
A COMPARATIVE STUDY OF GENERIC AND BESPOKE E-LEARNING PLATFORMS IN SECONDARY SCHOOLS IN ZIMBABWE

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ABSTRACT

The implementation of different e-learning software packages in developing countries has led to challenges due to differences in educational backgrounds and pedagogical views, relevance and content issues. The study investigated the effectiveness of using the bespoke Nelsoft e-learning software in comparison with the generic online m-Courser e-learning software for the ZIMSEC Advanced Level Computing syllabus in Zimbabwe. The findings indicated that bespoke Nelsoft software performs better than the online m-Courser e-learning software as indicated by the higher marks got by students who used Nelsoft e-learning software. The study made pre-test assessments so as to determine student performance before using the different e-learning software packages. Use of online e-learning software packages without customizing them to the local conditions may result in students using online e-learning software packages under-performing as the materials provided do not match the requirements of the local examination boards.

Key words. Bespoke, E-learning, Generic, M-Courser, Nelsoft, Software.

INTRODUCTION

The advent of Information Communication Technology (ICT) has improved the global education system from high school to university level (Chitanana, et al., 2008). The call for application of e-learning in secondary education is to infuse and inject efficiency and effectiveness in curriculum implementation. Bates (2014) argues that e-learning is forecast to grow in Africa as a whole at a rate of 15% per annum over the next four years, the African countries below have the following e-learning growth rates:

- Senegal: 30%
- Zambia: 28%
- Zimbabwe: 25%
- Kenya: 25%

E-learning is significant in that it improves flexibility in education delivery, enhances focus on learner centeredness. E-learning in its broadest sense can be defined as instruction delivered via an electronic media including the Internet, Intranets, extranets, satellite broadcast, audio/videotapes, interactive TV and CD-ROM (Cuban, 2001). It is through the use of ICTs that it has been observed that e-learning has the potential to change the way in which teaching and learning is organised and structured for schooling and thus will lead to the promotion and development of higher cognitive processes (Chitanana, et al., 2008). ICTs have been attributed in the increase and effectiveness of the educational process through changes in the overall efficiency of classroom activities and administration. Various kinds of e-learning solutions are frequently presented as panacea for all problems in education (Byron & Gagliardi, 2002). There is a plethora of initiatives that aim at improving education through the introduction of information and communication technologies (ICTs), each initiative from its own viewpoint. Implementing various e-learning solutions in developing countries has, however, often turned out to be problematic (Carry & Willis, 2001). Differences in geographical and economic conditions, different educational backgrounds and pedagogical views, language and content issues, usability and technical literacy issues, attitudes and prejudices, and even differences in climate have posed challenges to initiatives in technology-enhanced education (Tedre, et al., 2010).

Also from a general point of view generic e-learning platforms are those platforms that can be downloaded from the Internet to offer general services that an e-learning should provide, whilst a bespoke learning platforms are those that are tailor made for a specific institution to meet its learning environment needs.

Therefore, this study compares students' performance using the generic e-learning software and bespoke e-learning software in Zimbabwe particularly looking at secondary schools. Therefore the one which produces better student performance will be highly recommended for adoption for all secondary schools in Zimbabwe.

From a Zimbabwean perspective a few studies have focused on the aspect of e-learning and the following are examples: an analysis of challenges encountered by students on the e-learning platform at Zimbabwe Open University (Tafangombe & Kaputa, 2015), a change in university lecturers' perception of e-learning tools for instructional delivery at Midlands State University:

from techno-phobic to technology savvies (Chitanana, 2014), teaching with and learning through ICTs in Zimbabwe's teacher education colleges (Musarurwa, 2011), the current state of e-learning at universities in Zimbabwe: opportunities and challenges (Chitanana, et al., 2008), strategy for a sustained quality delivery mode of ODL programmes for massive enrolments and e-learning: the case for Zimbabwe Open University (Kabanda, 2014). Thus specifically in this paper we had the following objectives:

1. to determine student performance before using e-learning software packages.
2. to examine the effectiveness of the use of the Nelsoft e-learning software in comparison to the online m-Courser-learning software for the ZIMSEC A Level Computing Syllabus.

Furthermore, the following hypotheses following the above stated objectives:

1. H₀: There are no statistically significant differences between the students' Pre-test scores in the control group and in the experimental group before being taught specific concepts using e-learning packages.

H₁: There are statistically significant differences between the students' Pre-test scores in the control group and in the experimental group before being taught specific concepts using e-learning packages.

2. H₀: Nelsoft e-learning software is more effective than online m-Courser e-learning software for the ZIMSEC A Level Computing Syllabus.

H₁: Nelsoft e-learning software is less effective than online m-Courser e-learning software for the ZIMSEC A Level Computing Syllabus.

MATERIALS AND METHODS

In this study, a comparative experimental design was used to compare the effectiveness of the custom-made Nelsoft e-learning software as compared to generic ready-made online e-learning software from e-learning solutions. In this case, effectiveness was determined through content mastery and change in pass rate. Comparative experiments are designed to determine the differences between control and treatment groups (Verial, 2015) and for the study the study design is indicated in figure 1. Purposive sampling was used in the selection of schools that took part in this study. Purposive sampling was adopted as the schools were selected because of the rich information they held that was required to answer the research questions (McMillan & Schumacher, 2010). Specifically for this study, the two groups were from different schools that used different e-learning packages, Zimbabwe Republic Police (ZRP) High in Harare and St. David's Girls' High in Mutare. ZRP High school used the generic m-Courser e-learning software and St. David's Girls High used the bespoke Nelsoft e-learning software. It should be noted that the two schools used the same Advanced Level Computer Studies ZIMSEC syllabus. In this study, the target population was the A Level Computing students from the two chosen high schools with contrasting e-learning software packages (Table 1).

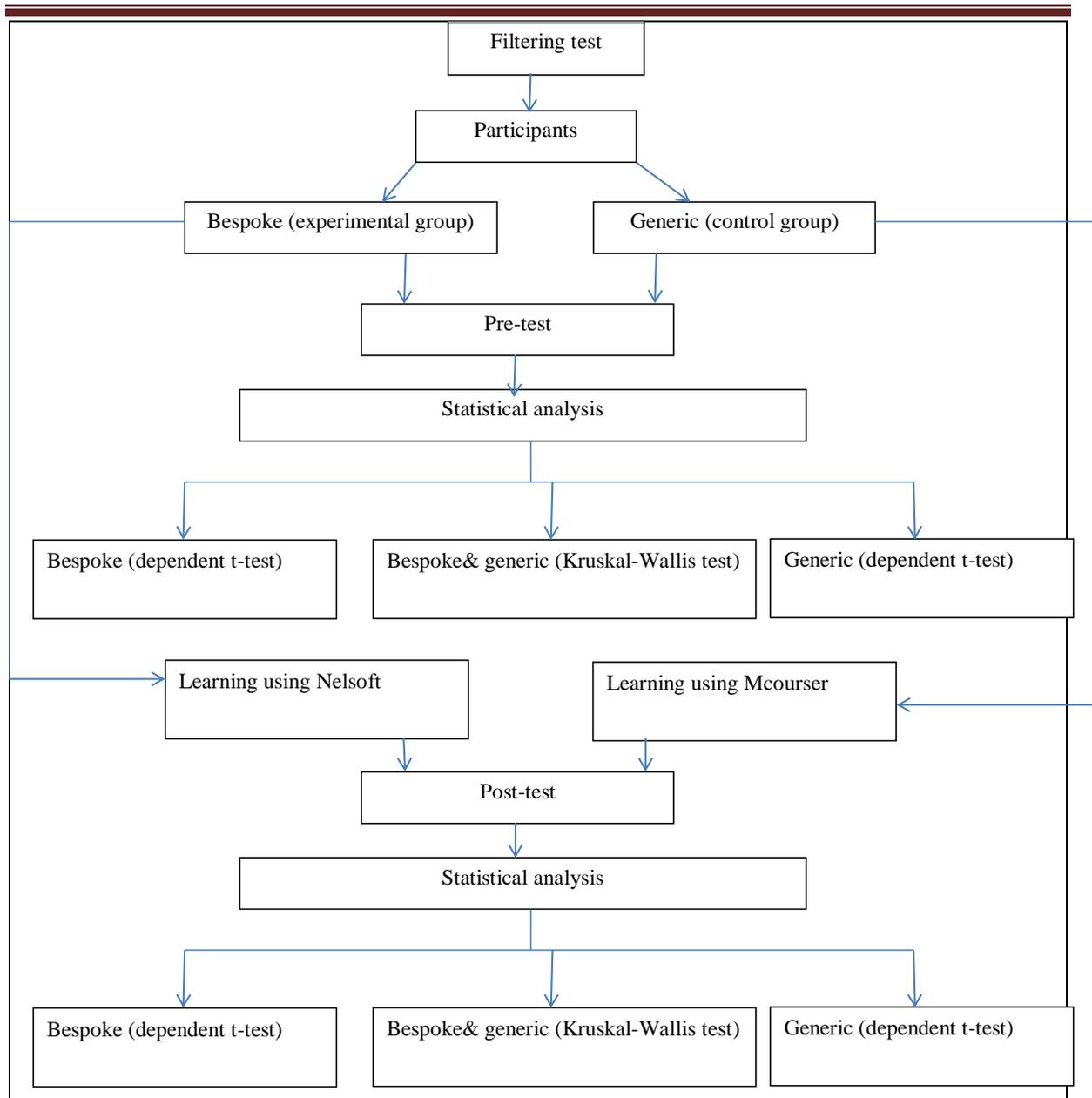


Figure 1: The study design

ZRP High school is a Zimbabwean School located in Harare, the capital City of Zimbabwe. The school was opened in 2001 and is closely affiliated to the [Zimbabwe Republic Police](#). Most of the students are children of members of the police force but the school is also open to ordinary Zimbabweans who want their children to receive their education at the school (Zimbowa, 2014). It has got an average enrollment of about 700 students. The school is one of the most outstanding secondary schools in Zimbabwe. As of 2014, the school was said to have made it into the top three of the [Zimbabwe School Examinations Council](#) O' Level results after posting a series of impressive results as high as 95,58% pass rate (Zimbowa, 2014). The school offers ten ordinary level subjects plus commercials, arts and sciences for Advanced level. Each year the school is said to have at least three of its students awarded scholarships to attend university outside of the country especially in America courtesy of the United States Embassy. The School introduced the m- Courser generic e-learning platform in 2013 which is currently being used by form 3 students up to Advanced Level

students. Junior students are introduced to the basics of computer studies so that when they get to form 3 it will be easy for them to use the m-Courser learning software.

St David Bonda High School is also a Zimbabwean School located in Mutare which is in the Eastern region of Zimbabwe near Mozambique. It has got an average enrollment of about 800 students. Just like ZRP High school St David High school is an outstanding school in Zimbabwe whose records of achievement stands out like a light house in the dark. Over the past five years the school produced impressive results achieving the general pass rate of 86.73%. The school offers ten subjects at Ordinary level and has commercial subjects, arts subjects and science subjects at Advanced level. The School introduced the Nelsoft bespoke e-learning platform in 2014 which is currently being used by form 3 students up to Advanced level student just like ZRP high school basing on the aforementioned reason.

Filtering

The first stage was to filter students that were going to be used for the study from the two mentioned schools. The objective of filtering was to get a set of students with similar performance on computer studies subject. A filtering test on computer studies was given to all Advanced level Computer Studies students at both schools with ZRP high given on the 1st of October 2014 and St David's Girls high school on the 8th of October 2014. St David high school had 13 A level students while ZRP had 12 A level students. The researcher had all the responsibility of managing and marking the scripts. Results of the filtering test are presented in Table 1.

St David High Schools	ZRP
71	70
71	71
72	72
77	72
71	76
77	71
72	71
73	73
73	72
74	72
77	72
77	

Table 1: Filtering test results (expressed as a percentage)

The mark range for all students on both schools was between 71-77% hence it has given a rise to an assumption that all Advanced level students at both school perform almost the same in computer studies subject. The reason could be attributed to the policy the school have on enrolling of students going for Advanced level from Ordinary level. For any subject a student wish to pursue for Advanced level studies one should have an A or a B at Ordinary level and also a student cannot do a subject at Advanced level that he/she did not do at Ordinary level. The study population comprised of all the 25 students doing A Level computing from the two high schools which were

chosen for the experiment. Thus the census approach was used for the selection of the students as it eliminated sampling error and provided data on all the individuals in the population achieving a desirable level of precision (Zimbowa, 2014). Thirteen students from St. David's Bonda Girls High used the Nelsoft locally custom-made e-learning software whilst twelve students from ZRP High used the ready-made online m-Courser e-learning software. In order to test how effective the different e-learning software packages were, the researchers administered a pre-test before the students were taught using the e-learning software packages and a post-test after the teaching of the students using the different e-learning packages. A pre-test for the Computing subject was given to both groups on the 29th of November 2014 that is the third term of 2014. Then the following first whole term of 2015 both groups were subjected to the e-learning platforms, ZRP High school for the generic platform while St David's Bonda High school for the bespoke one. Lastly a post-test was given on the 1st of April 2015 to assess the most effective e-learning platform.

The tests were then marked by the researchers and scores recorded for analysis. The assessment tests were suitable because of the following advantages: use of both pre-test and post-test enabled the measurement of the effectiveness of the two different types of e-learning software in isolation, thus eliminating the effects of prior knowledge of the students and ensuring internal validity of the experiment results.

Statistical analysis

Specifically for this study, normality tests were done to test whether the data followed a normal distribution. The determination of the normality was done in order to use the specific test statistic. In this regard, the *Shapiro-Wilk* test was used to test whether the data followed a normal distribution. Data was indicated to be normally distributed if the p-value was less than 0.05. Pre-test data was not normally distributed as Shapiro-Wilk $W=.95108$, $p=.28595$. The dependent variable was mean mark whilst the grouping variable was the groups (use of generic and bespoke e-learning software packages). All the tests and graphs were done in STATISTICA v10.

RESULTS

Pre-test marks within control and experimental groups

Pre-test marks within control group

Before determining the effects of the e-learning software between the experimental and the control group, there was need to compare the effects of the e-learning software within the groups. Accordingly, a dependent samples t-test was performed on the control and experimental groups using the pre-test and post-test marks as the dependent variables. Significant difference were stated to be pronounced if is less than 0.005 ($p<0.05$).

	Mean	Std.Dv.	N	Std.Dv.	t	df	P
Pre-test	44.91667	16.28975					
Post-test	48.25000	16.72301	12	3.256695	-3.54562	11	0.004587

Table 2: Dependent samples T-test for the control group

The control group was the one for ZRP High school in Harare which used the generic software. Thus from the dependent t-test, it could be stated that there were significant differences in student performance ($p=0.0046$). Thus it can be inferred that there was a significant change in the marks within the generic group implying that there was a change in the marks was after the use of the generic software.

Pre-test marks within experimental group

	Mean	Std.Dv.	N	Std.Dv.	t	df	p
Pre-test	59.38462	20.81882					
Post-test	77.92308	18.11289	13	7.125253	-9.38091	12	0.000001

Table 3: Dependent samples T-test for the experimental group

Just like the control group, there was need to test a change in test scores within the groups. Within the experimental group, there were significant differences in the test scores between the pre-test and the post-test ($p=0.000$). As such it can be noted that the mean scores for the post-test (78%) compared to (59%) for the pre-test. Thus from this study, it can be stated that the changes in the test scores can be noted after the introduction of the e-learning systems.

Pre-test marks between control and experimental groups

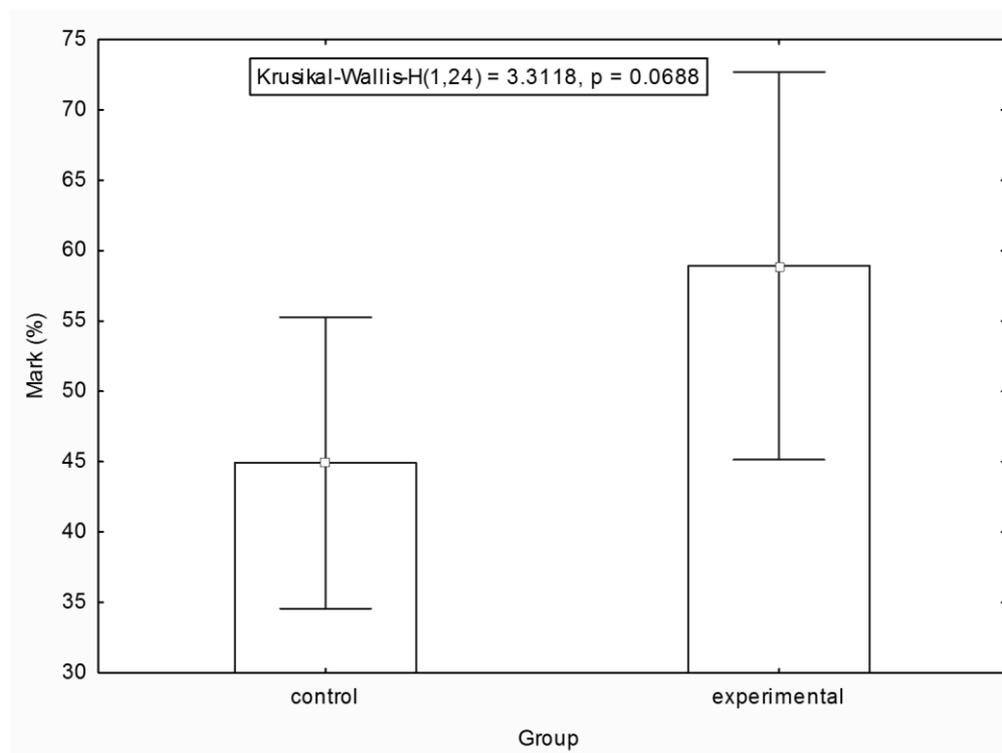


Figure 2 Pre-test marks between control and experimental groups

As data for the pre-test was not normally distributed, a robust non-parametric Kruskal-Wallis test was used to determine the differences in the mean score between the treatment and control groups. Results in this study indicated that there were no significant differences ($p=0.0688$) between the marks scored by A level Computing students in both the control and experimental

group (Figure 2). Therefore we fail to reject the initially stated H_0 : which indicated that there is no statistically significant difference between the students' pre-test scores in the control group and in the experimental group before being taught specific concepts using e-learning packages.

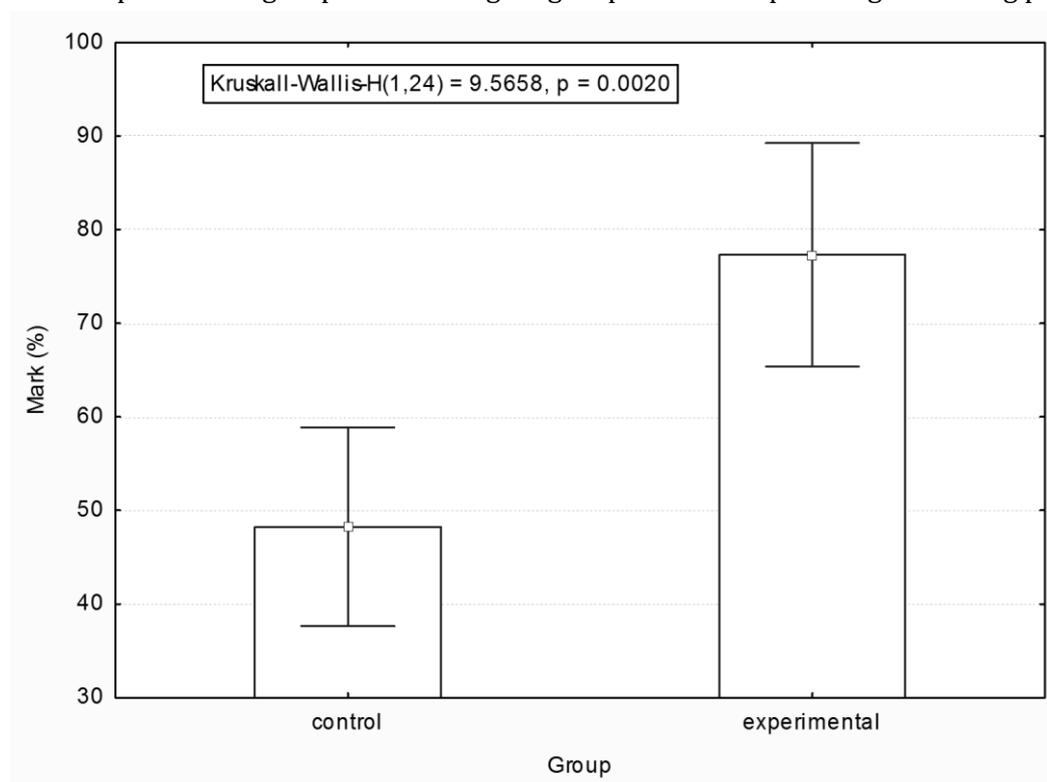


Figure 3 Post-test marks between control and experimental groups

Data for post-test followed a normal distribution, a parametric test in the form of independent t-test was used to test for difference in student performance. The findings for this study indicated that the group from the school that used m-Courser e-learning program got an average score of 48.5% whilst the group from the school that used Nelsoft e-learning program got an average score of 77.3% (Figure 3). Thus testing at 5% level of significance, the results indicated that there were significant differences between the control and experimental groups ($p = 0.0020$). This implied that H_0 is not rejected, therefore, it was concluded that Nelsoft e-learning software is more effective than online m-Courser e-learning software for the ZIMSEC A Level Computing Syllabus. The effectiveness of Nelsoft was seen through statistically significant differences in the mean scores obtained by students in post-test, after being taught specific concepts using the e-learning packages.

DISCUSSION

Pre-test results showed that there are no significant differences between scores of students that used the generic m-Courser courseware and the bespoke Nelsoft courseware. The generic software is not meant specifically for the ZIMSEC examinations and the Nelsoft courseware is specifically for the ZIMSEC syllabus, the difference in the marks between the groups may have been to a greater extent influenced by the prior use of the software in everyday study and lessons by the students. The above argument is supported by Israel, (2013) showed that overseas students benefit less from e-learning material than their home student counterparts. This is because most e-learning packages are designed by Westerners and are more tailored towards the

learning styles of Western learners. Similarly, teaching and learning resources designed by Western academics also tend to be more suited to the learning styles of Western students rather than those of overseas students (Daniel, 2014; Israel, 2013). Consequently, overseas students, especially students from developing countries receive minimal benefit from e-learning technologies and course resources because they are not tailored to their particular needs (Israel, 2013).

The lack of significant differences in the pre-test phase of this study is not surprising as the students will be answering their questions without the influence of the different e-learning software packages. However, the significant differences that exist in the post-test phase can be alluded to the effect of the different software packages. This can be alluded to the fact that there is no “one-size fits all” approach in e-learning technology (Daniel, 2014). The number of different learning styles is large, and each of them is largely affected by numerous context parameters known only to the teaching staff as such the teaching staff configure adaptation by choosing the appropriate learning style that best describes the educational context.

The underperformance of the generic online software over the bespoke (Kučírková, et al., 2012; Bates, 2014) software can be attributed to the lack of alignment of the generic software towards the demands of the local examining body (ZIMSEC). The findings from this study are in line with the general comments by (Tedre, et al., 2010) who indicated that differences in geographical and economic conditions, different educational backgrounds and pedagogical views, language and content issues, usability and technical literacy issues, attitudes and prejudices, and even differences in climate have posed challenges to initiatives in technology enhanced education.

The post-test results of the study indicated that there are statistically significant differences in the test scores between students using the bespoke and generic e-learning software. Our findings are contradictory to findings by Turčáni and Kapusta (2008) who found that there were no statistically significant differences in the results for students using the adaptive systems for hyperlinks annotation, non-adaption and unsupported e-learning software. However, despite the lack of significant differences in the test scores, adaptive systems for hyperlinks annotation which was customized performed slightly better than others (Turcani & Kapusta, 2008), which is similar to our findings where the customized Nelsoft e-learning software performed better than the generic m-Courser software.

CONCLUSIONS

In this study we tested whether there are significant differences in performance between students who used generic and bespoke e-learning software packages in Zimbabwe. The results indicated that there are significant differences in mean score between students using generic and bespoke e-learning software packages ($p < 0.05$). Specifically students who used bespoke software outperformed students who used generic software. Thus we concluded that students who use locally made e-learning software perform better than students who use online e-learning software. Based on the findings in this study it can be recommended that schools must customise their e-learning platforms such that they meet the requirements of their local curriculum.

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