A STRUCTURED PEDAGOGY FOR INTEGRATING GENERALIZED AUDIT SOFTWARE INTO THE AUDITING CURRICULUM

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ABSTRACT

The usefulness of generalized audit software in increasing both the efficiency and effectiveness of audits has been well recognized. Consequently, there has been an increasing trend especially during the past five years towards incorporating audit software into the chapters of many of the mainstream textbooks on auditing. Consistent with this trend, changes have been made to the auditing curriculums of many business schools. However, precious little guidance is available to instructors on how to best incorporate and introduce students to generalized audit software as part of the auditing curriculum. This paper attempts to fill this gap by delineating a tested pedagogy that has been successfully implemented at an AACSB accredited business school for introducing students to generalized audit software.

JEL: M400; M420; I290, C880

KEYWORDS: generalized audit software, computer-assisted auditing techniques, audit command language (ACL), auditing curriculum

INTRODUCTION

The effectiveness of computer aided audit techniques in the conduct of audits has been recognized by regulatory bodies and accounting practitioners (Debreceny et al., 2005; Weidenmier and Ramamoorti, 2006; Brennan, 2008; Baker, 2009). This has consequently led to changes in both the curriculum and the methods of teaching auditing courses, with many business schools actively promoting the integration of audit software into the auditing curriculum. However, despite the current emphasis in integrating audit software as part of the undergraduate auditing curriculum, precious little has been done to identify the instructional strategies that can be used to enhance its delivery by faculty, and thereby improve the learning experience of students.

The objective of this paper is therefore twofold: first, to give practical insights into how to integrate auditing software into the auditing curriculum, and second, to provide a series of exercises that will reinforce in students the key elements of the functionality and usage of the auditing software. The methodology outlined in this paper has been successfully implemented for the past four years at an AACSB accredited business school in introducing students to auditing software as part of its auditing curriculum. This paper will be of interest to accounting academics in appreciating the more effective means and methods of integrating audit software into the classroom, which is especially so for faculty considering the adaption of such software for the first time.

The remainder of the paper is structured as follows. The next section reviews the extant literature in the area and the objective of this paper. This is followed by section three, which details the pedagogy for introducing generalized audit software to students using ACL™, together with key teaching points that can assist in its more effective delivery in the classroom. Section four concludes the paper with a summary and opportunities for further research.

BACKGROUND AND LITERATURE REVIEW

With the increased prevalence and reliance on information technology by organizations, there has been considerable interest in information technologies that can assist auditors in conducting more efficient and effective audits. In the current tough economic climate with audit firms facing considerable pressure to be as efficient as possible, technology based audit techniques are seen as an effective way to expedite and maximise audit efforts significantly (Baker, 2009; IIARF, 2009). The technologies available to the auditor range from continuous audit management programs such as Approva® and AutoAudit® to other computer assisted auditing techniques in the form of generalized audit software such as ACL™ and IDEA® (Brennan, 2008; Baker, 2009; IIARF, 2009).

It is therefore imperative that auditors become familiar with current developments in IT based audit tools to fully harness their potential as a means towards increasing audit efficiency. However, there is currently a considerable shortage of well-trained accounting graduates with the requisite IT knowledge (O'Donnell and Moore, 2005). This has led some large accounting firms to cross-train current staff in information technology, and has encouraged audit firms to provide relevant IT related training to their staff (Debreceny et al., 2005; O'Donnell and Moore, 2005; Weidenmier and Ramamoorti, 2006; Baker, 2009). Audit firms are now, as a result, increasingly providing training on the use of computer assisted auditing techniques (CAATs) to their employees. CAATs can improve the productivity and efficiency of audits, and generalized audit software are one of the most commonly used forms of CAATs (Debreceby et al., 2005; Weidenmier and Ramamoorti, 2006; Baker, 2009). These techniques can reduce the time taken to complete the audit, and therefore, the cost of the audit (Brennan, 2008; IIARF, 2009). Furthermore, it enables the auditor to increase audit coverage by performing a more comprehensive audit, such as when the entire population can be tested effortlessly without having to resort to sampling (Lanza, 1998; Baker, 2009; IIARF, 2009).

Given the value and usefulness of information technologies in the form of CAATs in conducting more efficient and effective audits, there is an increasing demand for accounting graduates who are familiar with CAATs (Weidenmier and Herron, 2004; and Sharifi, 2004; O'Donnell and Moore, 2005). It is therefore essential that efforts are taken to integrate CAATs into the auditing curriculum, and business schools have been asked to help in this effort by producing accounting graduates who are capable of meeting the demands of employers (Weidenmier and Herron, 2004; and Sharifi, 2004; O'Donnell and Moore, 2005). To achieve the latter objective, computer-based learning, which is a subset of e-learning is especially appropriate due to the significance of the information technology content inherent in CAATs. E-learning strategies includes instruction delivered via a computer either led by an instructor or even self-paced learning (Bates and Poole, 2003; OECD, 2005; Clark and Mayer, 2007). This view is further supported by Bates (2009) who asserts that a major argument for e-learning pedagogies is that it enables the development of essential skills and competencies required by a profession or discipline by incorporating information technologies within the curriculum.

Consequently, a number of mainstream auditing textbooks over the past five years have responded to accounting firms' need for graduates with specific IT skills by integrating generalized audit software into the content of their texts through the use of computer based learning. These include the popular auditing textbooks by Arens, Messier, Rittenburg and Louwers. Integrating auditing software into the respective texts in this manner is expected to improve students' learning experience by exposing them to computer based methods used by auditors in the modern audit environment, which is a critical skill. It is also expected to make students' with skills in CAATs more marketable to potential employers (O'Donnell and Moore, 2005; Baker, 2009).

Although the necessity of developing specific training programs in IT for auditors is recognised by prior research, only a very limited number of studies have looked into the effective pedagogies for introducing

audit software as part of the auditing curriculum, as employers have requested (O'Donnell and Moore, 2005; IIARF, 2009). Prior research in this area is mainly prescriptive in that they suggest a number of exercises that can be used to introduce auditing software to students, without much emphasis on the specific practical aspects that will enhance its delivery in the classroom. One of the early efforts in this area is by Gelinas et al., (2001) who presented a case study based series of assignments. Although the assignments are useful, the practical aspects of pedagogy that instructors should be aware of when introducing auditing software in the classroom is largely overlooked by this study.

Nieschwietz et al., (2002) followed the work of Gelinas et al., (2001) and presented a series of assignments covering the revenue cycle, conversion cycle and sampling. Their work focused on what students were supposed to do in each of the presented assignments without emphasis on the pedagogical aspects.

Subsequently, Weidnmier and Herron (2004) compared the two most commonly used auditing packages on the market, which are ACL and IDEA, and provided feedback from both students and instructors on the use of the software. By analyzing the content of the software manuals of ACL and IDEA, they suggested how they can be used in the classroom environment. As with Gelinas et al., (2001) and Nieschwietz et al., (2002), little comment was made on the pedagogical aspects of introducing the software. Furthermore, no specific exercises or assignments were suggested that can enhance the integration and delivery of the audit software as part of the auditing curriculum.

The limited research in this area has also not explored the most appropriate methods of assessing students' learning outcomes once CAATs are incorporated into the curriculum. In this instance, the AACSB's Standards can be a useful foundation for exploring students' learning outcomes and possible assessment tools (Shaftel and Shaftel, 2007). The AACSB shows a strong preference for direct measures of learning compared to indirect measures. Direct measures require demonstration of students' knowledge or skills acquired in their course of learning (Kelley et al., 2010), which would be most suitable for assessing learning outcomes for CAATs in the auditing curriculum. Examples of direct measures from this context might include the use of written assignments and tests incorporating the appropriate use of auditing software.

As shown by the above review of literature, integrating audit software into the auditing curriculum is a new development in many business schools. Given the limitations presented in these initial prior researches, the remainder of this paper outlines a tested but flexible pedagogy that can be utilized to introduce generalized audit software as part of the auditing curriculum. It first gives an overview of the auditing curriculum, technology used and resources at the AACSB accredited business school at UAE University, where the pedagogy presented in this paper has been developed and implemented.

PEDAGOGICAL METHODOLOGY

The auditing baccalaureate in Accounting at UAE University has three streams: Financial Accounting, Management Accounting and a General Specialization. The curriculum closely resembles the U.S. system since the college is AACSB accredited. For each of the three aforementioned streams, Principles of Auditing is a compulsory course, while Advanced Auditing is an elective. Principles of Auditing is a prerequisite for Advanced Auditing. At the present point in time, many of the students who complete Principles of Auditing also go on to take Advanced Auditing. The typical number of students in each course per semester range from forty to sixty students. Each student and faculty in the university has access to a laptop, with lecture halls and classrooms having Wi-Fi access.

Computerized audit techniques in the form of generalized audit software is the first topic covered in Advanced Auditing. The course profile given to students on the first day of class has three weeks

allocated to this topic, which comprise about twenty percent of the course. Each class session is 75 minutes in duration and meets twice a week. Students in the pre-requisite Principles of Auditing class do not have any direct exposure to generalized audit software, other than being aware that these methods are now used by auditors in gathering evidence, with appropriate examples.

The textbook adapted for both Principles of Auditing and Advanced Auditing is "Auditing and Assurance Services: A Systematic Approach" by Messier et al., (2008). The textbook is in its 6th edition and it is bundled with an educational version of the ACL 9.0 audit software. Each chapter of the book has various ACL exercises. However, it is best for the instructor to tailor the exercises to suit his or her own class depending on how comprehensively the ACL program is integrated into the auditing curriculum.
The following sections detail an effective pedagogy that can be used to introduce students to ACL in six lecture sessions of 75 minutes each. The outlined pedagogy is flexible enough for individual instructors to make changes to it to suit their own curriculum and class format.

Class Session 1 (75 minutes)

In the first class, students are given a brief lecture on ACL and its specific uses, and told how the next three weeks will be proceeding. Then they are asked to install the ACL software off a CD on their laptops. As most students do not bring textbooks to class which contains the ACL program CD until the second week of lectures, it is efficient for the instructor to use several copies of the CD to ensure the quick installation on each of the students' laptops. Students are specifically asked to also install the 'ACL in Practice' PDF file as part of the installation routine.

Class Session 2 (75 minutes)

The second class starts the hands on practice using ACL. Prior research such as Weidnemier and Herron (2004) show that they essentially got students to go through the ACL workbook at their own space covering the first five modules. However, having first tried this approach, it was found to be more challenging for students as they had to familiarize themselves with the program and it capabilities on their own, with minimal input from the instructor.

A more effective method that improve the cognitive experience of students and get them off to a quick start is to first familiarize them with the ACL workspace, and then go on to the necessity of creating an ACL project, which precursor any analysis. This is done using a separate dataset on a company's accounts receivable data (available from the author on request). During this time, key points including the need to define data columns in the proper formats are explained. This first visual introduction to ACL is easily achieved by the use of a projector hooked onto the instructor's laptop. It is also important to inform students that the source data used in creating the project is secure, as ACL does not modify them at all.
Most students initially fail to see the purpose of creating a project in ACL, as they are mainly familiar with spreadsheets such as Excel. It helps at this juncture to stress that an ACL project is like a drawer or a cabinet, which is used to store all the relevant data for a particular audit. Once the project has been created, the concept of data categories should be explained in more detail, emphasizing that the three commonly encountered data types in ACL is character (ascii), numeric and date formats (Arens and Elder, 2008). Many students will have the misconception that if a particular column in ACL contains numbers, then it should be defined as numeric data. It is helpful to tell students that if a particular column is not going to be used for performing mathematical operations, then it should be set as character, unless it contains date type data. The example of a column of students' ID numbers can be used to illustrate this further. Since there is little value in adding or subtracting students' ID numbers, such a column should be defined as character even though they comprise of numbers or digits. This can be contrasted with a column of sales figures, where the auditor would be interested in obtaining the total value of sales or the highest value of a sales transaction. Such a column should always be defined as numeric.

After this visual introduction to ACL, students are asked to work through the first two chapters of the 'ACL in Practice' manual in the remainder of the class. This can be achieved by students in about 45 minutes as the first chapter is only a description of the fictitious company used in the manual. Chapter two requires students to open an existing project and familiarize themselves with basic ACL functions such as the statistics command and duplicate commands. It also introduces students to simple filters.

Class Sessions 3-5 (225 minutes)

Once the students are familiar with the basics, they proceed to complete chapters 3-5 chapters in the 'ACL in Practice' manual during the next three subsequent class sessions. These three chapters require students to first create a new project from a number of file types including Excel, Access and Text files. More advanced aspects of ACL are covered in these sessions, comprising of advanced filters and functions. Each chapter is allocated one class session of 75 minutes, and most students are able to complete each of the chapters in less than 75 minutes. During these sessions the instructor will monitor the progress and provide feedback. It was also found to be practical and effective at this stage to engage 2-3 students who are ahead of the other students to help their colleagues in going through the more challenging parts of the chapters. It was found that the chosen students were eager to contribute in this way, and it also ensured that students needing assistance received it in time as the instructor may not have sufficient time to devote to each individual student, especially in large classes.

By the end of chapter five, most students will have a good grasp of the key ACL commands ranging from the creation of projects to the writing of appropriate filters to achieve specific objectives such as to isolate invoices amounts within a given range. A number of students, however, will still overlook the importance of having to properly define variable columns according to the data types. It is therefore important for the instructor to frequently remind students of this critical task before starting to perform any analysis using ACL.

Class Session 6 (75 minutes)

Session six is the final session and it is used to reinforce in students the main concepts that they have learned in the previous classes. Each student is provided with a printed sheet of six ACL exercises which they are required solve within 45 minutes, utilizing an accounts receivables dataset. The data in Excel format is made available to students via Blackboard™, and is also available to the reader on request. The accounts receivable file has nine variables which are summarized in Table 1 below.

Table 1: Accounts Receivable Data Definitions

Variable Name	Description	Data Type
Amount	Dollar value of the sales transactions	Numeric
AR_Clerk	Accounts receivable clerk	Character
Authorized	Whether the transaction is authorized or not. Transactions exceeding the credit limit need authorization	Character
Cash_Receipts_Clerk	Cash receipts clerk	Character
Credit_Limit	Credit limit of the customer	Numeric
Customer_Number	Customer's unique number	Character
Due_Date	Due date of the invoice	Date
GL_Accounting	General ledger clerk	Character
Invoice_Date	Invoice date	Date
Invoice_Number	Invoice number	Character

The data used in the exercises is available from the author on request.

Students are instructed to first create a project and import the Excel data into ACL format before attempting the exercises. Most students are able to achieve this in a couple of minutes. At this juncture, it is also useful to reiterate the importance of defining the data appropriately as either character, numeric or date type before conducting any analysis. Once this is done, the 'verify' command can be used to ascertain whether the data matches the assigned data type. After these preliminary remarks, the students are given the opportunity to complete the exercises. Afterwards, the instructor walks through each of the exercises using the projector in the remainder of the class, stressing the main points. A summary of the exercises, the corresponding ACL steps needed to achieve them and key teaching notes are presented below.

Exercise 1

Objective: Provide a statistical snapshot of the credit sales transactions.

ACL steps: Go to Analyze} Statistical} Statistics. Select 'Amount' and click OK.

Teaching note: explain to students that a similar snapshot can also be obtained by using the 'Profile' command. However, this command provides more concise information than that provided by the statistics command, and it only works on numeric fields. On the contrary, the statistics command works with both numeric and date type data. This alternative approach can be quickly shown on screen.

Exercise 2

Objective: Identify if there are any duplicate invoices in the accounts receivable file.

ACL steps: Go to Analyze} Look for Duplicates. Select 'Invoice_Number' in the Duplicates On section and click OK.

Teaching note: inform students that the Duplicates command can be used on numeric, character and date fields. Mention that the result of this procedure is automatically saved as a file unless it is specified otherwise before running the command. Show students that more information about the identified duplicates can be viewed by clicking on the hyperlinks in the results table.

Exercise 3

Objective: Identify any gaps in the invoice numbers.

ACL steps: Go to Analyze} Look for Gaps. Select 'Invoice_Number' in the Gaps On section and click OK.

Teaching note: inform students that if there are more than five missing items, then ACL by default will report the results in ranges. This behaviour can be changed by selecting the 'List Missing Items' radio button and changing it to a different number. It is important at this point to emphasize the difference between the Gaps command and the Sequence command. Many students consider both commands to be identical. However, it should be stressed that ACL does not consider gaps or duplicates to be sequence errors, as long as the data is in ascending or descending order.

Exercise 4

Objective: Determine if there are any issues with the segregation of duties between the Accounts receivable clerk and the Cash receipts clerk.

ACL steps: Click 'Edit View Filter' button. Write the filter 'AR_Clerk = Cash_Receipts_Clerk' by double clicking on the variable names in the 'Available Fields' section. Click the Verify button followed by OK.

Teaching note: many students tend to manually write filters thereby increasing the risk of errors in the formulae. This is specially the case when dates have to be entered into the filter, given that ACL has its own syntax for describing date values. Therefore, it is helpful to advise students that it is more efficient to select variables for the filters by double clicking on them from the 'Available Fields' section, or by utilizing the 'Date' button where appropriate.

Exercise 5

Objective: Determine the total value and number of transactions for each customer.

ACL steps: Go to Analyze} Summarize. Select 'Customer_Number' in the Summarize On field and select 'Amount' in the Subtotals field. Click OK.

Teaching note: it is important to stress that the Summarize command can only be used on data defined as character or date type. An alternative to the Summarize command is the Classify command, which will give in addition the percentages for the classified items. Students find it helpful to see both techniques demonstrated on screen with the difference in the output pointed out.

Exercise 6

Objective: Perform an aging of the accounts receivables data to determine accounts that are more than three months overdue.

ACL steps: Go to Analyze} Age. Click on the Age On button and select 'Due_Date' from the list of available fields. Click Subtotal Fields button and select 'Amount'. In the Cutoff Date field, enter 31 December 2007, which is the company's year end. Keep the default periods in the Aging Periods section and click OK.

Teaching note: students often misunderstand or misinterpret the purpose of the Age On field and the Cutoff Date field when performing the aging. It is important for the instructor to clarify the latter points by explaining that the Age On field is used to calculate overdue period for each account, while Cutoff Date refers to the entity's year end. The intervals used in the aging are based on the values in the Aging Periods section, and this often requires further explanation. It should be emphasized that the default intervals calculated by ACL for aging are: 0-29 days, 30-59 days, 60-89 days, 90-119 days and 120-10,000 days. Students often query the last value of 10,000 in the interval. It should be explained that while the value of 10,000 is useful for identifying exceptionally old accounts, the user is able to designate any interval as required.

CONCLUSION

There has been considerable interest in the use of generalized audit software as a tool for improving audit efficiency. Audit software has been portrayed as an indispensible part of the auditor's toolbox that can make audits more effective and efficient. Consequently, regulatory bodies, accounting firms and accounting academics have all recognized the importance of integrating audit software into the auditing curriculum. Responding to these suggestions, many mainstream textbooks on auditing now incorporate auditing software into the relevant sections of their chapters. However, precious little guidance is available to instructors on how to best utilize and integrate auditing software into the auditing curriculum.

This paper addressed this issue and contributes to the teaching and learning of audit software by offering a tested but flexible pedagogy for incorporating audit software into the classroom. The presented pedagogy has been structured so that it can be effectively covered in six class sessions, with the final session used to reinforce the concepts learnt in the previous classes. It represents the culmination of four years of experience in using variants of this pedagogy. Students' feedback indicates that the developed pedagogy is highly effective, with 86 percent of students indicating that this style of instruction is successful for learning the application of the software. Therefore instructors introducing audit software for the first time as part of the auditing curriculum can use the presented methodology with little modification in the first semester, and then tweak it to their specific needs in later semesters. Instructors who have already integrated audit software into their curriculum may find alternative approaches and additional insight in this paper that can be utilized in their teaching.

A limitation of this paper is that it does not fully capture the effects of students' level of IT knowledge, cultural aspects and differences in individual learning styles in the teaching and learning of audit software. Further research from these perspectives will contribute to enhancing the instructional strategies for delivering audit software as part of the auditing curriculum. This will consequently enable business schools to respond to the call by employers and regulatory bodies to assist in providing accounting graduates who possess the core skills needed in an increasingly IT intensive audit environment.

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