspect of the simulation.

6 Empirical research findings

6.1 Respondent profile

From the total population of 394 students, 321 useful responses were obtained, giving a response rate of 81.5%. The majority of the class (80.0%) was represented by BAccounting students, and this distribution was also reflected by the fact that 80.1% of the respondents were BAccounting students. Of the respondents, 19.9% were registered for a BComm (20.0% of the class in total). (Refer to Section 5 of this article for a description of the courses.) The respondents were therefore representative of the class.

Only 10.3% of the respondents stated that they had had previous exposure to a project that integrated Auditing and Information Systems, whereas this was the first time for the remainder of the respondents (89.7%). A total number of 291 (90.7%) of the respondents indicated that they thought that Information Systems as a subject was an important part of their education and that the audit simulation added value to their education.

6.2 Class attendance

Due to the expectation that few students would have been exposed to real-world working papers and audits, class attendance was stressed as being important. In addition, the audit simulation took the form of a guided simulation where small sections of the simulation were discussed in lectures and students had to perform the procedures themselves in the next tutorial period. The course consisted of one lecture of 50 minutes and one and a half tutorial (practical) periods of 90 minutes (in total) per week. Because of the size of the group (394 students), provision was made for two classes and two tutorials per week. The work covered in the first lecture of the week was repeated in the second lecture. Approximately 100 students attended the first lecture, with the remainder in the second session. The attendance of tutorials was in the same ratio. During each lecture an in-depth discussion was held on the important areas and the requirements of the working papers that were to be submitted. The reasoning behind all the procedures was discussed and illustrated

with real-world examples. The students were also motivated to attend the tutorial classes, as the lecturer was available to answer questions. However, students were able to complete the work in their own time if they so wished. In the light of the importance of class attendance, students were asked what percentage of time they had attended the theory and practical classes. The results for this question are summarised in Table 1.

Table 1 Class attendance

	Lectures	Tutorial classes
Never	4.0%	24.3%
25% of classes	10.3%	20.2%
50% of classes	13.4%	19.9%
75% of classes	25.5%	22.4%
Always	46.7%	13.1%
Total	100%	100%

The majority of the respondents (85.7%) estimated attendance in excess of 50% or more of the theory classes. The tutorial classes had a lower class attendance, with only 55.5% of the respondents attending in excess of 50% of the classes. The fact that fewer respondents attended the tutorial classes than the theory classes is not an unexpected result, because the students would have been able to perform (at least) the basic functions on their own, without the assistance of the lecturer, after having attended the lectures. The majority (80.4%) of the respondents who attended 50% or more of the lectures felt that the lectures were valuable to them in completing the audit simulation.

6.3 Preparation from prior learning

The students were asked whether their Auditing courses had adequately prepared them for the simulation, to which 26.8% (86) of the respondents answered in the negative. Of these, 16 were BComm Management Accounting students who had only begun to study Auditing during the year they participated in the simulation, while the rest were taking their second Auditing course. Of the 86 respondents, 36 stated that they believed that the Auditing course did not give students practical experience, suggesting that students were told how, but were not given an opportunity to apply the theory to practical situations. The audit simulation allowed them to apply Auditing theory.

6.4 Sources of information used to complete the simulation

As one of the objectives of the simulation was to integrate Auditing and IT, it is worth considering which sources of information students used to complete the simulation. Of the respondents, 79.4% indicated that lectures were one of the sources of information they used for the completion of the different sets of working papers. While this was not a group project, the students were encouraged to discuss the audit simulation amongst themselves, and 76.9% stated that they had consulted with other students. These results supported the findings of a study by Walgenbach and Frank (1971:588). One third of the respondents indicated that they also used their Auditing notes, and 23.1% obtained additional guidance from the lecturer presenting the simulation. Table 2 presents the sources of information consulted by students in order of the percentage of respondents.

Table 2 Sources of information

Information source	Percentage of total respondents
Information Systems lecturers	79.4%
Discussions with and notes from other students	76.9%
Auditing notes	33.3%
Additional discussions with lecturer facilitating the simulation	23.1%
Lecturers in Auditing and other departments	11.5%
Professional consultants and auditors	7.5%
Tutors	4.4%

(Respondents were able to select more than one of the options, so that the total exceeds 100%.)

6.5 Usefulness of the audit simulation for teaching various competencies

In order to answer the first research question, the questionnaire contained 29 questions testing students' opinions on the usefulness of the audit simulation in teaching various competencies, compared to lectures and other traditional learning methods. They were able to answer on a four-point Likert scale varying from 'Not at all [useful]' to 'Extensively [useful]'. (In order to increase the readability of the article, the responses to these 29 questions are summarised in Appendix A.)

The most important competencies learned by students from the simulation, in order of usefulness (with the percentage of respondents who perceived the particular item to be either considerably or extensively useful in brackets), are ranked as follows:

- insight into the practical operations of an audit (84%) – this finding is similar, *inter alia*, to those of Arens *et al.* (1970), Siegel *et al.* (1997) and Massey *et al.* (2002);
- the skills to interpret large volumes of data (defined as the ability to understand and decipher data) (83%);
- the skill to relate theory and technical knowledge in Auditing to real-life situations or practical problems (with complexities and ambiguous information) (81%);
- the ability to summarise data (74%);
- the ability to integrate the understanding of the different components of Auditing courses (73%); and
- the encouragement of students to apply their theoretical knowledge to new and unique situations (71%).

The results for these 29 questions indicated that the main objectives of the simulation, namely to integrate Auditing with IT and to make Auditing more practical, had been achieved.

The following competencies were not successfully transferred to the students by the audit simulation, with 50% or more of the respondents feeling that that the simulation was 'not at all useful' or at best only 'somewhat useful' (classified in total as 'not optimally useful' in Appendix A) (the percentage between brackets indicates the percentage of respondents who held the opinion that it was '**not** optimally useful'):

- the ability to distinguish facts from opinions (61%);
- students' active listening skills (52%);

- the ability to prioritise when dealing with multi-problem situations and, in doing so, identifying the problems which require immediate action (51%);
- students' motivation to study Information Systems (50%); and
- judgement skills (defined as identifying and choosing between available alternatives) (50%).

The simulation will be adjusted in future to attempt to address these skills.

6.6 Perceived potential benefits of the audit simulation for students

The questionnaire contained a variety of questions to gauge the students' perceptions of various potential benefits of the audit simulation in order to answer the second research question. Almost all the respondents (90.3%) indicated that the audit simulation had contributed to their learning and understanding of Auditing courses. Students were asked whether the simulation had contributed to their studies in various ways. The results are presented in Table 3.

Table 3 Contribution of the simulation to different areas of students' studies

The audit simulation will enhance students' ability to:	Percentage
...better conceptualise Auditing	91.0%
...answer Auditing papers	76.6%
...answer Information Systems papers	68.8%

The respondents experienced the simulation as positive and believed that it contributed to their studies as a whole, corresponding with the findings of Gelinis *et al.* (2001) in their study, where 82% of the respondents felt that the simulation used in that study should be continued in their course. The majority (91%) of respondents in the current study felt that the simulations improved their understanding of Auditing. Interestingly, although the simulation was presented as part of the Information Systems course, more respondents felt that the audit simulation would improve their ability to answer Auditing papers than Information Systems papers. This is indicative of the high level of integration achieved.

On the whole, the evidence suggested that the audit simulation enhanced the students' interest in their studies in general (59.2% of respondents), and 67% of the respondents believed that they had experienced an increase in interest in Information Systems and 62.3% in Auditing. Overall, students felt that the simulation was a valuable tool in their studies, with 90% agreeing that they had learnt and remembered more from the simulation than they would have from any other teaching method that they had experienced before. Only 26.5% of the respondents felt that the time spent on the simulation could have been better spent studying on their own. The majority (92.5%) of the respondents were able to identify the benefit to them in their future jobs. These findings were similar to those in the studies by Hoyle (1975:232) and Massey *et al.* (2002:2).

Students were given the opportunity to list the three most important benefits arising from using the audit simulation as a teaching and learning tool. They were asked an open-ended question and the results are summarised in similar groupings in Table 4.

Table 4 Most important benefits of audit simulation

	Percentage of total respondents
Auditing is made more practical	63.9%
Enhances the practical implementation and use of spreadsheets	52.6%
Applying theory in practical scenario	20.9%
Integrating different subjects	18.1%
Learned about working papers	14.0%
Processing of large volumes of data, especially in spreadsheets	14.3%
Problem-solving skills	13.4%
Prepares better for working environment	7.8%
Reduces the time spend studying for Auditing	3.7%
Other	22.7%

(Respondents were able to select more than one of the options, so that the total exceeds 100%.)

The benefits the respondents listed focus on three main areas:

- practical exposure to realistic audit situations and the practical application of theory;
- enhanced utilisation of information technology tools; and
- the integration of different subjects.

These benefits were the stated objectives of the simulation and the respondents clearly felt that these objectives had been achieved. It is noteworthy that this was an open-ended question and that, as a result, the students gave their own opinions without being prompted or influenced. This therefore validates the use of the audit simulation as a teaching tool. The other benefits mentioned by 22.7% of the respondents (see Table 4) consisted of a wide variety of items, for example, increased decision-making and time management skills and having fun.

In order to support the 29 questions referred to in Section 6.5, students were asked to list the three skills that they had learned from the audit simulation, in particular in the field of Auditing. The results were encouraging: 42.7% of the respondents were of the opinion that one of the main skills was that they were able to see how selected areas of an audit worked in practice, and a further 26.2% felt that the exposure to working papers had been beneficial. This finding is similar to that of a study by Weidenmier and Herron (2004:104).

One of the particular areas in the audit simulation that received attention was the analysis of large databases, as students are not usually exposed to large databases at Stellenbosch University (the university presenting the audit simulation). Traditionally, smaller databases are used in Information Systems in class examples and tutorials at Stellenbosch University. The respondents perceived the large database to be a benefit and 13.7% specifically cited the processing of the large database as a valuable skill. A further 37.4% referred to data processing in general. In addition, 24.9% considered the integration between Auditing and IT to be a valuable skill.

6.7 Constraints arising from the simulation

Students were asked to list the three most significant constraints or obstacles that had arisen from the simulation (see Research Question 3). The results are summarised in Table 5.

Table 5 Main perceived constraints of the simulation

	Percentage of total respondents
The simulation takes a large amount of time	37.4%
Unclear objective or insufficient background information	19.6%
No definite guideline for doing things or no suggested solution provided	6.2%
Not realistic enough	5.6%
Working papers unknown to student	5.3%
Repetition of work previously covered	4.4%
Too much auditing knowledge required	4.0%
Class attendance important to know how to approach project	4.0%
Waste of time / boring / not difficult enough	3.7%
All the information is given in class – too little chance to take initiative	3.1%
Other	29.3%

(Respondents were able to select more than one of the options, so that the total exceeds 100%.)

Unlike the benefits which the respondents perceived to focus on three main benefits, the respondents listed a wide variety of drawbacks. As was shown above, the main drawback was the perceived period of time invested in the audit simulation: 120 (37.4%) of the respondents felt that this was the main constraint. This confirms the findings in the studies by Dennis (2003:418), Felix *et al.* (1985) and Hoyle (1975:232).

Another concern raised was that the objectives of the audit simulation were not clear and that insufficient background information had been provided. The reason for this was unclear, as 50 of the 63 respondents citing this as a problem indicated that they had read the instructions and course learning objectives before commencing and that they had a clear understanding of the objectives. It might very well be that the problem lies in transferring theoretical knowledge to a practical scenario.

6.8 Appropriateness of simulation as teaching method

The respondents were positive about practical projects such as the audit simulation as a teaching tool, with 85.7% indicating that it was an appropriate method of teaching Auditing. This does not argue in favour of eliminating theoretical Auditing lectures, as the theory underlying the practice must still be taught (Siegel *et al.* 1997:233). However, it does indicate that the respondents appreciated a more practical approach, which allowed them to conceptualise the subject in a practical scenario.

Of the respondents, 78.5% indicated that the simulation should be extended to cover other core Financial Accounting, Management Accounting and Finance and Taxation areas, and should be a means of teaching the practical application of the subjects. This finding also supports the results of the study by Gelinas *et al.* (2001:633).

7 Summary and conclusion

This article reports on the results of a survey using a questionnaire to test the perceptions of students regarding the usefulness of an audit simulation. The findings of this study, discussed in Section 6 above, are similar to those of similar international studies, as

discussed in the literature review. It also adds various new insights into students' perceptions and experiences of the audit simulation in a South African context.

The simulation made a valuable contribution to students' studies, assisting them in conceptualising auditing and making auditing theory more practical. A large portion of the respondents felt that they had developed or improved their skills in interpreting and summarising large volumes of data. This is related to the derived benefit of enhancing their IT skills. These findings therefore address the main objectives of the simulation. The respondents agreed that the simulation was an appropriate way to teach and felt that it should be extended to other subjects.

The time required to complete the simulation was noted as an important constraint. This is worth considering in the development of similar study aids.

An area for future research includes a study to determine whether the audit simulation assisted with their first workplace assignment. It would also be possible to repeat the study with a control group which is not exposed to the audit simulation and only to traditional teaching methods. Both of the above studies are currently in progress. Information related to gender and previous academic performance in Information Systems and Auditing could also form the basis for future research.

In conclusion, it can be stated that the goals of integrating Auditing and IT and making Auditing more practical were met. The respondents indicated that they thought the audit simulation was a useful part of their studies and consideration should therefore be given to including it as a part of students' courses. It is believed that this article adds to current understanding of issues faced by students in participating in an audit simulation and that it should be of value in developing and implementing similar study aids.

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Appendix A

In addition to various other questions, students were provided with 29 questions testing their opinion on the usefulness of the project in teaching various competencies, compared to lectures and traditional learning methods. They were able to answer on a four-point Likert scale varying from 'Not at all [useful]' to 'Extensively [useful]'. 'Not at all' and 'somewhat useful' are grouped and classified as 'not optimally useful', while 'considerably useful' and 'extensively' are grouped and classified as 'useful'. The results are summarised in the order that the questions appeared in the questionnaire:

	To what extent did the project help you to develop, improve, enhance or enable:	Not at all	Somewhat useful	Not optimally useful	Considerably useful	Extensively	Useful
1*	your judgement skills (defined as identifying and choosing between available alternatives)?	5%	45%	50%	43%	6%	49%
2	your ability to distinguish between cause and effect in an unstructured Auditing situation, thereby requiring you to make relevant assumptions and identify limitations?	5%	38%	43%	46%	11%	57%
3	the ability to integrate your understanding of the different components of the Information Systems course and consolidate your prior knowledge of the discipline?	3%	28%	31%	48%	21%	69%
4*	the ability to integrate your understanding of the different components of Auditing courses?	3%	23%	26%	50%	23%	73%
5*	the skills in interpreting large volumes of data (defined as the ability to understand and decipher data)?	2%	14%	16%	43%	40%	83%
6	your ability to think critically about issues?	7%	33%	40%	42%	18%	60%
7*	your analytical skills (defined as the ability to think in a logical and in a systematic manner)?	2%	28%	30%	48%	21%	69%
8	the ability to consider problems and evaluate a situation from more than one perspective?	8%	35%	43%	45%	12%	57%
9*	your ability to synthesize (combine) the essential elements of a given situation?	3%	39%	42%	46%	11%	57%
10	your active listening skills?	20%	32%	52%	30%	18%	48%
11	your problem-solving skills?	5%	30%	35%	48%	17%	65%
12*	you to take decisions with incomplete information?	4%	37%	41%	45%	13%	58%
13	your skill in evaluating ideas?	6%	41%	47%	41%	12%	53%
14	your ability to consider alternative solutions and applying judgement on the most appropriate course of action?	4%	36%	40%	48%	12%	60%
15	your motivation to study Information Systems?	16%	35%	51%	28%	21%	49%
16*	your ability to ask pertinent questions? i.e. breaking the problem down into its underlying parts.	8%	39%	47%	40%	12%	52%

continued

	To what extent did the project help you to develop, improve, enhance or enable:	Not at all	Somewhat useful	Not optimally useful	Considerably useful	Extensively	Useful
17*	you to prioritise when dealing with multi-problem situations and in doing so identifying the problems which required your immediate action?	9%	42%	51%	36%	12%	48%
18*	your active participation in the learning process?	7%	36%	43%	37%	19%	56%
19*	you to express ideas and opinions, formulate arguments or recommendations and articulate ideas in written form?	7%	31%	38%	40%	21%	61%
20*	you to relate theory and technical knowledge in auditing to real-life life situations or practical problems (with complexities and ambiguous information)?	2%	17%	19%	42%	38%	80%
21*	encourage you to apply your theoretical knowledge to new and unique situations?	2%	26%	28%	44%	27%	71%
22	your insight into the practical operations of an audit?	2%	13%	15%	44%	41%	85%
23*	your ability to identify information relevant to the particular task you are completing? (thereby distinguishing between macro issues from the micro issues, thus focusing on the most important and relevant facts to the objective set by the project)	5%	42%	47%	40%	12%	52%
24*	your ability to summarise data?	5%	21%	25%	42%	32%	74%
25*	develop your problem identification skills?	6%	33%	39%	44%	16%	60%
26*	your ability to think conceptually? In other words your ability to 'think outside the box'.	7%	36%	43%	36%	19%	55%
27*	you to distinguish facts from opinions?	18%	43%	61%	31%	8%	39%
28*	a willingness to take responsibility for your own learning?	6%	26%	32%	41%	25%	66%
29*	your interest in the subject and stimulate discussion around the problem?	9%	36%	45%	39%	15%	54%

* The total for these questions do not add up to 100%, because up to a maximum of approximately 2% of the respondents did not answer the particular question. In order to increase readability, a separate column was not included for this factor.

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