Role of Information Communication Technology (ICT) Integration on Performance of College of Agriculture and Veterinary Medicine Jimma, University

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Abstract

This research is a qualitative research aimed at analyzing and describing the role of information communication technology (ICT) on teaching learning, research and supportive administrative activities from the users' perceptions point of view in Jimma University College of Agriculture and Veterinary Medicine. A cross-sectional descriptive case study design was used. Both primary and secondary data were used. The primary data was collected using unstructured interviews, questionnaire, focus group discussion, and observation of the research setting. A sample of 131 respondents was participated in this research. Purposive and systematic random sampling was used to select the sample respondents. Qualitative data analysis were used to analyze data. The study reveals that, majority of participant students mentioned that, using ICT in their learning has improved their performance, and ICT integration in to the administrative functions of the college enabled efficient communication, improved collaboration among various functions, employees, customers and partners of the college. The major constraints hindering efficient ICT service delivery at the college were, unreliable internet connection, repeated power interruption and delay in purchasing the required ICT equipment. Therefore, having college based independent server and decentralized purchasing system would minimize the constraints.

Key Words: ICT integration, Performance, perception,

1. BACKGROUND OF THE STUDY

Information and communication technologies (ICT) have become common place entities in all aspects of life; that it has fundamentally changed the practices and procedures of nearly all forms of activities within business and governance (Andoh, 2012). The integration of ICTs in teaching and learning is more likely if the tools and resources of the Internet, multimedia, and related technologies are seen as being integrally connected with literacy learning in the wider sense of learning as a matter of accessing information, communicating, and applying knowledge (Zhu, 2003). Information and communication technologies (ICTs) play various roles in education through providing a catalyst for rethinking teaching practice; developing the kind of graduates and citizens required in an information society; improving educational outcomes and enhancing and improving the quality of teaching and learning, (Babbie, 2004; Cox et.al., 2003). Teaching and Learning through ICT in Higher Educational Institutions (HEIs) has attracted global ICT investments of various Governments; however the results of these investments in ICT, that has a target to enhance quality of education remains to be seen and realized (Andoh, 2012).

In Ethiopia, the promise of ICT in education is recognized by policy makers including the Ethiopian ICT for Development Agency and the role of ICT in the national development and poverty reduction process of the country is widely accepted, and has gained high considerations from the government of Ethiopia (Tibebu, et.al,(2009).   The Ethiopian Government acknowledges the role that ICT play in education in a way that it facilitates the development of education and enables both individuals and the country to meet the challenges presented by the knowledge and information age and therefore, the Government commits itself to the exploitation and application of ICT for educational development in the context of the goal that ICT   ensures that ICT is an integral part of the educational and training system at all levels, and wherever possible, ICT shall be used to extensively deliver education (Federal Democratic Republic of Ethiopia, 2009).

2. STATEMENT OF THE PROBLEM

Within education, ICT has begun to have presence but the impact has not been as extensive as in other fields (Andoh, 2012). Teaching and Learning through ICT in Higher Educational Institutions (HEIs) has attracted global ICT investments of various Governments. In Ethiopian, ICT is available in many universities, but there is limited evidence that it has been integrated into the teaching-learning process (Hare, 2007).

The use of ICT as a means to improve teaching- learning and managerial activities has received extensive attention over the past one decade in Jimma University in general and Jimma University College of Agriculture and Veterinary medicine (JUCAVM) in particular; hence, currently, access to and availability of ICT has significantly increased throughout Jimma University. Specifically, in an effort to make use of the possible benefits of ICT in teaching-learning and managerial processes, JUCAVM has started investing in ICT and implemented ICT integrated SMART class teaching-learning in the year 2007, with the acquisition and installation of ICT facilities. Though the effort by the JUCAVM to provide an ICT supported teaching-learning practices and to execute managerial activities is sustainably continued to date, the practical role/benefit realized as a result of ICT integration in teaching-learning and other managerial activities was remained undescribed and questions persist as to the actual roles these

technologies played in the teaching-learning activities and perceived benefits in using the ICT for managerial activities. Therefore, this study was intended to identify and describe the roles of implementing and using ICT in teaching-learning, in research and in executing the various managerial functions, based on all the stakeholdersøperceptions.

3. RESEARCH OBJECTIVES

The general objective of this study is to analyze and describe the role of ICT integration on performance of teaching learning, research and supportive administrative activities from the usersø perceptions point of view at Jimma University College of Agriculture and Veterinary Medicine. The specific objectives of this study are (1) to analyse the students and teachers feeling/perception with regard to the role of ICT in their learning and teaching activities, (2) to assess perception of management of the college on the role of ICT in carrying out the teaching-learning and administrative supportive activities, (3) to analyze the extent and purpose of use of ICT by the students and teachers of the college, (4) to identify the major factors supporting ICT service delivery in the college and (5) to identify factors constraining the ICT service delivery in the college.

4. LITERATURE REVIEW

This section presents literature on the role of ICT integration at organization level and individual levels (students and teachers) and factors influencing integration and use of ICT in teaching-learning and other organizational administrative functions. Both theoretical and Empirical literatures were briefly discussed.

Theoretical Literature

The role of ICT in the education at higher level is recurring and unavoidable; among the benefits of ICT, Supporting education in schools is one (Hubbard, 2013). In this regard, ICT can provide access to information sources, enable communications, create interacting learning environment and promote change in methods of teaching. Tusubira and Mulira, (2004) found that it became necessary for organisations to integrate ICT into organisational functions in order to increase efficiency, cost-effectiveness, and competitiveness. Also, Kimathi, (2012); and Mortagy *et al.,(*2005), found that ICT increased organisational productivity in some way or the other. According to Lasrado and Bagchi (2011), hardly any business transaction currently occurs without it being captured digitally at some point. Various researches have proved that information and communication technologies (ICTs) play a number of roles in education, that, ICT: brings positive changes in the social organization of the classroom; achieves higher student-centric focus and delivery (Capper, 2003; Cradler and Bridgforth, 2002); enhances teaching and learning through dynamic, interactive, and engaging content (Capper, 2003; Yusuf, 2005), and relates school experience to work place, provide opportunity for connection between school and world.

The effective use of technology in teaching and learning increases the benefits of ICT to enable students to become active learners and to develop their problem solving, critical-thinking, and creativity skills (Hubbard, 2013; Jung, 2006; Kean et.al, 2012; Klimova & Semradova, 2012). Integrating ICT in teaching-learning develops, enriches, accelerates, and deepens student skills (Capper, 2003; Becta, 2003c); enhances student motivation in the learning process which then,

accentuates enjoyment and interest in the learning process, and achieves higher commitment, increases independence, self esteem and confidence in students (Cradler and Bridgforth, 2002; Capper, 2003; Wael et.al, 2018). Regarding the Studentsø habits improvement, Cradler (2002), found that teachers observed improved student work interest and habits, which resulted in control often being loosened in other areas as students were granted õgreater autonomy in their workö. Studentsø attitudes toward learning and their own self-concept improved consistently when computers were used for instruction (Alazam et.al., 2013).

The teachers who learn to integrate technology into existing curricula teach differently than teachers who did not have such training or support from the institution (Alazam et.al., 2013). Integrating ICT in teaching-learning enhances learning opportunities and resources to the students and teachers (Byron and Gagliardi, 2001; Becta 2003a).

Factors influencing Integration of ICT into teaching learning
Leadership Support
Without the support from management/leadership, ICT adoption and integration is almost impossible. Support of these stakeholders is required for successful ICT integration and adoption in order to enhance quality education through ICT. Yee, (2000) believes that a leader who implements technology plans and also shares a common vision with the teachers and students to stimulate them in their lessons.

Technical Support
Break down of computers or malfunction of ICT infrastructure and facilities retards the enhancement of quality education through ICT. Without adequate technical support, teachers will effectively be discouraged from using computers because of fear of equipment failure. Therefore, if there is no technical support for teachers, they become frustrated resulting in their unwillingness to use ICT to teach students (Tong & Triniada, 2009).

Access to Technology: Norris et al. (2005) also pointed out to the importance of access to technology for effective adoption and integration by training institutions. Therefore, an understanding of institutional characteristics will influence teachersø adoption and integration of using ICT in teaching delivery.

Access to ICT Facilities: Access to ICT infrastructure and resources in schools is a necessary condition for the integration of ICT in education (Plomp et.al. 2009). Effective adoption and integration of ICT into teaching in schools, mainly depends on the availability and accessibility of ICT resources such as hardware, software, etc. Obviously, if teachers cannot access ICT resources, then they will not use them. Access to computers, ICT, updated software and hardware are therefore key elements to successful adoption and integration of technology for teaching and learning in Higher Educational Institutions (HEIs).

Access to ICT Training: ICT related training programmes develop teachersø competences in computer and ICT usage and influence teachersø attitudes towards computers (Bauer & Kenton, 2005; Franklin, 2007; Wozney et.al, 2006). ICT related training programmes also assist teachers

to reorganize the task of technology and how new technological tools are significant in student learning, so that related technology training can be successfully integrated in the classroom (Hew & Brush, 2007; Keengwe & Onchiwari, 2008; Muller et.al, 2008). Enhancement of quality education through ICT requires both teachers and students to be computer literate and ICT competent through training, where, computer literacy and ICT competence is defined as being able to handle a wide range of varying computer applications for various purposes (Andoh, 2012).

Personal Factors (Teachers' Attitudes, preparedness and Experience)
An understanding of personal factors that influence teachersø perception in accepting and integrating ICT into teaching is relevant and therefore, relevant literatures are briefly presented below.

Teachers' Attitudes towards ICT: To successfully initiate and implement educational technology in schooløs program depends strongly on the teachersø support and attitudes and it is believed that if teachers perceive technology programmes as neither fulfilling their needs nor their studentsø needs, it is likely that they will not integrate the technology into their teaching and learning (Andoh, 2012).

Teachers' experience and preparedness to use ICT: According to Schiller (2003), personal factors such as, educational level and experience with the computer for educational purpose can influence the adoption of a technology. Teachersø preparedness to integrate ICT into teaching determines the effectiveness of the technology and not by its sheer existence in the classroom (Jones, 2001).

ICT Development and Use Policy
Prior studies by Iqbal & Ahmed (2010); Hameed (2006); Khan and Shah (2004) argue that, in order to be successful, a country should improve its education system by implementing effective and robust ICT policies. According to the Federal Democratic Republic of Ethiopia (FDRE), (2009), in education sector, the Government of Ethiopia recognizing that ICT facilitates the development of education and enables both individuals and countries to meet the challenges presented by the knowledge and information age, has adopted its ICT policy in 2009. The final goal of Ethiopian ICT policy is to bring about significant development nation-wide in all sectors and in all citizens walks of life through effective utilization of ICT. To this effect, the government has committed its resources to the development of ICT infrastructure and human resource development.

Empirical Literature
Fuchs and Woessman (2007), and Luu & Freeman (2011) found a positive and significant correlation between the availability of computers at school and studentsø performance. Machin et al. (2007) examine whether the adoption of computers in UK schools over the 1999-2003 period have increased studentsø educational outcomes; in sharp contrast with most previous studies across US and European schools, they found a strong relationship between ICT investments and educational performance in primary schools, especially in the teaching of English and science (not of mathematics). Garicano and Heaton (2010) examine the relationship

between ICT, organizational change and productivity across some 8,600 US police departments using a panel data set that covers the 1987ó2003 period. They found that when considered alone, increases in ICT are not associated with reductions in crime rates, increases in clearance rates, or other productivity measures. These results persist across various samples, specifications, and ICT tools (PCs, mobile data terminals, mainframes and servers). ICT investments are, however, linked to improved productivity when they are complemented with particular organizational and management practices. The joint effect of large increases in ICT funding and a fertile background for making an efficient use of it, led to positive effects of ICT expenditure on educational performance (Antonioli, 2016).

In Ethiopian, ICT is available in many universities, but there is limited evidence that it has been integrated into the teaching-learning process (Hare, 2007). Teaching and Learning through ICT in Higher Educational Institutions (HEIs) has attracted global ICT investments of various Governments. However the results of these investments in ICT, that has a target to enhance quality of education remains to be seen and realized (Andoh, 2012). The research by Tibebu, et.al.,(2009), at Addis Ababa University (AAU), assessed the extent to which ICT has been integrated into the teaching and learning process at AAU and what challenges encountered by teachers in the process of integrating ICT into the teaching and learning process. This research emphasized only on management and teachersø perceptions. Studentsø view on ICT was not included.

Nana and Ahmedin, (2013),using Wollo University in Ethiopia and Accra Polytechnic in Ghana as case studies, studied institutional, personal and technological factors that can encourage stakeholders, teachers and students to use ICT to enhance the quality of education. The paper outlined and contributes to how training institutions can enhance and improve the quality of education (teaching and learning) through ICT. This study also emphasized only on importance of training for ICT use and it considered teachersø perception in this regard. Still studentsø perception on the role of ICT integration in teaching and learning activities remained unconsidered, and also, the role of ICT integration in administrative support activities didnøt considered. The study by Birhanu, (2015), at Adama University examined how information and communication technology (ICT) has contributed in promoting educational development initiatives and explored the process of integrating ICT into teaching-learning practices and its emerging challenges. The purpose of this study was to explore the readiness of and an extent to which the participant teachers integrate ICT into the teaching-learning process, based only on teachersø perceptions. The perceptions of students and management were not considered. Similarly, though the effort by the Jimma University College of Agriculture and Veterinary Medicine to provide ICT supported teaching-learning practices and to execute managerial activities is sustainably continued to date, the practical benefits realized as a result of ICT integration in teaching-learning and supportive activities is remained undescribed. Therefore, the current research is aimed at identifying the role of ICT on teaching-learning, research and administrative support activities in Jimma University College of Agriculture and Veterinary Medicine from users perceptions point of view.

5. RESEARCH DESIGN AND METHODS

This chapter presents the research design and methods to be used in this study. It discusses the research site, the research philosophy, research approach, research strategy and research methods to be applied in this study.

The organization selected for this research was Jimma University College of Agriculture and Veterinary Medicine (JUCAVM), which is one of the colleges of Jimma University, is located at 354km south-west of Addis Ababa, in the south western Ethiopia. The selection of Jimma University College of Agriculture and Veterinary Medicine is with researcherøs best ability to conduct detailed on site research and that, it is an innovative and a model college among the Colleges of Jimma University in integrating ICT in to its teaching and learning activities.

According to Hacker and Saxton, (2007), a research design is a framework or a detailed blueprint to guide a research project towards its objectives. This study employed descriptive research design with qualitative approach.

When regarding the physical world, researchers; epistemological stance is *Interpretivism* that, õwe interpret our everyday social roles in accordance with the meaning we give to these roles, and we interpret the social roles of others in accordance with our own set of meaningsö. When regarding the social world on the other hand, researchersø ontological stance is *subjectivism,* that we do believe that the social world is subjective; essentially a product of oneøs mind.

The research approach used was an *inductive process* leading from data to theory. The research question was to analyze how ICT integration impacts the performance of teaching-learning, administrative and research activities of the college. This question is answered by establishing knowledge about how people in the field (students, teachers and management) perceive the reality (the role of ICT) and constructs meaning.

The case study strategy was primarily used because it enabled perception on the role of ICT to be examined in a holistic manner within a real life situation. Furthermore, the case study research strategy accommodates the belief in multiple methods of data gathering and data analysis, which enabled triangulation of the study results. Yin, (2014) defines a case study as: '...an inquiry that investigates a contemporary phenomenon, within its real life context, when the boundaries between phenomenon and the context are not clearly evident, and in which the multiple source of evidence are used. It is particularly valuable in answering *who, why and how* questions in management research'. From a research strategy point of view, the case study is a way of establishing valid and reliable information or findings that add to the accumulated knowledge of the processes by which business and many other organizations functions (Boyd, 2012). Since the aim of this research was to *how and why* teachers, students and management of the JUCAVM perceive integration of ICT in teaching-learning activities, research and managerial functions performance, and *what* role ICT has played on the studentsø and teacherøs perspective and experience, *a descriptive case study strategy* was used.

Sample participants were under graduate students (year 3), in all the concerned smart class rooms, year two post graduate students (Masters and PhD), teachers on teaching duty, ICT support team staff members, college academic council members, finance head, property administration head, Human Resource Management head, and general service head.

From the total population of 460 respondents, (*404 under graduate, 29 MSc., 4 PhD, 31 instructors, and 4 Smart class supervisors*), a sample of 113 respondents, (91 under graduate,13 post graduate, 7 instructors and 2 class supervisors), were participated in this research. The sample size was determined at 92% confidence level, using Sloven¢s formula.

$$n = N/1+N\ (e^2)$$
$$n = 460/1+460(0.08^2)$$
$$n =\ 113$$

In addition, 14 Academic members and 4 administrative team leaders were participated by responding to the questionnaire. Therefore, a total of 131 respondents were participated in the study. Detail is given below.

Table 1: Population & Sample for the study

No	Department	Population per Programme				Sample size		
		Under Gr.	Post Gr.			Under Gr.	Post Gr.	Total
			MSc.	PhD	Total			
1	Agri. Eco. & ABVM	120	7	-	127	28	3	31
2	Horti. & Plt. science	85	4	1	90	20	2	22
3	Animal sciences	43	2	1	45	10	1	11
4	Natural R. Management	50	3	2	55	12	2	14
5	Post-Harvest Management	26	4	-	30	6	1	7
6	Rural Dev¢t & Agri. Extension	36	4	-	40	8	2	10
7	Veterinary Medicine	34	4	-	38	7	2	9
	Sub total	**404**	**29**	**4**	**425**	**91**	**13**	**104**
8	Teachers on duty in all classes of third year				31	-	-	7
9	Smart class supervisors				4	-	-	2
	Sub Total				**460**			**113**
	Academic council Members							**14**
	Administrative Team leaders							**4**
	Total							**131**

This study was aimed at identifying and describing the role of ICT on teaching-learning, research activities and managerial activities in JUCAVM; from students¢ teachers¢ and management¢s perspective. Therefore, the researchers employed systematic simple random sampling and purposive sampling for selecting the sample respondents. Systematic simple random sampling was used to select the respondent students and the sample of participant teachers from the list of teachers on teaching duty during the study period, i.e. semester one of the academic year 2018/19. Purposive sampling was used to select management members (academic council members and none members), of the college and third year class students, because they do have

better experience about ICT in the college.

For the purpose of this research, both primary and secondary data were collected. Major sources of primary data were data from the students, the teachers, the academic council members and other none academic council members. Secondary data were collected from the ICT team reports and records documents. Methods of data collection used for the study were unstructured interview, questionnaire, observation and group discussion for primary data and document review for secondary data collection.

This study used a *cross-sectional* study that data were collected in fixed one time period. However, for each group of respondents data were collected from respondents more than one time, using the various data collection methods. For example, data were collected from students and ICT support team twice, using interview and group discussions to clarify their response in questionnaire. For interviewing students conveniently and within few days, five instructors were assigned as enumerators, in addition to the first researcher.

For this study, the strategies employed to ensure data Validity and integrity/reliability are as follows. Reliability is a measure of the extent to which an instrument or approach gives the same results in different occasions under equal circumstances (Simatwa & Enose, 2010). According to Mays (2000), although there is no easy solution to limit the likelihood of errors in qualitative research, there are methods to improve the validity of the data. In line with the approach of respondent validity (Barbour, 2001), the researchers contacted a random sample of participants to verify the findings, that is, in order to obtain further cross validation of the results, the researchers, presented the result of the study to ICT unit head and team leaders and the management. It was found that the analyses were in line with that of the participantsø experiences. Focusing on reflexivity and relativism (Mays, 2000), the researchers avoided any bias, particularly from their own perception of the phenomenon. Throughout the data analysis, the first researcher discussed with the co-researcher on possible contradicting elements to the description of the role of ICT. In addition, the researchers provided credibility by using appropriate research methods, i.e selecting appropriate respondents and systematic random sampling. Furthermore, to ensure transferability and dependability (Shenton, 2004), detailed descriptions of the phenomenon in question were provided.

Analysis of research data in a qualitative study is an ongoing process, one that occurs throughout the data collection period. Accordingly, the following steps and techniques of data analysis were followed. (1). Raw data management- ÷data cleaningø (2). Data reduction, ó ÷chunkingø ÷codingø (3).Data interpretation ó ÷codingø ÷clusteringø (4). Data representation ó ÷telling the storyø ÷making sense of the data for othersø

Identifying usable and unusable data (Data cleaning) was the primary step after collection. After identifying usable and unusable data, identifying and classifying each answer (coding) was done. Then, in order to get a sense of the data holistically, the researcher read the interview and the questionnaire repeatedly (deeper immersion), while reading the interviews and questionnaire, the researcher wrote notes in the margin (memoing).

Chunking is about categorizing raw data into groups, and chunks of data that were similar were clustered and assigned preliminary codes. As the approach to this study was inductive, *in vivo* codes were applied; that is, Codes derived from the data by using code names drawn from interpretation of the data was used. Regarding Coding Levels, Descriptive to Interpretative to Pattern Coding was applied; that is, moving from summary to meaning to explanation of data.

After Chunksø of related data that have similar meaning were coded in several cycles, those ÷chunksø became clustered in to similar theme categories, and meanings were given to those clusters with labels and themes were interpreted to answer the research questions. Interpretation of qualitative data simultaneously occurs that, the researchers interpreted the data, then categorized and coded the data and inductively developed a thematic analysis. Finally, the authors investigated each topic that was extracted along with its original text, after which the topics were categorized into five themes.

6. MAJOR FINDINGS AND DISCUSSIONS

This chapter presents the major findings of the research as per the proposal. Starting with the ICT resources supporting implementation of ICT, it presents the five themes extracted, namely (1) Studentsø perceptions on the role of ICT integration on performance of teaching-Learning activities, (2) Teachersø perceptions on the role of ICT integration on performance of teaching- Learning activities, (3)Perceptions of Management on the role of ICT integration on the performance of the Collegeøs teaching-learning, administrative and research activities, (4) the extent and purpose of use of ICT and (5) Factors supporting and hindering the ICT service delivery in the college.

ICT Resources in Use at JUCAVM

ICT facilities and ICT topology in use

According to the respondents, ICT support team staffs of JUCAVM, the information communication Technologies (ICT) facilities in use at the college during the data collection period were; server based teaching ólearning (Smart class) facilities, internet service, Computers, LCD projectors, white board markers, Security camera, E-learning facilities, and Various automated systems. Detail of the ICT facilities is given in table 4.1, below.

Table 4.1. ICT facilities in use at JUCAVM, October 2018

No	ICT facilities in use	Location	Quantity
1	Computers	Class room	26
	Computers	Computing lab for both under & graduate programmes	90
	Computers	Under graduate computing lab	80
	Computers	Post graduate computing lab	32
	Computers	GIS lab	20
	Computers	Auditorium/AC meeting halls	5
	Total		**253**
2	LCD	Class room	38
	LCD	Auditorium	5
3	Security camera	Class rooms	12
	Security camera	Campus	3

Source: ICT support team, JUCAVM

Automated system developed and being used by JUCAVM

The automated system developed by JUCAVM ICT team at college level and in use during data collection period were: *JUCAVM Charity, Anonymous Suggestion Box, Automated Staff Audit System (Acad), Automated Staff Audit System(Admin), Online Class Scheduling , Graduate Profile, College Report, PHM Kaizen System, Auditorium system, Online Exam System, and Research Manager.*

Automated system developed at university and being used by JUCAVM

The automated systems developed at university level and in use by JUCAVM during data collection period were: *OTRS, SRS, and Teeal.*

Open-source Ticket Request System (OTRS): is a free and open-source trouble ticket system software package that a company, organization, or other entity can use to assign tickets to incoming queries and track further communications about them.

Student Record System (SRS): is used to report information for decision making about individual students efficiently and exchanging student records among schools.

The Essential Electronic Agricultural Library (TEEAL): is a digital collection of research journals for agriculture and related sciences. Researchers, students, faculty and librarians can discover and access thousands of full-text PDF articles without the use of the internet.

ICT Topology in Use

ICT topography, here, is to mean the overall ICT based system design being used at JUCAVM for teaching-learning, research and administrative support purposes. According to the ICT Support team, JUCAVM has implemented the samba server with windows XP for the processors (CPUs) installed in the class rooms and Linux for the SAMBA Server database, which integrates windows XP and Linux and enabled them to function together. Hence, the operating system is the combination of windows XP and Linux software.

Human Resources supporting ICT service at JUCAVM

The resources supporting ICT service delivery as per this study are; the ICT support human resources and the ICT development and use policy.

ICT staff

According to the human resource data of the ICT support team, the ICT support team is staffed with 28 ICT support staff with different ICT professions. The detail is given in table 4.2 below.

Table 2. Number of ICT staff, JUCAVM, October 2018

No	Job position/title	Quantity	Profession	Current duty
1	Class supervisors	4	ICT	Supervise ICT integrated class rooms
2	ICT lab attendants	11	ICT	Supervise & help users in the lab
3	ICT Lab technician	4	ICT	Supervise & Maintain ICT lab
4	User support technician	6	ICT	Maintain hardware & soft ware, responsible for wired & wireless infrastructure
5	ICT help desk	1	ICT	Overall ICT users support
6	Camera man	1	ICT	Record & document campus events
7	Documentation person	1	ICT	Keep ICT documentation
	Total	**28**		

Source: ICT support team, JUCAVM

ICT Development and Use Policy

Prior studies by (Iqbal, & Ahmed, 2010; Hameed, 2006; Amjad, 2006; Khan, and Shah, 2004) argue that, in order to be successful, a country should improve its education system by implementing effective and robust ICT policies.

Regarding the ICT development and use policy, Jimma University College of Agriculture and veterinary medicine has not yet own its ICT development and use policy. The questionnaire data from the respondent academic council (AC) members of the college and the ICT support team revealed that the college has no ICT development and use policy and it rather operates on annual plan of the college.

The server based teaching – learning system

With the existing system, instructors can easily share soft copy reference materials to their students. For this purpose, there is shared folder available on the server, which is easily accessed by students as well as instructors using simple procedure (Start, Run, and then type \\10.141.50.10\JUCAVM). To access personal account users follow that same procedure, but instead of writing JUCAVM, in login dialog box, the user writes his/her own pass word protected account.

Perceptions on the Role of ICT in Teaching- Learning Activities
Theme 1: Students' Perceptions of the Role of ICT in Teaching- Learning Activities

Analysis of the interview and focus group discussion with students revealed that students do have positive attitude on ICT integration in the collegeøs teaching ólearning activities.

Table 4.3. Theme 1: Studentsø perception on the role of ICT on performance

Students' Experience	Sub theme	Associated meaning
ICT has positive effect on performance because,	1.Using ICT in teaching-learning has benefited students, because,	ICT has: improved studentsø class attendance, motivated them to easily access course support sources, study more, prepare well for exam, do assignment timely, and improved their grade points.
	2.Using ICT in teaching-learning has benefited teachers, because,	ICT has enabled them to access & download course support material, prepare enriched teaching materials, use more time for discussion & elaboration in class. ICT facilitates efficient teaching learning activities & help teachers to easily teach & finish course in time.
ICT has negative effect on performance	3.ICT couldnøt help some teachers to improve their ability to teach	Because, some teachers read the PPT, rather than explaining & elaborating

Source: Own analysis

Table 2, theme 1, above shows using ICT in teaching-learning has benefited students that, majority of the participant students mentioned using ICT has impacted their performance positively; that, smart class enabled them to attend class actively and access to internet enabled them to access and read more course resources which highly helped them to have more knowledge in their course work; improved working in team on assignments, and hence, enabled them to work independently and to realize high scores (achievement). In addition, the top performer students (31/31) mentioned that using ICT enabled them to access and read supportive course material and this in turn, helped them to score higher and improve their grade points. This finding is supported by prior study conducted by Balanskat, et. al, (2006) which revealed that ICT has impact on competency development, team work, independent learning and higher order thinking skills. Likewise, Ramirez, (2003) reported that students print material from the internet in order to study and read later on; whilst Duignan & Gurr (2007), compared ICT integrated learning environment and traditional learning environment and observed that more effective and efficient learning occurs in ICT integrated learning environment and that the success level of students is raised. Furthermore, Hubbard (2013); Kean, et.al. (2012); Klimova & Semradova (2012) proved that the effective use of technology in teaching and learning increases the benefits of ICT to enable students to become active learners and to develop their problem solving, critical-thinking, and creativity skills. Comparable positive result on impact of ICT on student performance also found in several prior studies such as, Talley (2005); Sosin, et.al (2004); and Shamim et.al. 2016).

Students' Perceptions with regard to Role of ICT on Teachers' Activity

Results of the analysis of interview and group discussion with the participant students (both under and post graduate) revealed that integration of ICT in teaching-learning enabled teachers to execute their teaching activities with ease, complete courses in time. Even though, two of the 31 top academic performer under graduate students mentioned that very few teachers come to class without preparation and they simply read the PPT from the LCD screen, failed to deliver the lecture with no or insufficient explanation.

Theme 2: Teachers' Perceptions of the Role of ICT in Their Teaching Activity

Table 3, Theme 2. Teachersøperception on the role of ICT on performance

Teachers' Experience	Sub theme	Associated meaning
ICT has positive effect on performance	1.ICT Improved teachersø performance, because,	ICT enabled them to minimize unnecessary work load, reduce paper work, efficiently teach, submit grade online, and saved their time for preparation
	ICT improved studentsø performance, because,	ICT has improved studentsø class attendance motivated them to study more, improved their grade point.
ICT has negative effect on some students	ICT reduced performance of some students, because,	Some students stay longer on face book, rather than studying & couldnøt continue to improve their grade

The result of the questionnaire filled by teachers of Jimma University College of Agriculture and Veterinary Medicine, described in table 4.4, theme 2, above indicates that teachers do have positive attitude towards using the ICT in their teaching, that the ICT integrated smart class enabled them to deliver their class lecture comfortably and efficiently and using internet enabled them to access up to date teaching material helped them to avoid burden of chalk and blackboard. Similarly, Alazam, et al., (2013) proved that integrating newer technologies into education can play an important role in leveraging productivity and efficiency, and that, the teachers who learn to integrate technology into existing curricula teach differently than teachers who did not have such training or support from the institution.

Teachers' Perception of the role of ICT on students' performance

The result of questionnaire data from teachers, described in table 4, theme 2, above, evidenced that teachersø perception on the role of ICT integration in teaching-learning on students is positive. All the participant teachers concluded that ICT improved class attendance of the majority of students, motivated them to execute their assignment efficiently through the use of internet for resourcing reading materials and improved communication efficiency among themselves and between students and instructors through internet. Similarly, Fuchs and Woessman (2007), found that 86% of teachers in Europe state that students are more motivated and attentive when ICT facilities are used in class, their communication and process skills improved and they feel greater responsibility for their own learning when they use ICT, working more independently and effectively. Besides, Bauer and Kenton (2005) proved that, integration of ICT in to learning helps students with their learning by improving the communication between them and the instructors.

Theme 3. Management's Perceptions on the Role of ICT Integration on performance
Sub Theme 1: Perceptions of management on the role of ICT in teaching-learning activities
According to the questionnaire data analysis, described in table 4.5, theme 3, below, majority of the management members of the college reveals that ICT integration into the teaching learning of the college has highly improved the teaching-learning activity, in a sense, use of ICT in teaching-learning enabled teachers and students to browse and access additional new course materials. This finding is supported by prior studies by Hubbard, (2013); Kean, et.al. (2012); Klimova & Semradova (2012) that states, ICT integration in teaching learning offers teachers a more flexible and broader access to information and learning resources.

Table 4.5. Theme 3. Managementøs perception on the role of ICT on Organizationøs performance

Management's Experience	Sub theme	Associated meaning
ICT has positively affect organizational performance, because,	1.ICT improved teaching-learning activities, because,	Materials are easily accessed by students & staffs online, e-learning module and online books are available for use. ICT has reduced cheating on final exam as security camera has been integrated in class rooms, ICT enabled attractive teaching-learning environment makes teaching-learning process easier ; Using internet helped to gain new knowledge Evidence based class interaction because of the internet resource direct linking to the system, improved service.
	2.ICT improved Administrative activities, because,	Efficient communication- scholastic interaction worldwide, timely response in reporting, very easy to undertake financial activities, & to control annual cash flow of the college, very easy to use a printer for many computers (saving & efficient resource distribution), it makes use of one data base system & each & every leader can access the financial system when needed, Minimized unnecessary workload on staffs, reduced paper work & saves time, Efficient financial reports, to both internal & external respective bodies, Efficient follow up (control) of purchasing activities, & easy to control the casher and cash balances,
	3.ICT has improved Research activity, because,	Because, research materials easily accessed by students & staffs online, controlling plagiarism in research realized through research manager website developed and implemented at JUCAVM only.

Source: Own analysis

Sub theme 2: Perceptions of management on the role of ICT on administrative performance
Analysis of the questionnaire data from the participant management members, described in table 4.5, sub theme 2, above shows that, academic council members revealed that ICT integration in to the administrative functions of the college enabled efficient communication, improved collaboration among various departments and functions, employees, customers and partners of the college. For instance, respondent 1 and 2 from academic council members mentioned that

integration of ICT in to student record system (SRS) in the college has enabled teachers to record and report studentsø continuous assessment results directly on line and get approved by the respective department heads. This means, ICT supported student record system has improved the efficiency of teachers and other stakeholders in the student record activity through saving their time that would have been spent on manual recoding of students results, and realized efficient service delivery to students as it has enabled them to access their results on line. The current finding is supported by prior study of Hacker and Saxton (2007), who proved that information technology is being used by organizations to improve performance, communication, motivate employees, increase competitiveness, improve market dynamics, and repositioning the company against its competitors facilitating entry into new markets. Furthermore, Wihan et.al., (2016) also stated in their research that, ICT increases availability of employees to their employer, clients, and their family members, the various options for communication with others enabled employees to communicate and share information with others through ICT, to eliminate travel time. Likewise, Madden and Jones (2008) indicated that some of the positive effects of ICT on individual employees include; employeesø improved ability to do their job and to share ideas with co-workers, as well as more flexible working hours.

In addition, specific to HRM, the questionnaire data from human resource development team head and ICT support team head revealed that integration of automated human resources audit software in to human resource management enabled the human resources management and development team to compile and easily access the bio data of graduating students, academic & administrative staff. Correspondingly, the top management and the finance department of the college indicated that ICT integration enabled the finance department to efficiently control the credit & debit of the collegeøs annual budget, efficient financial reports (daily, weekly, monthly & annual), to both internal & external respective bodies online, efficient follow up (control) of purchasing activities.

Sub theme 3: Perceptions of management on the role of ICT in research activities
By the same token, analysis of the questionnaire data from the participant management members of the college, described in table 4.5, sub theme 3, above revealed that, ICT integration in the research work of the college helped in facilitating communication with and among the staff researchers, easy access of worldwide research materials. In addition, management of the college stated that ICT provides students and teachers with a more flexible and broader access to information and learning resources.

Theme 4. The Extent and Purpose of Use of ICT by Teachers and Students
Sub theme 1: the extent and purpose of use of ICT by students of the college
Table 4, theme 4, sub theme 1, below, describes analysis of the interview data and reveals that, 39 (30 under graduate & 9 post graduate) students use ICT (internet, face book), to access materials for supporting their course, that is, for doing their assignments and prepare for examination. The time they spent on internet on average is 1.55 hours per day for their academic activity and 35 minutes for communicating with friends, colleagues and family, totally, 2.30 hours per day on average and a total of 16.10 hours per week. This finding is supported by prior studies of Shamim et.al. (2016), who reported, few of the students use 15.6 hours internet and other ICT facilities per week to download books or to browse some information which will be

helpful for their exam preparation and the teachers use internet to prepare their lecture sheet or to prepare their presentation slides. Also, from the interview with ICT support team head and students, it is found that, using face book in the college is controlled; hence, both teachers and students couldnøt access face book service during working hours of a day on any ICT apparatus.

Table 4. Theme 4. The extent and purpose of use of ICT by students and teachers

Students' experiences	Sub theme	Associated meaning
	1.Extent of use of ICT	Students use internet for 115minutes & 35minutes for Face book per day on average.
	2. Purpose of Use of ICT	Students use internet to communicate with teachers & with each other through E-mail, to download teaching materials, they use face book for exploring & sharing information
Teachers' experiences	1. Extent of use of ICT	Teachers use internet for 45minutes & 30minutes for e-mail, 60minutes for downloading & reading teaching materials, 30minutes for face book
	2. Purpose of Use of ICT	Teachers use internet for downloading additional support materials, server network to access continuous assessment results, to save documents, E-mail to communicate with teachers, friends and family, and Face book to exchange information with friends.i.e.for personal communication.

Source: Own analysis

Sub theme 2: The Extent and Purpose of Use of ICT by Teachers

Table 4, theme 4, sub theme 2 above, describes analysis of the questionnaire data from teachers and reveales that, teachers use internet to access and download books to support their teaching, for communicating with colleagues, students and officials. Participant teachers responded that, they use internet for 2.15 hours on average for academic purposes and 30 minutes per day for personal communication, i.e, 2.45 hours per day and a total of 17.15 hours per week, on average.

Theme 5. Major Factors Supporting and Constraining the ICT Service Delivery

Sub theme 1: Factors supporting the ICT service delivery

As described in theme 5, sub theme 1, table 7 below, the major supporting factors of the ICT service delivery identified by the current study include participatory, committed, transparent and responsive leadership, who created committed ICT team, and sense of ownership of all of the staff of JUCAVM.

From the questionnaire filled by the teachers and academic council members, it is evidenced that, it was leadershipøs recognition of the role of ICT integration into teaching-learning, research and administrative support activities in realizing the ICT supported efficient system be in place. In support of this finding, prior studies by (Caldwell & Harris, 2008; Hargreaves, 2009; Hattie, 2009; and Mazano et al., 2005), recognized that leadership makes a critical difference. Similarly, the prior study by Agars et al., (2008), proved that leaders serve as role models for employees

through their interactions and hence, contribute to creative and innovative outcomes. The leadership of JUCAVM who initiated and implemented ICT integrated teaching-learning, research and administrative activities, was participatory-transformational leadership, who mobilized and worked with employees, through creating clear vision and direction. This finding is supported by prior studies of (Gurr, 2014), which states, leadership is characterized by leading with a vision to set direction, intention to implement the vision and influence to take others to achieve it.

Table 5. Theme 5. Factors supporting and Constraining ICT Service delivery

Sub theme	Associated meaning
1. ICT support factors Leadership and staff commitment	Participatory, committed, transparent and responsive leadership with: planned, strong and continued support in budget to implement & sustain ICT integration; created sense of Team work and ownership in all the staff.
2. ICT Constraints	Electric power interruption & internet/ network interruption, shortage of access points for all students at a time & low speed of connection. Inadequate training support to students & teachers by ICT unit, The ICT system of JUCAVM depends on the main campus ICT server which is not reliable and affect performance of ICT service of the college. Poor Purchasing system, that is the long procurement time for some ICT equipment limits ICT service Low salary level and lack of incentives for ICT unit staff

Source: Own analysis

Sub theme 2: Factors constraining the ICT service delivery
Theme 5, sub theme 2, describes the major constraints hindering efficient ICT service delivery of the college identified by this study; and includes, internet connection dependency on the main server at Jimma University, which is unreliable, repeated power interruption and delay in purchasing the required ICT equipment, as purchasing is centralized at university level. On the other hand, both teachers and students said that, the training given by ICT team on how to use the ICT system is to short inadequate. Finally, though, it does not constrain the ICT service delivery during the data collection period, lower monthly salary and lack of motivational incentives were reflected by ICT staff members of JUCAVM.

4. CONCLUSION AND RECOMMENDATION
5.1 Conclusion

From the above discussion, the following conclusions were drawn.
Integrating ICT into its teaching-learning, research and administrative activities, enabled JUCAVM to deliver demand based quality education and realized efficient and responsive administrative system. The study revealed that students do have positive attitude on ICT integration in the college¢s teaching¢learning activities, because using ICT has impacted their performance positively. The participant teachers of the college do have positive attitude towards using the ICT in their teaching, in a sense, ICT integrated smart class enabled them to deliver their class lecture comfortably and efficiently and using internet enabled them to access up to date teaching material helped them to avoid burden of chalk and blackboard.

The Study also revealed that management of the college has positive perception on ICT integration into the teaching learning of the college, which has highly improved the teaching-learning activity, assisted in facilitating communication with and among the staff researchers, easy access of worldwide research materials, and ICT integration in to the administrative functions of the college enabled efficient and effective communication.

The major supporting factors of the ICT service delivery in JUCAVM are: the participatory, committed, transparent and responsive leadership, who created committed ICT team, and sense of ownership to all of the staff of JUCAVM. Fortunately, this culture is sustained to the time of data collection for this study. The major constraints hindering efficient ICT service delivery of the college are internet connection dependency on the main server at Jimma University, which is unreliable, repeated power interruption and delay in purchasing the required ICT equipment, as purchasing is centralized at university level. Also, the orientation given by ICT team on how to use the ICT system is not sufficient for properly using the system, and there was a complaint on the pay system that their monthly salary is low and there is no motivational incentive to ICT staff of the college, which may limit efficient service delivery in the long run.

5.2. Recommendation

It is recommended that the college continue ICT integration in to its teaching-learning, research and administrative support activities so that the currently achieved benefits will continue. Hence, to realize this, purchasing system of the University be decentralized to college level so that the college will respond to purchase requests of ICT equipment as responsive as possible.

Despite recognizing the importance of ICT development and use policy, the College does not yet own ICT development and use policy, and itsøICT integration effort has been operated on the annual plan basis. Therefore, it is recommended that the college has the ICT development and use policy in line with the national ICT policy, so that the effort can be supported by institutional ICT policy and continue improving.

In order to have efficient service delivery from the ICT staff, it is recommended that the college evaluate the amount of salary being paid to the ICT staff against that of the other colleges of Jimma university and make necessary adjustment, and also, performance based motivational incentives to the ICT staffs will help to sustain efficient service delivery. Besides, training need identification and providing training is useful for both the students and employees of the college to enable them to use ICT in a better way. Finally, this study was limited only to Jimma University College of Agriculture and Veterinary Medicine, one of the seven colleges of Jimma University. Therefore, in order to increase the generalizability of the result of the study, University wide similar research is recommended.

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