

ICT Characteristics of Tablets used on Children Learning Experience Case for Kalawa Primary School Kenya

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ABSTRACT

Technology in teaching and learning is key to improving learning experience in the current generation where electronic media is a necessity. The government of Kenya launched a program to issue laptops to public class one primary school pupils with a common goal, i.e. to realize a better learning experience so as to cope up with the rapid growth of technology. Even though standards in various areas are already in place it was found necessary to focus on the ICT characteristics of the tablets being acquired and if contented with the tablets characteristics. Objective is to establish the effects of software, hardware, internet characteristics of tablets used on children learning experience case for Kalawa primary schools Kenya. Pragmatic approach was used to help us establish the direction and magnitude of the variables. The technique used was both qualitative and quantitative approach, the type of research is descriptive. 52 pupils completed close ended questionnaires. 9 pupils from the same sample size were interviewed. The hardware characteristic's had a Sig. value of .039 less than 0.05 which statistically made a significant contribution in the learning experience. Limitation is that it may not be generalized when trying to deeply assess learning experience with tablets. Finally ICT characteristics have a great impact, good design features lead to a meaningful learning experience compared to a tablet with poor design features. Pupils were very much interested in using their tablets to learn this gives more learning opportunities to children in the country.

General Terms

E-Learning, Devices, Government of Kenya, Primary Schools.

Keywords

E-Learning, Effects, Tablets, ICT, Characteristics, Schools

1. INTRODUCTION

Invention of television to computers to mobile devices to tablets offers new potential as a tool for education in children (e-learning). It is realized that previously these devices were specifically used at home and imparted less knowledge compared to if they were being used in schools. "Intrinsic motivation refers to doing an activity for enjoyment and interest while extrinsic motivation refers to doing an activity for a specific purpose or outcome Ryan & Deci [23]. Their study found that extrinsic motivation constructs had a significant effect on student learning and that both intrinsic and extrinsic motivation had a significant positive effect on student self-efficacy." There is need for collaboration of, manufacturers, educators, children advocates and developers to develop applications in this device (tablets and mobile) that help impart more knowledge and as well manufacture tablets that easily suite the learning environment. This brings about the study of effects of ICT Characteristics (Screen size and

resolution, audio and video, internet connectivity, processing speed, storage and weight of tablet used) on Children learning experience case study of Kawala primary school Kenya.

ICT characteristics of the tablet and learning experience are very important in realizing a good learning experience. "Typically, the use of devices like tablets affords students' ownership of learning, which may lead to positive learning experiences Kukulska-Hulme [15]."

The 2008 Melbourne Declaration on Education Goals for Young Australians MCEETYA affirmed the importance of ICT literacy within the classroom, stating that: "rapid and continuing advances in information and communication technologies (ICT) are changing the ways people share, use, develop and process information and technology. In this digital age, young people need to be highly skilled in the use of ICT. While schools already employ these technologies in learning, there is a need to increase their effectiveness significantly over the next decade."

2. LITERATURE REVIEW

The focus of this chapter is the authentic learning experience, this includes access to realistic settings and activities. "The term ICT must be seen as an evolution from the antecedent and more narrowly defined term IT (information technology) which maintains its usage in government, business, and industry and in relation to tertiary and other academic courses dealing with such areas as programming, database design and expert systems. In the United States, synonymous terms such as "technology" and "educational technology" are used. A useful definition of ICT is that it "generally relates to those technologies that are used for accessing, gathering, manipulating and presenting or communicating information. The technologies could include hardware (e.g. computers and other devices); software applications; and connectivity (e.g. access to the Internet, local networking infrastructure, and videoconferencing). What is most significant about ICT is the increasing convergence of computer-based, multimedia and communications technologies and the rapid rate of change that characterizes both the technologies and their use. Toomey [27]."

The importance of using mobile technologies lies in the new and unique affordance, they offer learners beyond the traditional desktop computer [27]. "Mobile devices open up new opportunities for independent investigation, practical fieldwork, professional updating and on-the-spot access to knowledge' [27]"

We do believe that the issues preventing positive learning experience could be handled well by integration of learning technologies. If the ICT characteristics of a tablet is suitable for learning then experience will be good, the students will be motivated and there will be ease of use which will lead to a greater zeal to realize positive learning experience.

The ICT characteristics of a device provide generic interface and components that should ease use with the range of device and, further. We need to have a theoretical foundation hence discuss them in the next paragraph the explanation used in the scenarios could also be extended with mobile devices.

Previous e-learning studies have used different theories to analyse the determinants of e-learning behavior and effectiveness. “These involve the gaps between what actually exist in the teaching and learning situation and the desired technical issues with regard to the existing technologies, new updates in software, hardware or networking.

“No matter how perfect an implementation is, it will definitely have some loopholes that need to be observed to achieve optimal benefit. Likewise the essence of assessment or evaluation (formative or summative) is to examine if an implementation is achieving its desired goals Adedokun-Shittu & Shittu [1].” This clearly indicates the need to identify the importance of doing studies from time to time regarding ICT as an evolving subject. This will help come about with the right ICT characteristics required for a device to be considered standard in the education system Some of the identified theoretical perspective related to ICT characteristics research in device include technology acceptance model, social cognitive theory and Technology to Performance Chain.

2.1 Empirical Literature.

If the ICT characteristics of a device is suitable for learning then experience will be good, the students will be motivated and there will be ease of use which will bring the zeal to adopt other better methods of education.

Most researchers have focused on design features which capitalize on internet access text and input in mobile device such, “mobile phones, pocketPCs e.g., apple iPhones e.g. [11].”

The ICT characteristics of a device provide an interface that motivates learners with its attractive and easy to use interface the next sub topic elaborates more on the theory of this ICT characteristics.

2.1.1 Effects of software characteristics on learning experience.

The use of mobile technologies is increasing in primary schools across the developed and developing world Kenya recently rolled out a pilot program to issue tablets to standard one primary school pupils as part of the bigger Kenya ICT Master plan [21]. Young people are already using them in great numbers in their personal lives. Younger children are also increasingly being provided with smartphone and tablet. This brings about the intrinsic motivation. It’s already realized that the learning software is important characteristics of a device for it brings about extrinsic motivation [32] found intrinsic and extrinsic motivation to have a significant effect on the behavior to use e-learning in a developing country. There are also some content-rich software programs that are designed to facilitate switch access which will help individual with limited mobility.

2.1.2 Effects of internet connectivity on learning experience.

Higher broadband penetration has been reported in schools, with 70 per cent of schools using broadband connections. Seventy-four per cent of teachers report using ICT in their classrooms, however this varies across countries, ranging from 35 per cent in Latvia, to 96 percent in the UK.

[2] Indicates that. “The majority of teachers report that students are more highly motivated, which in turn affects behavior and communication when using computers and the internet in class. In order to reach European targets set for the year 2010, the numbers of computers in schools have increased dramatically in recent years”.

2.1.3 Effects of Hardware (processing speed, screen size and resolution, video, audio, storage and weight) on learning experience.

The faster the processing speed the better the learning experience (e.g. time taken to load a photo with a large resolution or the ability to buffer audiovisual with high resolution). **Screen size and resolution** (e.g playing video with particular format and with a particular screen resolution), **Video and Audio** (e.g capability of playing video with different format). Considerable research suggests that students’ understanding can be enhanced by visuals.”

“Mayer, R. E., Heiser, H., & Lonn, S. [20] explains how integrating content in multiple media can activate multiple senses (visual, auditory, and text-based communication - pictures, sound and words) of the learners and provide them an engaging learning environment. Mayer’s reasoning is that multimedia, if appropriately used, can accommodate multisensory input devices- visual, auditory, and text-based communication (pictures, sound and words); according to him even for kinesthetic or tactical learners (learners prefer hands-on learning such as making models, doing lab work, and role playing), teaching and learning can be customized.”

Effects of weight and portability on learning experience researchers have found that, “embracing the mobility and connectivity of mobile devices may lead to innovation in language learning for students across different environments [30]”.

2.2 Critics.

Previous studies have used various theories to analyse what enhances e-learning adoption and effectiveness. It’s been realised that there is a gap between what’s really being taught and what’s at hand in the technical issues of the device in relation to hardware and software. Authors such as Kozma [14] have addressed challenges related to teacher preparation, curriculum, pedagogy, assessment, and return on investment as barriers to ICT deployment in education.

2.3 Conceptual Frame work.

The TPC model was modified to fit the study. The main focus is on the Technology characteristics, TPC model is a good model though it generalizes technology task, technology characteristics, utilization, TTF (Technology Task Fit) and impact. The main reason as to why TCP is modified is to refine the study and focus on the technology characteristics, TTF and children learning experience.

The technology characteristics of the device is the independent variable, this includes the Screen Size and resolution, audio and video, internet connectivity, processing speed, storage, weight and the software. The dependent variable in this case is the learning experience which depends on the technology characteristics to either produce a good or a bad learning experience. See figure 1.

3. RESEARCH METHODOLOGY

3.1 Introduction

Four key areas of literature that are relevant to this research was identified i.e. Task Technology Fit following the comprehensive review of this literatures (In chapter two) we modified technology-to-performance chain (TPC) research framework to came up with a conceptual framework.

In this chapter the master plan specifying the methods and procedure for collecting and analyzing the needed information in this research study is elaborated. It involved the research philosophy, research design, population sample, data collection, data analysis, operationalization of the research variables, Validity and reliability of the tools used and finally the ethical issues.

3.2 Research Philosophy

The tablet helped us establish the direction and magnitude of the variables, through a pragmatic approach which is a philosophical movement that includes claiming that an ideology is true if it works in satisfactorily. This applies if the meaning of a proposition is to be found in the practical consequences of accepting it, and that unpractical ideas are to be rejected. Using this approach helped in producing statistical information about aspects of education that interests policy makers and educators. This was realized through the link of the ICT characteristics and the learning experience.

3.3 Research Design

The technique used is both qualitative and quantitative approach, the type of research is descriptive. The descriptive function of research is heavily dependent on instrumentation for measurement and observation [6] This study facilitates the prediction of future learning experience based upon the ICT characteristics of the device (tablets) being used in Kenya primary schools by identifying a pattern in the different variables.

Descriptive research is used to describe characteristics of a population or phenomenon being studied. It's not intended to answer questions about how/when/why the characteristics occurred. Rather it addresses the "what" question (what are the characteristics of the population or situation being studied? [25]. Kalawa primary school Kenya was used to address the research question in relation to learning experience.

3.4 Data Source

Population sample were two standard four classroom in one of the primary schools in Kenya by the name Kalawa primary. The expected population is 52 pupils.

3.5 Data Collection

Primary data was collected using a semi-structured interview with a sample of 9 pupils as form of data collection. Close ended questionnaires was also used as a means of data collection tool where the aforementioned filled in the questions created in advance. All the questionnaires' were completed by the 52 pupils.

The first method was grouping pupils into sub sections and allowed the teachers to ask the questionnaires, helped them understand where it seems hard to comprehend and also filled on their behalf. This methods was to specifically try and save time due to their ongoing curriculum, the other alternative was to allow the pupils fill each questionnaire individually.

Though it was considered second, the method was ignored because the former response was not biased.

Table 1. Anova

| Model 1 | Sum of Squares | df | Mean Square | F | Sig. |
|------------|----------------|----|-------------|-------|-------------------|
| Regression | 52.175 | 3 | 17.392 | 2.382 | .081 ^b |
| Residual | 350.498 | 48 | 7.302 | | |
| Total | 402.673 | 51 | | | |

3.6 Data Analysis

The level of measurement associated with quantitative data was interval, this showed continued data that has logical order. Items on a likert scale of 1-5 where one is strongly disagree, two is disagree, three is neutral four is agree and five is strongly agree was measured.

The collected data was analyzed by technique of descriptive analysis where the mean was calculated with a view of finding out whether the ICT characteristics of the tablet are appropriate for a change in learning experience. The information received from the questionnaires was supplemented by interviewing 9 pupils among the 52 sample size.

By taking the descriptive approach we were able to tell whether certain ICT characteristics have effects on the children's learning experience. We were also be able to tell if the ICT characteristics of the specified device are suitable and able to change the learning experience, Task Technology fit. Multiple regression was further done and evaluated the model using the significance level where $p < .05$ to identify the statistical significance.

It still maintains that technology is not the panacea for all problems [12], [13] hence the technology use must not be forced as a main tool for learning.

4. RESULT AND DISCUSSION

4.1 Internet characteristics on learning experience

Beta value for Software was significantly low, it was actually the lowest with a value of .094. The sig value was at 0.501 that is far way above the threshold of 0.05(see table 1). This shows that it did not make a statistically significant value hence minimal relationship between the effects of software and learning experience in the case of Kalawa Primary School.

4.2 Software characteristics on learning experience

Here the beta value for software characteristics was also significantly low i.e. .162 slightly above the hardware characteristics with a difference of 0.068. Looking at the sig value, it stands at 0.251 still not meeting the required threshold of 0.05(see table 1). This also shows that it did not make a statistically significant contribution on learning experience.

4.3 Hardware characteristics on learning experience

The standardized coefficients show that the hardware dependent variable converted to the same scale to compare the contribution of each variable, the beta values show that its

largest coefficient which has a value of .291 this is the total for hardware characteristics, it makes it the strongest contributor in explaining the independent variable (learning experience). For deeper analysis this indicates that the hardware characteristics of the tablet plays a big role in measuring the effects of the learning experience on children.

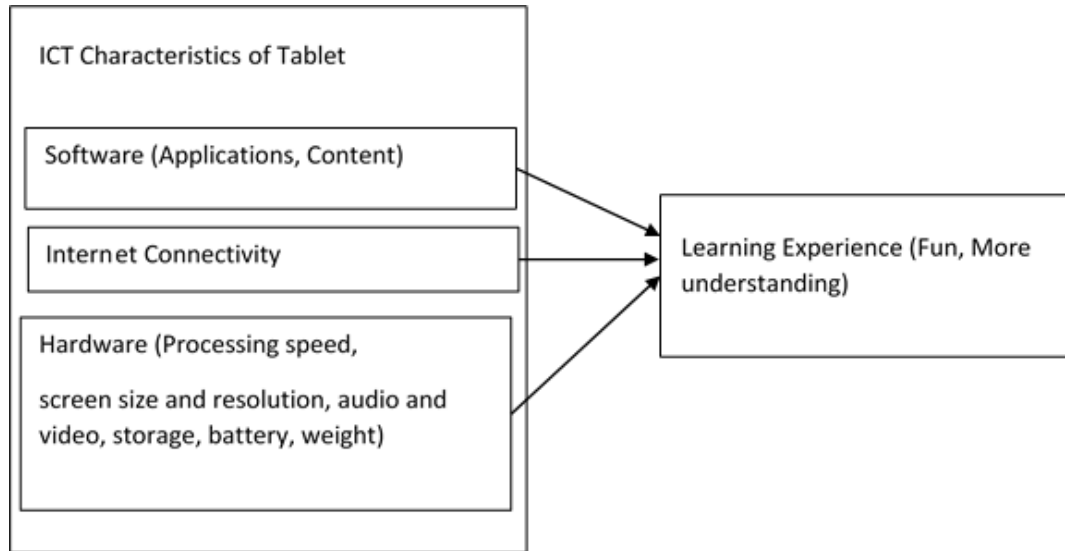


Figure 1: Conceptual Framework.

5. CONCLUSION AND RECOMENDARTIONS

The study shows that the ICT characteristics have a great impact, good design features lead to a meaningful learning experience compared to a tablet with poor design features. Pupils were very much interested in using their tablets to learn this gives more learning opportunities to children in the country.

The ICT Impact Report Balanskat et al[3] indicates that “in European schools ICT has positively enhanced performance in the primary years, particularly in the primary language of the country. Schools that have greater ICT infrastructure perform more highly than schools with less developed ICT infrastructure. Higher motivation is reported, particularly for primary students, with the use of ICT such as interactive whiteboards.”

The big change might not be immediately seen though the t-test conducted statistically show that there is significant change in the learning experience with the use of the tablets and its characteristics especially the hardware characteristics.

It’s clearly evident that learning was fun with the use of tablets due to the ICT characteristics which led to a better understanding when reading content in the tablet, seeing pictures, watching videos and listening to the audio.

It’s hoped that the analysis of the effects of ICT characteristics of tablets used on children learning experience will provide insights to interested parties.

The developers of the curriculum application should continuously release updates to ensure up to date content and bug fixes. They should also consider the tablet used across the country and the characteristics so as to have a compatible version of the software and the hardware that will make it easy to blend. Though educators and teachers already use technology in class, consideration should be made before

purchasing the tablets with the wrong ICT characteristics for the children.

The educators should also create a learning environment that suites the introduction of tablets as part of a better learning experience so us to control the enthusiasms that the student may have when using the tablets. This will make them not have diverted attention trying to explore and discover the device characteristics.

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