JIMMA UNIVERSITY

COLLEGE OF NATURAL SCIENCES

DEPARTMENT OF INFORMATION SCIENCE

Examining the Impact of Tablet Devices in Digital Resources Usage of Medicine Students : The case of selected Ethiopian public higher institutions

A Research Document Submitted to College of Natural Sciences of Jimma University in Partial fulfillment of the Requirements for the Degree of Master of Information Science (Electronic and Digital Resource Management).

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List of Acronyms/abbreviations

AmboU: Ambo University

CDSS: Clinical Decision Support System

EMR: Electronic Medical Resources

JU : Jimma University

ICT: Information Communication Technology

SPSS: Statistical Package for Social Science

PDAs: Personal Digital Assistants

HCP: Health Care Professionals

HEIs: Higher Learning Institutions

GPS: Geographical Positioning System

MAC: Media Access Control

NGO: Non Governmental Organization

PC: Personal Computer

USD: United States Dollar

VLAN: Virtual Local Area Network

WLC: Wireless Controller

WKU: Wolkite University

Abstracts

Through the advancement of mobile technology and their increasing access, tablet devices have transformed from a means of communication to learning. The purpose of this mixed-methods study was to analyze the impact of tablet devices on digital resource access of medicine students in Ethiopian universities. Data were collected mainly through student's survey, interviewee and online users' resource access data from server as source of triangulation to obtain better research results. The study revealed a growing tablet device use by students for accessing relevant medical resources and these devices availability helps students for studying 92.8% of lecture notes,65.2% of entertainment activities like social networking and 56.5 % accessing health related resources and journals. The other findings of the research revealed that students have a positive attitude towards the potentials of tablet devices for digital resources access through its features as capability and ease of use to access resources and to operate. It is also found that the investment has a return in terms of helping the students in their academic engagements but different factors inhibits students use including lack of proper and consistence network infrastructure and shortage of awareness about what resources are available for academic purposes in higher institutions. There is a need of strong supervision and support to minimize the limitations encountered in higher learning infrastructure and content preparation by incorporating all stakeholders to bring better results on such tablets initiatives on learning environments. Recommendations were forwarded as per the results of the current study.

Chapter One

Introduction

With the development and adaptability of future generation network environments on mobile devices, education and knowledge could be everywhere, place independent and personalized for mobile users. The rapid growth of mobile device users will push educational institutions to rely on mobile technology in every educational aspect including research and teaching learning activities (Rossing *etal*., 2012).

Mobile based learning environments proposes contemporary ways to sustain learning process over emerging mobile technology, such as mobile tablets, smart phones, personal digital assistants (PDAs), and much more. Thus, mobile supported learning allows students and teachers to access information and resources and other learning materials from anywhere and at anytime. Consequently, users have chance to control the time they want to learn and from which location they want to learn (Mehdipour and Zerehkafi, 2013).

In addition, mobile technologies including tablets have introduced a new generation of educational tools that afford creative use and direct access to online resources in the learning environment. These issues will push educational sectors like universities to rely on mobile technology in their educational activities.

Mobile tablets are quickly becoming a well-liked and influential educational tool for classrooms. One of the main benefits of mobile tablets is that they enable learning ever-present and location free with a possible improvement in education efficiency and standards. The researches of numerous experiments with mobile tablets in learning environments have provided valuable data on the repayment of implementing such technology (Nagel, 2013; Mehdipour and Zerehkafi, 2013).

For the past few years, there has been a large investment in ICT in the education sector for better teaching/learning process (Nasser, 2014). In this context, mobile devices, including smart phones and tablets emerge as an revolutionary tool connected with different methods and techniques for effective academic process (Wu and Zhang, 2010).

With the many technologies available, educators and students can access a multitude of digital information resources, make use of it and exploring their forthcoming. The use of these

technologies in the education institutions like universities provides a faster and simple way to accesses digital materials available in and out of the institutions (Passey and Zozimo, 2014). In addition, the usage of tablet devices in the education environment can yield many benefits for students in terms of improving their motivation, collaboration, creativity and developing IT skills (Rossing *etal*., 2012).

An individual's access to and use of important information, especially in education, is considered to be one of the ways of minimizing the digital literacy gap among stakeholders by promoting easy access to educational resources. As a result this will contribute for a better academic achievement of the students in their education (Traxler, 2010).

Since tablet devices have a capability to access the resources in a very easy way at any time and place, students would have to use the full prospective of mobile platform for assessing available digital contents available specially in schooling where the use of digital materials are mostly available with free of cost and in a better volume (Rajender, 2016). In addition to this, students would be able to employ mobile devices to inquire about, search for, and evaluate obtained academic information, and share information with both colleagues and team mates. This makes the device a viable tool for academic resources delivery service and information seeking and accessing for academic related resources (Wu and Zhang, 2010; Aryee and Hansen, 2012).

But technology does not make certain by itself achievement in education; as a result a proper focus should be given to the role of such technologies in facilitating access to digital resources which will lead to better results in the education sector (Nasser, 2014). This is also true in our country where such technology based education is laying its instances starting from the last few years in health information disseminations and aiding teaching and education process with strong budget investment in higher education (Kassa, 2016).

Hence proper focus should be given to examine the impact of such mobile devices in the teaching/education process, its potential and its role for better student's academic performance with respect to resources access in our higher institutions.

1.1.   Statement of the problem

Mobile Devices including tablets are being used to enhance health education in different ways (Aryee and Kinful, 2014; Greenspun and Coughlin, 2013). Using tablet devices to attain students will benefit higher educational institutions by providing a way to access digital resources and other electronic materials anywhere and anytime for better academic achievement (Lowenthal, 2010). Hence, many Higher education institutions (HEIs) are implementing digital and virtual education to provide flexibility in educational process and on the other side they facilitate ways to offer tablet devices access (Tsinakos and Ally, 2013).

Currently most countries in the world are investing huge amount of money to offer access to tablet devices to students for better academic results (Economides, and Nikolaou, 2008). In 2016, Ethiopian Ministry of Health also handed over 20,000 tablets that cost 18.5 million USD to medical schools in 28 public universities in order to ensure quality of education so as to produce skilled professionals in the health sector. The donation is part of the efforts of the Ministry towards bringing quality education in HEIs and believed that it will enable medicine students' access to up to date information in the field and allow students to access lectures, with or without access to internet as well as e-books, research works, journals and other digital resources in the form of audio-video, animation, photographs as well as texts (Kassa, 2016).

But, before academic institutions introduces a plan to invest in and/or introduce the use of mobile devices including tablets, or to permit access to them in the learning institutions, it should carefully consider, discuss with and agree on the educational reasons for doing so. It also needs to note the purpose and potentials of such tablets and other mobile devices for education and teaching or student's expert learning purposes (Aryee and Hansen, 2012). They also need to place assessment indicators which would enable the institutions to judge the extent to which any investment provides a return, over time, in terms of principles, schooling quality and school improvements (Rajender, 2016).

Even if there are some researchers conducted on the impact of such technologies in academic environments in and out of our countries, as per the research knowledge the previous attempts lacks investigating the overall learning with tablet impact on digital resource access in higher education in line with its users attitude and access behavior, potential of devices, limitations encountered and higher institutions level of readiness to lead the change.(Parveen, 2012;

Nasser,2014; Rajender, 2016), In addition to this, in our country also there was good research attempts which focus on assessing information seeking culture of the students in medical students (Sead, 2017).

As a result the current research attempt motivated to examine the impact of tablet devices in digital resources usage on academic performance to show the status of those tablet devices use status in HEIs with respect to the intended plan and aim by the stakeholders during the provision of devices in Ethiopian higher education institutions.

1.2. Research questions

This research attempt to answer the following research questions:

1. What are the types of digital resources accessed and activities performed with tablet devices by medicine students?

2. What is the role of availability of tablet devices in medicine student's access behavior towards educational digital resources?

3. What is student's attitude towards the potentials of tablet devices in promoting digital resources access and use?

4. What are the factors that inhibit efficient use of tablet devices to access digital resources in higher education institutions?

5. Do higher education institutions have an appropriate infrastructure and digital content preparation to help tablet users on digital resources access?

1.3. Objectives of the study

1.3.1. General objective

The general objective of the study is to examine the impact of tablet devices in digital resources usage of medicine students in public higher education institutions.

1.3.2. Specific objectives

- To identify the types of digital resource accessed and activities performed with tablet devices by medical students.

- To assess the role of availability of tablet devices in student's access behavior towards educational digital resources.

- To understand medicine students attitude towards the potentials of tablet devices in promoting digital resources access.

- To identify factors that inhibit medicine students tablet devices use to access digital resources in higher education institutions.

- To assess the level higher education institutions infrastructure and digital content preparation to help tablet users on digital resources access.

1.4. Significance of the study

This study is assumed to be significant in providing abasement indication in relation to mobile technology specifically tablet devices usage for accessing digital resources on the current digital world where there are plenty of resources available where ever we need. Since focus has shifted from whether or not to use them in teaching and learning, to understanding which technologies can be used for what specific educational purposes and to investigate how best they can be used and embedded across the range of educational contexts in educational institutions, the current research would examine the role of mobile devices in digital resources access on educational environments.

The study would also be useful for those in decision making roles and provides insight for the people responsible for mobile technology donors, digital resource providers in the institutions and IT application designers to provide better and efficient solutions for the user based on the users' usage pattern and attitude that was obtained in the course of research activity. It is hoped that this study would assist administrators of the university libraries in developing a more complete understanding of students' electronic and digital resources usage by limiting barriers occurred in the institutions.

1.5. Scope of the study

The scope of this study is to examine the impact of tablet devices in digital resources usage for better academic output in higher education institutions. Even if there are more than 28 public higher education institutions that are part of the donation, the current research was limited to only 3 selected higher education institutions which would be selected based on universities generation in strata. The researcher believes that analyzing the finding from selected universities medicine students in a better detail can be a used as an indicator to understand the other university student's situations and it would put standing point for future similar attempts.

The research scope also focused to only medicine students who are currently available in the selected institutions and have the donated tablet at hand to use it to the intended academic purpose.

1.6.   Limitations of the study

The limitation of the study was the absence of 2 institutions namely Wolkite and Ambo universities server usage data since their infrastructure doesn't support to extract the tablets users data separately. As a result the research was limited in using the Jimma University student's online usage data for triangulation of the findings.

1.7.   Definition of Terms

Tablet device: - a wireless touch screen personal computer that is smaller than a notebook but larger than a smart phone which can be controlled with finger or stylus and supported by one or more physical context sensitive buttons.

Medicine students: - a student enrolled in public higher education institution medical schools, who are training to become doctor.

Digital resources: - materials that require computer access, whether through a personal computer, mainframe, or handheld mobile device.

**E-textbook*:* is an educational or instructional book in digital form

1.8.   Organization of the Document

The research document is organized in to five chapters. The first chapter present introduction, statement of the problem, research questions, objective of the study, significance of the study, scope of the study and definition of terms employed in the study.

The second chapter deal with the literature review which discuss about mobile computing on student education, direct impact of mobile aided education on student education, role of mobile technology in education, potential of tablet computers in education, potential use of mobile phones in health, investment on mobile computing for education improvement and Reviews on related research work are included in the chapter.

The third chapter discusses the methodologies and procedures followed for the data collection, analysis and interpretations. The fourth chapter presents the study results and discussion of the results for the problem under investigation. The fifth chapter brings to an end of this research with conclusion and recommendations for practice and future works.

Chapter Two

Literature Review and Related Work

2.1. Literature Review

2.1.1. Role of Mobile Computing on Student Learning

Several things are associated with the idea of mobile computing including one to one computing, wireless computing, and m-education. These descriptors attempt to give characteristics to the idea that every student has full-time entrance to systems, Internet, and different resources that allow them to work anytime, anywhere with the technology. What is generally accepted about mobile based activity is that it reflects more than having a computer. The mobile education setting provides student access to a variety of digital devices and services (Barbosa *etal*, 2007).

More than the "one to one" conception of use, mobile computing suggests the "many to many" idea of equipment use. In this computing context, it is assumed that educators and students are dynamic participants in the learning process in which information is critically and work in partnership analyzed, communication takes place on multiple levels with learners, educators, and experts, and a number of network and activity tools are used to achieve particular tasks (Amirian, 2004).

A number of key issues have converged to rush the association of computing from fixed to mobile status. Those developments include advances in micro- and nano-technology, Internet access, wireless networking systems on multiple standards, diminishing costs, and educational priorities that recognize technology's importance in helping learners gain 21st century skills (Eichenlaub *etal,* 2011).

As mobile computing devices have entered schools, understanding their impact on student education is an evolving task upon which a body of literature is just beginning to emerge (Penuel *etal*., 2001). The availability of Internet resources and the application of tools such as online simulations, applets, pod casting, wikis, blogs, and other means of gathering and using information are promoted as ways to allow students to construct and manipulate knowledge while encouraging teachers to modify their instructional methods. However, understanding the behaviors of students and teachers that lead to improved connections with each other and with networked resources can be a complex task to undertake.

2.1.2. Direct Impact of Mobile Aided Education on Student Learning

A good deal of the research on mobile based activities has focused on improving interactivity in the classroom (Fujimura & Doi, 2006; Lindquist *etal*, 2007) or on increasing students' access to education materials anywhere, anytime (Cao *etal*, 2006). A few research endeavors have focused on supporting on-the-job training primarily in the medicine and nursing fields (Kukulska-Hulme & Traxler, 2005). Other projects have included teaching students some aspect of mobile technology, such as programming PDAs or using stylus technology (Bradley *etal*, 2005).

While studies exploring the impact of mobile based activities on student education are somewhat less prevalent, they do suggest some interesting possibilities. Research from higher education show that mobile based activities environments frequently involve digital tools such as databases, scientific probes, spreadsheets, and calculators to encourage higher level thinking (Van'tHooft & Swan, 2007).

Mobile based activities environments are reported to be more student-centered and constructivist teaching practices are more prevalent (Cambre & Hawkes, 2004). Attendance rates improve and disciplinary referrals decline (Knezek & Christensen, 2005). And, the use of project-based and inquiry-based lessons increases with the use of ubiquitous computers (Norris & Soloway, 2004).

A specific area of impact claimed through one-to-one computing has been improvements in technology literacy (Lowther *etal*, 2003). In a study of effects of laptop use among high school students in Germany, Schaumburg (2001) found that students had greater knowledge of hardware networks and operating systems, productivity tools, Internet navigation, and computer security than their non-mobile based activities program counterparts. Because of the frequency of use of computers at school and at home in one-to-one mobile based activities programs, positive effects on student writing have been realized (Jaillet, 2004). Study of an experimental middle school m-education laptop program in Maine found a positive effect size on a statewide test for 8th grade students of science in nine demonstration schools versus 214 schools serving as the control group. Another study examining the effects of mobile based activities on state achievement test scores in California found positive effects for narrative writing (Gulek & Demirtas, 2005).

2.1.3. Role of Mobile Technology in Education

Researchers have also recommended the use of technology to provide a fruitful education, in particular, the use of mobile devices. The use of mobile devices will provide its users with better education environments like that of use of technology. The use of mobile devices is prevalent among the current 21st century users. According to (Cochrane, 2010; Traxler, 2010), mobile devices enable learners to have better educational resources access at anytime and anywhere. Mobile devices allow learners to be embedded in realistic contexts (Walker, 2006). This is supported by the availability of mobile technology which include built-in cameras, connectivity, mobility, geo location, social networking, personal podcasting, and podcasting (Cochrane, 2010; Cochrane & Bateman, 2010)

Mobile devices have often been used in outdoor and field-based education providing learners with control over their education through instant feedback and prompts. These affordances promote a pedagogical shift from educational teacher-centered to participatory student- centered education (Facer *etal*., 2004). As such, mobile devices can work without a glitch to support authentic education in the situated context of the task.

2.1.4. Potential of tablet computers in Education

The introduction of tablet computers in educational settings has been primarily limited to middle and senior high school students. Barton and Collura (2003) found that tablets have advantages for improving the writing and organizational skills of high school students, because they are able to type or handwrite stories, and handwritten notes can also be converted to typed text. A case study by Borse and Sloan (2005) focusing on the fourth and eighth graders' use of stylus interfaced technology reported benefits such as high levels of student engagement, improved writing process, higher rates of homework completion, and fewer absences. Further, Schroeder (2004) found anecdotal support for improved student engagement with high school students due to the highly interactive nature of tablet computers. More limited support for stylus-interfaced technology in education has also been reported for early elementary students. For example, the integration of technology into the 100 days of school curriculum for children in kindergarten through grade two resulted in increased student motivation in math, reading, and writing (Mouza, 2005). Teachers reported that this was particularly true for students, who were not typically motivated by these,

While some information technology (IT) professionals and educators emphasize the potential benefits of mobile based activities in education, others highlight its drawbacks. University instructors have expressed technical concerns associated with the functionality of mobile based activities initiatives in the classroom. There are also concerns of a pedagogical type for instance, distractions caused by using networked mobile devices instead of focusing on course content. Other research conducted at the DePaul University showed that mobile based activities along with internet access has caused distractions for students. Students identified e-mails, instant messaging, and internet browsing as common distractions to their education experiences (Berque *etal*, 2004).

As for other concerns, lack of quality professional development, school policies that fail to support mobile technology use, instructors' beliefs about the role of technology in the curriculum, and cultures that are just not supportive of mobile based activities adoption have made the integration of mobile initiatives problematic in U.S. schools and universities. Many researchers and authors conclude from their experience that technology integration of any kind has been sparsely achieved, if at all (Franklin & Molebash, 2007; Hew & Brush, 2007). Other researchers believe that technology integration been achieved more in some segments of industry and society than others (Drucker, 2006; Hughes & Ooms, 2004).

2.1.5. Potential use of mobile phones in health

Current technological devices such as mobile phones, tablets, televisions, and radios have facilitated communication and access to information among individuals. According to Leo (2006), most of these devices are being used by a majority of adults in most developed and developing countries on a daily basis to perform various activities that range from calling to accessing information. Leo states that researchers conducted studies worldwide and found out that 75 percent of mobile phone users carry them at all times and had them turned on all the time, except when sleeping.

Despite the increase in mobile penetration and usage, government, NGOs, business co-operations, and individuals have not adequately explored the role digital technologies might play in health service delivery, especially in the health and education sector. The role of the device may also be beneficial to explore in rural communities where there is little or no access to clinics/hospitals. As indicated by Tamocha (2007), the high use of mobile phones has increased

most researchers' interest in the concept of mobile education, specifically for literacy development and access to educational information. Mobile phones are viewed as one of the new artifacts with the ability to perform various kinds of activities, particularly in Africa, where infrastructure is not highly developed (Traxler, 2009).

2.1.6. Use of Mobile Devices in Medical Education

Mobile technology is one of the latest strings of technological innovations that can be integrated into medical education. M-education has been used as a complementary resource for interaction between students and instructors for motivation and education. (mosa *etal*., 2012) Students view m-education as having an important additional function to e-education. (Divalip *etal*., 2013) Studies show that mobile technology creates content generated by the community and a community of learners, and so creates a more unrestrained or interactive setting rather than a traditional content-based setting. Mobile technologies have been found to be convenient, flexible, and cost-efficient when compared to paper-based technologies (Misra *etal*., 2013).

The main uses described for mobile devices in health schooling can be divided into: (Murfin, 2013).

      a.   Information management (IM),

      b.   Communication, and

      c.   Time management.

The growing amount of new systematic information made available by computers and the Internet is demonstrated by the growing number of available health sciences resource sites. Medical students, nursing students, those in other health science disciplines, and clinicians need to make information more manageable and accessible, especially at the point of care. Technological advances are available to assist them in keeping up with more information than what was accessible to their mentors (Murfin, 2013). These innovations are broadly categorized as mobile technology, Web 2.0 innovations, Education Management Systems/e-Education, and medical simulations (Ozdalga *etal*,.2013). Educators and education institutions must be equipped for the future and maintain proficiency in the ever-expanding world of human medication by adopting effective strategies that will infuse their lessons with the appropriate technology and allow their students to achieve their maximum potential (Misra *etal*., 2013).

Mobile devices were ever-present in educational settings, particularly because they are a "learn anywhere" resource for accessing information or double-checking knowledge (Payne KB *etal*., 2012; Ozdalga *etal*,.2013). Health care students are increasingly relying on mobile devices as a "pocket brain" for quick, easy access to information they need in order to succeed in their programs and careers (Murfin, 2013). Resources frequently used by health care students include: online textbooks and lectures, medical podcasts, medical calculators, and search engines to look up unfamiliar terms. In addition, many mobile apps for health care students can be used for knowledge assessment, such as case study quizzes or tests to help prepare for board examinations (O'Neill, 2013). The ability to access all of these resources has been shown to enhance student education in the clinical environment and to increase student knowledge scores (Misra *etal*., 2013).

Mobile devices are also used by practicing HCPs for educational purposes, especially for different activities that keep them informed about the most current evidence-based information and medical practices (Ozdalga *etal*,.2013).

2.1.7. Investment on mobile computing for education improvement

Technology has a ubiquitous presence in educational institutions across the globe. Higher education has been particularly aggressive in acquiring mobile technology, some institutions even adopting computing initiatives that require every student to own their own computing device. Currently, scores of higher education and K-12 institutions are involved in various levels of mobile based activities implementation. These technological implementations have required re-engineering network topologies and overhauling the data communication facilities. A number of institutions have even decided to adopt specialized devices of notebook computers that allow pen-based data entry and screen manipulation (Tablet PCs). Why the investment? In an analysis of institutions migrating to the wireless, mobile environment**,** Penuel and colleagues (2002)**,** found one or more of four primary motivations driving decisions to integrate mobile based activities into the instructional environment: to improve academic success; to increase equity of access of digital resources; to increase regional economic competitiveness by preparing students to effectively use technology in the workplace; and to effect a transformation in the quality of instruction.

As technology is infused into the classroom, health, science and engineering faculty in all levels of education should consider using tablet PCs over laptop and desktop computers in the classroom. Networked tablet PCs enable students and faculty to analyze problems, collect data, take notes, and combine handwritten and other electronic class materials. They also offer the flexibility to write and manipulate mathematical formulas, draw sketches, and add ink annotations when solving and analyzing problems. These benefits should be weighed against the additional cost of a few hundred dollars for a tablet PC compared with a regular laptop computer.

2.1.8. Higher institutions infrastructure preparation towards Educational digital resources access

Educational technology is an inseparable part of modern day education. It facilitates teaching and learning, increases student engagement and participation, and the appropriate implementation of it enhances and elevates student achievement.

Such mobile technologies needs better infrastructure preparations in terms of capability and access. A major practice of technology integration in education is through mobile learning should consider the level of higher institutions readiness (Ally and Prieto-Blázquez,2014).

Infrastructure readiness in terms of educational technology has found significant importance in higher education and is shifting the paradigm of education. Garrison and Akyol (2009) state: "online and blended learning ideas have begun to shift the thinking and practice of educators and leaders in higher education". E-learning has become widespread due to its benefits and advantages (Schwartz, 2013).

Through infrastructure preparations the capacity of education and forms of Knowledge preservation has altered significantly in higher education (Abu-Al-Aish, 2014). The traditional methods of teaching, such as passive lecturing are not popular anymore. Technology has altered teaching and learning practices (Baharak and Makki. 2012).

To obtain the most benefit from infrastructure preparation in higher education, we should make a shift from traditional methods of instruction and take advantage of capabilities of the new technologies (Ghaznavi and Keikha,2011). By focusing on the emerging communications technology we can improve higher education and make a shift from the large lecture methods of teaching. Educational technology provides the means to engage students and sustain that engagement in a beneficial and cost-effective manner (Cassidy etal.,2014). It is also important to

note that for a successful implementation of instructional technology, technology must be used in an efficient way, and too much emphasizing of the technology itself and getting distracted from the main subject matter of the course will reduce the benefits (Ghaznavi and Keikha,2011). Another major player in the successful integration of instructional technology in higher education is professional development.

Ongoing professional development for faculty and students is necessary in order to successfully integrate educational technology on the existing infrastructural preparations in higher education to assist the implantations of infrastructural investments (Ally and Prieto-Blázquez, 2014).

2.1.9. Use of Mobile Devices by Health Care Professionals

The introduction of mobile based activities aid with smart phones and tablet computers) has greatly impacted many fields, including medicine. Health care professionals now use smart phone or tablet computers for functions they used to need different devices to complete (O'Neill, 2013). Smart phones and tablets combine both computing and announcement features in a single device that can be held in a hand or stored in a pocket, allowing easy access and use at the point of care (Boulos , 2012).

2.1.10. Future Trends for Mobile Devices and Apps in Health Care

Several interesting trends regarding the use of mobile devices and apps in health care have been predicted for the future (Robinson, 2014). As better health outcomes become the ultimate goal of the health care system, apps will be needed to fulfill that purpose (Robinson, 2014). The prevention and management of chronic health conditions, such as diabetes, obesity, and heart disease, present serious problems for HCPs, patients, and the health care system (Tam and Sharma, 2014). Patient care management and compliance are difficult challenges, too, so apps that successfully address these issues are needed and eagerly awaited. Apps that support caregivers and promote better communication among patients, physicians, and other resources have also been identified as important unmet needs (Robinson, 2014). As patient ownership of mobile devices increases, new opportunities for direct communication with HCPs and for improved self-monitoring and disease prevention are expected to develop (Misra *etal*., 2013).

Mobile device hardware and apps are expected to continue to improve, bringing additional and enhanced benefits to clinical practice (Mosa *etal*., 2012). Future mobile apps are expected to include even larger databases, as well as CDSS prompts that will aid in clinical decision-making, similar to features that are already built into the EMR systems on desktop computers in clinical

settings. Various other types of mobile apps will continue to evolve and transform into CDSS apps that incorporate artificial intelligence–oriented algorithms. There is also a need to develop standards for mobile apps so that they can integrate seamlessly with HIS capabilities, such as EMRs and patient monitoring systems (Tam and Sharma, 2014). This may require in-house CDSSs that are carefully customs designed for each patient care setting. Such measures will enable HCPs to use mobile apps in a more meaningful way that hopefully leads to improved patient care.

The role played by mobile devices and apps in health care education is also expected to grow (Misra *etal*, 2014). Medical school HCPs and students predict that mobile devices and apps will become even more integrated into patient care and will eventually completely replace textbooks (Robinson, 2014). As the use of medical devices and apps expands, more educational health care programs are expected to incorporate them into medical curricula.

Several issues challenge the future integration of mobile devices and apps into health care practice. While the majority of HCPs have adopted the use of mobile devices, the use of these tools in clinical care has been debated since their introduction, with opinions ranging from overwhelming support to strong opposition. Among the concerns raised regarding mobile devices are: their reliability for making clinical decisions; protection of patient data with respect to privacy; impact on the doctor–patient relationship; and proper integration into the workplace. In addition, HCPs have expressed concerns about lack of oversight with respect to standards or content accuracy, especially for apps involved in patient management (Murfin, 2013).Older HCPs, as well as those who are intimidated by or less inclined to use new technologies, may be at a disadvantage if the use of mobile devices becomes a requirement within the health care fields.

The increased use of these devices by clinicians in their personal and working lives has also raised important medico legal and ethical implications (Divali P, 2013). Consequently, establishing standards and policies within health care institutions will be necessary to ensure ethical and transparent conduct. A call has also been made for the examination of the effect of mobile devices and medical apps on clinical education. Adoption of these recommended measures will be greatly helpful in guiding clinicians, administrators, educators, and researchers in determining how to best incorporate these increasingly sophisticated tools into clinical

practice (Tam, 2014). Best-practice standards for medical app developers should also be established. These standards will raise the barrier for entry into the medical app market, limiting the overwhelming quantity and increasing the quality of the apps currently available to HCPs and patients (Robinson, 2014).

2.1.11: A Framework for Measuring the Usability Issues and Criteria of Mobile Education

There are various ways and diverse subject areas in which mobile devices can be utilized in an educational context. Even if the current research attempt focus medical education with tablet devices environment context, framework design considerations should take in to account multi functionality of the proposed approach for all subject areas and mobile device types. Multi-functional applications apply to a variety of uses, but applications are also customized for certain purposes. However, no mobile learning activity exists ready-made in a piece of technology or software. Hence, mobile devices or applications by themselves do not guarantee their potential or use and the simple adoption of mobile devices does not guarantee mobile learning (Grant & Barbour 2013). Ge et al. (2013), stressed that mobile aided learning clearly requires preparation and design by considering the following points:

- What kind of added value and opportunities do mobile technologies provide?
- What kind of applications and devices are suitable for the purpose?
- What is the infrastructural capacity, resource preparation and educational requirements and pedagogical practices exist? must be the basis of mobile learning design.

Mobile learning also requires adequate resource providers and ICT infrastructure, including tools, equipment, and networks, as well as sufficient awareness and support and competent teachers. The availability of devices and guidelines for appropriate mobile device use in an educational context is a key issue relating to mobile devices and their integration (Ng and Nicholas, 2013). Mobile learning devices and applications should also be user friendly, intuitive, and attractive for learners. Teachers also need knowledge and skills regarding how to apply technologies to teaching and learning. Teachers should be trained in their new roles as mobile learning facilitators. However, everything begins with an awareness of available technologies and their potential uses. Meaningful mobile learning is not an isolated activity or phenomenon. It should be integrated as part of the learning continuum and strategies which include multiple

tasks and multidisciplinary learning. The mobile learning design should take into account a learner's needs and preferences, technology, context, content, usability, and pedagogy along with the objectives of the course (Bensassi and Laroussi ,2014). Overall, previous attempts revealed that (Ozdamli 2012;Wei and So,2012; Bensassi and Laroussi ,2014) has indicated that well-planned and structured mobile learning activity, where issues relating the technology, contents, context, usability, and pedagogy are presented along with the objectives of the course, can be highly motivating and attractive for learners. But mobile learning has an ascending trend and research in the field of mobile learning has been conducted all over the world, multiple mobile learning frameworks are available. All of the proposed mobile learning frameworks and models emphasize different characteristics. Some are clearly technology centric, some highlight pedagogy and some view mobile learning in a more holistic way. However, aspects such as learner, device, context, time, content, social interactions, usability, pedagogy, and previous experiences are shared (Ozdamli, 2012; Grant & Barbour, 2013). Mobile aided learning framework proposed by (pollara, 2013) was illustrated below.
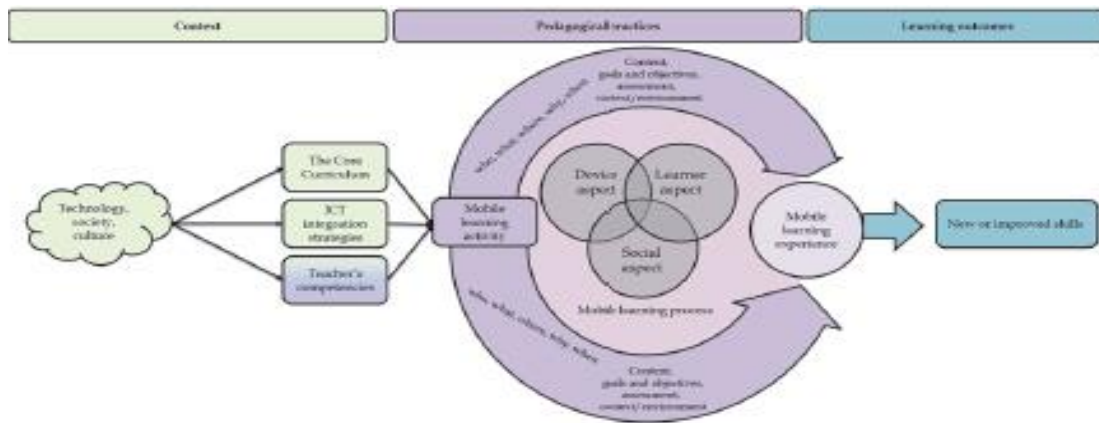
Figure 2.1: A Framework for Measuring Mobile aided learning in higher education (pollara, 2013)

2.2. Related Works

Ebiye (2015) investigated the impact of Smartphone's/Tablets on the information seeking behavior of medicine students and staff, Nigeria. The study revealed high level of awareness and use of smart phones/tablets by medicine students and staff for their academic works. Results also shows that smart phones/tablets has made tremendous impact on their medical education most especially with easy and fast internet access, high speed browsing, saves time and money going to cybercafé/college library, easy access to medical teaching and e-learning materials/e-textbooks. Lack of technical experts on repairs when faulty within campus, operational difficulties, high cost of data subscription from service providers and fragility were identified as the major problems they encountered in using smart phones/tablets. The study recommended the need for medical university management to collaborate with IT companies to develop smart phones/tablets capable of supporting their seeking of medical and health information.

Sead (2017) also conducted a research to assess the impact of Tablets on the information seeking behavior of medical students in Jimma University. He used survey design for the study using questionnaire as the main instrument for data collection. He selected Seventy (70) medical students from the total population of 965.He analyzed the data using tables, graph and simple percentages. His results shows that tablets has made tremendous impact on their medical education most especially with easy and fast internet access, high speed browsing, saves time and money going to cybercafé/college library, easy access to medical teaching and Easy note taking. His findings also identified that lack of technical support when faulty within campus, operational difficulties, poor knowledge on usage, high cost of data subscription and poor power supply as possible barriers bedeviling the use of smart devices for medical information seeking by students in the target medical students. He recommended that the university technical services department should train manpower that can meet the repair needs of users in other to ameliorate distances traveled to put their smart devices in other.

Davies et al (2012) investigated how mobile information resources contribute to learning for undergraduate clinical students in the UK. The study adopted mixed-methods triangulation approach using quantitative and qualitative analysis of surveys, focus group discussion and observation through usage tracking data to 387 medical students provided with a personal digital assistant (PDA) loaded with medical resources for the duration of their clinical studies. Their

study results showed that the PDA was an important addition to the learning ecology rather than a replacement and contextual factors impacted on use of mobile technologies both positively and negatively on medical students learning outcomes. Interruption of clinical interaction and negative responses from teachers and patients were discovered as some of the barriers encountered while using the mobile devices during their clinical practices and those students preferred a future involving Smartphone platforms.

Nasiru *etal*.,(2014) conducted a pilot study of medical students in the clinical years to assess their current utilization of mobile phones, the perceived advantages and barriers. A cross-sectional survey of 5th and 6th year medical students using a pre-tested questionnaire was conducted. Information gathered were bio-data, type of mobile phone owned, usage pattern in terms of frequency and applications, perceived advantages and barriers. Data was analyzed employing SPSS version 15. results showed that , all the 123 participants owned Smartphone's and the greatest use among majority (63%) was for routine functions such as receiving or making calls, sending or receiving SMS and e-mails, as schedule/calendar/planner and as dictionary. Less frequent usage (41% to 59%) was to access and take lecture notes, access medical videos, electronic textbook and for medical research. They were rarely used (< 32%) as clinical tools in patient management, for course evaluation and as log book. Battery life, small size screen, slow speed, limited memory and cost were the major barriers to mobile learning while the greatest advantages were mobility of the device, ease of use, access to current information and ease of access to resources. As per their pilot study, medical students appeared comfortable with the use of Smartphone's for routine personal applications, searching academic resources as well as accessing and taking lecture notes without institutional assistance. As per the researchers suggestions students could be encouraged to use their Smartphone's for more educational activities with minimal support. Such activities include allowing students download lecture notes before time.

Of the previous attempts conducted before with prior motivations listed, the merit of mobile based activities devices like tablets can be evaluated on a number of points ranging from improvement in student learning, to instructor feedback, to students' level of instructional engagement, the impact of mobile based activities devices like tablets remains questionable due to the limited amount of research available on these new latest equipment environments and the

complexity of identifying mobile based activities outcomes from other school improvement initiatives. Specially in country like ours, where the experience with such latest equipment is in infancy stage still, it is important to understand the impact of mobile devices within educational institutions, to clearly get the nature of mobile based activities aided way of education delivery, including its criticisms, followed by emerging evidence of such tablets and other mobile devices educational effectiveness. As a result the current research aimed to investigate Ethiopian higher education medicine students in relation to tablet devices impact for digital resources access on academic environments.

Chapter Three

Research Methodology

3.1. Research Design

In this research mixed research design was used which employed both quantitative and qualitative research method. Questionnaires and server log data analysis was used as quantitative method and interview was carried out with selected medicine students and library digital resource managers for qualitative inputs for the study. The questionnaire was partially adapted and modified from Pollara(2011).

3.2. Study Area

The researcher selected three (3) universities based on their generations as per Ethiopian higher education classifications. Those 3 selected universities are selected purposively hence, the study was conducted on Jimma University from 1st generation, Ambo University from 2nd generation and Wolkite University from 3rd generation, and this is mainly due to the fact that those universities have nearness to one another for data collection within the assigned time and limited budget.

By geographical location Jimma University is located in South West of Ethiopia in Oromia regional state, Jimma zone in Jimma town, at about 352Km far from Addis Ababa. Ambo University located in West of Ethiopia in the Oromia Regional state, West Shewa Zone in Ambo town, at about 120Km far from Addis Ababa. and Wolkite University is located in South West of Ethiopia in Southern Nation and Nationality regional state, Gurage zone about 200km far from Addis Ababa.

3.3. Study population

According to Burns and Grove (2001), a study population is defined as all elements (individuals, objects and events) that meet the sample criteria for inclusion in a study. Therefore, the populations are the selected universities medicine students and library digital content mangers.

3.4. Sampling Techniques and procedure

The list of all medicine students was retrieved from the each Registrar offices of the correspondence universities and was used as the sampling frame for the quantitative study. This study was conducted on all the medicine students of the selected higher education institutions which are above 2nd year to intern period (Final year of medicine education).

In order to get appropriate representative data from each batch, the research used proportional stratified sampling techniques at the time of data collection since it is appropriate where there is Stratified population and the strata have different size in number of members.

Then the final participants were selected using simple random sampling technique from each batch since there might be different reasons that hinder some medicine students to be participant in the research like absence of volunteerism to participate, un availability of tablet computers due to damage and theft, un availability of the student at the time of data collection and etc. In addition Purposive sampling was used to select some medicine students and library staffs for interview from each institution.

3.5. Sample size determination

According to the data collected from the institutions registers currently there are a total of 1765 medicine students in the selected institutions with a proportion of 1385 students from Jimma University, 253 Ambo University and 127 medicine student from Wolkite University. Here it is assumed that all students in both institutions have an equal chance of getting the tablet device since it is distributed without discriminations for all students who are medicine students above medicine 1 (med1) to intern period or all students above pre medicine (Pre med) period i.e. first year.

Having the population of medicine students in the selected universities, the total sample size is determined using Cochran (1977) formula. So, the sample size was determined by using the statistical formula given below:

$$n = \frac{n_o}{1+\frac{n_o}{N}} \qquad \text{Where} \qquad n_o = \frac{(Z_{\partial/2})^2 X pq}{d^2}$$

Where n = sample size   *d= margin of error*

N = total number of students= $N_{JU}+N_{AmboU}+N_{WkU}$ N_{JU}= Total number of JU

N_{AmboU}=Total number of AmboU $\qquad\qquad\qquad$ N_{WkU}= Total number of WkU

p= proportion of population $\qquad\qquad\qquad\qquad$ *α= level of significance*

q = 1-p $\qquad\qquad$ *Where: d = 0.05,* $\qquad$ *p = 0.5,* $\qquad$ *α=0.05*

$$n_0 = \frac{1.96^2 * 0.5*0.5}{0.05^2} = 384$$

Considering the population correction factor into account the sample size should be:

$$n = \frac{N x n_0}{N+n_0} = \frac{1765 x 384}{1765+384} = \frac{677760}{2149} = 315$$

i. Jimma University

$$n_{JU} = \frac{N_{ju} x\, n}{N} = \frac{1385 x 315}{1765} = \frac{436275}{1765} = 247$$

- $Ju_2 = \frac{N_{jU2} x\, n}{N} = \frac{250 x 247}{1385} = \frac{61750}{1385} = 45$

- $Ju_3 = \frac{N_{jU3} x\, n}{N} = \frac{227 x 247}{1385} = \frac{56069}{1385} = 40$

- $Ju_4 = \frac{N_{jU4} x\, n}{N} = \frac{302 x 247}{1385} = \frac{74594}{1385} = 54$

- $Ju_5 = \frac{N_{jU5} x\, n}{N} = \frac{301 x 247}{1385} = \frac{74347}{1385} = 54$

- $Ju_6 = \frac{N_{jU6} x\, n}{N} = \frac{305 x 247}{1385} = \frac{75335}{1385} = 54$

ii. Ambo University

$$n_{AmboU} = \frac{N_{AmboU} x\, n}{N} = \frac{253 x 315}{1765} = \frac{79695}{1765} = 45$$

- $AmboU_2 = \frac{N_{AmboU2} x\, n}{N} = \frac{60 x 45}{253} = \frac{2700}{253} = 11$

- $AmboU_3 = \frac{N_{AmboU3} x\, n}{N} = \frac{53 x 45}{253} = \frac{2385}{253} = 9$

- $AmboU_4 = \frac{N_{AmboU4} x\, n}{N} = \frac{49 x 45}{253} = \frac{2205}{253} = 9$

- $AmboU_5 = \frac{N_{AmboU5} x\, n}{N} = \frac{46 x 45}{253} = \frac{2070}{253} = 8$

- $AmboU_6 = \frac{N_{AmboU6} x\, n}{N} = \frac{45 x 45}{253} = \frac{2025}{253} = 8$

iii. Wolkite University

$$n_{WkU} = \frac{N_{wkU} x\, n}{N} = \frac{127 x 315}{1765} = \frac{40,0005}{1765} = 23$$

- $WU_2 = \frac{N_{wkU1} x\, n}{N} = \frac{58 x 23}{127} = \frac{1914}{127} = 11$

- $WU_3 = \frac{N_{wkU1} x\, n}{N} = \frac{69 x 23}{127} = \frac{2277}{127} = 12$

Besides this, purposive sampling was used to select medicine students and library digital content mangers for interview which was used as source of triangulation in the current research.

3.6. Data sources

In this study the main data source was the primary data. The primary data was collected from the selected institutions medicine students of the three (3) selected Higher education institutions in Ethiopia through structured questionnaire and Jimma University students' digital resource usage and access behavior from server logs for Jimma University.

In line with this, data was collected through semi structured interview with 7 selected students and 3 library staffs who worked in the area of digital resource content preparation and system management. In addition to this, secondary data was used as per the need in the course of the study.

3.7 Study Variables

The following independent and dependent variables were identified for analysis of the data. Dependent variable is a variable that is affect or explain by another variable. An independent variable is a variable that causes change in another.

3.7.1 Dependent variable

The dependent variable in this study is digital resource access of students

3.7.2 Independent variable
❖ Students attitude
❖ Capabilities of tablet devices
❖ Factors that hinder resource access
❖ Infrastructure readiness

3.7. Method of data collection

In order to meet the objectives of the study, questionnaire and interviews was used as data collection instruments. Questionnaires were prepared and interviews were carried out with students, and library staffs in each selected institutions. Beside this, server log data was used from Jimma University to assess students online access behavior in terms of digital resources usage on their daily academic engagements.

Unfortunately it is only possible to get the proxy server usage data of tablet users from Jimma University since they applied squid based proxy in the campus which linked with the wireless controller throughout the campus that helps to link the data sources from proxy and Wireless controller (WLC) as per the requirement. The remaining 2 selected universities namely Ambo and Wolkite University students online access log data are not included due to inaccessibility of the tablet devices usage pattern since the existing ICT infrastructure was not able to store and retrieve the selected data as per the researcher requirements. As a result the researcher forced to use only Jimma University student's server log data to assess their usage pattern for resource access in line with the responses of the research participants. The researcher believed that using JU students' usage data for access pattern would have a positive contribution to see the actual reality with respects to medicine students' online access since those students has more than 88% of the total sample size

The questionnaires were distributed and collected by recruited data collectors at each University after giving training for the data collectors. An interview with the respective bodies was conducted by the researcher. Interview was conducted with purposively 3 library digital content mangers, 7 medicine students (3 from JU, 2 from WKU and 2 from AmboU) were selected for interview based on their willingness to participate during data collection period. Participants were reminded of their right to withdraw from the study or terminate the interview at any time before commencing the session. The interview question was prepared in English (Appendix B and C).

Generally quantitative and qualitative methods were both employed to guide the research. The methodology, along with the instruments used, the collection process, and the analysis of data were integral in answering the research questions. All research instruments, the survey, the server log data and the interview protocols, were appropriately validated and administered to a sample population that was reflective of the target population.

3.8. Methods of Data Analysis

Data was analyzed using both descriptive and inferential statistics, so as to draw meaningful inferences about the problem under investigation.

Quantitative data obtained from questionnaire was analyzed by using descriptive statistics such as descriptive (frequency, mean and percentage) and inferential statistics like linear regression analysis with the use of Statistical Package for the Social Sciences (SPSS) version 20. The qualitative data obtained from interviews was also used as source of triangulation in the course of the study.

3.9 Validity and Reliability of Scale Measures

3.9.1 Validity Analysis

The validity analysis of the measurement instrument was based on pilot study on 10 % respondents that can be representative of the sample population. The respondents of the pilot study were provided with the original questionnaire and have rated their extent of agreement/disagreement on the statements of the questionnaire. To do so, before administrating the questionnaire, the researcher was took 10% of the respondents, which has been taken in to account 31 of students from Jimma University. Furthermore, they have pointed out the shortages of the original data collection instrument by rendering critical suggestions, which are incorporated by revising the survey questionnaire. At the end of all aspects related to pilot test, the researcher went to Ambo University, and Wolkite University to distribute the remaining questionnaire for target sample population in addition to Jimma University.

3.9.2. Reliability Analysis

The reliability measurements were calculated on students' side questionnaire for the overall tablet devices impact on digital resources usage by applying internal consistency measurement (Cronbach Alpha). The total average interterm correlation/Cronbach alpha coefficient was computed to be (α= 0.778, 0.742, 0.891, and 0.917). The values of alpha is close to one (1) indicating a salient level of reliability and well beyond the cutoff point ($\alpha \geq 0.7$) (Leary, 2004).

3.10. Ethical Consideration

Ethical issues are, or should be, an important consideration in the design and conduct of research (Wilkinson, 2000). It does not involve people without their knowledge or consent. It keeps the privacy of each participant. The information gathered was used only for the purpose of conducting this research. All activities in this study were conducted in a legal way. It was conducted by taking and distributes the permission letter from Natural science college of Jimma University during the data collection period.

Chapter Four

4. Data analysis and Results

This study was designed to reveal the impact of tablet devices for digital resources usage of 3 selected universities medicine students toward tablet devices usage for academic improvements. The survey data was collected from April 25- May 7, 2018 G.C with the help of data collectors and data analysis was started by the researcher immediately. Data was first analyzed in descriptive manner for all groups. The responses for the likert scale data that was collected for this study were analyzed by using mean, standard deviation, frequency and percentage. 7 randomly selected days online access usage was exported in period of May 1 – May 31, 2018 G.C and used to strength the data obtained from the respondents as a triangulation mechanism in relation to medicine students resource access trend. Interview with 3 librarians who were responsible for digital resource management (librarian from AmboU was not included due to unavailability and one additional librarian from JU was included in the study to get more information), seven undergraduate medicine students as per the plan were made in order to understand the results of the qualitative data more in depth.

4.1. Data Analysis

4.1.1 Procedure for data analysis

Different procedures were carried out for analyzing the data's obtained in the course of the research. Table 4 below outlines the procedures for analyzing quantitative and qualitative data**.**

Table 4.1: Procedures for analyzing quantitative and qualitative data

Research questions	Data sources
What are the types of digital resource accessed and activities performed with tablet devices by medicine students?	Students common day to day activities using tablet usage (questionnaire) Number of times students spent for activities on their tablets (questionnaire) Proxy server log files for JU students (Server log data)
What is the role of availability of tablet devices in student's access behavior towards educational digital resources?	The role of availability of tablet devices in students access behavior (items on the base of the five Likert scale) Capability ,easiness and flexibility of tablets to assist students academic activities (Likert scale questionnaire) Interview questions from students
What is student's attitude towards the potentials of tablet devices in promoting digital resources access and use?	Attitudes of students towards the benefits of tablets in their education (Likert scale questionnaire) Interview questions for students
Do higher education institutions have an appropriate infrastructure and digital content preparation to help tablet users on digital resources access?	Interview from students and librarians Higher institutions readiness on infrastructure and digital content preparation (Likert scale questionnaire)
What are the barriers in efficient use of tablet devices to access digital resources in higher education institutions?	Factors that hinder the effectiveness of tablet usages in higher education (Liker scale questionnaire) Interview results from students

4.1.2. Survey data analysis

Survey data was obtained from questionnaire in hard copy format and then transferred and reformatted into SPSS version 20. In line with this, the data from server log is filtered and filled in excel which is then analyzed using SPSS as per the research need. Descriptive statistics were calculated for gender, age and year of study in order to summarize the accessible population and compare it with the target population in the study. During this analysis, no outliers were identified that could significantly affect the study.

4.2.1 Socio-Demographic Characteristics of the respondents

This section presents the results for the study by highlighting response rate , demographic analysis of the respondents of questionnaire, distribution of the respondents over three public universities, gender of the respondents, age group of the respondents, educational level of respondents, The data collected using questionnaires and the server log data's presented in frequency tables and percentages. Descriptive statistics on study variables were summarized in means and standard deviation. Deductive approach was applied to analyze qualitative data based on content analysis.

As per the sample size, the total numbers of respondents were a total of 315 from the 3 selected institution with a proportion of 247, 45 and 23 from Jimma (JU), Ambo (AmboU) and Wolkite (WKU) universities respectively.

After the questionnaire distributed and collected the response rate of the respondents was illustrated in table 4.2.

Table 4.2: The response rate of the respondents

Institution	Responded	Non responded	Total distributed	Response Rate
JU	218	29	247	88.25 %
AmboU	37	8	45	82.22 %
WKU	21	2	23	91.30 %
Total	**276**	**39**	**315**	**87.6**

As the table 4.2 depicted, the total number of respondents is **276** that is a response rate of 87.61 %. The level of response rate per institutions is 88.25 % from JU (218 responses from 247), 82.22 % from Ambo (37 responses from 47) and 91.30 % from Wolkite University (21 responses from 23). This can be considered a good response rate since on average 87.61 % response rate is obtained.

The overall demographic information about the selected sample respondents including age of respondents , sex of respondents and the number of years since receiving the tablet devices with from the 3 selected higher institutions was illustrated in the below table 4.3. and table 4.4.

Table 4.3: Demographic Characteristics of respondents from the selected 3 institution

Institution	Age of Respondents		Sex of Respondents	
	Age	**ƒ(%)**	**Sex**	**ƒ(%)**
	19	4(1.8)	Male	174(79.8)
	20	18(8.3)	Female	44(20.2)
	21	38(17.4)		
	22	62(28.4)		
JU	23	48(22.0)		
	24	30(13.8		
	25	10(4.6)		
	26	4(1.8)		
	27	4(1.8)		
	Total	**218(100)**		**218(100)**
	Age	**ƒ(%)**	**Sex**	**ƒ(%)**
	19	1(2.7)	Male	24(64.9)
	20	8(21.6)	Female	13(35.1)
	21	9(24.3)		
AmboU	23	4(10.8)		
	24	7(18.9)		
	25	7(18.9)		
	30	1(2.7)		
	Total	**37(100)**	**Total**	**37(100)**
	Age	**ƒ(%)**	**Sex**	**ƒ(%)**
	19	1(4.8)	Male	8(38.1)
WKU	20	9(42.9)	Female	13(61.9)
	21	11(52.4)		
	Total	**21(100)**	**Total**	**21(100)**

As table 4.3 illustrates the gender mix of the respondent's accounts 74.63 % of males and 25.36 % of females.

As per respondents from the 3 institutions', the gender response rate vary and it is 79.8 % of M

and 20.2 % of F from JU, 64.9 % M and 35.1 %F from Ambo and 38.1 % M and 61.9 % of F respondents were obtained.

As the table 4.4.The respondents also asked to fill their years of study in parallel with the number of years since receiving the tablets. Respondents were affiliated with a variety of batches on each institution.

Table 4.4: Year of study and the number of years since receiving the tablets

Institution	Year of Study			NO of years since receiving the tablet	
	Year of study	**ƒ(%)**			**ƒ(%)**
JU	Second Year	42(19.3)	1 Year		44(20.2)
	Third Year	36(16.5)	2 Years		130(59.6)
	Fourth Year	50(22.9)	3 Years		37(17.0
	Fifth Year	51(23.4)	4 Years		7(3.2)
	Six Year	39(17.9)			
	Total	**218(100)**	**Total**		218(100)
AmboU	**Year of study**	**ƒ(%)**			**ƒ(%)**
	Second Year	10(27)	2 Years		37(100)
	Third Year	7(18.9)	2 Years		
	Fourth Year	8(21.6)	2 Years		
	Fifth Year	7(18.9)	2 Years		
	Six Year	5(13.5)	2 Years		
	Total	**37(100)**	**Total**		**37(100)**
WKU	**Year of study**	**ƒ(%)**			**ƒ(%)**
	Second Year	9(42.9)	2 Years		21(100)
	Third Year	12(57.1)	2 Years		
	Total	**21(100)**	**Total**		**21(100)**

Respondents were from 2nd year to 6th years of medicine education with 1 year up to 4 years of experience with the tablet device. Among the 3 selected institutions Jimma and Ambo has students from 2nd to 6th of study where as Woklite University only has 2nd and 3rd year students only with donated tables at the time of data collection.

4.3. Types of digital resources accessed and activities performed with tablet devices

4.3.1. Analysis of Students Survey Data

The student's survey instrument can be found in Appendix A. After providing demographic information, respondents were asked to choose as many of the activities which are commonly performed in their day to day tablet device usage that represented their experiences with a tablet device. These questionnaires aimed to get responses from students about types of digital resource accessed and activities performed with tablet devices which can answer the first research questions. The table 4.5 below represents the number of respondents that choose each common activity and the total percentage of the sample that those respondents represent.

4.3.2. Common activities used in students day to day tablet device usage

To answer the first research question, frequencies were calculated for each common activity. A percentage was then be calculated by the dividing the number of respondents who checked each answer with the total number of respondents. These percentages indicate the amount of students in the population who are engaging in different educational activities using their tablet devices.

Table 4.5: Common activities used in students day to day tablet device usage

Which activities are commonly used in your day to day tablet device usage	ƒ (%)
Surfing the web / web access	155(56.2)
Reading offline digital materials	156(56.5)
Taking Note	103(37.3)
For entertainment activities like social networking	180(65.2)
Studying lecture notes	256(92.8)
Using Medical apps for course references	150(54.3)
Medication Formulary/ drug reference	89(32.2)
Clinical Score systems/medical calculator	39(14.1)
disease diagnosis/ management	111(40.2)
procedure documentation	59(21.4)
Calendar	80(29.0)
Password storage	31(11.2)

The results indicate that the majority of students (>90%) commonly used their tablets for studying lecture notes i.e. a total of 92.8 % (256). In line with this 65.2% (180) of students used their tablet devices for entertainment activities like social networking, 56.5 % for reading offline materials, 56.2 % for web access and 54.3 % using medical apps for course references as the first top common activities since they obtained more than half of the respondents.

However, it is clear that students are familiar with performing functional daily tasks that are easily accessible on tablet devices (i.e. accessing a calendar, medication formulary/ drug reference, clinical score systems/medical calculator and disease diagnosis/ management, procedure documentation) that may require a more experience in medical education which can be applied among senior students expertise and be more useful in using a tablet device as an educational tool in medication areas as well.

Beside this, the respondents also mentioned that they performed other types of activities in their day to day tablet usage including taking picture/camera, note preparation for presentation, to watch movies and to listen music and for reading religious books and documents were among the points they suggest as a response of open ended questions .

4.3.3. Time spent on different activities using tablet devices

In order to support the finding for the raised question in relation to types of common activities and types of resources accessed by medicine students were also asked to answer the number of times they spent on average for selected common activities in their day to day tablet usage. As a result the following result was obtained. The table 4.6 below illustrates their responses.

Table 4.6: Time spent on average for common activities

Times you spent on average for following activities using your tablet)	Daily 1-3 hours f (%)	Daily more than 3 hours f (%)	Rarely f (%)	Never f (%)	Occasionally f (%)
Surfing the web for social network access	53 (19.2)	13 (4.7)	80 (29.0)	51 (18.5)	76 (27.5)
Surfing the web for health related websites, journals, digital resources and health Apps	50 (18.1)	18 (6.5)	81 (29.3)	45 (16.3)	82 (29.7)
Watching online tutorials that includes videos, animations, pictures that relates to the academic	65 (23.6)	29 (10.5)	64 (23.2)	29 (10.5)	89 (32.2)
Studying offline course related digital resources	64 (23.2)	67 (24.3)	49 (17.8)	46 (16.7)	50 (18.1)
Accessing locally available medical resources in the university library repositories	42 (15.2)	54 (19.6)	51 (18.5)	86 (31.2)	43 (15.6)
For personal entertainment purpose (watching films, listening music, photo capturing)	103 (37.3)	28 (10.1)	80 (29.0)	6 (2.2)	59 (21.4)
Taking lecture notes and conducting assignment related works	53 (19.2)	89 (32.2)	43 (15.6)	24 (8.7)	67 (24.3)
For medication formulary /drug reference and procedure documentation	34 (12.3)	52 (18.8)	46 (16.7)	101 (36.6)	43 (15.6)
For clinical score systems, medical calculator and disease diagnosis/ management	32 (11.6)	26 (9.4)	41 (14.9)	114 (41.3)	63 (22.8)

Remark:

Rarely: indicates student's access for defined activity not more than 4-5 days a week.

Occasionally: indicates students' access for defined activity on some selected occasions only like weekends and non school days.

The descriptive statistics in Table 4.6 above showed that medical students used their tablets to surf the web for social network access on average as 29.0 % rarely, 27.5 % occasionally, 19.2 % daily 1 – 3 hours ,4.7 % used more than 3 hours daily and 18.5 % of the respondents indicated that they never used their tablet devices for web surfing.

29.3 % and 29.7 % of students used rarely and occasionally for Surfing the web for health related websites, journals, digital resources and health Apps where as 18.1 % of them used it daily 1 to 3 years. With respect of watching online tutorials that includes videos, animations, pictures that relates to the academic activities 32.2 %, 23.6% and 23.2 % of students used it as occasionally, daily 1 to 3 hours and rarely respectively on average . Even if students response shows that there is a good attempt to academic related tutorial sites, the daily usage in the range of 1 to 3 hours which account 23.6 % of the respondents were still needs improvements for students on the area of medicine since most of the courses need illustration and demonstration activities which can be more supported with selected tutorial sites.

The other common activity which is studying offline course related digital resources were used among students in proportion of 24.3 % more than 3 hours ,23.2 % daily 1 to 3 hours and 18.1% of their times occasionally. This shows that most of the students spent their average time daily for offline resources access in medical education. This can be considered as one of the benefits of such devices since they facilitate easy way of resource access at any time for better academic achievement.

For accessing locally available medical resources in the university library, the respondent's response revealed that most of the responses 31.2 % never used their tablet devices, and 18.5 % of students indicated that they used their tablet devices for locally available resources access rarely. On the other side 19.6% of students indicated that they used more than 3 hours in a daily manner. the survey result also indicate that 37.3 % of the students used daily 1 to 3 hours for personal entertainment purpose (watching films, listening music, photo capturing) and 32.3 % for taking lecture notes and conducting assignment related works using their tablet devices.

Beside this, proportional responses were obtained for remaining activities as medication formulary /drug reference and procedure documentation and clinical score systems, medical calculator and disease diagnosis/ management as part of their daily activities with tablet devices.

Even if the remaining activities have also proportional number of percent in student's daily activities, the top most mentioned activities are under online and offline types of access.

Activities namely taking and studying lecture notes, reading offline materials for academic study, procedure documentations, drug references and using medical Apps can be considered in most cases as offline activities where as entertainment activities like social networking Surfing the web for health related websites, journals, digital resources , watching online tutorials that includes videos, animations, pictures that relates to the academic and accessing locally available medical resources in the university library repositories can be considered as online activities. Whereas watching films, listening music's and the like might be both offline or online based on the student's usage.

4.3.4. Student's online resources usage analysis

Since it is not easy to see the student's offline usage pattern, the researcher tried to analyze the user's online usage pattern from the proxy server logs. Unfortunately it is only possible to get the proxy server usage data of tablet users from Jimma University as described in the data collection section with the justified reason. The remaining 2 universities have infrastructure limitations to generate and visualize their tablet device users log files as per the researcher interest.

Due to this the researcher was forced to use only Jimma University student's online access data to triangulate the students survey responses with the actual access behavior in the campus to get a better results about the impact of such devices for resource access and better academic achievement . The researcher believed that using JU students' usage data for access pattern would have a positive contribution to see the actual reality with respects to medicine students' online access since those students has more than 88% of the total sample size.

As a result some information's like physical address, Logical address and VLAN information were exported from the WLC on some randomly selected dates and their corresponding access lists which can help the researcher to analyze the student's online usage pattern were exported from Jimma University Squid proxy. After getting both Log data's, it was necessary to map the physical addresses with their access history using their correspondence information's using the proxy server to identify tablet users from other internet users who were accessing the system via different devices other than tablet devices like cell phones, desktops, laptops and other electronic

devices which has a capability of accessing the system. To clearly identify the target tablet device, their corresponding Media Access Control (MAC) address were taken in to account based on the device vendor 48 bit or 12 hexadecimal MAC representations by considering the 6 Hexadecimal representation which are vendor specific.

Hence, a total of 700 server log data from 100 separate users or students of 7 randomly selected days in the period of one month (May 1 –May 31) was exported from WLC and squid server within a period of a specified date for research inputs. The data was exported based on Media Access Control (MAC) address by taking in to account regular class days and weekends to see the student's usage during regular class hours and after class hours.

The researcher tried to categorize the log files in to 5 major categories after observing the types of resources accessed by students and to easily relate with most common activities that the students were selected as per the survey questions regards common activities they frequently performed within tablet devices. As a result students each online access attempt was feed in to one of the 5 categories manually by the researcher to triangulate the result with the survey responses from the students. The table 4.7 below shows categories to classify medicine student's server log data

Table 4. 7: Categories used to classify the server log data from Jimma University

Surfing the web for social media
Surfing the web for health related websites, journals, digital resources and health Apps
Watching online tutorials that includes videos, animations, illustrations pictures that relates to academic
Watching online videos, animations ,films and music's that relates to non academic
Accessing locally available medical resources from university library repositories
Un specified / un identified

Key *: Unspecified / unidentified represents access attempts of students which were difficult to categorize in to the common mentioned categories due to their content and /or but don't get proper responses due to address error , un available or page not found requests, access control list filters due to restricted access rule violation or system response errors through the proxy server.*

As per the plan, the researcher tried to collect data for randomly selected 7 different days starting from May 1-May 31, 2018 including 2 weekend days. The data collection days were (May 5,My 9,May 14,May 18, May 25,May 27 and May 31,2018).

The summarized usage data of students from JU proxy and WLC for a period of 7 days was illustrated below after summary in to the defined categories. The detail students per day access information for each category was summarized and attached in the Annex A and B.

The student's access time was grouped in to less than one hour, 1 to 3 hours and more than 3 hours to relate the finding to the survey data analysis. As per the information obtained from the server, students have made different attempts to server for different purposes which can be categorized under the mentioned categories. A total of 100 students data were selected and their 7 selected day's usage was analyzed to categorize in to the 5 divisions which are selected by the researcher by considering the most frequently selected activities as per students survey responses which was collected prior to server log data collection.

Since the server log data was obtained from JU, it was necessary to see the student's survey responses with obtained server results separately to understand student's actual access behaviors.

Table 4.8. JU students' survey and user access data from server as per the 5 categories.

Activity performed	Server Log result (7 day average result (JU students only)	Survey Result (JU students only)
Surfing the web for social media	Less than one hour (18.6%) 1 to 3 hour (27.6%) More than 3 hours (53.6%), Never (0.3%)- 2 users	(32.1 % rarely, 34.9% occasionally) Daily 1 – 3 hours (24.3%), More than 3 hours (5.0 %) Never (3.7%)
Surfing the web for health related academic	Less than one hour (66.6%) 1 to 3 hour (9.6 %) More than 3 hours (23.1%), Never (0.7%)	(28.0 % rarely, 33.9% occasionally) Daily 1 – 3 hours (22.9 %) More than 3 hours (8.30 %), Never (6.9%)
Watching online videos, tutorials relates to academic	Less than one hour (46.6%) 1 to 3 hour (9.1%) More than 3 hours (43.4 %), Not Accessed (0.9%)	(24.8 % rarely, 37.2% occasionally) Daily 1 – 3 hours (20.2%) More than 3 hours (10.1%), Never (7.8 %)

Watching online videos, tutorials relates to non academic.	Less than one hour (27.4%) 1 to 3 hour (49.4%) More than 3 hours (22.1 %), Not Accessed (01.0%)	(24.8% rarely, 37.2% occasionally) Daily 1 – 3 hours (17.0 %) More than 3 hours (10.1%), Never (7.8 %)
Locally available resource	Less than one hour (9.7%) 1 to 3 hour (3.3%) More than 3 hours (3.9%), Not Accessed (83.3%)	(29.0 % rarely, 21.4% occasionally) Daily 1 – 3 hours (37.3 %) More than 3 hours (10.1%), Never (2.2 %)

.3.2.1. Students web access for social media

As per the result a total of 18.6% users were attempted to surf the web for social media for less than 1 hour period , 27.6% users access 1-3 hours per day and majority of the students surf the web for social media takes more than 3 hours per day on average accounts 53.6%. From the selected users 0.3 % (2 users) was not using the web for social media access.

This can indicate that more than half of the students have social Medias access behavior that last longer more than 3 hours a day and not less than one hour surfing habit for not less than 2/3 of the total students as per the analysis. This indicates that students are using more time than they indicate as per the survey result (32.1 % rarely, 34.9% occasionally).

Their social media access average result also indicates that in most selected days there is nearly equivalent trend of accessing the web for social Medias irrespective of the days. Based on the log data's collected students access behavior don't show a significant change during weekends also where there is an assumption that there will be more social media users other than the working days. The other point which needs to take in to account is that all most all except 3 students were using their tablet for social media access at least once in a day for the 7 randomly selected days regularly; this shows that there is a strong habit of using or checking their social media accounts daily as per their need.

4.3.4.2. Students web access for health related websites, journals and digital resources

As per the log data obtained, most of the users that is 66.6% accessed the server for health related websites, journals and digital resources on average for less than 1 hour period. The remaining 23.1% and 9.6% of user's accessed such web resource sites for more than 3 hours and 1 to 3 hours respectively. From the results it is possible to state that most students don't take more time on health related resources for more than an hour in regular basis. This result can show that majority o the students still have a behavior of accessing health related webs resources in their online surfing history. By taking the 95% confidence minimum of 63.3% of users and a maximum of 70.1% were spent less than one hour for accessing health relate resources on the web surfing category.

4.3.4.3. Student's online tutorial access that relate to academic activities

The student's online tutorial access is more situated on the range of less than one hour and more than 3 hours daily as per their log data. Nearly equivalent results were obtained with respects to student's access behavior towards online tutorial academic related access. As per the analysis 46.6% and 43.4% requests lasts less than one hour and more than 3 hours per day respectively. By taking 95% of confidence interval the level of students access ranges from minimum of 43.0 to 50.4% for students access less than one hour and from minimum of 39.5 to maximum of 47.7 for students access more than 3 hours. This might be due to fact that most online tutorials have different interval as per the contents. Beside this the nature of video buffering and streaming also needs to take in to account during such online tutorial access behavior analysis. This result is encouraging in a field like medicine where most courses needed visualization and illustrations.

4.3.4.4. Students results for watching online videos, films, music that related to non academic

As per users log results, the majority of students access such sites for 1 to 3 hours daily which accounts 49.4% log on average which is different from resources access for online tutorial that relates to academic. The remaining students take less than 1 hour as 27.4% and more than 3 hours 22.1% for non academic online video tutorial resources access. One percent users don't access non academic related sites in defined date. This indicates that there is more tendency of being online for video based activities which have implication in respect to time and bandwidth which needs proper monitoring and supervision with concerned bodies.

4.3.4.5. Students results with respect to accessing locally available medical resources universities repositories

Locally available resources are aimed to serve their local users in relation to information resources need. Those resources will be prepared and make accessible in the institutions for their users. According to the data obtained, most students don't access locally available resources via their repository. Based on 7 selected day's access behavior results of medicine students who are using tablet devices, 83.3% of them don't access which are available locally via different resource servers like digital library and institutional repositories. But even if it is small some students tried to access those resources which are locally available in different time span. Hence 3.3% accessed daily 1 to 3 hours and 3.9% and 9.7% of them accessed resources locally available more than 3 hours and less than 3 hours daily. Even if the percentage is small, the students log data can indicate that some students are using the resources which are available in the institution.

On the other hand, there are also attempts which were categorized as unspecified due to one of the reasons like unauthorized and proxy bypass attempts, address error, unavailable or page not found requests, access control list filters due to restricted access rule violation or system response errors. Based on the result 47.0% of them uses for less than 1hour, where as 39.6% and 12.6% accessed the system for daily 1 to 3 hours and more than 3 hours daily. This result can show that there is an attempt of making some illegal and unauthorized proxy by pass attempts in student's access behavior in line with allowed accessed in and out of the institutions. Beside this, there are also different student attempts to web resources where the page is not responsive, with wrong web address and some web requests can't be easily classify based on the defined categories as per the researcher.

Generally JU students online access data results from server can be summarized with the figure 4.1 below.

Server Log result

	Less than 1Hr	1-3 hr per day	more than 3 hr per day	Not accessed
■ Social Media	18.57	27.57	53.57	0.286
⊞ Health related website	66.57	9.571	23.14	0.714
⊞ watching videos, film related to acadamic	46.57	9.143	43.43	0.857
⊞ Watching Videos, film to non acadamic	27.43	49.43	22.14	1
➤ Locally available resources	3.266	9.571	3.857	83.29
■ Unspecified	47	39.57	12.57	0.857
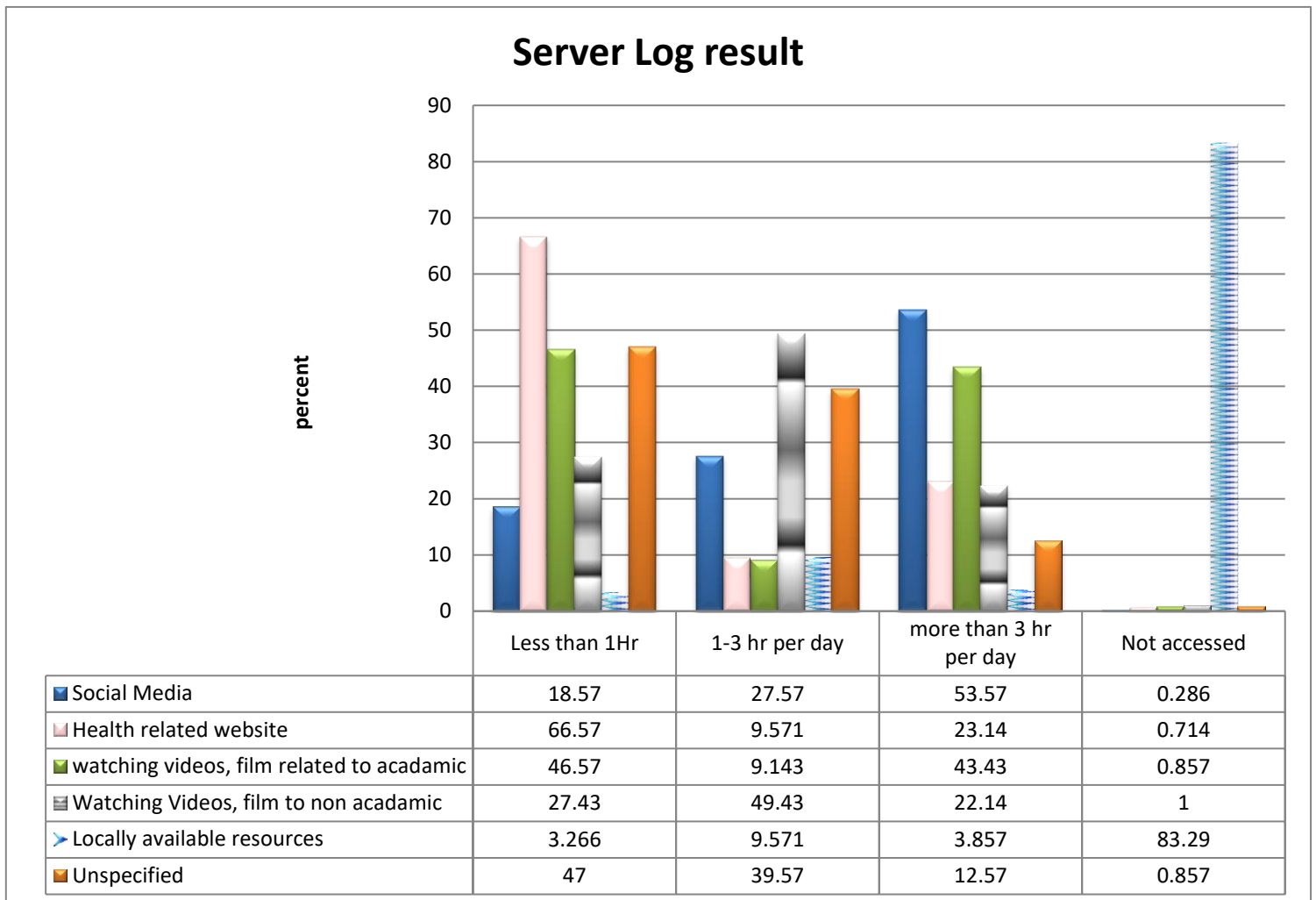
Figure 4.1: Student's server usage summery

As indicated in figure 4.1. Student's online usage has different attempts on different activities on the defined categories. The total usage of the students revealed that most health related web access was performed in less than 1 hour average usage time. Watching videos relates to academic also takes the next big percentage (46.57%) on average less than 1 hour. Student's access behavior also shows an attempt of being online for 1 to 3 hours on activities like watching videos for non academic purpose and social media access. The other issues was students shows more than 3 hours daily online resources use for social media as 53.37% and 43.33% of them uses videos that relates to academic activities. This indicates that students social media usage needs to be reconsider by themselves and the concerned body since they are on the discipline that

needs a long hour of academic engagements. On the other hand students' engagement on watching academic based videos was encouraging in fields like medicine in reasons mentioned earlier.

During students online resource usage attempts locally resources takes the smallest share since 83.29% were not making attempts to access locally prepared resource repertories like IR, university digital libraries and university library website. The result also showed that there is an attempt of making some illegal and unauthorized proxy by pass attempts in one side and lack of proper search skill and literacy on the other side which were putted under unspecified in the analysis.

4.4. Role of availability of tablet devices in students access behavior towards education resources

4.4.1. Students responses on the role of availability of tablet devices in students access behavior towards education resources

The second research question which aimed to evaluate the role of availability of tablet devices in student's access behavior towards education resources were obtained using likert scale based questionnaire from students.

The responses for the likert scale data that was collected in the current study were analyzed by using mean (M) and standard deviation (SD). According to Kenate and Gojeh et al., (2013) taking a decision on the respondents ranking of the variables, the mean of responses were guided by the scale 1.0-1.49 Strongly Disagree, 1.5-2.49 Disagree, 2.5-3.49 Neutral, 3.5-4.49 Agree and 4.5-4.99 Strongly Agree.

Table 4.9 Illustrates the responses the students give as per the questions distributed to assess the role of availability of tablet devices in students access behavior towards educational digital resources.

Table 4.9: Role of availability of tablet devices in student's access behavior towards education resources

	Mean	Std	Decision
It helps to access health related digital resources easily	4.13	.856	A
It helps for reading books and digital documents using office applications, e-readers, micro blogging, and readers of RSS subscriptions.	3.90	.959	A
It increases a chance of getting different forms of information at any time	4.09	.860	A
Enables students to access locally prepared educational related resources in the campus	4.00	.917	A
Helps to reach diverse course content on internet via tablets	3.99	.983	A
Engage students in exploring real world issues and solving reliable problems using digital tools and resources	3.56	.950	A
Researching and High-level thinking skills (analytical, critical) of students have improved	3.63	.828	A
Media literacy capabilities of students have improved.	3.75	.703	A
Participation of students to extracurricular activities has increased.	3.62	.859	A

Key: **SA= Strongly Agree, A=agree, NT= Neutral, D= Disagree, SD=Strongly Disagree**

Numbers of questions were posed to the respondents on the role of availability of tablet devices in student's access behavior towards education digital resource access. The results presented in Table 4.9 show that the all of respondents were agreed about role of availability of tablet devices in student's access behavior towards education digital resource access with mean range value 3.56-4.13. This result also indicates that students were agreed with all points mentioned like its role to access digital resources available (M= 4.13 and SD=0.856), for reading books and documents using office applications (M=3.90 and SD=0.959), to get different form of information (M=4.09 and SD=0.860), to enable locally available resources access (M=4.00,SD=0.917), Helps to reach diverse course content on internet via tablets (3.99 .983), to engage students in exploring real world issues (M=3.56 and 0.950), to increase researching and high-level thinking skill (M=3.63 and SD=0 .828),to increase media literacy capabilities of students (M=3.75 and SD=0.703), to help participation of students to extracurricular activities (M=3.62 and SD=0.859) respectively.

Based on the results of mean values for all questions are on the range of 3.56- 4.13 which indicate high and positive value of devices role with respect to access behavior towards educational digital resources.

4.4.1.1. Linear Regression on role of availability of tablet devices and educational digital resource access

In general in order to analyze significance of the role of availability of tablet devices in relation to educational digital access, the researcher performed linear regression results on role of tablet devices availability for digital resource access.

Table 4.10: Role of availability of tablet devices and educational digital resource access

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.840[a]	.706	.699	.469

a. Predictors: (Constant): students extracurricular activities has increased, getting different forms of information at any time, Researching skills has improved , Enables access to locally prepared resources , Reading books and digital documents using office applications, Media literacy capabilities improved , Engage in exploring real world issues, Helps to reach diverse course content

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	142.045	6	23.674	107.465	.000[b]
	Residual	59.260	269	.220		
	Total	201.304	275			

a. Dependent Variable: Digital resource Access

b. Predictors: (Constant), students extracurricular activities has increased, getting different forms of information at any time , Researching skills has improved, Enables access to locally prepared resources , Reading books and digital documents using office applications, Media literacy capabilities improved , Engage in exploring real world issues, Helps to reach diverse course content

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.351	.190		1.851	.065
	Reading books and digital documents using office applications	-.026	.039	-.029	-.659	.510

Getting different forms of information at any time	.497	.044	.500	11.287	.000
Enables access to locally prepared resources	-.026	.035	-.028	-.741	.459
Helps to reach diverse course content	.364	.040	.419	9.058	.000
Engage in exploring real world issues, Helps to reach diverse course content	.026	.039	.029	.672	.502
Researching skills has improved	.111	.038	.107	2.938	.004
Media literacy capabilities improved	-.049	.026	-.146	-1.849	.066
Students extracurricular activities has increased	-.003	.019	-.013	-.179	.858
a. Dependent Variable: Digital resources access					

Source: Research Data

Role of availability of devices explains 70.6% (R Square = 0.706) of the variation in students digital resources access. The regression model was significant at (F= 107.465, p=0.000). Since the calculated p-value was less than 0.05, it was conclude that role of availability of tablet devices has statistically significant effect towards students' digital resource access. This can be interpreted to mean as the tablet devices availability does contribute for medicine students digital resource access.

The results presented in Table 4.10 indicate that a positive relationship between role of availability of tablet devices and digital resource access. Since the p-value was less than 0.05, it was concluded that role of availability of tablet devices has a statistically significant effect on digital resource access. As per the model coefficients results, the ability of getting different forms of information at any time and improvement of research skills have p value less than 0.05 which is .000 and .036 respectively with beta value positive. Hence it indicates they contribute to digital resources access positively. The remaining items registered negative beta value and p value of greater than 0.05 which indicates, had no statistically significant effect at digital resources access.

In the mean time, students are asked to fill questionnaire about their responses about capability, easiness and flexibility of tablets to assist student's academic oriented activities towards their academic engagements. As a result their responses were summarized in table 4.11 below.

Table 4. 11: Capability, easiness and flexibility of tablet to assist student's academic activities

	Mean	Std	Decision
Enable me to accomplish tasks more quickly	4.17	.749	A
Slow down my performance and effectiveness in class.	1.92	.888	DA
Helps me to get standard education to improve my domain knowledge through resources access	3.86	.803	A
Learning to operate the tablet is easy for me	3.97	.831	A
I find the tablet to be capable and flexible to interact with	3.98	.827	A
I have the knowledge necessary to use tablets for better academic achievement	3.93	.989	A

The result as presented in Table 4.11 shows that most of the respondents agreed on capability, easiness and flexibility positively. The results presented in that the most of respondents were agreed that capability, easiness and flexibility of tablet devices on questions relates to its ability to "enable me to accomplish tasks more quickly", "helps me to get standard education to improve my domain knowledge through resources access", "Learning to operate the tablet is easy for me", "I find the tablet to be capable and flexible to interact with and I have the knowledge necessary to use tablets for better academic achievement" with mean value 4.17, 3.86,3.97, 3.98, and 3.93 respectively. Correspondingly at mean value 1.92 the respondents were disagree on the statement " Slow down my performance and effectiveness in class" are disagree with standard deviation of 0.888.

In addition to this, as per open ended questions raised to students about tablet devices help asked to justify their reason to say so and the following issues were forwarded from students. Among students who agrees about its help for better academic achievements mentioned different points including its benefits in relation to easy access for resource, its economic benefits for those students have low level of income, its help for any time and any where educational use, its role for sharing of resources among students and teachers and as a way of personal entertainment after study or research were mentioned.

On the other side, even if there percent is small students who stated their disagreement also mentioned points that leads for their disagreements as lack of proper platform and readiness from the stakeholders to design better resource platform, the effect of the tablet devices for some students education performance decrement due to improper use and the tendency of students wasting most of their time in non academic activities were mentioned.

4.5. Attitude towards the potentials of tablet devices in promoting digital resource access and use

In order to understand the attitudes of students, the research tried to get responses from respondents using student's questionnaire and students interviews to understand their attitude in the potentials of tablet devices on academic environments through digital resources access facilitation. The aim was to understand the level of student's attitude towards the potentials of tablet devices in promoting digital resources access and use on academic environments. Summaries of the respondents response is presented in table 4.12 below for student's survey:

Table 4.12: Attitude of students towards the benefits of tablets in their education

	Mean	Std	Decision
I have confidence that I can complete my medical courses using tablet based learning platform in a better way.	4.12	.940	A
I am interested in the information and resources that I obtained using tablet based learning platform	4.29	.779	A
The tablet based learning platform helps me to access digital resources easily and to gain and learn knowledge easily	4.30	.883	A
This tablet aided instructional approach in medical course helps me understand the field in a better ways than the older fashion.	4.09	.968	A
I would like to spend more time learning on tablet for my education to access resources	3.97	.815	A
Using tablets take too much time from my normal duties like academic study.	2.75	1.221	N
My academic performance has improved after receiving the tablet device	3.74	.968	A
It leads me to information overload scenarios that I can't easily select what to read and referee for academic inputs	2.63	1.145	N
Decrease my chances of getting a good grade	1.90	.980	D
I have a positive attitude about the benefits of the tablet devices in the academic institutions	4.15	.808	A

As per the students the student's response it is clear that most of the students have positive attitude towards the potentials of tablet devices in relation to their education in one way or another. Based on the items distributed to measure their attitudes 7 of the items were stated to measure their positive attitude where as 3 items were putted to measure their negative attitudes. As a result among the items which measures their positive attitude towards the tablets devices use in medical education like "I have confidence to complete medicine courses using tablet based learning", "I am interested in the information and resources that I obtained using tablet based learning platform", "The tablet based learning platform helps me to access digital resources easily and to gain and learn knowledge easily", "This tablet aided instructional approach in medical course helps me understand the field in a better ways than the older fashion"," I would like to spend more time learning on tablet for my education to access resources", "My academic performance has improved after receiving the tablet device" and "I have a positive attitude about the benefits of the tablet devices in the academic institutions" obtained agreement with the mean and standard deviation value of (M=4.12 and SD=0.940; M=4.29 and SD=0.779 ; M= 4.30 and SD=0.883 ,M= 4.09 and SD=0. 968; M= 3.97 and SD= 0. 815; M= 3.74 and SD=0.940 and M= 4.15 and SD=0.808) respectively.

Furthermore respondents were for questions like "Using tablets take too much time from my normal duties like academic study and 'It leads me to information overload scenarios that I can't easily select what to read and referee for academic inputs" neutral with the mean value 2.75, 2.63 and standard deviation 1.221, 1.145 respectively. This result showed that students were uncertain about the negative issues that might come from improper use of devices in academic environments. On the other side, respondents shows disagreement for question "Decrease my chances of getting a good grade" with the mean value 1.90 and standard deviation .980 respectively. This response shows that students have positive attitude towards tablets potentials and they believed that tablet devices have no significant effect in decreasing chance of getting good results in their education engagement.

4.5.1. Linear Regression for student's attitude and Digital resources access

Table 4.13: student's attitude (Independent) and Digital resources access (Dependent)

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.549[a]	.301	.277	.823

a. Predictors: (Constant), attitude about the benefits of the tablet devices ,take more time from normal duties, information and resources obtained ,Decrease chances of getting a good grade, Easy access of digital resources, leads to information overload scenarios ,Helps to understand the field in a better ways, Confidence to complete medicine courses using tablet.

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	77.581	9	8.620	12.731	.000[b]
	Residual	180.111	266	.677		
	Total	257.692	275			

a. Dependent Variable: Digital resources access

Predictors: (Constant), attitude about the benefits of the tablet devices ,take more time from normal duties, information and resources obtained ,Decrease chances of getting a good grade, Easy access of digital resources, leads to information overload scenarios ,Helps to understand the field in a better ways, Confidence to complete medical courses using tablet.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.198	.127		9.426	.000
	Confidence to complete medical courses using tablet.	-.008	.090	-.008	-.092	.927
	information and resources obtained	.108	.104	.087	1.039	.300
	Easy access of digital resources,	.096	.073	.088	1.313	.190
	Helps to understand the field in a better ways	.109	.069	.109	1.578	.116
	spend more time learning on tablet to access resources	.400	.079	.337	5.096	.000
	Take too much time from my normal duties.	.019	.047	.024	.396	.692
	leads to information overload scenarios	.001	.053	.001	.011	.991
	Decrease chances of getting a good grade	.044	.059	.044	.738	.461
	Attitude about the benefits of the tablet devices	.173	.067	.145	2.606	.010

a. Dependent Variable: Digital resources access

Source: Research Data

Students attitude on the role of tablets devices explains 30.1% (R Square = 0.301) of the variation in students Digital resources access. The regression model was significant at (F= 12.731, p=0.000). Since the calculated p-value was less than 0.05, it was conclude that role of students' attitude has statistically significant effect towards students' move to digital resources access. This can be interpreted to mean as students perception about the tablets devices can contribute for medicine students digital resources access. Since the p-value was less than 0.05, it was concluded that students attitude on tablet devices role has a statistically significant effect on their digital resources access. As per the model coefficients results, the tendency to spend more time learning on tablet to access resources and attitude about the benefits of the tablet devices have p value less than 0.05 which is .000 and .010 respectively with beta value positive which indicates their contributions to digital resources access positively. The remaining items except "confidence to complete the medical course using tablets" has registered positive beta value and p value of greater than 0.05 which indicates, had statistically non significant positive relationship for students digital resources access.

4.6 Factors that hinder the effectiveness of tablet devices usage in higher education

The other objective of this research was to identify barriers in using tablet devices to access digital resources in higher education institutions. As a result students were targeted to identify factors that inhibit the effectives of tablet device usage in higher education for better digital resources access. The student's survey descriptive result was summarized in the table below 4.14.

Table 4.14: Factors that hinder the effectiveness of tablet devices usage in higher education

Factors that hinder the effectiveness of tablet devices usage in higher education	Mean	Std	Decision
Lack of digital resources that are designed for your esteemed field of discipline	3.05	.978	A
Shortage of awareness about what resources are available for academic inputs	3.01	1.109	A
Improper and inconsistence network infrastructure in the institutions for seamless digital resource access	3.44	1.041	A
University policies that fail to support use of such tablet devices	2.93	1.121	A
The role of technology aid learning like tablet use in subject development	3.15	.876	A
Lack of previous experiences on such technology usages in previous grades including preparatory schools	3.29	1.077	A

As per student's survey response about points relates to factors that hinder the effectiveness of tablet devices usage in higher education as "Lack of digital resources that are designed for your esteemed field of discipline"   with (M=3.05 and SD= 0.978), "Shortage of awareness about what resources are available for academic inputs" (M=3.01 and SD=1.109), "Improper and inconsistence network infrastructure in the institutions for seamless digital resource access" with (M=3.44 and SD= 1.041)," The role of technology aid learning" with (M=3.15 and SD= 0.876) and "Lack of previous experiences on such technology usages in previous grades including preparatory schools" with (M=3.29 and SD= 1.077) agreed positively. This result showed that there are different factors which inhibit the effectiveness of tablets devices use for students digital resource access in medical education in our higher institutions. On the other side students response showed that they were not certain about absence of university policy that support use of such tablets devices for academic achievements with mean value of 2.93 which can be an indication that institutions needs to do with awareness creations activities among students about

the government policy supports to use tablets devices in educational environments so as to improve students digital resource access.

4.6.1. Linear Regression analysis for factors that hinder resource access and digital resource access

Table 4.15: Table 4.15: factors that inhibit resource access (Independent) and digital resource access (Dependent)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.265[a]	.070	.050	.228

a. Predictors: (Constant), Lack of previous experiences on such technology usages in previous grades including preparatory schools, Lack of digital, Shortage of awareness, University policies, Improper and inconsistence network infrastructure

ANOVA[a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	1.062	6	.177	3.397	.003[b]
	Residual	14.011	269	.052		
	Total	15.072	275			

a. Dependent Variable: Digital resource access

b. Predictors: (Constant), Lack of properly prepared digital resources, Improper and inconsistence network infrastructure, Lack of previous experiences, Lack of digital, Shortage of awareness, University policies, Improper and inconsistence network infrastructure

Level of significant difference at p<0.05

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Lack of properly prepared digital resources	.008	.017	.035	.500	.617
Shortage of awareness	.045	.014	.215	3.148	.002
Improper and inconsistence network Infrastructure	.199	.057	.242	3.502	.001
University policies that fail to support use tablet devices	.008	.014	.039	.581	.562
Shortage of awareness	.012	.017	.145	.343	.003
Lack of previous experiences	-.010	.014	-.044	-.693	.489
Dependent Variable: Digital resource access	**Source:** Research Data				

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Factors that inhibit resources access explains 7% (R Square = 0.070) of the variation in students digital resource access. The regression model was significant at ($F= 3.397$, $p=0.003$). Since the calculated p-value was less than 0.05, it was conclude that factors that inhibit digital resources access has statistically significant effect towards students' move to digital resources access. Even if R Square value is minimum, this can be interpreted as factors mentioned as inhibitors of resource access have effect on medicine student's digital resource access. Since the p-value was less than 0.05, it was concluded that factors or barriers that inhibit seamless resource access has a statistically significant effect on their digital resources access. As per the model coefficients results, shortage of awareness about what resources are available, improper and inconsistence network infrastructure and students resource access have p value less than 0.05 which is .002, .010 and 0.003 respectively with beta value positive which indicates their contributions to digital resources access s positively. The remaining items except "lack of previous experience" has registered positive beta value and p value of greater than 0.05 which indicates, had statistically non significant positive relationship for students digital resource access. This indicates that there is a need of interventions to make the non significant points to make significant in terms of students digital resource access since those points were agreed as barriers based on the students survey mean values.

4.7. Higher institutions readiness on infrastructure and digital content preparation

As a result in the current study an attempt was made to see the level of our selected higher institutions readiness towards infrastructures and digital content preparation as per the objectives proposed. The result obtained from students questionnaire and library content providers through interview. The table below presented the descriptive results of the student's survey.

Table 4.16: Student's response in relation to infrastructure readiness and digital content preparation

Infrastructure readiness and digital content preparation	Mean	Std	Decision
There is regular supervisor about tablets devices use and effectiveness in the institutions	2.04	1.133	D
Frequent digital resources update in the institutions repository	2.96	1.106	N
There is Proper and consistence network infrastructure in the institutions for seamless digital resource access using tablets	2.29	1.114	D
The digital resources available can be accessed with tablets without display problems	2.94	1.084	N
There is regular technical support in relation to tablets maintenance and battery replacement in the campus	2.07	1.161	D
There is a way of promotion to dissemination digital resources which are available for each discipline	2.82	.977	N

Numbers of questions were posed to the respondents on the Infrastructure readiness and digital content preparation to help tablet users for better digital resources access.

The results presented in table 4.16 show that respondents were disagree on higher institutions readiness towards regular supervision about tablets devices use (M=2.04 and SD=1.133), Proper and consistence network infrastructure (M=2.29 and SD=1.114), "Digital resources accessibility with tablets without display problems and regular technical support in relation to tablets maintenance and battery replacement (M=2.07 and SD=1.161).

Correspondingly students were neutral for questions that relates institutions readiness towards "Frequent digital resources update in the IR" and "Away of promotion to dissemination digital resources which are available for each discipline" with mean values of 2.96, 2.94 and 2.82 respectively.

4.7.1. Linear Regression for infrastructure readiness and digital content preparation and Digital resources access

Table 4.17: Infrastructure readiness and digital content preparation (independent) and Digital resources access (Dependant)

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.365[a]	.134	.114	.911

a. Predictors: (Constant), promotion to dissemination digital resources , regular supervisor about tablets devices use, regular technical support, digital resources can be accessed without display problems., Frequent digital resources update in the IR, Proper and consistence network infrastructure

ANOVA[a]					
Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	34.405	6	5.734	6.908	.000[b]
Residual	223.287	269	.830		
Total	257.692	275			

a. Dependent Variable: Digital resources access

b. Predictors: (Constant), promotion to dissemination digital resources , regular supervisor about tablets devices use, regular technical support, digital resources can be accessed without display problems., Frequent digital resources update in the IR, Proper and consistence network infrastructure

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	3.816	.231		16.543	.000
Regular supervisor about tablets devices use	-.133	.051	-.152	-2.611	.010
Frequent digital resources update in the IR	-.125	.058	-.143	-2.164	.031
Proper and consistence network infrastructure	.193	.066	.222	2.904	.004
digital resources can be accessed without display problems	.179	.060	.201	3.002	.003
regular technical support	-.167	.051	-.217	-3.273	.001
promotion to dissemination digital resources	-.010	.069	-.010	-.144	.886

a. Dependent Variable: Digital resources access   **Source:** Research Data

Higher institutions infrastructure and digital content readiness explains 13.4 % (R Square = 0.134) of the variation in students digital resources access. The regression model was significant at (F= 6.908, p=0.000). Since the calculated p-value was less than 0.05, it was conclude that higher institutions infrastructure and content preparation readiness has statistically significant effect towards students' move to academic achievements. This can be interpreted to mean as higher institutions infrastructure and content preparation readiness can contribute for medicine students educational digital resources access.

As per the model coefficients results, Proper and consistence network infrastructure and digital resources can be accessed without display problem have p value less than 0.05 which is .004 and .003 respectively with beta value positive which indicates those points in higher institutions contributions to academic achievements positively. The remaining items except "promotion to dissemination digital resources" has registered negative beta value with p value of less than 0.05 for points as regular supervisor about tablets devices use, frequent digital resources update in the IR and regular technical support which indicates there is statistically significant but negative relationship for students digital resources. This shows that higher institutions should takes in to account those points to use them for better results in relation to tablets devices aid learning environments.

4. 8. Qualitative Results

As described in the methodology section of this research, interview was made with purposively selected students and librarians who were responsible for digital content management.

Interview narration and Analysis

A semi-structured interview was employed. Appendix B and C contain interview protocols for Librarians and students. The researcher interviewed 3 Librarians and seven undergraduate students. All digital resource managers' interviews were conducted in their office and students' interview was carried out on open learning classes.

Interviewees were then asked to give their permission for the interview to be recorded. All participants agreed. The average length of the interview was 14.75 minutes. Recordings were obtained through the use of the researcher's Smartphone. Audio files were automatically created at the end of each recording and the researcher transcribed each interview using Word.

Interviews were recorded and transcribed immediately following the interview. The data was then used to supplement the quantitative data obtained and answer each research question more deeply. The results provide a thorough understanding of the current educational use of tablet devices with respect of their digital resources access on academic environments.

The respondent's code was illustrated on tablet below

Table 4.18: Interview student's code

Students respondent	Respondent	Remark
JU	No 10, 91 and 162	All respondents were selected as per their willingness to have an interview in the course of questionnaire data collection and contacted as per their positive agreements.
WKU	No 3 and 18	
Ambo U	No 1 and 28	

4.8.1. Students interview analysis

Respondent students were selected based on their willingness that the researcher asked during survey data collection.

This is done to add more depth and breadth to the quantitative data and provided detailed information about use, attitudes, and perceptions of faculty and students regards to the impact of tablet devices usage in relation to student's digital resources access. Seven student's interviews were conducted with three males and four females that represented a variety of different year of study. Almost all of interview students believed about the help of the device in terms of academic achievements by stressing its benefits for getting digital resources, browsing websites, access to softcopy lecture notes and standard text book from the internet and different websites.

Respondent No 10 from JU says "*It makes the students to share the latest information via the internet with the recent findings. It enables us to gain much useful information about the current up to date research. It also improves the skills of student*".

Students also mentioned that also helps the students to be familiar with recent information's that is related to their topic or lesson and they also download what they interested for course assistance as per their opinion. The other respondent from WKU putted his idea on this regards as "*it helps the students to get all what they most at the same place and at same time. It reduces the burden of hardcopies (books) to use because they can easily get from the tablet and home internet access on different medical websites*" Respondent 18.

In line with this, students strongly suggest that this is novel potion for them regards to update and current resources at any time and environment. Beside this, those students who accept the helps of tablet devices for their resource access put forwarded suggestions that need improvement for future as part of such investment initiatives.

Most of them seriously mentioned a maintenance problem needs to be solved for devices by cooperating both preventive and corrective types, usage training and detail orientation should be given for students before students obtain it to use the device efficiently and properly. Even if it was not shared with all interviewed students, some of them agreed that there is a tendency of using their tablets for social networking more time than other academic activities per days but the claim that this is true for some students and it is more common on non exam periods. Students also stressed tablet devices role in relation to minimizing resource limitations in libraries where students were obliged to use by queue in earlier times.

One student from JU explains this as **"*Before students were given these tablets, there were resource limitations especially "standard medical textbook", so that the students are obliged to use by queue. But know every text books, these universities and other universities lecture notes, many Ethiopia, WHO, CDC guidelines are available in PDF, so that the students can access, compare and use these materials easily. It also highly decreased the goes between students who came from poor and rich family background. Students can also look easily for updates***".**

4.8.2. Library digital content managers interview analysis

The researcher also carried out interviews with 3 library digital resource managers from the selected three universities.

All most all participants have positive attitudes with respect of the devices use in improving information literacy and resource access. They mentioned that it will have a big impact medical resources access and to improve their digital citizenship via different social networking and forums they enrolled.

 Interviewers also mention that its needs to be cautious about its implantations of cautious with medicine student's way (approach) of handling table devices.

The library resource providers also share this idea and they believe that is enhancing student's tendency to referee materials easily without problems.

On the other side, library content managers stressed that students also raised its portability as one of contributing factor students learning with tablet devices. On the same regard, also agreed about its portability benefits for learning and teaching regards to minimizing the handout cost as a contributing factor to its usage among students.

Beside this, librarians also explain points that inhibit students learning with tablet devices. Interviewed librarians mention that students are becoming social media dependants and they were wasting their time on watching non academic movies and music's. But all librarians agreed that lack of supervision and orientation is the cause for such limitations.

Content mangers also have reservations on the level of infrastructure and digital resources access in their institutions. Most of the respondent from Jimma University claims that there is good internet and ICT infrastructure but they claim about the availability of digital resources for separate field of disciplines.

As per library resource managers, there are different digital resources available on their respective institutions but they agreed that there is lack of regular updates and absence of state of the art journals since it's not possible to subscribe journal articles due to cost.

But they also explain that there are different resources including different journals subscriptions for some selected field of disciplines which are available based on their institutions. Librarians explain that most of students don't have a habit of browsing repositories regularly.

They also agree that there is absence of digital resources separately designed for medicine students and tablet users in the institutions. This is true in all 3selceted institutions. Even they were aware of availability of tablet device imitative in the institutions; they argue that there is no any formal or informal link established to design and prepare resources for such tablet aided teaching and learning approach separately. The other point explained by the content mangers was lack of evaluation on the resources available in the institutions from the user perspectives.

Generally students and content providers suggest that there needs to be a strong linkage and coordination's among all stakeholders for such initiatives success in the institutions. This idea was stressed by the content providers and they believed that faculty members should have a direct communications with them for resource preparations and availability of resources which are in the hands of medicine school staffs and other institutions repositories that interlinked with the program executions.

4.9. Discussion of the findings

Nowadays, mobile aided learning services are interesting and very recent addition as a new vital platform for the higher education environment. This study explored the impact of mobile devices namely tablet devices in digital resources access for better academic achievements and the higher education environment. As a result this section presented the discussion of the research.

4.9.1. Types of digital resource accessed and activities performed with tablet devices by students

The study found that medicine students were performing activities using their tablet devices as studying lecture notes, for purpose of entertainment activities like social networking, to read offline materials, for web access and to use medical apps for course references as the first top common activities since they obtained more than half of the respondents. From this it is clear that students would use their tablet devices for both academic and non academic activities in the institutions. As per the findings of Shahrzad and Diane (2013) who investigated how medical students in USA perceived mobile latest equipment as a component of their learning experience, the three main uses of a mobile device by students were recreation, Communication, and Education. Their findings also reported that more than half of the students have used their devices for education, primarily to download education course materials and listening to podcasts and/or recorded lectures.

This indicates that except some order change most of common activities which were practices among students in higher insinuations remain the same even if they are in different educational environments. As per their findings (Shahrzad and Diane, 2013) students also mentioned that over 75% of student respondents would use their mobile devices as a study device for reviewing instructional materials. In this regard our higher institutions registered a more percentage in relation to using tablet devices as a study device i.e 92.8%.

Similar study conducted by Percival and Claydon (2015) which aimed at determining user perceptions and usability tablets in the classrooms of a Canadian university by both students and faculty revealed that, common activities in particular includes social media 'apps', email communications, and general web browsing, were the primary focus of tablet usage.

On the other hand, Nasiru etal.,(2014) conducted a pilot study of medical students in the clinical years to assess their current utilization of mobile phones, and results showed that majority was for routine functions such as receiving or making calls, sending or receiving SMS and e-mails, as schedule/calendar/planner and as dictionary. Less frequent usage was to access and take lecture notes, access medical videos, electronic textbook and for medical research.

As per Percival and Claydon (2015) , the activities where students spent the most time engaging with their tablet device was for general web browsing (average 5.9 hours), social media (average 5.1 hours), listening to music (average 5.6 hours), and watching videos (average 5.3 hours). Completing coursework (notes in particular) and access the learning management system (Blackboard) were also listed as high usage activities at an average of 5.17 hours and 4.4 hours respectively. Based on the current research survey responses activities like taking lecture notes and conducting assignment related works (32.2%), studying offline course related digital resources (24.3%), accessing locally available medical resources (13.7%), for personal entertainment purpose (watching films, listening music, photo capturing) 10.1% and surfing the web for social network access were listed as major activities that lasts more than 3 hours per day. But the student's online resource usage trend shows there are more non academic oriented activities which might affect the students daily activity on educational institutions. The students online resources access behavior also showed there is a need of awareness creation and ways of monitoring to help students for better academic results.

4.9.2. Role of availability of tablet devices in student's access behavior towards education resources

The study revealed that most students were positive response in relation role availability of tablet devices to enhance education digital resource access and academic and extra curricula activities, in relation to its ability for researching and high-level thinking skills and media literacy capabilities of medicine students. As per the open ended and interview questions responses most of the students mentioned that the tablet devices have economical benefits in minimizing time and money wastages for hardcopy academic resources in line with other roles it gives.

This was also proved based on the qualitative analysis results the mean values for all questions are on the range of 3.56- 4.13 which indicate high and positive value of devices role with respect to access behavior towards educational digital resources.

Ebiye (2015) and Seid (2017) also conducted a research on impact of Smartphone's/ Tablets on the Information Seeking Behavior of students in Nigeria and Ethiopia, and they reach on the same results which shows that smart phones/tablets has made tremendous impact on their medical education most especially with easy and fast internet access, high speed browsing, saves time and money going to cyber café/college library, easy access to medical teaching and e-learning materials/e-textbooks. Nasiru etal.,(2014) conducted a research on medical students in the clinical years to assess their current utilization of mobile phones also explains the greatest advantages mobile phones were mobility of the device, ease of use, access to current information and ease of access to resources.

Those research results also match in many ways to the current study at hand in relation to its role on academic environments through different wings. This can be an indicator for its investment return in terms of aiding medical students towards accessing resources that in turn make students competitive and skillful in the field.

The finding of the current research also proves that tablet devices have a capability to support students and it is easy to work with for students. But we need to consider the results from online usage and resource access where users were spending more time on activities which don't have direct link with academic activities and such issues also needs to be considered while considering the role of tablet devices as positive.

4.9.3. Students attitude towards the potentials of tablet devices in promoting digital resource access and use

As per the result obtained students have positive attitude towards the potentials of tablet devices in promoting digital resources use and access. This can be confirmed with mean the result which reveals that there is high level of agreement on the positive attitude towards their benefits (mean range is 3.74- 4.30).The regression analysis results also show that the overall significance between attitude of students and academic achievement is positive in higher institutions context. Davies et al (2012) study results showed that the PDA was an important addition to the learning ecology rather than a replacement and contextual factors impacted on use of mobile technologies both positively and negatively on medical students learning outcomes. This idea is shared with the current research also since most of the students' attitude justifies the tablets usage in non clinical activities in most cases. They also mentioned that negative responses from teachers and patients were discovered as some of the issues that limit student's tablets use during their clinical

practices. In line with this as per the current study the clinical usage of tablets is not focused in detail, hence a future involving mobile platforms involvements should be taken in to account as a study direction.

4.9.4. Factors that hinder the effectiveness of tablet devices usage in higher education

Most countries in the world including our countries are investing towards integrating device based learning and teaching system in their higher learning institutions. In order to make such approach and investment successful it needs to be aligned with infrastructure and resource preparation (Misra *etal.*, 2013).

The current research findings showed that improper and inconsistence network infrastructure in the institutions for seamless digital resource access takes the lion share as the major factor that might inhibit the tablet usages. Shortage of awareness about what resources are available for academic inputs and lack of digital resources that are designed for your esteemed field of discipline were also the other facts that the students more or less agree.

And it is possible to understand that there needs to focus on resource preparations for their field of study to minimize their shortage of resources and awareness problem with respect to the resources.

As per Ebiye (2015) and Seid (2017) findings lack of technical experts on repairs when faulty within campus, operational difficulties, high cost of data subscription from service providers and fragility were identified as the major problems they encountered in using smart phones/tablets.

In relation to the current research the cost of data subscription from service providers were not among the factors since students use their institutions internet infrastructure as source of internet usage. Based on a pilot study which was conducted by Nasiru his collogues also justify that battery life, screen size, limited memory and cost of devices were the major barriers to mobile learning (Nasiru etal.,2014). In this regard, our student's interview also mentioned problem of battery life as one of their challenges that inhibit their long hour usage especially out of dormitory.

4.9.5. Higher institutions readiness on infrastructure and digital content preparation

In order to make mobile aided learning approach and investment successful it needs to be aligned with infrastructure and resource preparation. As a result in the current study an attempt was made to see the level of our selected higher institutions readiness towards infrastructures and digital content preparation on the perspective of students through survey, and library content providers through interview.

The results identified lack regular supervision, of absence of technical support when faulty of devices occur within campus, unsatisfactory and non frequent update in the institutional repositories for resources as possible barriers that faced higher learning institutions infrastructure and content preparation in tablet devices use for medical resources**.**

Seid(2017) findings also identified lack of technical support when faulty within campus, operational difficulties and poor power supply as possible issues which bedeviling the use of smart devices for medical information seeking by students in the target medicine students in 2017. Even after a year, the readiness is still not enough and students have complains in this aspect.

The findings of Percival and Claydon (2015) also have similarity in this aspect. On their study they tried to determine instructor's perception about the level of institutions infrastructure readiness for support and reveals that Instructors also found that there was limited support in the Teaching and Learning Center (TLC) on the use of tablets in education in the Canadian universities. Also as per Ebiye (2015) findings there is need for medical university management to collaborate with IT companies to develop smart phones/tablets capable of supporting their seeking of medical and health information to minimize the infrastructure and content preparations limitations. This is shared also in the current research since strong collaboration is needed to maximize the benefits obtained from tablets devices in terms of digital resources access in their academic environments.

4.10. Proposed framework for efficient use of tablet devices for academic achievements

The design and implementation principles relating to the learning results needs to be consider how the mobile device affects learning, new assessment methods and evaluate the implementation.

Beside this, important questions related to the learning results and outcomes including how does the mobile device influence learning? And how can such influence are evaluated? Needs to be taken in to account.

The research indicated that, tablet aided learning in medicine education learning can motivate learners and assist their effort towards. Thus, the integration of mobile devices can result in a positive emotional climate. Students may think that higher institutions and learning are more present-day. Thus, learning is influenced by the total environment. Overall, evaluation after the implementation is important.

The findings in this study also provide insights into and information about the practices associated students resources access, their attitudes towards the potentials of tablet devices with mobile learning, the factors that hinder the facilitation of tablet based education and the higher institutions readiness in terms of infrastructure and the extent of tablet devices distribution investment and its return in terms of education quality and students educational resources access were analyzed.

All of previously proposed mobile learning frameworks and models emphasize different characteristics. However, aspects such as learner, device, context, infrastructure, content, social interactions, usability and previous experiences are shared.

Overall, previous attempts revealed that (Ozdamli 2012;Wei and So,2012; Bensassi and Laroussi, 2014) has indicated that well-planned and structured mobile learning activity, where issues relating the latest equipment, contents, context and usability are presented along with the objectives of the course, can be highly motivating and attractive for learners.

But mobile learning has an ascending trend and research in the field of mobile learning has been conducted all over the world, multiple mobile learning frameworks are available.

Hence the current research attempted to propose a working framework for tablet based learning educational environments as per the research findings.
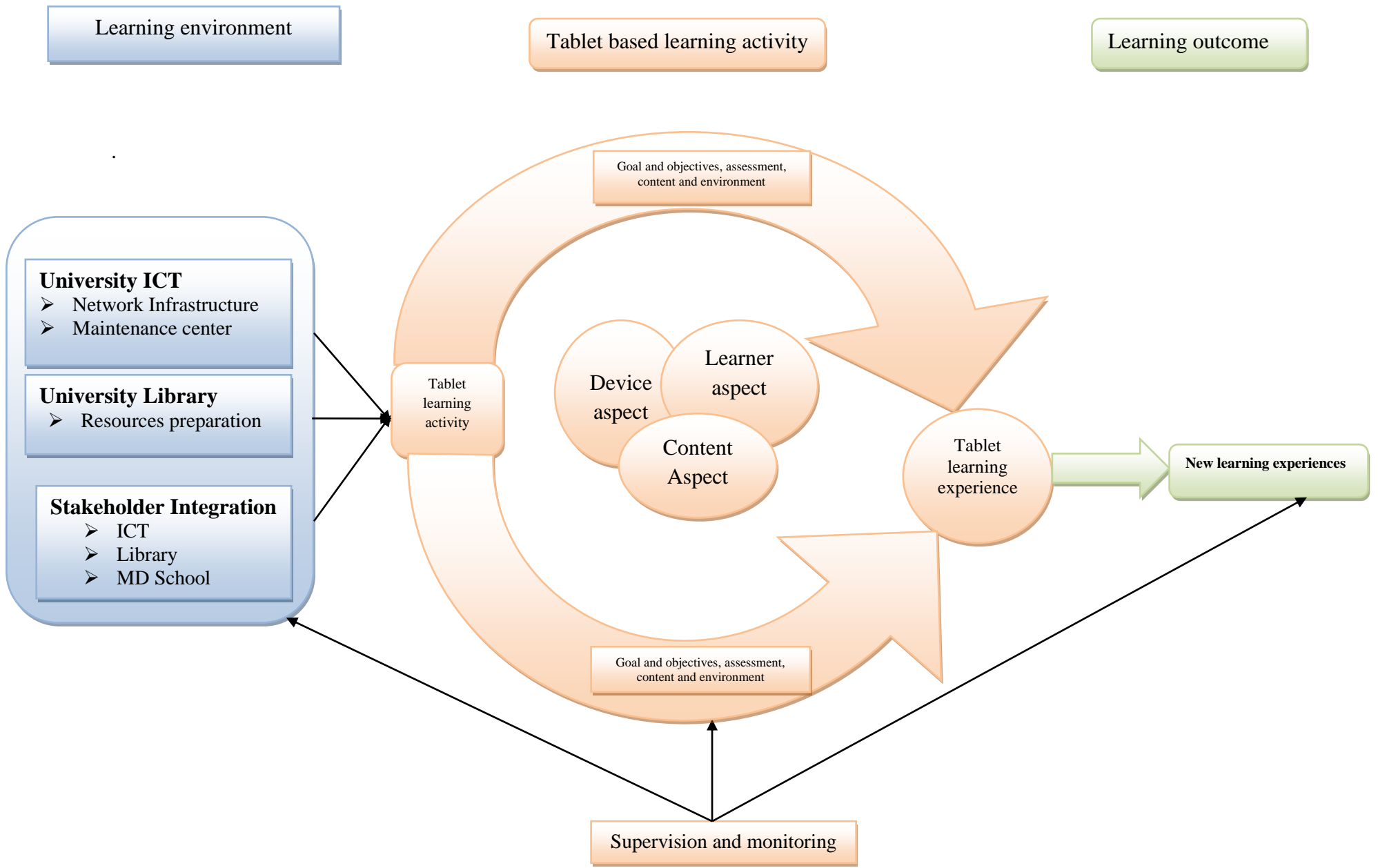
Figure 4. 2: Proposed tablet based learning framework to improve the use of tablets for digital resources access

Key:

Learning Environment- this indicates the higher institution overall environments in terms of being suitable for such tablet based learning and teaching initiatives. It comprises inputs or initial preparations before implementing tablet based learning in higher educations.

- **University ICT** – refers to the section of higher institution responsible for management of network infrastructure and providing maintenance support.
- **University Library**: - refers to section of higher institutions responsible for resource preparation and updates.
- **Stakeholder integration**: refers to all concerned bodies on such tablet based learning initiatives including schools /colleges, ICT and Library and the investors or donors

Tablet based learning activities: this includes all process that takes place during the implementations of tablet aided learning in higher education's by taking in to account content, device and learner aspects.

- **Content Aspect**: - relates digital resources that have to be delivered to learners to improve their domain knowledge.
- **Device Aspect**: relates to tablet devices capabilities and functionalities for digital resources access
- **Learner Aspect**:- relates to the attitude of the user in terms of device benefits and users actual use of resources.

Learning outcomes: relates to the intended aim designed on the provision of such tablet devices on educational environments in terms of learning academic improvements and experiences obtained.

- **New learning experiences**: relates to skills obtained using such devices exposure like literacy and digital citizenship skills which would have a contribution for students digital resources access and better quality of education in our education institutions.

Hence, the aim of tablet aid learning implementations should be to offer new opportunities for learning that extend learning beyond the traditional teacher-led approach. It is important to remember that the mobile devices themselves do not guarantee mobile learning or meaningful learning experiences. Much depends on stakeholder's involvement and competency practices and mobile learning activity design (Ozdamli, 2012).

As a result, the proposed tablet based learning framework assumed to be significant in providing abasement for tablet devices aided initiatives that will takes place in education environments including higher learning institutions by incorporating the concerned stakeholder's as needed. The proposed framework derived as per the current research which investigates the impact of tablet devices on digital resources access among medicine students.

CHAPTER FIVE

5. Conclusions and Recommendations

5.1. Conclusion

Nowadays, mobile aided learning services are interesting and very recent addition as a new vital platform for the higher education environment. Moreover, it provided the knowledge base about the current state of students' access behavior, the attitude towards tablets use and usage, the level of infrastructure readiness and content preparation and barriers that inhibit the fruitful implementations of device aided learning were examined in relation of digital resource access and academic achievement.

There is a growing tendency of using tablets by students for accessing relevant medical resources that would led students for better digital resources access and that these devices has made incredible impact on students activities for their daily academic engagements. But students online access behavior shows there is a need of continues follow-up and support since non academic activities were taking much time from their normal academic based duties in the course of medicine education knowingly or unknowingly.

Tablet devices have also enormous role for medicine students in relation to digital resource usage in academic environments for students since those devices have a capability and easiness to use and to work with. In addition, its economical benefits in minimizing time and money wastages for hardcopy academic resources contribute for their accepting tablets role among students of Ethiopian higher institutions.

On the other side, different factors were inhibiting seamless way of digital resource access in higher educational institutions for effective use of digital resources among medicine students. This indicates that there is a gap in terms of collaboration among digital resource managers, staffs and ICT experts and this need to be focus direction for future. It also is arguably agreed that limitations that observed in students tablet uses in terms of higher education's medicine students tablet devices use can be minimized with strong supervision and orientation. Generally while tablet devices can enhance educational effects through digital resource access, the actual impact of tablet aided learning programs needs to be enhanced by longer intervention durations and closer integration of technology and further assessment of higher-level skills is needed.

Therefore, there is a need to follow a systematic and all inclusive approach with all concerned bodies before implementing the mobile technology initiative for future in any context especially in resource poor settings where such interventions could have a significant impact and contribute to strengthening the target benefits. As a result the following recommendations are forwarded as recommendations for practice and recommendations' for future research based on the findings and conclusion made.

5.2. Recommendations for practice:

- University technical services department should train manpower that can meet the repair needs of users in other to ameliorate the time and resources wastage to put faulty devices t work other than replacing a new one when problems occur.

- Medical college officials should collaborate with ICT, Library content managers and concerned departments to work towards improving the existing environment to encourage students about their continuous use of tablets to support their digital resources access and use for better academic results through resource sharing and exchange of updates of information's.

- Digital resources updates to the institutions library website and learning management systems including digital libraries and institutional repositories that allow them to be viewed in a mobile format.

5.3. Recommendation for future research

- This current research attempt to analyze the impact o tablet devices to digital resources usage for academic achievements in selected higher institutions mobile aided learning environment. Since the current study was limiting to investigate undergraduate students at 3 selected universities, future research could also be done to include graduate students and compare the usage and attitude of undergraduate and graduate students on mobile devices use in medicine education.

- It was necessary to investigate the attitudes and perceptions of large sample to add to the current research, since the current research showed a limited devices usage in clinical aspect, it would also be beneficial to analyze the students and faculty for clinical use in the course of patient diagnosis and treatment by considering faculty and patient perceptions in a border manner.

- The current research attempt tried to analyze student's online resources usage by taking in to account their resource access types and average time usage. Since this research only limited to get the Jimma University students tablet users to see students access behaviors in higher education, it is recommended to analyze their access behavior in a more data and by taking a long time span, using data mining and big data techniques about their usage to determine and predict their access trend by incorporating more server source data from different institutions.

- Mobile devices including tablets, PDA and smart phones were getting wide spread and popularity in people's day to day activities including on their academic life. With increasing use of those devices by students, it is logical to expect the next step to incorporate these devices in all level of learning environment. As a result it is also recommended to see the impact of such mobile devices use and befits for students academic environment in all level of education starting from elementary to higher education in a wide manner.

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Appendices
Jimma University
College of Natural Sciences
Department of Information Sciences

Research Questioner

Dear Respondents, this research is being conducted as part of partial fulfillment of the requirement for degree of Master of Science in Information Science. This questionnaire is prepared to collect data on "Examining the Impact of Tablet Devices in Digital Resources Usage among medicine students in Public Higher Education Institutions". It is part of a study being conducted in order to come up with appropriate recommendation for effective tablet uses in digital resource access for enhancing student's academic performance. Please note that, the study is conducted for academic purpose only and the result of this study is expected to help the students, ICT experts, librarians, researchers and other government officials to suggest and make use of technology driven teaching and learning process in a better way. All information you provide will be kept confidential.

Thank you for devoting your precious time to fill out the questionnaire!

Appendix A:

Part 1: Demographic information's of students

1. Sex _____

2. Age _____

3. Year of study _____

4. Number of years since receiving the tablet computer _____

Part 2:

1. **Which activities are common in your day to day tablet device usage? (Please remark all that apply)**

    ☐ Surfing the web / web access

    ☐ Reading offline digital materials

    ☐ Taking notes

    ☐ For entertainment activities like social networking

    ☐ Studying lecture notes

    ☐ Using medical apps for course reference

    ☐ medication formulary /drug reference

    ☐ clinical score systems/medical calculator

    ☐ disease diagnosis/ management

    ☐ procedure documentation

    ☐ calendar

    ☐ password storage

    ☐ Other, please specify

    _____

    _____

Remark:

Rarely: indicates student's access for defined activity not more than 4-5 days a week.

Occasionally: indicates students' access for defined activity on some selected occasions only like weekends and non school days.

2	Please remark the number of times you spent on average for the following activities using your tablets (Use √ sign to indicate your answers)	Daily 1-3 hours	daily more than3 hours	Rarely	never	occasionally
	Surfing the web for social network access					
	Surfing the web for health related websites, journals, digital resources and Health Apps					
	Watching online tutorials that includes videos, animations, pictures that relates to the academic					
	Offline course related digital resources access					
	Accessing locally available medical resources in the university library repositories					
	For personal entertainment purpose (Watching films, listening music's, photo capturing …)					
	Taking lecture notes and conducting assignment related works					
	For medication formulary /drug reference and procedure documentation					
	For clinical score systems, medical calculator and disease diagnosis/ management					

Instruction: from Question 4-8 please provide your opinion as per the degree of the liker scale. Tick (√) your choice

1. **Strongly Disagree**   2.Disagree   3.Neutral   4. Agree 5. Strongly agree

4	Questions that relates to attitude of students towards the benefits of tablets in their education	1	2	3	4	5
	I have confidence that I can complete my medical courses using tablet based learning platform in a better way.					
	I am interested in the information and resources that I obtained using tablet based learning platform					
	The tablet based learning platform helps me to access digital resources easily and to gain and learn knowledge easily					
	This tablet aided instructional approach in medical course helps me understand the field in a better ways than the older fashion.					
	I would like to spend more time learning on tablet for my education to access resources					
	Using tablets take too much time from my normal duties.					
	My academic performance has improved after receiving the tablet device					
	It leads me to information overload scenarios that I can't easily select what to read and referee for academic inputs					
	Decrease my chances of getting a good grade					
	I have a positive attitude about the benefits of the tablet devices in the academic institutions					

Other, please mention it _____

_____

_____

5	Questions that relates to capability ,easiness and flexibility of tablets to assist student's academic activities through digital resource access	1	2	3	4	5
	Enable me to accomplish tasks more quickly					
	Slow down my performance and effectiveness in class.					
	Helps me to get the current state of the art education to improve my domain knowledge through resources access					
	Learning to operate the tablet is easy for me					
	I find the tablet to be flexible to interact with					
	I have the knowledge necessary to use tablets for better academic achievement					
6	Questions that relates the role of availability of those devices in student's access behavior towards educational digital resources	1	2	3	4	5
	It helps to access health related digital resources easily					
	It helps for reading books and digital documents using office applications, e-readers, micro blogging, and readers of RSS subscriptions.					
	It increases a chance of getting different forms of information at any time					
	Enables students to access locally prepared educational related resources in the campus					
	Helps to reach diverse course content on internet via tablets					
	Engage students in exploring real world issues and solving authentic problems using digital tools and resources					
	Researching and High-level thinking skills (analytical, critical) of students have improved					
	Media literacy capabilities of students have improved.					
	Participation of students to extracurricular activities has increased.					

Other, please mention it

_____

_____

7	Questions that relates about factors that hinder the effectiveness of tablet usage in higher educations	1	2	3	4	5
	Lack of digital resources that are designed for your esteemed field of discipline					
	Shortage of awareness about what resources are available for academic inputs					
	Improper and inconsistence network infrastructure in the institutions for seamless digital resource access					
	University policies that fail to support use of such tablet devices					
	The role of technology aid learning like tablet use in subject development					
	Lack of previous experiences on such technology usages in previous grades including preparatory schools					

Other, please mention it _____

8	Questions that relates higher institutions readiness on infrastructure and digital content preparation to help tablet users for better digital resource access	1	2	3	4	5
	There is regular supervisor about tablets devices use and effectiveness in the institutions					
	Frequent digital resources update in the institutions repository					
	There is Proper and consistence network infrastructure in the institutions for seamless digital resource access using tablets					
	The digital resources available can be accessed with tablets without display problems					
	There is regular technical support in relation to tablets maintenance and battery replacement in the campus					
	There is a way of promotion to dissemination digital resources which are available for each discipline					

10. Do you think the free tablet donation helps students to improve your digital resources access in the institutions? YES____   NO____

Why? (Please state your reasons)_____

Thanks for your time!

Appendix B: Library digital content Mangers Interview Questions

Demographic information of library staffs who participate on the Interview

Age _____ Sex _____

Role in the library _____

Year of experience in the assigned work _____

1. Have you give any literacy based trainings or workshops to medicine students so that they can use the resources on their tablets easily?

2. How do you evaluate the students awareness about the available digital resources for their respective discipline?

3. Do you make any advertisement and awareness creation sessions to disseminate the information's regards to the available resources for medicine students and staffs?

4. Have you ever plan to prepare separate and up to date resources for medicine students that can be easily accessible using their tablet devices?

5. Is there any mechanism that you use to evaluate their access behavior with respects to digital resources access in the campus?

6. How do you evaluate the availability of such tablet devices for students with respect to their digital resource access?

7. How do you evaluate the infrastructure and academic based digital contents preparation status in your institutions?

8. Anything else that we have not asked or considered and you would like to suggest?

<div align="right">Thank you!</div>

Appendix C: Students Interview Questions

Demographic information of students who participate on the focus group discussion

Age   _____

Sex   _____

Year of study (Batch) _____

1. What are the pros and cons of having tablets in medical education?

2. What is the benefits that you got from the tablets to improve your academic achievement?

3. In what ways, if any, learning with tablet in the classroom increased your ability to conduct health related information search and practice digital literacy and presence (i.e., Internet safety, legal ethical behavior)?

4. How can the process of tablet aided educational implementation be improved in the future?

5. How did the tablet impact your learning or understanding of topics related to health sciences particularly medicine?

6. Did the use of tablet make a difference in your learning of the subject matters in medical educations?

7. Is there anything you want to tell us about using tablet in the medical education?

Thanks for your time!

Annex A: **Students online resources access summery from server log data**

day accessed * surfing the web for social media					
		surfing the web for social media				**Total**
		Less than One Hours	Daily 1-3 Hours	daily more than 3 hours	Not accessed	
day accessed	Day 1	34	32	32	2	100
	Day 2	16	27	57	0	100
	Day 3	19	24	57	0	100
	Day 4	19	25	56	0	100
	Day 5	15	33	52	0	100
	Day 6	12	28	60	0	100
	Day 7	15	24	61	0	100
Total		130	193	375	2	700
day accessed * watching online tutorial that includes videos, animation that related to the academic						
		watching online tutorial that includes videos, animation that related to the academic				**Total**
		Less than One Hours	Daily 1-3 Hours	daily more than 3 hours	Not accessed	
day accessed	Day 1	61	17	20	2	100
	Day 2	44	5	50	1	100
	Day 3	48	4	47	1	100
	Day 4	48	3	48	1	100
	Day 5	49	6	45	0	100
	Day 6	31	23	45	1	100
	Day 7	45	6	49	0	100
Total		326	64	304	6	700

day accessed * surfing the web for health related web site, journals, and digital resources					
		surfing the web for health related web site, journals, and digital resources			**Total**
		Less than One Hours	Daily 1-3 Hours	daily more than 3 hours	Not accessed	
day accessed	Day 1	70	20	8	2	100
	Day 2	63	12	25	0	100
	Day 3	73	3	23	1	100
	Day 4	66	10	23	1	100
	Day 5	67	7	26	0	100
	Day 6	69	1	29	1	100
	Day 7	58	14	28	0	100
Total		466	67	162	5	700

day accessed * watching online videos, films, music that related to non academic					
		watching online videos, films, music that related to non academic			Total
		Less than One Hours	Daily 1-3 Hours	daily more than 3 hours	Not accessed	
day accessed	Day 1	51	33	12	4	100
	Day 2	21	54	25	0	100
	Day 3	25	49	25	1	100
	Day 4	26	49	24	1	100
	Day 5	23	54	23	0	100
	Day 6	22	56	21	1	100
	Day 7	24	51	25	0	100
Total		192	346	155	7	700

day accessed * accessing locally available medical resources from universities repositories					
		accessing locally available medical resources universities repositories			Total
		Less than One Hours	Daily 1-3 Hours	daily more than 3 hours	Not accessed	
day accessed	Day 1	14	7	2	77	100
	Day 2	0	5	2	93	100
	Day 3	8	0	4	88	100
	Day 4	12	1	4	83	100
	Day 5	19	0	3	78	100
	Day 6	14	4	5	77	100
	Day 7	0	6	7	87	100
Total		24	67	27	582	700

day accessed * unspecified					
		Unspecified			Total
		Less than One Hours	Daily 1-3 Hours	daily more than 3 hours	Not accessed	
day accessed	Day 1	48	41	9	2	100
	Day 2	47	41	12	0	100
	Day 3	45	35	19	1	100
	Day 4	55	38	6	1	100
	Day 5	44	46	9	1	100
	Day 6	39	41	19	1	100
	Day 7	51	35	14	0	100
Total		329	277	88	6	700

Annex B:

surfing the web for social media								
		ƒ(%)	Valid Percent	Cumulative Percent	Bootstrap for Percent[a]			
					Bias	Std. Error	95% Confidence Interval	
							Lower	Upper
Valid	Less than One Hour	130(18.6)	18.6	18.6	.0	1.4	**15.7**	**21.4**
	Daily 1-3 Hours	193(27.6)	27.6	46.1	.0	1.7	**24.4**	**31.4**
	daily more than 3 hours	375(53.6)	53.6	99.7	.0	1.8	**50.0**	**57.1**
	Not accessed	2(.3)	.3	100.0	.0	.2	.0	.7
	Total	700(100)	100.0		.0	.0	100.0	100.0

a. Unless otherwise noted, bootstrap results are based on 700 bootstrap samples

surfing the web for health related web site, journals, and digital resources								
		ƒ(%)	Valid Percent	Cumulative Percent	Bootstrap for Percent[a]			
					Bias	Std. Error	95% Confidence Interval	
							Lower	Upper
Valid	Less than One Hour	466(66.6)	66.6	66.6	.0	1.8	63.3	70.1
	Daily 1-3 Hours	67(9.6)	9.6	76.1	.0	1.1	7.4	11.9
	daily more than 3 hours	162(23.1)	23.1	99.3	.0	1.6	20.1	26.4
	Not accessed	5(.7)	.7	100.0	.0	.3	.1	1.4
	Total	700(100)	100.0		.0	.0	100.0	100.0

a. Unless otherwise noted, bootstrap results are based on 700 bootstrap samples

watching online tutorial that includes videos, animation that related to the academic								
		ƒ(%)	Valid Percent	Cumulative Percent	Bootstrap for Percent[a]			
					Bias	Std. Error	95% Confidence Interval	
							Lower	Upper
Valid	Less than One Hours	326(46.6)	46.6	46.6	.0	1.9	43.0	50.4
	Daily 1-3 Hours	64(9.1)	9.1	55.7	.1	1.2	7.0	11.6
	daily more than 3 hours	304(43.4)	43.4	99.1	.0	1.9	39.5	46.7
	Not accessed	6(.9)	.9	100.0	.0	.4	.3	1.6
	Total	700(100)	100.0		.0	.0	100.0	100.0

a. Unless otherwise noted, bootstrap results are based on 700 bootstrap samples

watching online videos, films, music that related to non academic							
		ƒ(%)	Valid Percent	Cumulative Percent	Bootstrap for Percent[a]		
					Bias	Std. Error	95% Confidence Interval
							Lower	Upper

Valid	Less than One Hours	192(27.4)	27.4	27.4	.1	1.6	24.4	30.6
	Daily 1-3 Hours	346(49.4)	49.4	76.9	-.1	1.9	46.0	53.2
	daily more than 3 hours	155(22.1)	22.1	99.0	.1	1.6	19.1	25.3
	Not accessed	7(1.0)	1.0	100.0	.0	.4	.3	1.9
	Total	700(100)	100.0		.0	.0	100.0	100.0

a. Unless otherwise noted, bootstrap results are based on 700 bootstrap samples

accessing locally available medical resources universities repositories							
		ƒ(%)	Valid Percent	Cumulative Percent	Bootstrap for Percent[a]		
					Bias	Std. Error	95% Confidence Interval
							Lower	Upper

Valid	Less than One Hours	67(9.6)	9.6	9.6	.0	1.4	7.4	11.9
	Daily 1-3 Hours	23(3.3)	3.3	12.9	.0	1.1	2.1	4.6
	daily more than 3 hours	27(3.9)	3.9	16.7	.0	.7	2.6	5.3
	Not accessed	583(83.3)	83.3	100.0	.0	.7	80.6	86.1
	Total	700(100)	100.0		.0	.0	100.0	100.0

a. Unless otherwise noted, bootstrap results are based on 700 bootstrap samples

Unspecified							
		ƒ(%)	Valid Percent	Cumulative Percent	Bootstrap for Percent[a]		
					Bias	Std. Error	95% Confidence Interval
							Lower	Upper

Valid	Less than One Hours	329(47.0)	47.0	47.0	-.1.0	1.9	43.5	50.6
	Daily 1-3 Hours	277(39.6)	39.6	86.6	.1	1.9	36.3	43.3
	daily more than 3 hours	88(12.6)	12.6	99.1	.0	1.2	10.2	15.1
	Not accessed	6(.9)	.9	100.0	.0	.4	.1	1.6
	Total	700(100)	100.0		.0	.0	100.0	100.0

a. Unless otherwise noted, bootstrap results are based on 700 bootstrap samples