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UTILIZATION OF THE INTERNET FACILITY IN DAR ES SALAAM SECONDARY SCHOOLS IN TANZANIA

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ABSTRACT

Various ICT based projects have been implanted in schools with the purpose of improving educational accessibility, quality and the management system. The aim of this study is to determine the extent to which ICT tools particularly internet is utilized to improve provision of education in secondary schools. Various types of data collection tools such as interviews, questionnaires and documentary review were used to collect qualitative information in four secondary schools. It was observed that internet use in secondary schools is basically for searching materials for both teachers and students. Accessibility of materials from the internet has helped some teachers to advance their carriers especially through the Open University of Tanzania. However, there is little application of the internet facility in these schools to develop classroom pedagogy. Therefore, further exploration of the challenges facing internet use in secondary schools is a mile stone towards improving internet utilization in schools.

General Terms

Education, Computer, Teacher, Students, School

Keywords

Internet, ICT, Teaching and learning, pedagogy, multimedia

1. INTRODUCTION

1.1 Background

Throughout the 1990s, major advances took place in the field of information and communication technology (ICT). At the time, most benefits were felt in the North as the new applications and tools which brought unprecedented access to information became a common feature, both in the workplace and in the home. The situation in the South was very different and, mindful of the growing digital divide between the developed and the developing world [1]. The Dutch Ministry for Development took action in 1997 and set up the International Institute for Communication and Development (IICD). Its mandate is to advise and support developing countries in their goal to harness the potential of internet for the benefit of their citizens. It has been observed that the importance of the use of technology especially internet in education system in today's world is unavoidable. This is the reason why Tanzania has been crediting various school based ICT projects [1]. For instance, IICD has supported local organizations in Tanzania with their efforts to develop

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their own ICT-related activities, including the development of internet projects geared towards improving the education sector. It has also worked closely with the Ministry of Education and Vocational Training (MoEVT) on developing an ICT policy for the Education sector.

In October 2004, IICD and Tanzania Commission for Science and Technology (COSTECH) joined forces with stakeholders from the education sector to develop an implementation strategy for the ICT policy in the education sector. IICD supported the development of various ICT projects in Tanzania which work with secondary school students and teachers and aim to enhance teaching and learning. They achieve this by helping teachers with their professional development and by providing the educational resources required. The projects involve: Distance Education Learning Services (DILES), Teacher Professional Development using ICT (BETF), TanEdu Educational Website, Wanafunzi Student Website, ICT -Connect-TED, Procurement of Computers for Tanzania, Secondary Schools (TCLSS) and Model School. All these projects aimed at empowering secondary schools towards effective utilization of the internet facility in various aspects of teaching and learning including electronic learning materials for supplementing conventional teaching methods using "chalk and talk" with remote and virtual methods using Internet and multimedia. This also supports the current Education and Training Policy which aims at Increasing educational opportunities through both open and distance learning to be enhanced by increased effectiveness in the use of internet [3].

Never the less research shows that in the classrooms, some important variables such as the classroom teacher and the teacher's attitudes towards the effective use of computer technology have not been paid attention [4].Therefore a study needs to be done to determine how the ICT facility in schools is utilized to improve the quality of education as this is largely dependent on the attitudes of their users. This is by considering the observation that attitudes, once established, help to shape the experiences the individual has with object, subject or person [5]. One of the aspects of ICT facility that this study is addressing is the internet service.

1.2 Purpose of the Study
The purpose of this study is to determine the extent of internet utilization in Dar es salaam secondary schools following implementation of various internet based projects in secondary schools.

2. LITERATURE REVIEW
One of the aims of education in the 2014 education and training policy in Tanzania is that, ICT should facilitate expansion of educational opportunities [3].The policy concurs with the observation by Recesso [6] that, each of the problems to education system has a direct impact on student learning, but it provides broader lens of considering potential use of internet in education. Kalinga [8] categorized role of ICT in education into 3 parts by focusing at improvement of education management system, improving access and improving quality.

Considering educational management system; internet is potentially powerful tool for extending educational opportunities, both formal and non-formal, to previously underserved constituencies—scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus [9]. Management may also involve availability and maintenance of the internet facility itself. For instance; selecting a reliable internet provider needs considering a number of questions such as: What are your organization's current and future technology needs? What services do you offer your staff and constituents? What are your requirements in terms of bandwidth, latency, and uptime? For that matter, what do bandwidth, latency, and uptime actually mean? [10].

Role of internet in improving accessibility of education relies greatly on its ability to transcend time and space. For example, internet makes it possible asynchronous learning, or learning characterized by a time lag between the delivery

of instruction and its reception by learners. Certain types of internet, such as teleconferencing technologies, enable instruction to be received simultaneously by multiple, geographically dispersed learners [11]; [12]; [13]. Also, Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in libraries (and available in limited quantities) for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at anytime of the day and by an unlimited number of people [14]; [15]. Internet also facilitate access to resource persons— mentors, experts, researchers, professionals, business leaders, and peers—all over the world [16].

Internet may improve and develop the quality of education by providing curricular support in difficult subject areas. To achieve these objectives, teachers need to be involved in collaborative projects and development of intervention change strategies, which would include teaching partnerships with internet as a tool. According to Zhao & Cziko [17] three conditions are necessary for teachers to introduce internet into their classrooms: teachers should believe in the effectiveness of technology, teachers should believe that the use of technology will not cause any disturbances, and finally teachers should believe that they have control over technology.

However, research shows that most teachers do not make use of the potential of internet to contribute to the quality of learning environments, although they value this potential quite significantly improve their pedagogy [18]. Harris [19] conducted case studies in three primary and three secondary schools, which focused on innovative pedagogical practices involving internet. Harris [19] concludes that the benefits of internet will be gained when confident teachers are willing to explore new opportunities for changing their classroom practices by using internet.

But confident teachers are produced from effective professional development focusing on content and collaborative to effect change in teacher practices in ways that ultimately improve student learning [20]; [21]; [22]. A focus on a specific content area or a particular pedagogical strategy will enable teachers to take this new knowledge from the professional development and integrate it with their classroom practices. Therefore, teacher professional development in computer technology cannot just focus on computer technology applications; it must connect with a specific curriculum and subject area and with specific attention to the pedagogical practices associated with the subject area. Since the effectiveness of computer technology integration is more rooted in pedagogical and design principles, rather than computer technology itself [23]; [24]; [25], teacher professional development must focus on not only how to use a particular hardware or software, but also on how it is used in alignment with more effective pedagogy, content, and context.

Aligning internet with pedagogy supports Gurumurthy's [26] study that based on policy reviews, theoretical explorations and empirical evidence of delivery systems of CAL in Kerala and Karnataka. The study points out that the digital medium has the capacity to allow local knowledge construction and also supports all the modes (text, audio, video). Hence, its potential for revolutionizing teaching learning needs to be explored. However this exploration needs to be firmly grounded in both educational aims/philosophies as well as educational contexts and anchored by educationists to be successful.

For the case of Tanzania, integrating internet in education is in line with the educational aims as such aims are supported by both education and training policy and internet policy [27]; [28]; [3]. But whether the context supports the implementation of these policies or not, still remains questionable as research shows that problems facing Tanzanian secondary schools involve low skills for teachers to teach using competence based curriculum, large class size, lack of teaching and learning resources and low teacher motivation [29].

These problems may be linked with teachers' ability or attitude to integrate internet with their classroom practice as Fishbein and Ajzen [30] emphasized that an attitude is a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object. Attitudes also influence the use of technology as it is stated by the use

and gratification theory that people's needs influence what the media would choose, how they use certain media and what gratification the media gives them [31]. It means the influence of gratification on people's attitudes cannot be ignored. For instance, studies show that teachers" attitudes have been found to be a major predictor of the use of new technologies in instructional settings [32]; [33]. Christensen [34] states that teachers" attitudes toward computers affect not only their own computer experiences, but also the experiences of the students they teach. This implies that how internet is used in schools cannot be simply understood from the ICT projects introduced in schools until a study is conducted in such schools where the projects were introduced.

3. METHODOLOGY

The study involved four secondary schools in Dar es salaam with internet facility. The study focused Dar es salaam schools because Dar es salaam is the largest city in the country where most of the ICT based projects have been implemented. This is by considering the purpose of this study; i.e. determining the extent of internet utilization in Dar es salaam secondary schools. However not all schools in Dar esa salaam are connected to the internet; hence, the study employed a qualitative approach to gather in-depth information on the application of internet as a resource material for teaching and learning in four secondary schools with internet system. From each school all ICT coordinators and the heads of schools were selected. Secondary school subjects were categorized into three groups; i.e. science, arts and language. From each group two subject teachers were selected as part of the sample. Therefore, from the four schools; 4 ICT coordinators, 4 heads of schools and 24 teachers were selected for this study. The study also involved 40 students who were randomly selected from Forms two and three in each school. Therefore, a total of 160 students were sampled from the four schools. But classes considered were only those which were studying computer studies as a subject. Interviews, questionnaires and documentary reviews methods were used in Data collection.

Documentary reviews involved the saved documents that were reviewed in the Compact Discs (CD) and on computers and printed documents of teachers' subject materials for classroom use. The materials reviewed include materials for specific subjects for example, Chemistry (on Bonding, Periodic table of elements and their properties), Biology (on Digestive and Circulatory systems and Cell division), Geography (on volcanic eruptions, Soil erosion, Wave action), Physics (on Pressure and its types), English (on Tenses) and Computer studies (on Operating systems and Computer software and Computer hardware). The collected data were summarized and analyzed according to thematic areas as presented in the findings section below.

4. FINDINGS

4.1 Internet Connectivity in Secondary Schools

Considering the condition that all the sampled schools were connected to the internet, It was realized from the heads of schools sampled that Internet connectivity in secondary schools was done after it was proposed that there is a need for secondary schools to be connected following the introduction of internet policy in education by the Ministry of Education and Vocational Training in 2007. The policy aimed at allowing schools to implement ICT policy in secondary education in phases.

The results from interviews with the heads of schools and internet coordinators on the items that wanted them to mention the type of internet connectivity in their schools have revealed that all 4 sampled schools had a wide area networks as the type of internet connectivity. When responding to the item why they used such type of internet connectivity they all reported that it is the internet connectivity that connects computers across many other computers globally and easily accessed teaching and learning materials from different parts of the world.

The heads of schools also named different internet service providers to which their schools are connected based on the stability and cost of internet service provider. All 4 heads of the studied schools and internet coordinators mentioned that the process involving connectivity was open to any internet service provider as schools are not limited to any service provider. In school B for example, the headmistress said her school is connected to UHURUONE and the other three

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heads of schools said that their schools are connected to Tanzania Telecommunications Company Limited (TTCL); the only government owned internet service provider. The main reasons of getting connected to TTCL are that it is one of the local providers, it is cheap compared to other service providers. One of the heads of schools said: '.....*To us internet service is a consumable good, everyday it is in use therefore, we always look for cheaper service providers, who have stable internet systems'* (Field data, 2015).

The heads of the sampled schools cited school fees as their major source of funds to pay for internet connectivity. They also reported that, these funds do not all come in at once each year but collected in every term; also, it is paid in by students slowly and it trickles down for the rest of the year, hence hampering the payments of internet connectivity in most schools. This causes students and teachers not to fully utilize the internet facility for instructional purposes. However, one of the interviewed heads of schools reported that her school was connected to internet freely by one of the internet service providers; therefore her school does not use school fees as the source of funds to pay for internet subscription.

The heads of schools were aware that the Tanzania's ICT policy seeks to maximize cost efficiency and to enable the private sector to focus on last mile infrastructure, content, and application services. This has bee done by encouraging private companies to utilize the government-owned backbone (optic fibre), because, aggregating traffic in a single backbone can significantly lower the cost of broadband service provision even to the schools (URT, 2009). But it seemed the cost for internet was still not regularly affordable to all schools.

Regarding the freedom of accessing the internet, the teachers mentioned that, they were free to access the internet in the computer rooms provided. One teacher said:

> *"...We are free to access the internet provided that there is no any problem, but when there is a problem the chief technician [school ICT coordinator] informs the users of the problem including when the services will be restored"* (Field data, 2015).

This response indicates that, teachers were using the internet service and the school internet coordinators were responsible for checking the accessibility and making sure that the computers are in good order for the users.

4.2 Internet as a Means of Communication

All four internet coordinators from the sampled schools reported that in this information age e-mails and chats on the internet are used by teachers to send learning notes as attachments to students. Teachers also chat with their fellow teachers in other schools to get important skills and knowledge on a given topic instead of inviting him/her as a guest teacher.

Moreover, 18(75%) out of 24 subject teachers during interviews named e-mails and chats as one of the resources that were most frequently used in teaching. 4(16.7%) teachers of computer studies from the sampled schools reported that e-mails and chats were used all the time regardless of school hours. When assessing how the e-mails and chats were used in teaching and learning, the teachers' interviews responses revealed that e-mails were used to send assignments and lesson notes to students and also teachers received feedback from their students through e-mails. For instance, one of the teachers said:

> *"...The internet sometimes replaces the use of students' exercise books as teachers usually use the e-mails to accomplish lesson notes and students activities on one topic or subtopic. Also we use emails and chat rooms to communicate with our friends and students"* (Field data, 2015).

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Again chats between teachers and students and among the students themselves were mentioned to be used to solve difficult academic problems when face-face was not possible. Teachers addressed students' problems through internet provided that both teachers and students had made initial plans and were on line at that time. This was possible also for those students with computers and internet connectivity through modems at their homes and at internet cafes. But only 4 teachers showed ability to practice connecting to the internet privately when they are out of the school compound.

These findings indicate that, through e-mails students were given lesson notes and other classroom activities and they submitted assignments to their teachers. The findings are supported by students' responses from questionnaires when responding to the item 'Do you use internet to interact with your teachers and fellow students?' 76(47.5%) students said that they neither interacted with their teachers nor their fellow students through e-mails because they were not interested in chatting. But 84(52.5%) students reported that they interacted with their teachers and their fellow students through e-mails and chat rooms on the internet for seeking assistance from teachers and exchanging materials with other students. This shows that through internet, e-mails and chats were used for academic communications in which teaching and learning processes were going on between teachers and students when they both were far from each other.

In categorizing the internet interactions by students from different schools in exchange of learning materials through the use of e-mails and chat rooms it was found out that 92(58%) students of the sampled schools showed that they used e-mails to exhange learning materials with their fellow students from other schools within Tanzania. They also used e-mails for the same purpose to communicate with their sisters and brothers in other schools outside Tanzania such as Penrhorse school in Australia and many other schools in Finland and Germany. This shows that internet is a useful resource which connects distant friends in exchange of information regarding learning.

4.3 Internet as an Instructional and learning Tool

When responding to the item that 'what resources on the internet do you use for instructional purposes? All 24 teachers through interviews mentioned search engines as their main resource to enhance quality teaching and learning. They further said that these search engines have in them e-books, notes, articles, and encyclopaedias, sample experiments in multimedia and 3D which cannot be found easily in their day to day teaching environment. One teacher said: '…*We normally use search engines such as Google, AltaVista, Wikipedia and Yahoo for downloading teaching materials. We search materials on the internet then display them on the database projector for students to view and learn'* (Field data, 2015).

When responding to the item that wanted them to explain how they assist students using internet for instructional purposes, 20(83.3%) teachers said that they normally provide students with specific websites where they can get learning materials relevant to their cognitive levels. The teachers continued saying that the internet and search engines have changed tremendously the teachers' role from being the communicator of knowledge to student-centred pedagogy. It is a resource based approach of teaching and learning and this is done because internet offers a diverse teaching and learning materials which can be accessed easily by students themselves.

The reviewed teaching and learning resources during the study identified teachers' CDs and print outs materials with associated web source links showing that they were obtained through the named search engines. Some of the observed web illustrations are shown in figures 1 and 2.

Figure 1: Volcanic éruptions

Source: http://www.alaskamuseum.org/features/volcano/
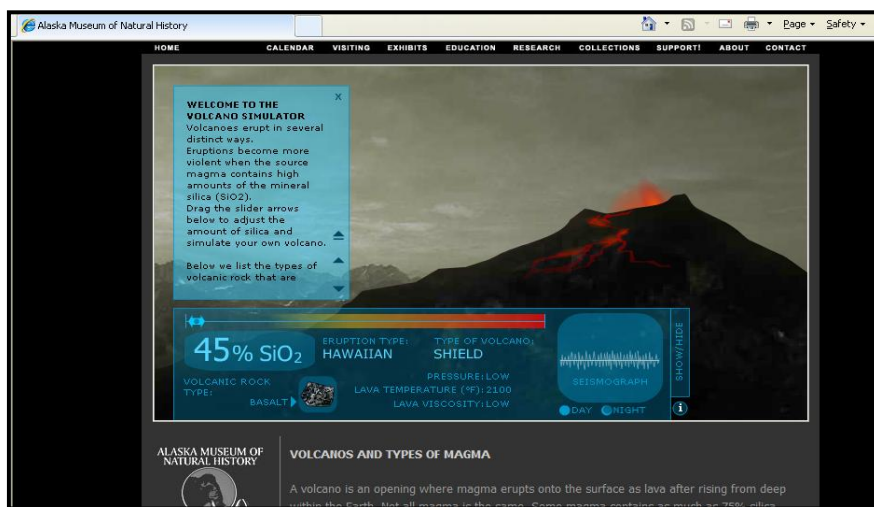
This online simulator allows students to observe what happens to volcanic eruptions as the silica content of the magma changes. By operating a slide it changes the percentage of silica, and the display shows the rock type, type of eruption, and type of volcanic edifice. It also displays temperature, pressure, viscosity of the lava, and seismic activity. Teachers could justify that these processes could not be explained easily on a chalkboard.

Another example of a simulation saved in a computer accessory involved an operation of a single fixed pulley as shown in Figure 2 below.
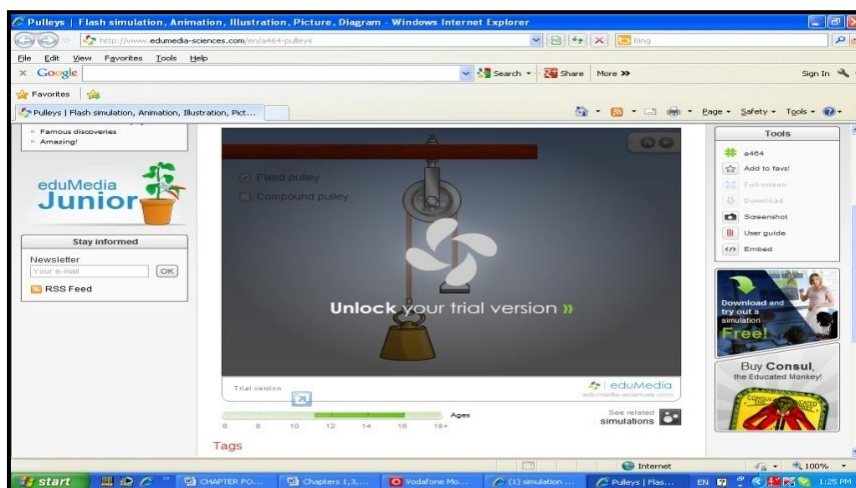

Figure 2: Single fixed pulley, as shown in the teaching of physics

Source : http://www.edumedia-sciences.com/en/a464-pulleys

Figure 2 represents an animation that enables students to compare the properties of a fixed pulley with those of a pulley system. One pulley enables students to change the direction in which a force acts. Associated with one or several other pulleys (compound devices) forms a system that enables one to reduce the force needed to lift a mass. Again, teachers

demonstrated that these are some of the processes that cannot be explained easily on a chalkboard without any other teaching aid.

When students were responding to the item in the questionnaire on how do they use internet for learning? 138(86%) students said that search engines are important options of the internet as they enable them to search for solutions on different assignments given to them by their teachers on line. Further question to students through questionnaires on how they used the internet indicated that, 152 (95%) students used internet for educational purposes which included searching for reading materials and downloading relevant information for use in different subjects. However, 8(5%) students said that internet was used for social matters such as communicating with family and friends who live very far from them. This shows that internet at schools is not only for educational purposes but is also used for social matters.

4.4 Internet as a Means of Professional Development

The interviewed teachers 22(91.6%) mentioned that internet has become one of their best tool in helping them to develop their careers through enrolling in professional courses that are offered online, communicate with their instructors and other students who are also registered online. Research has shown that teachers are upgrading their knowledge from one level to another, i.e. diploma holders are doing their first degree, and bachelor degree holders are doing master's degree. One teacher reported that:

> *''…The internet resources have helped us very much because most of us are doing our first and second degrees at the Open University of Tanzania, therefore we use these internet resources in getting our own notes in the course of studying and answering assignments''* (Field data, 2015).

Moreover, teachers use internet to search updated materials in their areas of specialization and new teaching methodologies. For example, teachers were of the view that, the operating competence based curriculum of 2005 in Tanzania, has been implemented without any professional assistance to teachers by the Ministry of Education and Vocational Training or the Tanzania Institute of Education (TIE); instead most teachers took their personal initiatives through internet to at least learn about it. For example, a biology teacher after having learnt about learner centred teaching and learning through the internet has demonstrated before his colleagues on how to use collaborative learning through students groups, where the formed groups were given opportunities to discuss and present to their colleagues and arose interest in dialogue and knowledge sharing. The process has been very effective as the lesson was interactive and both students and teacher's roles changed as they all participated in the teaching and learning process.

5. DISCUSSION

The findings of this study support other researchers' observations that internet service in secondary schools make learning an easy task for students and such internet offers teachers with the opportunity for accessing up-to-date lesson notes, lesson plans and teaching methods that are specific to different subjects [35]; [36]. Also, teachers could advance their profession through the Open University of Tanzania. But the internet facility was not in use to improve accessibility of education through multimedia programs. For instance, reducing the problem of large class size by attending multiple classrooms through video conferencing or teleconferencing was not a common experience to the observed teachers.

Considering the use of internet to improve the quality of education; the teachers could use simulations to motivate students and also assist them to create mental models but they could not extend such simulations to develop varieties of other skills such as hypothesis testing, experiential learning and schema construction as studies demonstrate their effectiveness in improving learning [37]; [38]. Also, there was no evidence that teachers were able to use internet in establishing link sources through web Quest as a means of simplifying searching for materials, saving time for searching for materials or focusing learning especially to higher levels. Though web Quest was not common in the surveyed schools it is a popular teaching technique in several countries. For instance, as Dodge developed activities for pre-service teachers, he launched the Web Quest, arguably the most popular approach for integrating the Web in classroom learning [39].

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Furthermore, the observed teachers could not demonstrate pedagogical skills involving the use of internet to engage students with varieties of learning styles and abilities such as supplying the tools and directions to online resources where students can teach themselves on how to use the internet tools and start using them after completing the tasks given to them by their teachers. This is by considering the theoretical framework that; internet can be used for both knowledge construction and support as it was observed that internet is not only an educational tool, but also a support for learners, because it helps to develop children with special needs and behavioral problems [40]. For example, Lindstrom [40] observed that once students learn how to use the ICT tools they can teach other kids in the class and a teacher can of course learn from the students as well.

It is clear that use of internet as a means of communication in secondary schools in Tanzania is very important, as it breaks the communication barriers between distant teachers, students and friends in the course of learning. But it seems that it is upon the students to choose on how to use the internet. This means even if the school internet system may be blocked from unwanted websites, still students may be wasting much of their useful time communicating with their friends online through their emails. However, the use of the internet for purposes other than school learning is not necessarily bad because one of the advantages of internet in schools is for pleasure and entertainment [41]. This is a management issue implying that the extent to which students may use internet facility in schools constructively depend on the context set by the school management and parents.

But ability of the school to set appropriate context for effective utilization of the internet tools in schools needs teacher professional development programs on the internet facilities in schools. Therefore, if one needs to design effective teacher professional development program on the use of internet or ICT in general in Tanzanian schools needs to understand the prominent challenges facing the use of such facilities focusing both on the pedagogy and system management in the same schools. For the case of the observed schools the ICT coordinators can be considered as part of the management team.

6. CONCLUSION

For the schools with internet facility in Dar es salaam, both students and teachers could use them for academic purposes basically searching of materials and exchange of information between teachers, students, friends and parents. This agrees with the uses and gratifications theory that users proactively search for media options that will not only meet a given need but enhance knowledge, social interactions and diversion. Other uses of the internet involving e-mails and chats though mostly used could not be easily associated with students academic achievement because various challenges especially those related with internet management system in Dar es salaam schools were not substantially known to the researchers. In order for the internet facility to be able to benefit both teachers and students in schools, there should be an effective teacher professional development program focusing on pedagogy, developing positive attitudes towards internet use in school learning and internet system management. Therefore effective Internet facility in schools needs to improve educational quality, accessibility and management system.

7. ACKNOWLEDGMENTS

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