International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 02 Issue: 09 | Dec-2015 www.irjet.net p-ISSN: 2395-0072

Internet technology utilization in learning

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Abstract - *Internet technology utilization has drawn significant attention when used in the learning environment. The utility derived from the technology in the learning process of a student has not been considered and determined over the years. The internet is a valuable resource used in the discipline of education and has brought significant changes and developments. Hence, there is a challenge in determining whether its use in learning contributes to the learning output of a student or not.*

The use of internet technology in higher learning institutions has been influenced by factors that affect both the student and the institutions. These factors include the knowledge of a student in the use of the technology (which ends up affecting their level of interaction with the technology), the total investment made by an institution in the provision of the technology and the usability of the technology that has been invested in.

This paper addresses the measure of internet technology utilization in the learning environment by applying the Cobb Douglas production theorem.

Key Words: *Internet technology, internet utilization, Cobb Douglas theorem*

1. INTRODUCTION

The internet is a rich, multiple layered, complex environment which has become a fundamental part of daily human activities. It has impacted on people's ideologies and ways of life in a number of ways [14]. For instance, it has availed opportunities that have expanded and improved human relations hence reducing the digital divide between nations [17] [25]. The utility derived from the continued use of this resource varies from sector to sector. The focus of this paper will be in education.

Utility refers to the power of a commodity or a given service to satisfy an existing want. This satisfaction can be actual or expected and derived from the consumption of the commodity at hand. Hence, utility differs from one person- to-another, one place-to-another and one time-to-another. As a result, a good or service that has the capability of satisfying a human want, has utility [7]. This paper will focus on the utility of internet technology in satisfying the learning output of a student in a higher learning institution.

The utilization of internet technology in higher learning institutions has greatly influenced the way teaching and learning is conducted in the recent past. [22] The use of internet technology in higher education has created a better and faster learning environment by digitizing resources that can be made available both on and off-campus, hence facilitating and enabling learning to take place in diverse environments. Moreover, utilization of the technology in the learning environment has enabled easy access to many resources and as a result, information sharing has tremendously increased [26]. Somewhat, this has promoted learning to take place anywhere anyway.

In order to fully understand the effects of internet technology utilization in learning, one would measure how the technology is utilized in the learning environment by considering its effect in the learning output of a student. This requires an understanding of the utility of the technology and other factors that affect its use. By applying the Cobb Douglas production theorem to evaluate these factors that affect the use of internet technology, it will then be possible to evaluate the usage of the technology in learning.

2. INTERNET USE IN LEARNING

The integration of computing technologies into learning institutions infrastructure is tremendously affecting internet usage in these institutions. Some of the immediate effects of internet usage is in information acquisition, innovative teaching and learning and unparalled research outcomes [21] [4]. Generally, learning and teaching have become more flexible globally [13] [30].

Using the internet as a teaching and learning tool is becoming a common phenomenon in providing teachers with anecdotal accounts and valuable insights that can be integrated into learning [16].

Teachers learn about professional conferences and workshops via the internet and as a result they gain both pedagogical knowledge and technical training in order to assist their students in embracing the expanding nature of the technology. Teachers use the internet in their professional activities to prepare their lectures by finding low-cost or free information and other resources. This is because there is online access to thousands of books, games and websites. They also communicate with colleagues and other teachers in other institutions through email. They post information or opinions or suggestions that can help in different joint projects. Teachers use the technology to connect their students to the larger world and help in developing their perspective and look of things. This ends up motivating students and giving them an opportunity to learn by doing things themselves. Teachers also use the internet to share ideas of the good things taking place in their classes and as a result other instructors benefit from the different experiences shared [11].

Students on the other hand have been globally connected online. This assists them to become multicultural and hence bridge the gap between students all over the world. Virtual classrooms are created and students meet to discuss a variety of extensive ideas while being miles apart [28]. Moreover, students interact with the massive resources available online with the help of their parents and teachers and as a result improve their research. Furthermore, students use the internet for both social communication and academic work.

It is therefore clear that, the internet has been exceedingly useful for both teachers and students. Its presence in the learning environment makes lives simpler and enables a vast access to information than ever before. Most importantly, it enables students and teachers to learn and connect with each other and hence ease and promote the learning experience.

3. INTERNET TECHNOLOGY UTILIZATION IN LEARNING INSTITUTIONS

Internet technology utilization in higher learning institutions has been seen in different perspectives. Students and teachers frequently use this resource in research. It has also made it possible for students to acquire up to date information regarding different developments taking place in different disciplines and this can be accesses from different databases with scholarly information.

The utilization of internet technology in learning has promoted the implementation of visual data rather than plain text. This includes the use of images, graphics, animations and pictures [10]. Using visual text and the internet leads to a greater satisfaction in the learning approach of students. They get to see different aspects of a subject and hence appreciate it more.

Internet based learning leads students to attend virtual classes, to learn and have assessments. The use of internet technology aids in the satisfaction of students who desire to gain knowledge from anywhere in the world regarding different subjects.

The utilization of internet technology in learning can also be seen in the area of communication where students are able to communicate with their teachers and their fellow students [14]. This also enables teachers to communicate with the parents and guardians of the students.

Students also derive great utility while using internet technology for their research on their respective projects. The resource hosts one large sea of information regarding a vast variety of subjects. This information proves helpful and easier for students looking for information. It is also faster to use the internet on a given subject than going through an entire book.

The utilization of internet technology has led to easy access of knowledge at an affordable rate. It is possible to acquire knowledge in a university course regardless of location. This helps in demystifying access to education and jobs for all.

Internet utilization in learning has made it possible for people of all ages and circumstances to acquire some extra knowledge on a given subject. This is possible due to the fact that students can now access the internet and attend virtual classes according to their needs and time available [17] [29].

The use of internet technology in learning has helped researchers to benefit from fully refereed academic journals, e-books, magazines, newspapers, books and archives that are present online. Researchers can construct their studies, have publications done and also circulate the publications [19].

Utilization of the internet has allowed academics to communicate in a disciplined and rigorous manner with their national and international colleagues while publishing in the scholarly journals. This helps in improving the levels of research done in the higher learning institutions. Hence, researchers can build long-term knowledge, skills and research expertise [5].

Use of internet technology forms a key aspect in teaching, learning and research in the institutions of higher learning. This cannot be taken for granted with the current changes that are being seen and experienced in the field of academia. Hence, this resource has greatly assisted in revolutionizing the education sector.

4. FACTORS INFLUENCING THE LEARNING OUTPUT OF A STUDENT WHO USES INTERNET TECHNOLOGY IN LEARNING

The growing utilization of internet technology in learning encourages students to spend increasing time online. It is not therefore possible to measure their productivity and effectiveness in their use of the resource to aid in learning. As a result, a few factors will be considered to check on the learning output of a student who uses internet technology in learning. These include attitude towards internet technology, knowledge of internet technology, availability of the technology, effort of the student, infrastructural investment for the provision of the technology and the utilization of the technology.

In considering the use of internet technology, the individual attitude needs to be reviewed. The attitude portrayed by students in higher learning institutions as they learn may either motivate and interest them to use internet technology or vice versa [8]. The effective implementation of a technology, regardless of its sophistication and capability, depends upon the users having a positive attitude [18]. Generally, attitude encompasses the affective, behavioral and cognitive aspects [31]. The affective consists of the like and dislike, the behavioral consists of what the individual does or intends to do and the cognitive involves the belief that something can help improve the quality of their output [1]. Internet technology attitudes are based on the Technology Acceptance Model (TAM) which was developed based on the Theory of Reasoned Action (TRA). TAM suggests that attitude is based on two behavioral beliefs, perceived ease of use (PEOU) and perceived usefulness (PU) [9]. PEOU posits that the use of a technology will be free of effort (process expectancy) while PU posits that the use of a technology will improve and enhance productivity (outcome expectancy). The behavior intention of a student leads to the actual use of the technology [32].

Knowledge of the internet consists of the different individual features or qualities that are developed over time. These features are applicable and can be used for more than one set of tasks across the internet [26]. It can also refer to what people know about internet technology, both the terminology and the skills. Internet knowledge also consists in what people know about the internet (declarative knowledge) such as internet terms like cookies and browsers; what people can do using the internet (procedural knowledge) such as perform different tasks [24]. However, internet knowledge (what one knows) is different from internet experience (what one has done). The more internet experience one has, the more internet knowledge one will generally have. Internet knowledge is also what people know about a specific technology as well as the various kind s of things people can do using that technology.

Knowledge is developed as individuals observe others and experience their behavior. Such knowledge will affect their beliefs in their 'capabilities to organize and execute the courses of action required to produce given attainments' [3].

Labor refers to the aggregate of all human physical and mental effort that is required in order to get a task accomplished [6]. In the context of this paper, labor is used to identify the effort that a student expends while using internet technology in order to accomplish a given task. As a result, the effort of a student will be affected by the level of knowledge and skill that a student has as far as use and interaction with the internet technology is concerned. The students need to be in a position to know how to use the technology to aid in learning. Since, if a student does not know much about the resource, using it and investing effort in it will not yield much result [2] [23]. Effort increases or decreases second by second when a student is engaged in a task and these variations correspond to changes in the demands imposed by the task at hand [15].

Capital refers to the money or any financial asset that is used to generate income or make an investment [12]. Institutions of higher learning have largely invested to ensure that they can provide internet access to their staff and students. These capital costs include the cumulative total of all the costs needed to set up the infrastructure in the institution. This includes the money for procuring all the required hardware and software that will enable the implementation and access of internet technology. The cost also includes all the trainings that are carried out to educate staff and students about the presence and use of the internet in the institution. The capital investment also includes the cost of the effort required to set up all the equipment and ensure that the internet resource is available. This effort will also be rewarded through remunerating the staff implementing the project based on an agreed upon timed rate.

With the capital investment in place, it would be helpful to consider the availability and access of the internet in higher learning institutions. Internet access could be influenced by the location of the institution, whether in urban/metropolitan or rural setting. In some higher learning institutions, inadequate financial capacity is a constraint when it comes to providing internet access to numerous users on campus. In some cases, departments have taken up the initiative to provide internet access to their respective students and faculty [20].

The utility of internet technology means that internet technology gives satisfaction for one person at a certain time or place and the same technology may not give any satisfaction for another person at another time or place [6]. A student therefore has a choice to use the internet technology or not to use it. Hence, the student who uses

the internet has a higher utility index for the tasks that they accomplish using the internet. As a result, an aggregate utility index can be computed based on all the tasks that are accomplished by the use of internet technology.

The above factors can be modeled to give the learning output of a student who uses internet technology in a higher institution of learning. Given the nature of the factors, an appropriate theorem would be an economics production theorem which takes the different factors of production, models them and gives an output. In this case, the Cobb-Douglas production theorem will be used. This theorem is suitable and convenient for use in all industries. It is also the most commonly used function in the field of econometrics and can be fitted to time series analysis and cross-sectional analysis. The Cobb-Douglas production theorem is defined as,

$$Q = a\ l^{\alpha} k^{\beta} \quad \text{..... (1)},$$

where Q is the total quantity of goods produced, $\boldsymbol{a}$ is a scaling parameter (this acts as a fixed regulator which checks on the increase/decrease of attributes and is not dependent on other attributes), $\boldsymbol{l}$ and $\boldsymbol{k}$ are factors of production represented as labour and capital respectively. The sum of the exponents $\boldsymbol{\alpha + \beta}$ determines the returns to scale on factor inputs.

5. CONCLUSIONS

As mentioned above, internet technology significantly helps students in higher learning institution in learning, to fulfil their academic and social needs and increase their well- being. In order to measure the learning output of a student who uses internet technology, there is need to examine and model the different factors highlighted in this paper. Therefore, the future plan of this research is to measure the factors and to come up with the re-modelled Cobb Douglas production theorem which will give an index to represent the learning output of the student.

ACKNOWLEDGEMENT

Thanks to Strathmore University, Faculty of Information Technology for the research support grant. Special thanks to my supervisors Prof. Simon Msanjila and Dr. Vincent Omwenga. Thanks to my husband, Simeon Timmothy Khakata for all the support and encouragement.

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