E-LEARNING TECHNOLOGY AND ITS IMPACT ON PUPILS’ ACADEMIC PERFORMANCE IN ZAMBIAN RURAL SCHOOLS: A CASE OF ZEDUPAD COMPUTER TABLET

PRESENTED
BY
William Phiri & Richard Silumbe
FOCUS OF THE STUDY

• ICTs and E-learning in rural schools
• Effectiveness of specific emerging technologies used in e-learning
• Availability, impact and sustainability of ZEDUPAD computer tablets on the teaching of Mathematics in rural schools
INTRODUCTION

• According to Ministry of Labour (2016) Zambia’s population is estimated at 14.98 million
  – 49.1% are males
  – 50.9% being females
  – Population growth rate stands at 2.88%.
  – The majority (66.2%) being those aged less than 24 years
  – while those aged between 25 and 54 are represented by 28.5%.

• These statistics gives a fast population growth thereby mounting pressure on the provision of quality social amenities such as education and health.
INTRODUCTION CONT

• Other notable challenges facing Zambia today includes:
  – Early marriages and pregnancies
  – high poverty levels
  – High unemployment rates especially among the youths
  – disease burden such as HIV/AIDS
  – Increased load shading by ZESCO
  – lack of access to clean drinking water, quality education and health

• Despite such challenges, the Zambian government in partnership with private sector has identified education as one of the sustainable tools that can be used to significantly fight against the above stated problems.
INTRODUCTION CONT

- Government through Ministry of General Education (MoGE) has a task to make sure that this education being given to its citizens should be of high quality, effectively and efficiently delivered.
- This is where e-learning which is one of the forms of Information and Communication Technology (ICT) comes into play.
- E-learning is a broad term that encompasses many teaching approaches, types of technologies and administrative practices (Olsno, et al, 2011).
- In this paper, a specific reference of e-learning is the use of the computer educational tablet called the ‘ZEDUPAD’ which has been recommended by Ministry of General Education to be used in schools.
INTRODUCTION CONT
Statement of Problem

• Many studies have been done on ICTs and E-learning in general (Phiri, 2016; Bahufite, 2015)
• However much remain un-researched and not documented on the effectiveness of specific emerging technologies used in e-learning in specific subjects especially in rural areas
• Hence a case of ZEDUPAD computer tablets and its impact on pupils’ academic performance in mathematics in rural schools.
PURPOSE AND OBJECTIVES

• Purpose:
  – Establish the impact of e-learning through the use of ZEDUPAD tablet on pupil’s academic performance in Mathematics in rural schools

• Objectives:
  – To assess the availability of e-learning facilities (ZEDUPAD tablets) in rural schools.
  – To determine the impact of e-learning through the use of ZEDUPAD tablets on pupils’ academic performance in Mathematics.
  – To ascertain sustainable measures in the use of e-learning (ZEDUPAD tablets) in the teaching and learning of Mathematics in rural schools.
LITERATURE REVIEW

• Most studies reveal that use and adoption of ICTs in African and later on Zambian schools remain low and a challenge (Bahufite, 2015; UNESCO, 2013; MOE, 2012; Shafika, 2007).

• However, recent trends show a slight improvement especially in urban areas (Phiri, 2016; Mtanga, Imasiku, Mulauzi and Wamundila, 2012).

• Nevertheless, an assessment of how effective and impact of specific technologies especially in rural schools remain unknown, hence this study
THEORETICAL FRAMEWORK

• Constructivist theory guided the study.
• According to the constructivists’ theory, the reality is a multitude in the learners’ minds and each learner is unique.
• Learning therefore takes this into consideration and allows learners to explore and use their abilities to process information in order to create the personalised knowledge which makes more sense to them (Woolfolk, 1995).
THEORETICAL FRAMEWORK CONT

• In the constructivist class, the environment is democratic and centred on the learner, where the curriculum is negotiated and not imposed (Kalpana (2014))

• Learners participate freely in the creation of the knowledge either individually or through interaction with the peers or significant others of which the ZEDUPAD tablets could play such a role.
THEORETICAL FRAMEWORK CONT

• ICT and e-learning come in constructivism as a medium to facilitate the learning-how-to learn process by eliciting learners’ curiosity which leads them into critical and analytical thinking, thereby resulting in discovery (Kharade and Thakkar, 2012).

• The principles underlying the constructivist theories, aim at promoting learner’s activity in any teaching-learning process through the use of e-learning facilities such as the ZEDUPAD tablets.
THEORETICAL FRAMEWORK CONT (constructivist theory don’t encourage a teacher dominate the learning process)
THEORETICAL FRAMEWORK CONT (constructivist theory encourage active pupil participation and involvement in the learning process)
RESEARCH METHODOLOGY

• Research Design:
  – Correlation and
  – case study were triangulated.

• Targeted:
  – rural primary schools
  – A case study of St Pauls Primary School in Kapiri-Mposhi District of Central Province, Zambia
  – 58 grade 6 pupils (experiment group) participated.
  – 42 grade 6 pupils (control group) from the same school provided a reliable baseline data.
RESEARCH METHODOLOGY CONT
(Grade 6 control group classroom)
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(Grade 6 control group classroom)
RESEARCH METHODOLOGY CONT

• Sampling techniques:
  – Although the school was purposively selected, the experiment group and control group were randomly chosen.
  – The experimental group which received treatment (i.e. use of ZEDUPAD tablets) were directly observed during mathematics lessons for a period of one full academic term.

• Data analysis:
  – Quantitative data
    • Statistical Package for Social Sciences (SPSS) was used to generate Pearson Product of Correlation and independent t-tests which compared the means and standard deviations respectively.
  – Qualitative data
    • Thematic analysis was employed using themes and sub-themes derived from research objectives
FINDINGS AND DISCUSSION

• Availability of E-learning Facilities (ZEDUPAD tablets) in rural Schools
  – In the case of St Pauls Primary School where the study was conducted, the findings revealed that there was:
    • only one (1) pupil edition ZEDUPAD tablet in the whole school against a total population of 406 pupils from grade one to grade seven.
    • This represent a pupil- tablet ratio of (1 tablet-406 pupils) if the tablet was to be used by all the grades equally
    • or 1tablet – 58 pupils) if only grade six pupils (experiment group) were considered.
  – This is a sad development especially that government policy on education has made ICTs and e-learning compulsory in all schools.
FINDINGS AND DISCUSSION CONT
– Sadly, the only tablet in school was not functional and it was just kept in the head teachers’ office.
– Therefore, in order to obtain relatively reliable and valid results from the study, Zambia Research and Development Centre (ZRDC) in conjunction with Information and Communication University (ICU) sponsored and bought additional ZEDUPAD tablets for the school and to be used in the experiment.
FINDINGS AND DISCUSSION CONT
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– Despite numerous benefits that come along the use of ZEDUPAD, these tablets are not available in most rural schools and these could attributed to the following factors:
  • High poverty levels
  • High cost price
  • Erratic or no funding to rural schools by government
  • Generally ICTs and e-learning activities may not be a priority by school administrators in most rural schools.
FINDINGS AND DISCUSSION CONT

• Impact of E-learning using the ZEDUPAD tablets on pupils’ academic performance in mathematics

  – Table 1: Pupils performance before use of ZEDUPAD tablets

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean Score</th>
<th>Std Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment Group</td>
<td>58</td>
<td>59</td>
<td>13.12</td>
</tr>
<tr>
<td>Control Group</td>
<td>42</td>
<td>58.8</td>
<td>13.79</td>
</tr>
</tbody>
</table>

Source: Field Data, 2016
FINDINGS AND DISCUSSION CONT
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– No significant difference from the mean and standard deviation for both the experiment and control group in the pupil’s academic performance in mathematics.

– This could have been that both classes were being taught by the same teacher under similar classroom environmental conditions.
FINDINGS AND DISCUSSION CONT

– **Table 2**: Pupils academic performance in mathematics after using ZEDUPAD tablets

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>MEAN SCORE</th>
<th>STD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experiment Group</strong></td>
<td>56</td>
<td>67.4</td>
<td>10.02</td>
</tr>
<tr>
<td><strong>Control Group</strong></td>
<td>42</td>
<td>60.3</td>
<td>15.43</td>
</tr>
</tbody>
</table>

**Source**: Field Data, 2016
FINDINGS AND DISCUSSION CONT (Teacher facilitating pupils’ learning using ZEDUPAD)
FINDINGS AND DISCUSSION CONT (Pupils fighting over ZEDUPAD while teacher controls)
FINDINGS AND DISCUSSION CONT

• Mean score of pupils in the experiment group increased by 14.24% from 59 to 67.4
• while the standard deviation dropped from 13.12 to 10.02 which further suggest a significance improvement in pupil’s academic performance in mathematics generally.
• Mean score for the control group equally posted an increase by a small margin (2.55%).
• Therefore academic performance in mathematics by pupils in the experiment group was better than control group.
FINDINGS AND DISCUSSION CONT (Pupils curious to learn using ZEDUPAD while teacher guides)
• **Table 3**: T-test e-learning using ZEDUPAD tablets and academic performance

<table>
<thead>
<tr>
<th>t-test</th>
<th>12.97</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence Interval (C.I)</td>
<td>95%</td>
</tr>
<tr>
<td>Degree of Freedom (df)</td>
<td>3</td>
</tr>
<tr>
<td>Level of Significance (α)</td>
<td>0.05</td>
</tr>
<tr>
<td>Probability Value (Pv)</td>
<td>0.0005</td>
</tr>
</tbody>
</table>

**Source**: Field Data, 2016

- **H₀**: Use of e-learning facilities (ZEDPAD tablets) does not improve pupils’ academic performance in Mathematics.
FINDINGS AND DISCUSSION CONT

• Findings from an independent t-test indicate:
  – $P_v = 0.0005$ is less than level of significance ($\alpha = 0.05$)
  – Since ($P_v < \alpha$), the null hypothesis is rejected.
  – The findings therefore suggest that using e-learning facilities and in this case, the ZEDUPAD tablets helped improve pupils’ academic performance in mathematics.
  – What remains is to determine how strong the association is, hence the Pearson product of correlation ($r$) which is shown in table 4 below.
FINDINGS AND DISCUSSION CONT

• Table 4: E-learning ZEDUPAD and pupil’s academic performance

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>56</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.000</td>
</tr>
<tr>
<td>Pearson Product of Correlation (r)</td>
<td>0.892</td>
</tr>
</tbody>
</table>

Source: Field Data, 2016

– Results as seen above, indicate a very strong association \((r = 0.892)\) between using e-learning ZEDUPAD and pupils’ academic performance in mathematics.

– The findings therefore, suggest that the ZEDUPAD tablets positively impacted on pupils’ academic performance in mathematics.
As observed by Kalila (2015) and Koory (2003) which are line with the findings of this study, the improve in the academic performance was because the ZEDUPAD tablets facilitated teaching and learning were:

- highly interactive
- Engaging
- had multiple languages of instruction
- provided self-taught tutorials to pupils
- all the preloaded educational materials and lessons were voiced
- encouraged pupils develop critical and logic thinking and reasoning as it was learning by doing (refer to the real life experiences in the pictures)
FINDINGS AND DISCUSSION CONT (Pupils teaching themselves using ZEDUPAD while teacher observes)
Table 5: Sustainable measures of implementing e-learning in rural schools

<table>
<thead>
<tr>
<th>Sustainable Measure</th>
<th>No of Teachers</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment of special education fund</td>
<td>4</td>
<td>50%</td>
</tr>
<tr>
<td>Government subsidising ZEDUPAD tablets</td>
<td>2</td>
<td>25%</td>
</tr>
<tr>
<td>Parental/community involvement</td>
<td>1</td>
<td>12.5%</td>
</tr>
<tr>
<td>Adoption of e-learning ZEDUPAD by private companies</td>
<td>1</td>
<td>12.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Field Data, 2016
FINDINGS AND DISCUSSION CONT

• It is clear from the findings that the majority of the respondents opted for a creation of a special education fund to help implement ICTs among others especially in rural areas.

• Moreover, the Ministry of General Education has very good planned projects but lack of financial muscle remains a critical constraint.

• Therefore, a suggestion for government to enact a law for the creation of special education fund to go towards implementing ICTs in rural schools is a welcome move.

• The only drawback with this measure is that only the already overtaxed civil servants would bear the whole load on their shoulder.
CONCLUSION

• The findings of this study has revealed that:
  – E-learning facilities (ZEDUPAD tablets) were not available in most rural schools.
  – This scenario has made most pupils in rural schools to lag behind in the use of ICTs and e-learning in the teaching and learning of mathematics.
CONCLUSION

• As regards to the impact of e-learning on academic performance:
  – there was a significant improvement in academic performance.
  – Both the independent t-test ($P_v < \alpha$; i.e. 0.0005 < 0.05) and the Pearson product of correlation ($r = 0.892$) confirmed that pupils who used the ZEDUPAD tablets performed better than those in the control group which did not use the pads.
  – However such gains were being hampered by lack of e-learning facilities (i.e. ZEDUPAD tablets) in rural schools.
CONCLUSION

• The study also sought views from respondents on sustainable measures that government and other stakeholders would institute to promote the implementation of ICTs and e-learning in rural schools.

• Although there were other proposed measures such as parents, communities and companies taking responsibility over the implementation of e-learning, the majority nevertheless opted for the establishment of a special education fund meant to be used for e-learning implementation especially in rural schools.
REFERENCES


REFERENCES

• Ministry of Labour (2016). Zambia’s Population Hits 15m’: Zambia Daily Mail (www.daily-mail.co.zm); accessed on 21/01/2016 at 18:27.


• Phiri, W. (2016). Pupils’ and teachers’ perception toward the use of Information and Communication Technology (ICT) in the teaching and learning of Mathematics in selected secondary schools of Central Province, Zambia; International Journal of Multidisciplinary Research and Development; Volume 3; Issue 1; January 2016; Page No. 77-87

THANK YOU

QUESTIONS?