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Effects of E-Learning Program in Accounting on Students' Achievement and Motivation to Learn Double Entry Bookkeeping

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Abstract
The present study examined the effects of an E-learning program in accounting (ELPA) used to teach and motivate secondary school to learn accounting concepts of double entry bookkeeping. Accounting concepts are taught as part of the business education subject in Kenyan secondary schools in order to prepare students to take the accounting subject in Form Three. But it has become difficult to motivate students to take the subject, hence a very low number of students enrolling for accounting at the Kenya National Examination Council (KNEC). A quasi-experimental non-equivalent pretest-posttest research design was employed. A sample of 400 subjects from ten intact classes of boys-only and girls-only secondary school categories in Rift Valley and Western provinces were participated in present study. The intact classes were randomly selected and assigned to the treatment classes. The treatment schools were selected on the basis of being in possession of IBM-compatible computers and teaching business education as a subject in their school curriculum. Both the pre-test and the post-test were administered to all groups using two instruments; the Accounting Achievement Test (AAT) and the Student Motivation Questionnaire (SMQ). Quantitative data analysis was done using t-test, and ANCOVA with statistical significance level set at p=0.05. The results indicate that the ELPA improved the students' achievement and motivated them to overcome the notion of accounting being a difficult subject in secondary education. The study concluded although the ELPA program was modestly effective in improving students' performance and bolstering their motivation to learn accounting; more studies are still needed.
Keywords: E-learning, School Accounting, Secondary Education, Business Studies, Double Entry Bookkeeping

Introduction

Business education is an integrated subject encompassing more than five subjects in the secondary school curriculum that includes: commerce, accounting, economics and office practice. It was introduced into the curriculum to help the country achieve the national objective of education of self-reliance and economic development. The goal of business education is to equip students with the knowledge, skills and attitudes necessary to function effectively in any business environment (Kenya Institute of Education [KIE], 1998; Boone and Kurtz, 1987) because any shortcoming in the teaching of the subject in secondary school will result in poor business managers and accountants.

The notion of business education being a "subject of self-reliance" was expected to give enough incentives to as many students as possible to seek and acquire the skills and knowledge in the subject by opting to sit for it at the Kenya Certificate of secondary education (KCSE) examination level. The success of the subject would be reflected in the number of students willing to select any business education subject offered in the syllabus and especially accounting because it is more work oriented and is readily applicable in the business world. But a recent investigation on the students' enrolment reveals that only a small number of students enrol and prepare for accounting (KNEC, 2003).

As can be seen in Table 1 below, despite a high number of enrolment in school commerce, only very few secondary school students opt for accounting during their selection of subjects in form three, with girls registering a much lower figure than the boys (Mutia, 1998; Mukachi, 2002; Tanui, 2003). This finding seem to support Powers (1996) insinuation that accounting operations and practice suffered and continue to suffer from the pervasive subjectivity of its calculative nature in most institutions of learning. The solution to this problem in school accounting is yet to be found.

Table 1 KCSE Accounting and Commerce Student Enrolment 2001 and 2002

Year	2001 Gender		2002 Gender	
Subject	**Female**	**Male**	**Female**	**Male**
Accounting	3,404	6,704	3,253	9,929
Commerce	43,441	50553	43,684	49360

(KNEC, 2003)

Nevertheless, the use of ELPA that has proved successful in the teaching of difficult topics in science; mathematics and geography (Kiboss, 2000; Tanui, 2003; Wekesa, 2003) could probably provide the answer to the problem facing accounting subject. This is because the ELPA is perceived to provide students with the needed opportunity to participate actively in the classroom and hence, making the calculative nature of the subject easier (Hudson, 1999; Dillon, 2000).

Olson (1988) noted that computer-based techniques can be used both as an adjunct to existing training methods and as a replacement for conventional approaches to instruction that do not result in learning. Moreover, previous studies indicate that the use of CBI does not just produce positive results in the teaching of difficult subjects or where pupil motivation lacking but also has the capacity to improve the students' performance by motivating them (Davies & Selwyn, 1999; Kiboss, 2002). However, this does not mean that the use of e-learning is the panacea to all the problems of teaching business accounting in our schools.

Despite the shortcomings, the use of computers often opens new worlds of learning which go beyond the traditional classroom activity and stimulate the intellectual climate and social interaction among pupils (Crawford, 1999). They help teachers to do better what they already know and act as amplifiers of existing practice (Boucher, 1998; Tanui, 2003). It is on this basis that the teaching of accounting in secondary schools was chosen in this study to benefit from the use of CBI. This study therefore brings into focus the use of information and communication technology (ICT) in the teaching of double entry bookkeeping in accounting with the goal of determining whether the perceived technology's potential in classroom instruction in Kenya can influence the students' performance and motivation in accounting.

Methods

Subjects - Approximately 400 students taken from ten form two intact classes (i.e., 40 per intact class) situated in Rift Valley and Western provinces formed the subjects of this study. Learners from two intact classes of each school category (boys only and girls only) served as either the treatment or the control class. One group of each school category was placed in the ELPA treatment and the other served as the control condition for a period of eight weeks all learning the same Business Education lessons on double entry course.

Design – Because of the nature of the schools setting that could not allow classes that have already been constituted to be reorganize for experimental purposes, the study employed the quasi-experimental pre-test and post-test research design. This design was deemed appropriate because it allowed two school categories to be assigned to the treatments and their data compared. The teachers taught the same content of double entry course to both groups except for the teaching methods used (i.e., teachers in the control group used the regular method while those in the treatment group used the ELPA mode).

Instruments - Three instruments were employed to measure students' learning of double entry in school accounting. The Accounting Achievement Test (AAT) specially developed for this study was used to assess students' academic achievement in school accounting. The test consisted of objective items, filling the blanks, short answer and problem solving. It was set from the topics taught (e.g. accounting principles, definitions and application problems. A piloting of the instrument using the Kuder-Richardson (K-R) 20 formula yielded a reliability index of 0.83 that is considered acceptable for research purposes (Coolican, 1999).

The Students' Motivation Questionnaire (SMQ) and the Student Interview Guide (SIG) both adopted Kiboss (1997) and modified to suit this study focused on the motivational component that entailed the measurement of affective domain using survey research technique. The SMQ had five general statements about the accounting lessons. Each of the five statements had several Likert-type scale options describing the state of the students' motivation. The piloting of the instrument using the Spearman Brown reliability index yielded a reliability coefficient of 0.74 that is also considered acceptable for research purposes (Coolican, 1999).

Materials – Two treatments were employed: the ELPA program and a regular teaching method. Students in the experimental treatment learned double entry lessons via the ELPA while those in the control condition learned through the regular teacher.

The ELPA Program - The ELPA courseware content used in the study was developed using Kenya Institute of Education (KIE) Business Education syllabus, KIE Business Education Pupil's textbook and KIE Teacher's guide, Business Education textbooks plus other appropriate resource materials. Double entry bookkeeping was chosen for the study because it forms the opening and most important topic to the study of accounting in secondary schools in Kenya. On-the-shelf computer software called QUEST was used to design lessons for the ELPA program. QUEST is an authoring tool that enables the teacher to prepare lessons and draw diagrams while the students take the course using "Learn" which is a students' learning device in the software. It also enabled the teacher to prepare performance activities for students. A problem was given that requires the students to discuss and write the answer on the computer screen. The computer would then give them immediate feedback and then would allow them to proceed with the lesson. Due to the nature of computer hardware available in the schools, the students could only use such specific keys as `the enter key', `the arrow keys', and the normal keyboard keys to respond to directions and questions posed to them on the computer screen.

The portion of the syllabus dealing with double entry bookkeeping was chosen for the study because it forms the opening and most important topic to the study of accounting in secondary education in Kenya. The concepts covered included:

1) *Accounting equation,*
2) *Balance sheet and double entry in ledger accounts,*
3) *Trial balance and trading account, profit and loss account*.

Moreover, this course was chosen because it is an area that has proved difficult to students during class presentation. The students learned double entry bookkeeping for a period of eight weeks.

Conventional Regular Teacher Method – Students in the control classes learned double entry lessons through the traditional/regular method. The teacher used expository teacher where students sit and listen and write notes from the teacher. They all learned the same double entry bookkeeping content for a period of eight weeks, just as those in the experimental classes except for the method of delivery of the lessons.

Procedure – Prior to the beginning of the study, a pre-test was administered to all the students using the AAT and SMQ. Following this, the students in the experimental classes learned their double entry lessons using the ELPA. At the beginning of every lesson, the teacher introduces the lesson and the students could assemble around the computer and commence their lessons. Each computer was used by a group of upto five students. Every student was issued with a student manual that provided guidance through the ELPA lesson. A single lesson lasted for a period of 40 minutes while a double period lesson lasted for 80 minutes.

Students in the control classes attended lessons taught by the teacher only using the conventional method. Here, the students could sit and listen to the teacher who delivered the lessons and give them notes to copy. During the lessons, students were interviewed using the SIG regarding their experiences with the double entry lessons. At the conclusion of the study, a post-test was administered to all the students using the AAT and SMQ.

Data Analysis – The data collected during the study were analysed using both descriptive and inferential statistics. The data collected from interviews were reported in percentages and the t-values calculated to determine the significance of the difference at the 0.01 level of significance. The data collected using the AAT and SMQ were analysed using t-tests and ANCOVA procedures.

Results and Discussions

The analysis of data reported in this paper is concerned with the effects of ELPA treatment on (1) students' achievement in double entry bookkeeping in school accounting as measured by Accounting Achievement Test (AAT), and (2) students' motivation towards School Accounting as measured by the Students' Motivation Questionnaire (SMQ). In the sections that follow, the findings of the effects of ELPA on achievement and motivation to learn double entry bookkeeping in School Accounting of students exposed to ELPA and those not so exposed are presented and discussed.

Analysis of Students' Entry Behavior

Given that it was not possible to randomly draw subjects independently, it was deemed necessary to determine the entry level before. In this regard, the pre-test mean scores on both the AAT and SMQ were analysed using a two-sample t-test to ascertain if the mean difference would be statistically different at 0.01 level.

Table 2: A Two-sample t-test on Pre-test Mean Scores of AAT and SMQ

Program	*AAT*	*SMQ*
Control	20	97
Experimental	19	103
p-value 0.01	0.121^{ns}	0.686^{ns}

^{ns}Not statistically significant (p>0.01)

The pre-test mean scores difference on AAT and SMOT shown in Table 2 revealed no significant differences (p>0.01). This implies that the students had comparable characteristics and that they were drawn from the same population (Bryman & Cramer, 1997).

Table 3: Two-sample t-test on Pre-test Mean Scores of AAT and SMQ by Gender

Gender	*AAT*	*SMQ*
Male	19	94
Female	20	106
p-value at 0.01	0.057^{ns}	0.003*

*statistically significant; ^{ns} Not statistically significant (p>0.01)

A look at the results presented in Table 3 reveal no statistically significant between the boys and girls achievement and motivation towards accounting prior to the treatments. Therefore, it is safe to conclude that the subjects of the study came from a stable population with comparable characteristics because the mean differences are not statistically significant at 0.01. Moreover, such knowledge is useful in that the study is able to come up with a valid and objective conclusion about the population after the treatment (Bryman & Cramer, 1997; Coolican, 1999). The independent sample t-test on the post-test means scores obtained by the subjects on the AAT according to group showed significant differences (p <0.01).

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The post-test means for AAT are contained in Table 4. A paired t-test on the combined (control and experimental) pre-test and post-test AAT means showed some statistically significant differences (p <0.01).

Table 4: Posttest mean scores according to program

Group	*AAT*
Control	43
Experimental	55

This statistically significant means difference between the pre-test and post-test means of AAT is a clear implication that a reasonable amount of learning took place between the pre-test and the post-test period in both the experimental and control groups.

Analysis of co-variance (ANCOVA) was also computed for the results with the goal of reducing error of variance when subjects are not randomly assigned (Bryman and Cramer, 1997). The ANCOVA results in Table 5 showed that statistically significant differences (p<1%) exist between control and experimental post-test means scores according to program adjusted for the pre-test in favour of the experimental (E) group who scored significantly higher on AAT than the control group. It can therefore be inferred here that the higher mean scores obtained by the experimental group is not unrelated to the use of ELPA.

Table 5: ANCOVA of AAT Posttest Mean Scores of the Subjects in the ELPA and Control Programs

Group	*Mean*	*CV*	*P-value*
Control	43	23.5*	0.000
Experimental	55		

*Statistically significant (p-value <0.01)

Apparently, these findings lend support to earlier studies that found higher performance in geography, physics, biology, and music respectfully earlier thought by students as difficult subjects to be learned by students and/or difficult to teach by regular methods may be alleviated by use of electronic learning programs (Boucher, 1998; Kiboss, 2000; Rees, 2002; Wekesa, 2003; Kiboss, Wekesa & Ndirangu, 2004).

Effect of the ELPA on Students Motivation towards School Accounting

Motivation of students during the instructional process was assessed using the SIG and SMQ. The results for the SIG are reported in Table 5 while those gathered using the SMQ are reported in Table 6 and elaborated in the paragraphs that follow. During the study, learners were interviewed in regards their experiences with the teaching program.

Table 6 Students' Motivation Responses in Percentages and t-values

Variable	Group		
	E	C	t-value
Learning accounting my class was:			
fun	84	67	5.12
stimulating, satisfying	85	70	4.50
informative	96	78	7.0
hard and involving	18	36	5.0
dull and boring	14	43	6.0

The results shown in Table 6 indicate that 84% of the experimental group found learning accounting in their class to be fun compared to 67% of those in the control group. The t-test on the significance of proportion led to a t-value of 5.12, which is statistically significant at 0.01. The higher proportion of the experimental group who agreed that the lessons were full of fun can be attributed to the ELPA. This is because the sharing of satisfaction and a sense of accomplishment in the ELPA tend increase students' personal confidence in learning, which was lacking in the control group (Kiboss, 2000). The orderly presentation of ELPA lessons allowed the students to interact with the contents of the lesson with minimal teacher participation that contributed to the students' liking of the classroom activities (Tanui, 2003).

Similarly, 96% of the students in the experimental group agreed that the lessons were informative while 78% of those in the control class who concurred. The results led to a t–value of 7.0 that is statistically significant at the 0.01, implying that the students in the experimental group found their learning using the ELPA to be more informative than the control group who learned only from the teacher. The students in the experimental group found the lesson informative because the ELPA guided them through detailed lessons in the computer as opposed to those often taught mostly from the teachers' class notes or from the class textbooks (Voogt, 1993; Underwood & Underwood, 1990).

The results further show that 85% of the students in the experimental group agreed that learning was stimulating and satisfying compared 70% of the control group. A t-test led to a t-value of 4.5, which is statistically significant at 0.01. This means that the ELPA made the lessons more stimulating and satisfying to the experimental students than the lessons conducted by the teacher in the regular instruction. Goldstein (1997) and Fisher (2000) have also observed similar findings. The percentage of the experimental group who found the learning in their class to be hard and involving was only 18% compared to twice as much (36%) in the control group who found the learning of double entry accounting hard and difficult. The t- test on the significance of the difference in proportion led to t-value of 5.0, which is statistically significant at 0.01 in favor of ELPA group. The ease with which the experimental group found the learning of double entry accounting can be presumed to have come from the use of ELPA. Related studies have shown that students taught using ELPA are more motivated to learn and often performed better than those taught just using the conventional instruction (Hudson, 1997). This is because the ELPA makes the topics easier as the students often get the opportunity of sharing their strengths and weaknesses (Stallings, Hutchinson & Sawyer, 1996).

Finally, the results have also shown that 14% of students in the experimental group agreed that learning was dull and boring compared to 43% of those in the control group. A t-test to find the significance of the proportions led to a t-value 6.0, which is statistically significant at 0.01. It can be concluded that the students in the experimental group found the accounting lessons easy and not boring due to the use of ELPA. The results reveal that over half of the students in the control group found the lessons dull and boring.

On the overall, the ELPA improved the learners' rating of the nature of their learning of double entry accounting course. The teacher in the experimental group practiced the principle of "fading" away, which gives the students independence during the lesson (Tait, 1997; Shayer, 1998). To Shayer (1998), the teacher is supposed to only perform the operations that learners cannot yet handle on their own but should gradually "fade" slowly to allow the students to perform the task themselves during the lesson. This is the reason why the students in the experimental group found the learning of double entry accounting doable as compared to those in the control group who found the learning of double entry in their class to be difficult. Evidentially, the ELPA contributed to the high performance in the AAT by the experimental group. Indeed, the use of ELPA by the experimental group relegated the notion of difficulty of the subject to the periphery as most students talked positively about their ability to do accounting subject as noted by Sanders (1992). Moreover, the experimental students' expectancy was positively influenced by the new technology.

Table 7 Posttest Mean Scores obtained by the Subject on SMQ

Group	*SMQ*
Control	104
Experimental	111

Results of an independent t-test of the post-test mean scores obtained by the subjects on the SMQ presented in Table 7 above revealed that the experimental group achieved a higher mean score than the control group with a p-value of less than 0.01 which is statistically significant. Also, an ANCOVA of the post-test mean score adjusted for the SMQ pre-test indicated in Table 8 showed statistically significant differences between the means obtained by both subjects (experimental and control) on the SMQ when adjusted for the pre-test.

Table 8 ANCOVA of the Posttest SMQ Mean Scores when adjusted for the Pre-test

Group	*Mean*	*CV*	*P-value*
Control	104.43	13.36*	0.000
Experimental	111.03		

*Statistically significant ($p<0.01$)

According to these results, the lack of significant difference implies that the mean scores obtained by the subjects in the experimental condition on motivation were higher because of the use of the ELPA to learn double entry lessons in school accounting. Moreover, this is supported by a coefficient of variation of 13.36, which indicates that the results are reliable. This finding is supported by Crawford (1999) who found that the ELPA do provide the necessary impetus in learning something that often lacks in the regular classrooms taught by the teacher using the traditional method. Boyle (1996) and Kiboss (2000) also observed that the high student involvement in the ELPA classroom help increase the students' motivation towards learning as opposed to passive learning that is often common in the regular classes.

Conclusions and Recommendation

The results of the study have shown that the ELPA enhanced the students' learning of double entry accounting. On the basis of the preceding discussions, there seems to be a strong relationship between the use of ELPA to augment conventional instruction of double entry accounting that is considered difficult to teach and learn by teachers and students and the students' achievement and motivation towards school accounting. The extent of students' performance on the AAT and SMQ and their rating on SIG observed in the ELPA classes is a theme that emerged in support of the ELPA's strength to improve learning and motivation towards double entry in school accounting (Crawford, 1999; Tanui, 2003; Kiboss, 2000, 2002).

There is a considerable evidence from significant mean scores favouring the ELPA classes to suggest that augmenting double entry instruction with the use of ELPA can be modestly effective in reducing the students' perception of the accounting being considered as a difficult subject and improving their motivation towards school accounting and probably their choice of the subject at the KCSE examination. A logical conclusion that can be drawn from the study is that the effectiveness of the ELPA has been empirically proven to exert influence not only on the students' achievement in school accounting but also their motivation towards the subject.

In advocating for the need to integrate the use of ELPA in business education instruction, the following recommendations can thus be made:

a) There is need for a wider usage of the ELPA to encourage students' active participation in business education instruction. Such programs should involve more courses in school accounting.

b) Because of the recent acceptance by the Ministry of Education to integrate computers in the school curriculum, there is a need to promote the development of locally designed courseware and trying them in more schools to provide more data from other areas.

c) In order for teachers to make effective use of the ELPA courseware, there is a need to train them on the proper use of computers in the school curriculum. Teacher colleges and Universities should begin integrating courses on the use of computers in the school curriculum into their teacher education program.

d) Teachers should take advantage of such teacher education programs that are aimed at enabling subject teachers to designed local courseware for use in their regular instruction or to enhance conventional instruction.

e) Due to the rapid technological and the economic changes in both the computer hardware and software, there is a need to investigate into the relative efficiency of the ELPA versus the regular instruction method. Such research should ascertain whether or not computer-based classroom innovations might influence the cost, management, availability, and/or efficiency of the instructional delivery of secondary school subjects to large classrooms.

The study has explored the effect of ELPA on the students' achievement and motivation towards school accounting in secondary school curriculum. The recommendations and suggestions for further research presented above are intended to widen the database and to enable business education teachers and policy makers make more valid decisions regarding the use of computers in the school curriculum.

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