PROSPECTS FOR COMPUTER-ASSISTED TEACHING AND LEARNING IN SECONDARY SCHOOL ACCOUNTING CLASSROOMS

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ABSTRACT

The purpose of this paper is to extend the dialogue about teaching, curriculum and pedagogy in the area of accounting education. The paper suggests and describes opportunities for computer-aided instruction in accounting classrooms. Examples of classroom computer applications suitable for teaching accounting lessons which include spreadsheets, presentation software, online games, simulations and drill and practice exercises are described together with suggestions of topics where such applications can be used. The paper concludes by contending that by virtue of their versatility, computers, can be used in accounting education to help to shift the focus of instruction from learning that is teacher-centred to learning that is student-centred, thus implying that computers bring with them a constructivist conception of teaching which shifts attention from teaching as the imparting of knowledge to teaching that engages students in that there is hands-on interaction with instructional materials in authentic problem-solving contexts.

Keywords: Accounting, Accounting Education, Information and Communications Technology (ICT), Computer-assisted learning (CAL)

INTRODUCTION

Advances in information technology have transformed classroom teaching and learning by providing alternatives to traditional teaching methods such as the standard lecture format by giving teachers and students' access to a wide range teaching and learning tools. According to Oak (2012), computer technology has had a deep impact on the education sector in that large amounts of data can be stored in them, they enable quick processing of data, can be used as teaching aids and teachers and students can use the internet to search for information. In accounting education, computers were used increasingly from the 1980s and 1990s (Sangster, 1992).

Information and communications technology (ICT) has long been heralded as a crucial element of both professional accountancy and accounting education (Elliot, 1992 as cited in Marriott et al., 2004) and it is a recognized part of the overall tools for supporting and enhancing teaching and learning as well as supporting and transforming pedagogy (McVay et al.,2008).The pedagogical benefits and the capacity of computers to assist in business education teaching were outlined by Spinelli (2010) and these include (a) emphasis on active learning, (b) enhancement of collaborative learning, (c) encouragement of greater student independence and (d) task-based teaching (p. 43). In a nutshell, the ability of computers to bring realism and learner-centredness to teaching supports contemporary constructivist views of teaching where emphasis is placed on authentic learning environments, realism and active student involvement in learning tasks.

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Many other potential benefits of the use of computers as an alternative mode of delivery in accounting education have also been reported. For instance, McInnes et al., (1995, as cited in Lane and Porch, 2002) concluded that students taught using computer-aided learning (CAL) approaches were initially more inclined to finding accounting an interesting subject, and were more confident of their ability to work with computers than were those in the lecture-based classes. Another study carried out in Australia by McDowall and Jackling (2006) on student perceptions of the usefulness of computer-assisted learning packages in learning accounting concepts found out that CAL programmes as part of the curriculum in accounting education have the potential to positively impact on academic performance, measured by academic grades in the unit of study. In a paper on the use of ICT in economics and business education, Ping (2003) argued that ICT facilitates the acquisition of important cognitive skills required for effective economic analysis and evaluation. It can thus be concluded that the potential benefits of using ICT in business subjects classes are immense. On top of providing students with concrete experiences of business concepts and practices used in the real world context, ICT can also increase students' self-confidence and competencies with technology.

Computer technology tools that are available to accounting teachers take many forms, including computer-assisted instruction by drill and practice, multimedia simulations and electronic games and financial modeling (Boland et al.,2005). A study carried out by Ahadiat (2008) with subjects drawn from all 50 states of the United States revealed thatby far the most popular applications of information technology and computers by accounting educators are email, the Internet, word processing, spreadsheet, presentation and data analysis software. For instance the internet can be used to access accounting simulations, games and puzzles, to carry out online research and for exploring endless resources such as accounting literature, academic journals, facts, figures, etc. Spreadsheet software such as Microsoft Excel can be used to analyse financial information, perform calculations and to create forecasting models. They can also use it for financial modelling in the preparation of cash flow forecasts, balance sheets, trading and profit and loss accounts and start-up capital estimates. Since it is now widely accepted that the integration of modern technologies into the teaching-learning process has great potential as a tool to support learning, accounting teachers should strive to incorporatecomputer-aided pedagogy in their classroom practices since such technologies have the potential to improve and enhance student learning and understanding. Premuroso et al.(2011) argue that the use of new classroom technologies may create a more interactive and dynamic teaching-learning environment compared to the traditional lecture-style classroom.

Although technology has been integrated into financial accounting practices in business for years, accounting teachershave not fully capitalized on technology in the classroom (Teeter et al., 2007). Although available accounting education literature has offered relatively little insight into the extent to which accounting teachers incorporate computer technology in their classroom practices, there are many empirical studies which have shown that established teaching methods remain in place and available technology is often underused and poorly integrated into classroom practice. Many factors have been cited for the limited ICT adoption and integration in teaching and learning such as the unavailability and inaccessibility of ICT resources in schools (Plomp et al., 2009; Yildrim, 2007); teachers' incompetence and lack of confidence in the use of ICT (Christensen and Knezek, 2006; Peralta and Costa, 2007); teachers' negative attitudes towards ICT and their beliefs that the use of ICT in teaching did not benefit their students' learning (Korte and Husing, 2007). In light of this it can be inferred that much of the real potential of computer-assisted learning remains untapped because teachers may not be using the technology effectively.

METHODOLOGIES FOR COMPUTER AIDED TEACHING AND LEARNING IN ACCOUNTING

Spreadsheet software

Electronic spreadsheets are computerized ledger sheets organized in rows and columns that automatically perform calculations or other operations on numeric or text data. With electronic spreadsheets teachers can prepare classroom instructional materials or perform calculations they would otherwise do manually (Mills and Roblyer, 2005). Accounting teachers can use spreadsheets such as Microsoft Excel in recording transactions in the books of prime entry. Engaging learners in recording and balancing two column cashbooks, three column cashbooks, petty cashbooks and the sales and purchases daybooks through the use of Microsoft Excel is both interactive and student-centred. Several classroom and homework assignments can be tackled in this manner. Once the formulae and the parameters are set, students may explore different business transactions and their effects on accounts of a business. The example in Table 1 below shows how Microsoft Excel can be used in accounting classrooms:

Table 1.Spreadsheet software exercise

Recording transactions in a two column cashbook

2015

December 1. Lorato started her business with capital of $20 000 which she paid into a business

Bank account

2. Paid rent of premises, $650, by cheque

3. Purchased goods on credit, $9000, on credit from Layer Suppliers

4. Withdrew $230 from the bank for office use

10. Paid advertising expense, $78, in cash

18. Sold goods, $ 3456, on credit to Gamer Suppliers

20. Paid Layer Suppliers account by cheque

23. Bought delivery van, $6547 from the business bank account for personal use

24. Lorato took $4000 from business bank account for personal use

Required: Enter the transactions in the cash book and balance the cashbook as at 31

December 2015, bring down the balance to 01 January 2016.

A sample cash book in Excel is shown in Figure 1 below. All students need to do is to enter the details of the receipts and payments in the exercise above into the cash book. If students are not familiar with the use of the Excel cash book, teachers could consider making them enter the transactions in their manual cash book first and then transfer the information into

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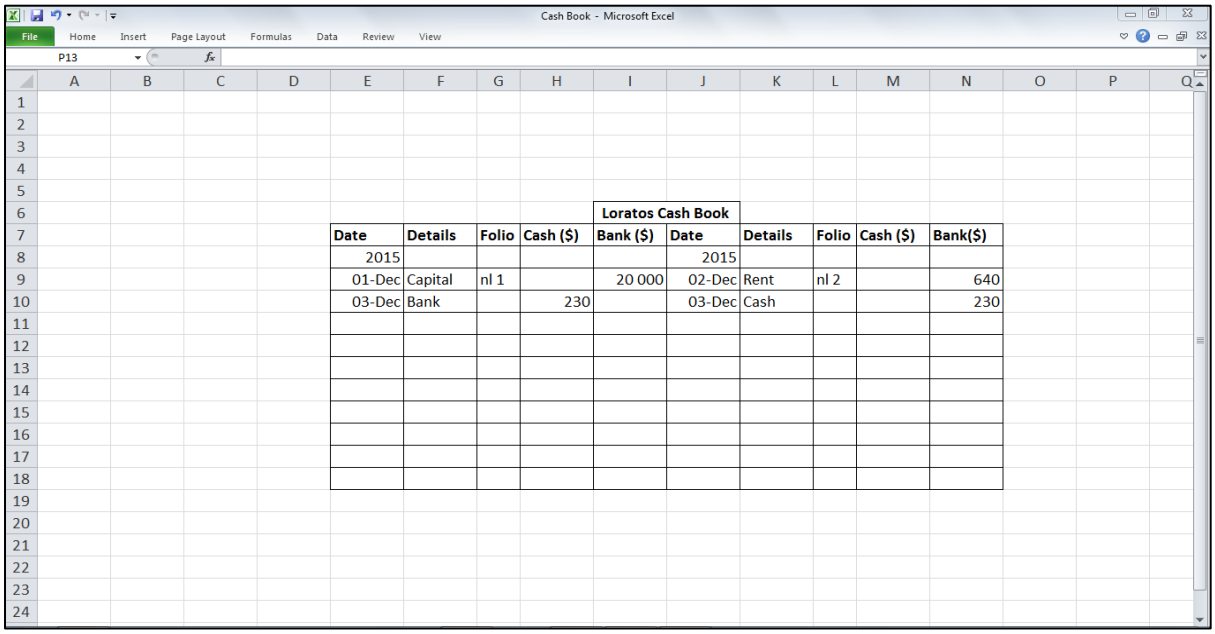
the computerised version – this would provide a good training exercise and also allow them to compare the totals in the two versions.



									Loratos Cash Book							
				Date	Details	Folio	Cash ($)	Bank ($)	Date	Details	Folio	Cash ($)	Bank($)			
				2015					2015							
				01-Dec	Capital	nl 1		20 000	02-Dec	Rent	nl 2		640			
				03-Dec	Bank		230		03-Dec	Cash			230			

Fig. 1.Spreadsheet exercise

As students will be recording transactions in the cashbook, various issues such as the recording of a bank overdraft and dishonoured cheques can be included in the practice exercise. Students will have first- hand experience of going through such issues and will be able to understand the effects on business performance. Teachers can take students from simple exercises to more complex ones by inserting more columns in the example above to accommodate new concepts such as cash discounts, contra entries and other specific cash expenditures. Students will manipulate figures and check for the effects on balances and hence specific decisions aligned to any financial performance.

Spreadsheet software can also be used for the computation of end of period reports and statements such as the trial balance, cash flow forecasts income statement and statement of financial positions. Through the use of spreadsheets, students and teachers can pose and solve different scenarios that a hypothetical business can experience during its trading activities and how this affects the net worth of the business through movements in the equity and debt financing.

Presentation software

Using PowerPoint in the classroom can lead to an effective learning environment if students are allowed time to take notes and summaries of teachers' PowerPoint slides (Sugahara andBoland, 2007).Szabo and Hastings (2000) also suggested that class presentations via PowerPoint have particular advantages due to their ability to capture students' attention through the various use of colour, fonts and images as well as providing visual clarity.In teaching complex concepts, where sequential and logical steps must be followed such as the ledger entries to record the sale of a non-current asset, the slide in Figure 2 below can be used as an example of the procedure. The slide chronologically exhibits what and how the learner should proceed at any given stage. Once mastered, students will then try to follow the steps by attempting different sets of classroom exercises which can be manipulated by the teacher and can be made to accommodate other complex issues such as part-exchanges.

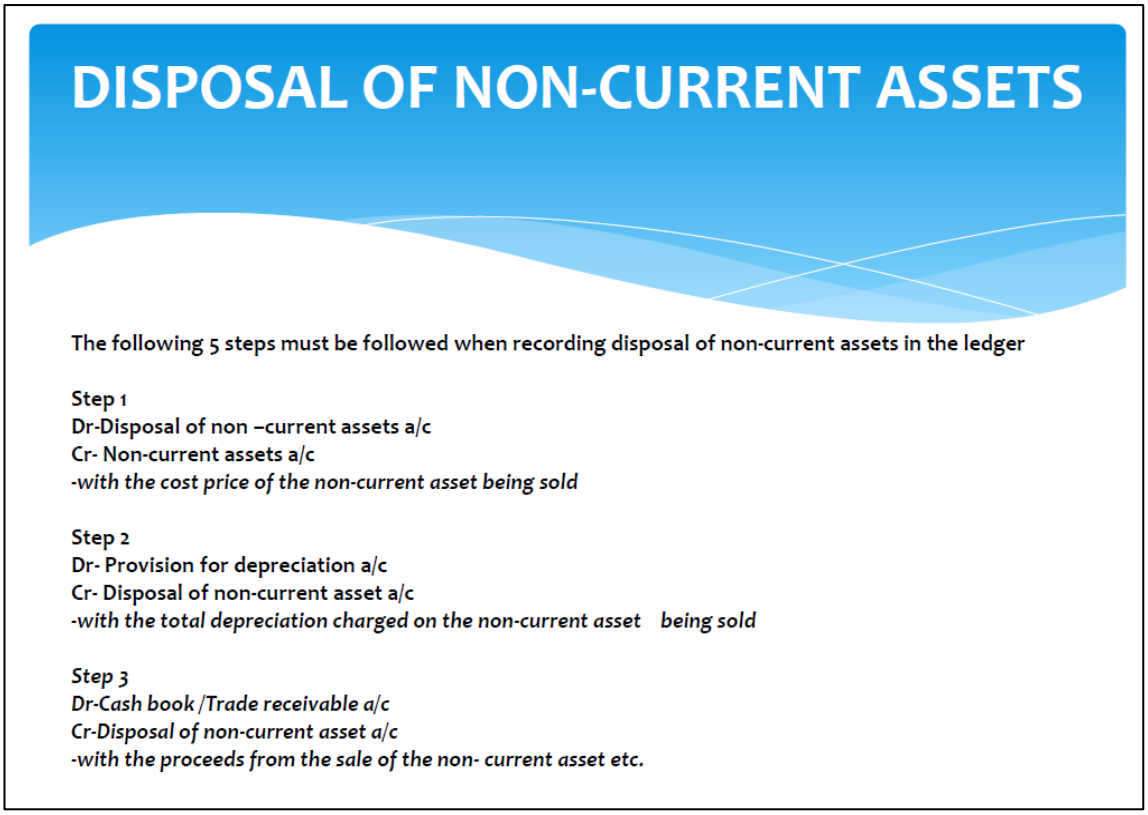


Fig. 2.PowerPoint slide

Many accounting topics such as *Manufacturing Accounts, Partnership Accounts* and *Limited Company Accounts* can be delivered using presentation software, with individual components and sub-components being visually displayed and the nature of formats and presentation articulated. Students will input data using the prescribed formats and the teacher can reveal other adjustments and let the students discover their effects on the business accounts.

Online Computer Games

Computer games can be used in the accounting classroom to support defined educational objectives. They can be used in many different areas of the subject to support, complement and reinforce specific discipline concepts. Some of the advantages of using online games in the classroom are that learning is active and uses active multisensory experiential learning methodology. Studies have shown that this leads to higher retention of both factual and skills-based knowledge (Davis et al., 2009). Also, since they are constructivist and experiential, they maximise learner engagement and ultimately improve learning outcomes.

There are many types of computer-based online games that are available to accounting teachers (for example, adventure games, action games, simulation games, puzzle games, etc.). In this paper, we will only discuss four types, namely puzzle games, terminology scrambles or word search games, drill and practice exercises and simulations.

Online Crossword Puzzles

Crossword puzzles have been shown to be effective teaching tools of terminology, definitions and spelling, resulting in greater retention of facts (Moore and Detlaff 2005). Other important skills required for completing these puzzles include making inferences, evaluating choices and drawing conclusions. According to Jones (2007), crossword puzzles also have the advantage of appealing to different learning styles in that visual learners often have strong puzzle-solving skills and feel great satisfaction when they complete one. Auditory learners

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enjoy step-by-step reasoning, so they also benefit from the sequential steps of completing a crossword and kinaesthetic learners enjoy the multi-task strategies required to solve a crossword.

Interactive crossword puzzles like the one in Figure 3 below are abundant and freely available online. Teachers and students can visit websites such as *Accounting Coach,Dinesh Bakshi, Bean Counter* and many others and take advantage of numerous accounting crossword puzzles covering several topics in the syllabi of different examination boards. As students continually attempt to provide solutions, attention, focus and concentration is achieved. Teachers can assign homework to students through the selection of topic-specific online computer- based crossword puzzles.

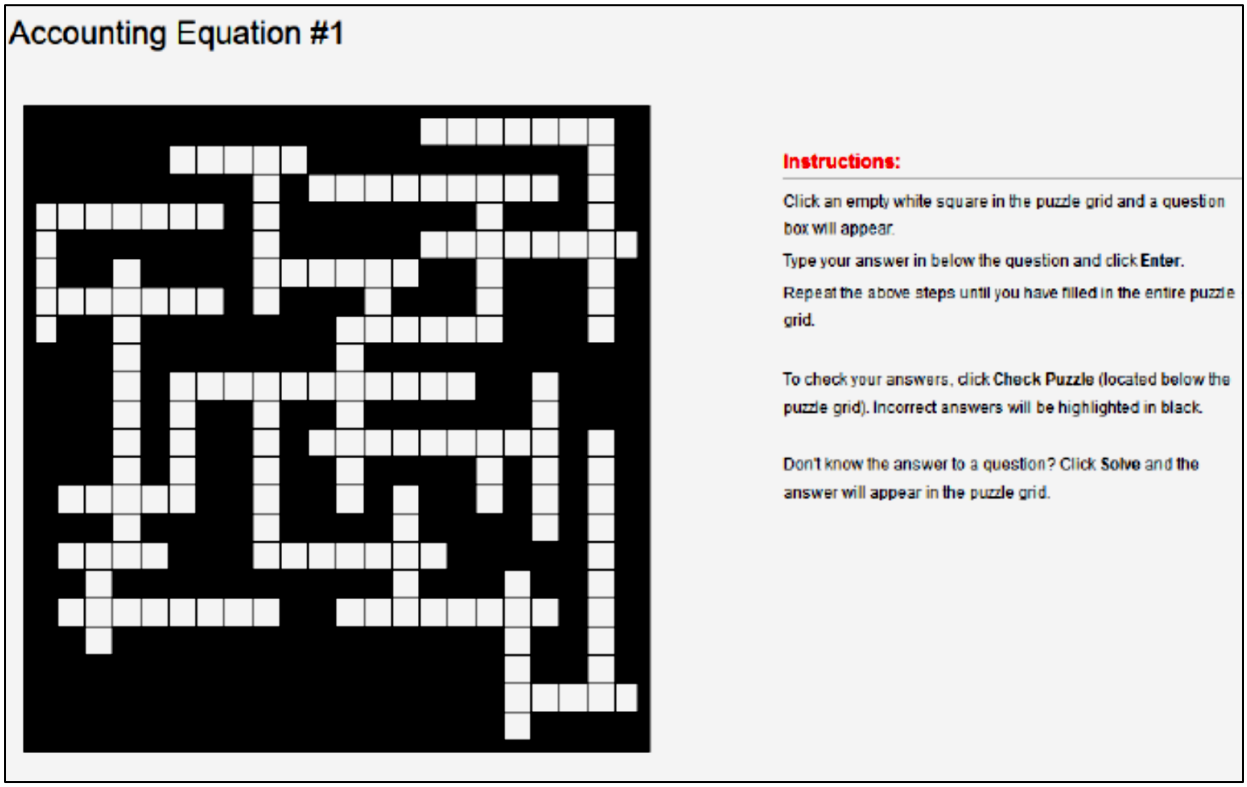

Fig.3.Accounting crossword puzzle (Accounting Coach, 2016).

The use of crossword puzzles asstudy and revision tools, are helpful in identifying students' areasof understanding as well as lack of comprehension and areas of weakness (Weisskirch, 2006). When students identify answers correctly, they may have an increase in confidence and research has also shown that these puzzles increase motivation and students' interest in the topic at hand (Franklin et al., 2003).

Terminology scramble or word search

Accounting teachers can use terminology scramble games (also known as word search) to review and reinforce accounting terminology (Swanson et al., 1991). As mentioned earlier on, free samples of terminology scramble games and puzzles like the one in Figure 4 are available online for free.

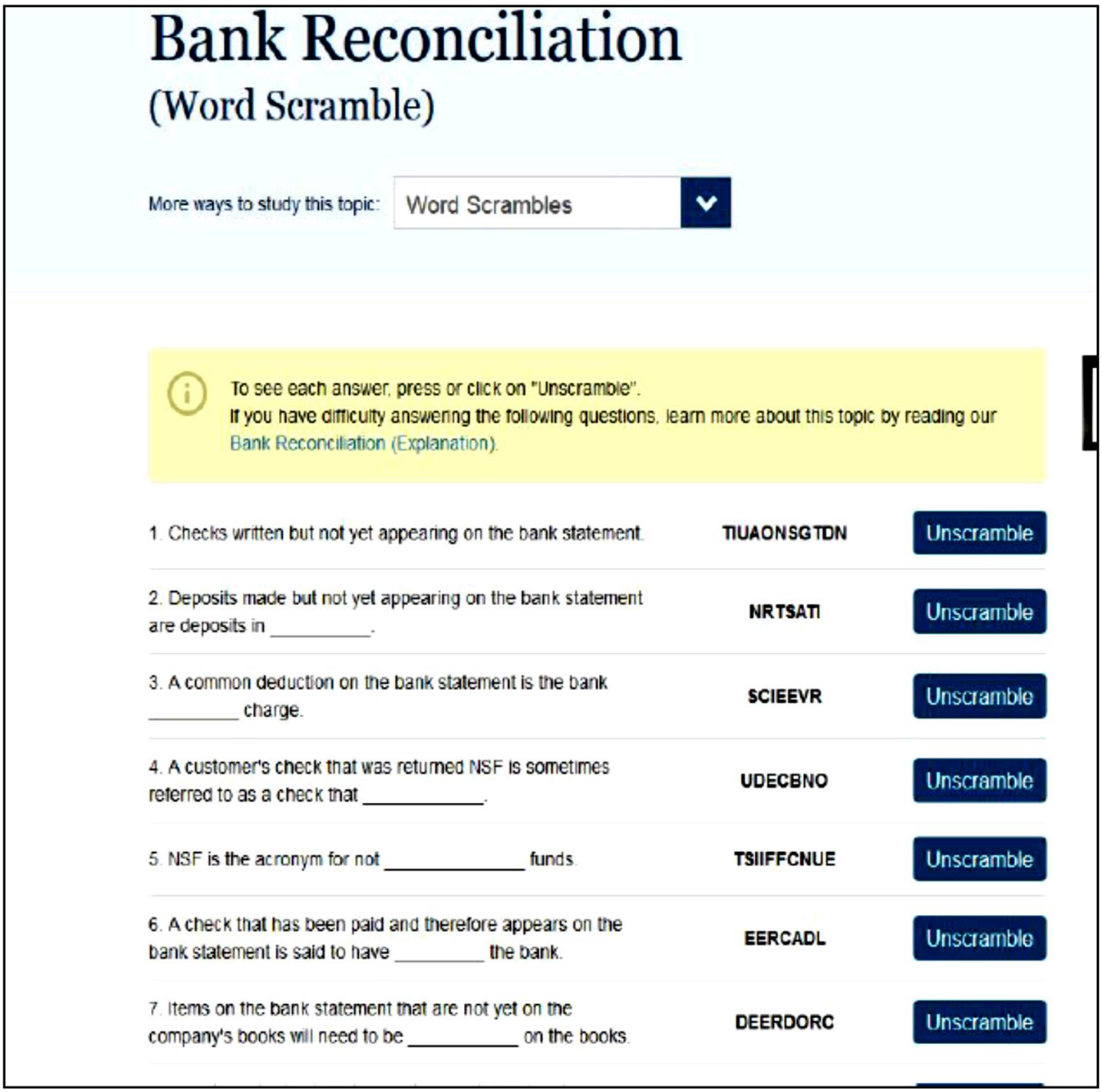

Fig. 4.Terminology unscramble (Accounting Coach, 2016).

Well-selected game-based learning has several advantages over traditional experiential learning methods. According to Quinn and Neal (2011), the use of online games creates a hands-on, minds-on opportunity that allows players (students) to actively focus create and change a scenario while simultaneously learning about consequences of choice in the situation. As students become more engaged and committed to succeeding in the game, they become more willing to learn about the scenario the situation is taking place in. Other benefits of using games in the classroom include teaching students alternative techniques to studying, impacting cognitive development, and motivating students to learn instead of simply memorizing and boosting students' confidence when they get a correct response (Davis et al., 2009).

Drill and practice exercises

Drill-and-practice is a teaching strategy in which students practice skills previously learned and receive corrective feedback. Computer-based drill and practice involves the use of a computer-assisted instruction technique in which a series of structured problems or exercises

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with immediate feedback to student responses is provided (Bordy, 2010). In accounting drill and practice exercisespromote the acquisition and mastery of knowledge and skills through repetitive practice.The use of drill and practice software is not intended to teach new concepts, but instead to reinforce concepts already taught through review and practice.

In the *Drag and Drop* exercise in Figure 5 below, students will be required to classify given items according to whether they would usually be an asset, a liability, revenue or an expense. Students will immediately receive feedback on their performance by clicking the *Check My Score* icon.

Fig. 5. Drag and drop exercise (Business Studies Online, 2016).

An exercise such as this could be useful when a teacher wishes to reinforce work done on assets vs. liabilities and revenue vs. expenses. Hundreds, if not thousands of ready-made web-based drill and practice exercises, tests and quizzes specifically written for various examination boards are freely available online from educational websites such as *AccountingCoach*, *BBC Bitesize*, *Dinesh Bakshi*, *Business Studies Online*(now called *Business Ed*), just to mention a few. All that a teacher needs to do is to take his/her class to the computer lab during scheduled times and let students get to work under his/her supervision.

Accounting simulations

Simulation and gaming is particularly popular in accounting education. By customizing computer-based accounting simulations, students can integrate key accounting concepts in the learning process (Blazic et al., 2012). Accounting simulations are realistic and represent a fun-filled and interactive way to learn about Accounting on a computer. One such online simulation in Figure 6 is the *Virtual Business Personal Finance* simulation which is a visual computer simulation that lets students learn and practice key personal financial skills.

Fig. 6.Personal finance simulation (Knowledge Matters, 2015).

Other *Virtual Business Simulations* are available where students begin by learning the basics of accounting as they work with T-accounts, general journals, general ledgers and worksheets. They practice making correct entries and also practice making business decisionsbased on the accounting information they will be preparing. In later lessons, students move on to using financial statements and ratio analysis to solve real business problems.

CONCLUSION

The potential benefits of computer-aided teaching and learning in accounting classes are immense.As a contemporary teaching method, computer-assisted instruction tends to be all-round, multi-level and it can make the teaching of content vivid, interesting and fascinating because the presentation of information can be synchronised in the form of text, images and sound. Furthermore, computer applications such as the internet, simulation programmes, databases and spreadsheetsoftware can allow students to see the relevance of accounting by demonstrating to them the relevance of concepts taught to real life. Because of their versatility, computers, can be used in accounting education to help to shift the focus of instruction from teaching and learning that is teacher-centred to learning that is student-centred. Computers bring with them a constructivist conception of instruction which shifts attention from instruction as the imparting of knowledge to instruction as the guidance of socially-based exploration in authentic and intellectually rich settings.

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