

*Full Length Research Paper*

# Comparative advantages of using modern technology for teaching-learning process in agricultural sciences in Jigjiga University, Ethiopia

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Modern technology is the backbone approach for teaching technology education. It continues to be increasingly adopted and used by higher institutions in Ethiopia. The objective of this study was to identify the comparative advantages of using modern technology in improve teaching-learning process in agricultural sciences in Jigjiga University. This study was conducted with the sample of 4 departments, and a total of 16 instructors and 240 students were selected in random basis. An inquiry data using a qualitative approach was undertaken to ascertain the opinions and benefits of using modern technology regarding to their understanding of agricultural course items, improving students' achievements, course coverage in planned time intervals and in reduction of drudgery of teachers'. According to our interviews and observations, uses of modern technologies created a conducive environment; 88% of students' revealed that using modern technology in teaching-learning process generally improved students achievement (from 55 to 90% level) and increased their interest in course items for theoretical and practical demonstration. Whereas, 82% of instructors' agreed that, the use of modern technologies facilitated teaching-learning for agricultural course items. It can be concluded that using modern technologies in teaching-learning process highly benefits instructors and increased students participation and motivation than chalk and talk traditional method.

**Key words:** Advantages, agricultural science, Ethiopia, Jigjiga University, modern technology, teaching-learning process.

## INTRODUCTION

The world has changed and the rate of change is continuing at an ever accelerating pace and an increasing magnitude, which is due to the advancement in both science and technology (Mapotse, 2014). Technology continues to be increasingly adopted and used by educational institutions across Ethiopia (MoE, 2014). Today, science and technology are moving ahead

on a parallel path and each feeds the other and enables more advances as problems of our era are creatively solved Toki and Pange (2010). Modern technology is the backbone approach for teaching technology education. Technology is around everything we do (Muir-Herzig., 2004).

Some technologies have been adopted widely in specific

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sectors for example, virtual learning environments (VLEs) in higher education, and interactive whiteboards (IWBs) in schools. A few technologies for learning for example, presentation software and data projectors have been widely adopted across all sectors (Becta, 2009). In a traditional teacher-centered classroom, the students are the listeners and followers. The teacher is the one given freedom to move about, to initiate actions and interactions, to ask questions and to set limits on activity times. The activity is generally the teacher's domain (Bruce and Levin, 1997; Sandholtz et al., 1997).

Becta (2009) calls this teaching style "real school". In the "real" classroom, students participate in the listening to teacher's lecture, raising their hands to answer questions or working independently on some written assignment. Modern technology applications to simulate real-world environments and create actual environments for experiments, so that students can carry out authentic tasks as real workers would, explore new terrains, meet people of different cultures, and use a variety of tools to gather information and solve problems (Muir-Herzig, 2004).

Future students will learn easily and quickly because by using modern technologies for education which were available, they are being developed for the future. Accordingly, E-learning is defined, in a number of settings, such as distance learning, online learning and networked learning (Behnoodi and Peyman, 2014). For example, using modern technologies in class and the introduction of e-learning like E-Mobile learning has and will make education more mobile. Mobile phones are portable and now days we have smart phones which can access internet and they also have big storage hardware which can be used to store electronic books and notes for students.

Despite the apparent phenomenal growth of modern technologies over the years, higher institution in Ethiopia is not using this technology in teaching-learning process. Yet, Jigjiga University college of dry land agriculture is required to use modern technology in teaching-learning process for agricultural sciences which is also responsive to the national goals and aspirations of all Ethiopian higher institutions for delivering quality education and improving students' performance. It was against this background that the use of modern technology on a vigorous exercise in an attempt to make teaching-learning process easy, innovative, increase student achievement and high quality.

This finding was focused on examining the advantages of using of modern technologies across the agricultural sciences course items and students views on the impact on teaching and learning. Therefore, the main purpose of this proposed study was to examine the benefits of using modern technology to improve students' performance by delivering quality education. Hence, the objective of this study was to examine the comparative advantages of using modern technology in teaching-learning process by improving the students' performance in college of Dryland

Agriculture.

## MATERIALS AND METHODS

### Study location

This study was conducted in Jigjiga University which is one of Thirty two government higher institutions in Ethiopia. Again, Jigjiga University is the first and the only higher institution in Ethiopian Somali Regional State, which is founded in 2007 G.C. The University is serving as a center of excellence in pastoral and agro-pastoral studies and working towards the nation's leapfrogging development. Currently, the University is interior of nine colleges and Dryland Agriculture is amongst the college that serve community stakeholders in teaching effectively, training, conducting research and communities, and different activities in the region (JJU, 2014).

### Data collection

Multiple sources of data were used to better understand of the scope of happenings in the use of modern technologies (LCD, flip charts, sample specimens, smart mobiles, etc.) in teaching learning process in college of Dryland Agriculture. To address the research problem, an inquiry using a qualitative approach was undertaken to ascertain the opinions and benefits of using modern technology in teaching and learning process for students and teachers regarding to their understanding of agricultural course items (theories and practical demonstration), students' achievements or performances, course coverage in planned time intervals and in reduction of drudgery of teachers, and was compared to batch of students with different section and instructors which were not using in teaching-learning process in Agricultural Sciences.

This study was conducted with sample of four departments, and a total of 16 teachers and 240 students' were selected in random basis, with specific reference to the effects and benefits of using modern technologies like LCD, flip charts, sample specimens etc. in teaching-learning process in Jigjiga University college of Dryland Agriculture. The students' attitudes and reactions were documented by the students themselves, by their teachers, and by our own observations and experiences.

### Data analysis

The data was generated by comparing these students' and teachers' attitudes toward teaching-learning by using modern technologies, effects on students' achievements, benefits obtained for both and in improving teaching agricultural sciences. Samples of students' and instructors' were surveyed and selected from four departments on random basis from each class members and their teachers' from each departments and qualitative method of data analysis was used for reporting.

## RESULTS AND DISCUSSION

### Use of modern technology and classroom environment for agricultural sciences

Among student respondents, 25% were read the lecture notes by their smart mobiles in our college (College of Dryland Agriculture). So, long distance learners can easily use their smart mobile phones to attend a lesson in our college (CDA) or any other academic institution; they

**Table 1.** Comparative advantage of using modern technologies in learning process.

S/N	Use of modern technology in learning process and its effects on students performance		
	N	Parameters	% of respondents
1	240	Read the lecture notes on smart mobiles	25
2	240	Make class room environment conducive	100
3	240	Increased students enthusiasm & motivation	88
4	240	Mastering fundamental skills and proficient users of technology	88
5	240	Achievements in exams and tests	90
6	240	Achievements in exams and tests(without) <sup>a</sup>	55

\*N= number of sample size, <sup>a</sup>= without using modern technology in instruction.

**Table 2.** Benefits of modern technologies in learning process for students.

S/N	Benefits of modern technologies in learning process		
	N	Parameters	% of respondents
1	240	Facilitated visual learning using audio-visual films and etc.	100
2	240	Enabled students' to take notes in different forms	95
3	240	Better student presentations of their project works	85

\*N= number of sample size.

can also use the same device to download course units and books for further reading about a specific subject, which made classroom environment more conducive for teaching-learning process. According to our interviews and observation, using modern technologies created a more conducive education environment for both group which encourages students to read more and learn from anywhere in the world. So, these future technologies are being created in mind that they have to be user friendly and also affordable to every students in specific departments in the college or every educational institutions (Table 1).

Generally, these educational technologies were used to tailor lessons based on students interests. Unlike in the past, where students are taught in the classroom what they do not like, in the future, students will learn only what they like most and this will boost innovation amongst students and teachers. This finding is consistent with the results of studies by by Sulla (1999), Muir-Herzig (2004) and Carrillo et al. (2010) which argued that the use of computer-aided instructions like projectors (LCDs) could help in facilitating the knowledge-constructed classroom.

### Effect of using modern technologies and student performance

Among respondents, 88% students revealed that using modern technology in teaching-learning environment, increase enthusiasm in learning, high interest in course items for theory and practical demonstration, that is, motivating students to higher levels of achievement by

decreasing absenteeism, lowering dropout rates, learning easy and quick, mastering fundamental skills (addition of technology in the classroom has helped students master the reading, writing, and math skills that provide a foundation for future learning), becoming proficient users of technology (proficiency with technology affects students' ability to write better, express themselves more clearly, and understand presented material faster and with greater recall) (Table 1). It is evident that 82% of instructors agreed that, LCD, video clips, flip charts facility, made easy teaching in the class for both concepts of the courses (that is theoretical and practical items) (Table 2).

Based on survey results, the use of modern technology has positive effects on some measure of student's achievements in exam and tests when well-implemented modern technology were used in agricultural science. About 90% of students performed better for the same course as compared with in the same batch of students but different sections which (55%) were not using modern technology in teaching. The studies (Hollis, 2004; Mapotse, 2014) supported the tentative finding of this study that there is a positive effects of using modern technologies on student achievement and their interest for attending the classes. In addition to that, it also helped the students in preparing project works, laboratory report, audio-video practical demonstration and assignments for course requirements or for future achievement in higher institution and in the workforce at large.

Of course, as with all educational interventions and practices, a definitive relationship between LCD use and student achievement is challenging to identify and quantify since the link may depends on how the technology

**Table 3.** Comparative advantage of using modern technologies in teaching process

S/N	Use of modern technology in teaching process for instructors'	
	Parameters	% of respondents (N=16)
1	Teaching by using different modern technology like LCD projector	88
2	Made teaching environment conducive	100
3	Facilitated and made easy of teaching in the class for theoretical and practical courses	82
4	Increased time of discussion than chalk and talk; facilitated face to face communication and feedback from students'	91
5	Enabled prior preparation, highly organized notes and re-use of materials	91
6	Enables to manage time effectively than chalk and talk	100

\*N= number of sample size.

is used as well as on how achievement is defined and measured (Table 3).

### **Benefits of using modern technologies in teaching-learning process**

#### ***Facilitate visual teaching aid***

This finding and that of Byrom (1998) and Becta (2009) point out that the use of modern technologies like LCD projector definitely have a number of advantages that would outdo most other visual teaching aids. Among teacher respondents, 91% use it in just the same way as a chalkboard and indicated that using LCD projector facilitated face to face communication in learning for whole class students and maintain eye contact all times with their students instead of having to turn around and write. This eye contact plays a very big role in both facilitative as well as expository teaching, and serves both as a means of receiving feedback from the class on how good or bad the session is and as an outward non-verbal communication medium for the instructors.

#### ***Facilitate prior preparation and re-use of materials***

All instructor respondents revealed that, LCD was used to present prior prepared material, which enables them to prepare lecture notes, tables, diagrams, and so on; and also for using these prepared material anytime, re-use repeatedly with minor modification. It was also used to display information in a variety of formats like graphs, charts, Audio-video forms and flow charts and to ask students to analyze and discuss about it and also capture attention of the students by preparing power point in attractive form and displaying a visually interesting image at conclusion of an activity (Table 3).

#### ***Easier note taking for students and teachers***

Among the respondents 91% of teachers' responded that

these technologies were enabled them to prepare bulleted Power Point presentations or other highly organized notes for the class. With the use of projectors in the classroom, 95% students responded that it enabled them to take better notes with the ability to discuss the most useful concepts of course items effectively (Table 1). Additionally, all the students in the class got chance to asks questions, the instructor to repeat a slide if they missed an information, or even ask that the teacher to email the presentation for further review.

#### ***Greater teaching versatility***

According to respondents, using modern technologies released instructors from being bound to chalk and dry-erase boards to present information to their students. Hence, 100% were agreed that using modern technologies made teaching more versatile. With the use of projectors, instructors use films, slides, and images to teach students about a variety of practical and demonstrative subjects.

#### ***Enhance class time management***

All instructor respondents agreed that using modern technologies in education enabled them to manage time effectively comparatively than chalk and talk (spend time writing notes on the board, as well as erasing it after board filled up) (Table 3). Therefore; by using projectors and others, instructors prepare all notes prior to class for easy presentation and spend less time repeating or rewriting information that is now accessible with a simple click. In our college, this practice facilitated courses to be covered within given interval of time.

#### ***Better student presentations***

Among student respondents, 85% appreciate the use of modern technologies as they prepare class projects that they create in Power point or other electronic mediums

(Table 2). Consequently, students found that presentation creation go faster with each person using their own computer or smart mobile's to create their section of the presentation. Presentations on a LCD projector, additionally, reduce the need to make copies of materials to pass out to classmates during presentations that can be displayed for the entire class to view at once. Generally, using modern technologies like LCD Projector definitely has a number of advantages that would outdo most other visual teaching aids, facilitating instructors' for prior preparation and re-use of materials, enabled them to manage time effectively comparatively than chalk and talk (spend time writing notes on the board, as well as erasing it after board filled up), made teaching-learning process more versatile, save time and allow more time for discussion and feedback which is lined with the report of Hawkins et al. (1996) and Becta (2009). It also promotes active learning for students and improves students achievement or performance for practical agricultural courses.

## Conclusions

Modern technology continues to be increasingly adopted and used by higher educational institutions across Ethiopia. This finding focused on identifying the advantages of using modern technologies in Jigjiga University across the teaching-learning process of agricultural sciences course items and students views on the impact on teaching and learning. The objective of this study was to identify the comparative advantages of using modern technology in improving the student performance in teaching-learning process in college Dryland Agriculture. The summary and interpretation of this finding is that while a majority of respondents from students and instructors perceived effective use of modern technologies in teaching-learning process in agricultural sciences course items have great advantages in improving student's academic performance and instructors in different verges.

Among student respondents, 25% were read the lecture notes by their smart mobiles in dry land Agriculture College which made classroom environment more conducive for teaching-learning process for both categories. The findings also point out the uses of modern technologies was created a conducive environment, 88% of students revealed that using modern technology in teaching-learning process was generally improved students achievement and increased their interest in course items for theoretical and practical demonstration. Whereas, 82% of instructors' agreed that, use of modern technologies facilitated teaching-learning for agricultural course items. It can be concluded that, the use of modern technologies in teaching-learning process highly benefits instructors and increased students participation and motivation than chalk and talk traditional

method when effectively implemented and professionally used in teaching-learning for different agricultural sciences theoretical and practical courses.

It is strongly recommended that due to the course nature of agricultural sciences, advancement in recent modern technology and their crucial role in teaching-learning process in improving the students performance, there is need to have an effective professional development for teachers in the integration of technology into their instructions to support student learning. There is also a need to tackle the main challenges like shortage of this technology and auxiliary materials and breaks of power supply to use it effectively in class in higher institutions of Ethiopia like Jigjiga University.

## Conflict of Interest

The authors did not declare any conflicts of interest.

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