ORIGINAL ARTICLE

Assessment on the impact of plasma television implementation on the teaching learning process of mathematics class: the case on selected practicum sites (high schools) for education faculty of Jimma University

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ABSTRACT

The progress of science and technology is the major areas where society comes up for essential means of solving problems, adaptability to the environment and bring civilization by developing the necessary knowledge, ability skill and attitude. Mathematics education is then the basis of all field of sciences be it social or natural science. Hence teaching Mathematics at high school levels should be given due emphasis so that students could easily manage their further studies in different fields of higher education institutions and further contribute towards the development of the society/country. This cross sectional study, assessing the impact of plasma television implementation on the teaching learning process of mathematics class was assumed significant as the curriculum of education is being made a shift towards active and participatory learning; since the current natural need is to implement active learning in every class activities not only in secondary schools but also in higher learning institutions. Hence supporting this new teaching aid; plasma TV by designing appropriate methodology inevitably essential and hence strong contribution to the country at large.

Consequently, the study was focused on the selected high schools around Jimma University centers for practicum training. Mathematics school teachers, and students at different grade levels were the subjects for this study. The data were collected using self administered questionnaire directed to students and mathematics teachers, and randomly selected class observations of mathematics classes from May to June 2005, and the report completed on June 2006.

As the result indicated, the plasma TV was found strong support of active learning in mathematics classes at high schools with all its odds and cones; specially uniform lessons and contents through out the country, and supplement the laboratory activities bringing the rural areas closer to same level of the urban. On the other hand, introducing TV lessons in high schools created several new implementation problems like lack of coordination with the teacher, fast to understand, inappropriate planning of the lessons, inefficient utilization of the technology, misunderstanding as if the plasma TV present the lessons independently by it self with out the involvement of the teacher and the like which need adjustment some how.

Thus in this study it is recommended that; effective planning of the TV lessons and maximum utilization of the technology must be designed and implemented; the teacher must work hard in his or her lesson plan to go hand in hand with the TV support and make delivery active and interesting. For this, the teacher training institutions like Education Faculties must change their methodological courses accordingly. Besides awareness and refresher short training programs must be designed to school teachers and even to the student population at large to avoid frustration.

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INTRODUCTION

As indicated in the education and training policy document, education is a process by which one transmits his/her experiences, new findings, and values accumulated over years, in the struggle for survival and development through generation.

The main objective of educational system is to cultivate the individual capacity for problem solving and adaptability to the environment by developing the necessary knowledge, ability, skill and attitude. [1, 2]

The greatest impact to education in the history of instructional technology came from the 2nd World War where efforts was made to teach various skills to the military. Soldiers had to be recruited and trained to be ready for action within the shortest possible time. Next the invention of the computer and programmed instruction were applied to education with encouraging results. Correspondence education later developed into distance education that we have today. While correspondence education utilized print materials and programmed instruction, distance teaching has incorporated a variety of media to achieve educational results [3, 4].

The progress of science and technology is the major areas where society comes up for essential means of solving problems, adaptability to the environment and bring civilization by developing the necessary knowledge, ability skill and attitude [1,2]
Mathematics education is then the basis of all field of sciences be it social or natural science. Hence teaching Mathematics at high school levels should be given due emphasis so that students could easily manage their further studies in different fields of higher education institutions and further contribute towards the development of the society/country.

It is a mere fact that the standard of education in Ethiopia has been declining both in terms of quality and quantity for some decades. During the previous governments, there were a lot of complaints that the system is unable to produce competent educated human power due to impoverishment of facilities, shortage of instructional

materials, shortage of teachers and qualified teachers.

The concept "new technologies" recognizes that technology improves all the time. New ideas are all the time being introduced by industry and these should be applied to the process of education in order to help in resolving problems that educators are challenged with. The new technologies applied to education should be considered within the socio-economic context of each country [3, 4].

As time goes on, the rapid break throughs in new information and communication technologies will further change the way knowledge is developed, acquired and delivered. It is also important to note that the new technologies offer opportunities to innovate on course content and teaching methods and to widen access to learning [5].

As a result, the ministry of education introduced a new educational policy, the new curriculum followed by the introduction of new technologies like plasma television at government high schools [6].

As the present situation reveals, it has been long since the system of education in Ethiopia had been criticized for its traditional methods of teaching and learning. This is because there had been no revision made on the system for a long period of time to come to student centered making the teaching and learning process active and more of practical and participatory. Specially, comments had been given that it was not focused towards solving the problems of the society.

Hussen Eshetu in his article enhancing students involvement suggested that variety of techniques is very much helpful for achievement in shifting sensory channels by addressing pupils' different senses through the use of audio-visual materials like the plasma TV currently installed in large number of government secondary schools; reminding us that the stimulus variation need not be random, but carefully considered by the teacher [7, 8].

One venture that the ministry of education recently taken was to revise the curriculum of education at all levels, elementary, secondary, and tertiary, then

planted plasma television in most government high schools and has a plan to plant throughout in all government high schools in Ethiopia as one of the element of the change which costed a lot of money to buy plasma televisions for the government of poor country to venture.

The plantation of plasma TV at all this expenditure was done on the assumption that the system of education must be changed to active learning by using modern technology which brings us close to advanced world bringing every corner of Ethiopia where high schools coming together at equivalent better standard.

As part of this, teaching Mathematics using the TV is the concern of teacher educators of Mathematics in the faculty of Education. Consequently make an investigation in this respect and design additional and effective teaching methods on how to use the TV in Mathematics classes at high schools. On one hand, teachers produced in these faculties should be equipped with appropriate techniques of using the TV and to discover what these would be teachers do and need to be able to do and on the other hand to devise a means of assisting the existing high school teachers through short term training and the like.

It is a great leap that ministry of education (MOE) started to change the system of the previous Ethiopian education. One of which is to support the teaching learning process of secondary school using plasma televisions which is at this moment planted in most government high schools of Ethiopia. For the plantation of plasma television, the government invested a large amount of money to show its great concern to the improvement of Ethiopian education. Till now no previous governments in Ethiopia had tried to expand education at this rate so far. Thus any citizen in favor of the development of Ethiopia must be wise to support the development/change of the educational system, and hence the teaching-learning system of the high schools to the effect of plasma TV.

Since 2004- 2005 academic year, plasma TV lessons have been implemented in Ethiopian high schools with its problems of implementation along side with its merits. In this line therefore, teacher training institutions like university

faculty of education, and teacher training colleges are to be warned about the type of the methods of teaching they used to train the would be teachers corresponding to the new paradigm shift, using plasma TV in teaching and learning process. Accordingly, the need of constructing new or modified teaching methodology based on investigation is inevitable for the respective disciplines.

Fenemma and Frank stated in the article, the general belief is that teachers must learn more their subjects .The higher the level of the subject a teacher knows the better he or she becomes efficient. This however may not be necessarily true; as sited by School of Mathematics study group, 1972; Eisenberg, 1977; General Accounting Office, 1984 stated in Fenemma and Frank, 1992.

Catherine P.Vistro-Yu writes in her article that studies have shown that what teachers do in the class room, how they teach, how they make decisions all have as much influence in their effectiveness, as do their content knowledge. Certainly, the amount of Mathematics content that the teachers know affects their ability to respond to students dilemmas involving the how and why of learning Mathematics. However pedagogical knowledge in the subject is that kind of knowledge that a teacher uses to deal with the everyday task of teaching and relating to students in the class room [9].

As indicated in education sector strategy of the country, about 60% of the teachers in senior secondary schools teaching different subjects at this level are at risk in their academic qualification. More over, high schools are also plagued with shortage of books, references and laboratory equipment for study in various disciplines. School teachers are also inadequately trained. It is this scenario which forces the government of Ethiopia to plant plasma Television in secondary schools so that the objectives of the New education policy (1994) goals can be achieved. With all these and other problems the government is trying to equip all government high schools with plasma TV to improve the teaching-learning process. Since the introduction of plasma television is new for our country, not only the unqualified 60% of the school teachers but also the qualified 40% of them, all in one, will have a new challenge in methods of utilizing the TV appropriately. Thus, like any of the

subjects supported by TV, teaching Mathematics through the TV will become a very difficult task for the school teachers. This difficult task or challenge is not only the challenge of the school teachers but also it is of the challenge for teacher educators, the faculty education at tertiary level.

As its implementation observed during practicum, problems were observed in utilizing the plasma TV right in the class, both in methodology and material preparation. Some of these problems were: It is too fast to take notes and to do exercises, difficult to understand due to communication problem, it does not consider individual differences, it does not give time for the teachers to help us, power interruption and students expectation, appropriate use of the technology at hand, early preparation, etc. These observed problems at some of Mathematics classes of the high schools lead the initiation of the investigation on the impact of the TV on the teaching-learning process at hand.

Since the introduction of plasma television is an issue that concerns many people, the faculty of education in universities must be the vanguards to investigate such cases, come up with appropriate recommendations, and design possible solutions in support of the appropriate utilization of new technology by producing new methodological tools.

This study was then focused on the general objective, which was to evaluate the impact of plasma TV on teaching methods of Mathematics classes and develop a means to assist the methodology. It was specially geared to the specific objectives to;

- Determine the strengths and weakness of the TV lessons; factors influencing the teaching and learning process.
- Determine the advantages and problems encountered by the teacher, student due to the TV introduction.
- Identify the strengths and weaknesses of the TV implementation in preparation, maximum utilization of the technology, methodological influence on active learning method.
- Assess the reaction of parents to this innovative movement

- Identify the limitations of Plasma Television
- Gather detailed information to be used as a basis for judging plasma TV effectiveness
- Identify any supporting materials in favor of the TV lessons.
- Forward suggestions that would support the teaching learning activities and design appropriate methodological support to be incorporated.

The study was assumed significant as the curriculum of education is being made a shift towards active and participatory learning. The current natural need is to implement active learning in every class activities not only in secondary schools but also in higher learning institutions. At this juncture, investing a huge amount of money for buying plasma TV is an indicator for the commitment of the government to improve the teaching-learning process. Hence supporting this new teaching aid; Plasma TV, by designing appropriate inevitably essential and hence strong contribution to the country at large.

METHODS AND PROCEDURES

Population and site : Jimma University Education faculty practicum sites, eight high schools implementing plasma television (TV), were planned appropriate for this study out of which six of them responded properly (Jiren, Jimma Technical and vocational, Dedo, Yebu, Agaro, Asendabo high schools). The rest two schools (Serbo and Seka high schools**)** could not respond to the questionnaire since the time was a final year examination period and due to the inconveniences of May, 2005 election hence not appropriate to get the attention of students. Mathematics school teachers, and students at different grade levels were the subjects for this study. Prior to the study, one Mathematics school teacher was selected as a research assistant and explained the purpose of the study, standard procedures of collecting information through the questionnaire given and provide assistance to the students and mathematics teachers how to use the instrument. The study was conducted from May to June 2005 under the grant awarded by the Faculty of Education , Jimma University based on TDP fund.

Study design and sampling: The study was cross-sectional; high school students

randomly selected based on the grades 9, 10, 11, 12 where by 50 students each taken from grades 9 and 10 while 20 students each from grades 11 and 12; females given attention proportionally. Samples were fairly distributed to all sections not more than 5 students / section in most cases. The procedures utilized were designed to ensure that all students had equal chance of being selected in the sample. Besides, since the number of Mathematics teachers were very few ranging 3 to 10 in each high school all of them were taken to give their views even though some of them did not respond due to unknown reasons.

Data collection and Analysis: Data were collected using self administered formatted questionnaire and randomly selected class observations. The study was focused mainly on strong and weak sides of plasma TV implementation. Variables, like: strengths and weaknesses of the TV, number of students in a class, teaching and learning facilities, supply of text books, power supply, staff qualification (Status & experience), the TV affecting the teaching-learning activity of Mathematics classes, strong and weak experiences encountered by teachers, methodology, technological advantage, time management, flow of program and interruptions, coherence with the syllabi, open suggestions for improvement were considered. Data were summarized and analyzed using SPSS-PC computer software package; based on basic statistical methods like chi-square test.

The consent of the schools' authorities were approached to conduct the study through official letters of the university regarding ethical consideration. The consent of the school community were also confirmed before the study for ethical clearance.

RESULTS

I: Background and results from students response

Out of 8 high schools appropriate for the study utilizing plasma TV, six of them responded as planned. From the six respondent schools two of them Agaro and Asendabo high schools consisted 9^{th} to 12^{th} grade students and Jimma Technical Vocational School (JTVS) had students of 11^{th} and 12^{th} grades only while the other three had grades 9^{th} and 10^{th} only.

Distribution of student respondents by school and grade

Table-1

School	9th grade	10th grade	11th grade	12th grade	Total	
					Number of students	**%**
JTVS	-	-	33	22	55	9.3
Jiren	50	51	-	-	101	17.0
Dedo	52	51	-	-	103	17.1
Yebu	47	43	-	-	90	15.2
Agaro	50	51	20	20	141	23.0
Asendabo	47	36	14	4	101	17.0
Total	246	232	67	46	591	100
%	41.6	39.3	11.3	7.8	100	

Out of a total of 591 student respondents, 73.6% (435) and 25.7% (152) were found to be males and females respectively, the rest 0.7% (4) students did not mention their sex.

According the demographic questions to identify the students age, 577 exposed their age to the question, and 83.7% of them were between 16 and 20 inclusive where **as** the maximum and minimum ages were respectively 28 and 13. In line with their sex, 576 of them responded for their sex identification and majority of the females 99.3%(150) were at most 20 years of age. The ratio of male students to female students was about 3:1. Proportionally, the Asendabo high school consisted relatively more females compared to other schools but in the rest schools females ratio was very much low in comparison to males. Students were asked to give their views on the changes observed from plasma TV lesson; by saying yes or no corresponding to 17 teaching learning activities listed and 570 of them responded for it. Accordingly, more than 80% of them suggested that there is a change in teaching learning process in

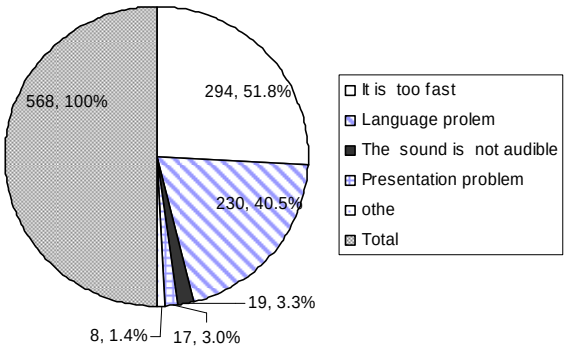
general and sufficient teaching aids are presented in particular. Again more than 70% of them suggested that the application of TV minimizes material wastage, lessons are organized, contents and topics are completed with in the allotted period of time, appropriate class exercises is given, and it supports the teachers teaching activity. On the other hand, 57.6% said the lesson was not understandable, 65.8% complained that the allotted time for lessons were not appropriate. Moreover 82.1% of them forwarded that sufficient teaching aids were presented (Table - 2)

Rate of change /improvement of mathematics class teaching and learning by plasma TV.

Table-2

Change made by plasma TV	Yes		No		Total
	#	%	#	%	
It Changed the teaching learning process	482	82.7	101	17.3	583
It encourages students to participate	334	57.5	247	42.5	581
It motivates the students learning	380	65.5	200	34.5	580
Minimize material (cost) wastage	424	72.6	160	27.4	584
Students are disciplined	338	58.2	243	41.7	581
The lessons are interesting	372	63.8	211	36.2	583
Sufficient teaching aids are presented	468	82.1	102	17.9	570
It give chance for students to discuss in groups	356	62.1	217	37.9	573
The lessons are well organized	411	73.5	148	26.5	559
The lessons are understandable	242	42.5	328	57.6	570
It makes students alert and active	292	51.2	278	48.8	570
The lesson is appropriate with in the given time	196	34.2	377	65.8	573
It finishes a content (topic) with in the allotted time	432	75.9	137	24.1	569
It gives appropriate class exercise that students can do	422	74.6	144	25.4	566
It gives appropriate home work	325	57.1	244	42.9	569
It supports the teachers' teaching activity	426	74.5	146	25.5	572
It gives time for the teacher involvement to help his/ students	313	54.9	257	45.1	570

The majority of students 351 out of 567 have difficulty to understand the lessons offered by the plasma TV by choosing from the given parameters: very often, often, sometimes, rarely, not at all. Among these 38%(216) sometimes understand the lesson offered by the plasma TV 26%(148) of them did not understand the lesson presented at all or rarely. From the total respondents who did comment that their understanding of the TV lesson rarely or not at all, most (51.8%) reasoned out that the TV lesson was too fast to follow and some(40.5%) said that they had language problem (figure-1).



Reasons not to understand the lessons presented by TV rarely or not all

Figure -1

Students were requested to rate the impact of the TV lesson on time management, the presentation of variety of materials and teaching aids, the appearance of the TV presenter on the screen. According to their view, the time management was found poor and very poor at the rate of 36.2% (208); fair at the rate of 35.7%. On the contrary the variety of materials and teaching aids were frequently (always and most of the time) appeared at the rate of 63.7% (363). As of the appearance of the TV speakers on the screen 75.6 % (433) of them agreed that he /she appeared always or most of the time. To assess the observation of the students on the quality of utilizing the TV when preparing the lesson, certain points were raised and consequently 27.2% (161) of

them agreed that the presentation had no any innovation and was just like things happening on the black board in the olden days. Besides, 70.6%(417) suggested that the presentation was not supported by the technological facility that could be used by the TV like animation, colorful, glittering etc. Besides, 32% (189) could not see the written material on the screen from every corner of the class (Table-3).

Quality of TV presenting mathematical formulas and statements on the screen Table-3

Item	No	%
• Just like on the black board	161	27.2
• Words and statements animated	417	70.6
• Small and are not readable from every corner	33	5.6
• Appropriate to be seen from any corner of the class	189	32
• Not readable from far behind	24	4.1
• Others	7	1.2

According to the students observation 62% (353) of them agreed teachers always or most of the time used English as means of teaching media, only 2.6% said that they did not use at all. Moreover 18.6% (110) of the students did not understand the TV English media at all or they did understand it rarely. On the other hand, 40.5% (225) of them understood the TV media at most or always.

As indicated in Table-5 students revealed their feelings on the weakness of the plasma TV classes by agreeing or disagreeing on the selected important class activities listed. Accordingly majority of them agreed or strongly agreed on many of the items like poor time management (69.7%), communication problem (57.3%), too fast to listen (70.3%),no time to get support from the teacher (73%), too fast to take notes (80%), short time to do class works (72.7%), cannot replay back once missed (89.3%), etc.

Rate of Weakness of the plasma TV (Cases that needed improvement)

Table-4

	Strongly agree (%)	Agree (%)	Some how (%)	On and off (%)	Disagree (%)	Strongly Disagree (%)
Poor time management	157(31.8)	187(37.9)	3(0.6)	1(0.2)	104(21.1)	41(8.3)
Communication not understanding	92(19.1)	184(38.2)	3(0.6)	1(0.2)	159(33)	43(8.9)
Too fast to listen	136(29.1)	193(41.2)	5(1.1)	4(0.8)	94(20.1)	36(7.7)
Class work is difficult to solve	128(28.1)	180(39.5)	2(.4)	6(1.4)	108(23.7)	32(7)
No time to get the support teacher	136(30.1)	194(42.9)	3(.6)	5(1.1)	78(17.3)	36(8)
Too fast to take notes	182(39.1)	190(40.9)	2(.4)	2(.4)	48(10.3)	41(8.8)
No enough time is given to do class works	144(31)	194(41.7)	3(.6)	2(.4)	77(16.6)	45(9.7)
Lesson is not audible	80(17.8)	130(28.9)	1(.2)	3(.6)	143(31.8)	93(20.7)
Can not replay back	174(37.4)	181(38.9)	3(.6)	-	63(13.5)	44(9.5)
Exposed for external disturbances	93(21.1)	124(28.2)	2(.5)	2(.5)	139(31.6)	80(18.2)
Not clearly observable/ no clear image	93(20.7)	123(27.4)	2(.4)	11(2.4)	131(29.2)	89(19.8)

As to how good was the TV presentation, 57%(321) students suggested that the TV lesson was good and very good compared to the teacher's lesson, where as 25.6% said fair, only 17.4% said poor and very poor. The teachers method was assumed to give highly more (39.4%) chance to student participation as compared to TV method (29.5%) where by 26.4 said both gave more chances to student participation.

On the other hand, the TV lesson was suggested to have more variety of appropriate materials (75.7%) than the teachers. More over, 57.5% (317) students said that they could not understand the TV lesson with out the presence of the teacher. 57.2% of students rated that the TV interrupted

rarely and not at all, 30% sometimes. During the TV lesson, the level at which the teacher played his /her role in the class room rated good and very good by 55.3% (307), and 28.1% fair.

As to how frequent the teacher gives introduction before the TV lesson, 40.7% of them said rarely and not at all, 27.3% sometimes. Similarly, only 22.7% said that their teachers gave conclusion, rarely and not at all. As to the case of the teachers moved round the class to help students was rated 30.9%(171) under sometimes which was the highest and then 24.4% rarely; 37.4% said teachers were more active always and most of the time. Most of the students 66.1% (357) did not get text books at an individual level, they rather shared with their class mates.

Respondents also suggested that changes must be made in the teaching and learning activities of the TV involvement in Time management (49), Teachers task (23), teaching materials (21), Lesson preparation (13), Communication (25), Active learning (14), Class exercise (12), Home work (15), Others (4); the numbers indicating the number of respondents.

Opinions of students on several issues of the plasma TV implementation based on open ended questions

Students were asked to suggest on several issues like the strong and weak sides of the plasma TV implementation in teaching mathematics at high school level. The open ended questions that asked students to give reasons on closed ended questions, contributions of teachers, modifications, etc. Accordingly, the following points were raised; the numbers along each point or issue indicating the magnitude of the respondents and one if empty.

Strong points of the plasma TV implementation in teaching mathematics

- **Acceptance of the students progress** (242)

It completes the portion within the given period of time and we know many things in one lesson, we understand the use of time management, rather, it pushes students how to use their time properly. It encourages and advises students to work hard. It uses variety of teaching materials, variety of examples, variety of exercises, and tries to make the learning active and student centered, and encourages group discussion. It shows

us better graphs and models of actual objects.

- The contents and methods are standard which is nationally prepared (2)
- It gives us some challenging exercises and additional concepts out of the text book (5)
- Encourages the students to upgrade their language proficiency (1)
- It forces teachers and students to come to class on time, to read the text before hand (2)
- It supports the teachers to get rest (3)

Weak sides of the TV lesson on teaching mathematics that need improvement

- Too fast to understand and follow the lesson. It gives short time to take notes, to discuss in groups and do exercise. The time given to discuss among students and to get the help of the teacher is not sufficient. It's time management is weak in general, the time given to do exercises does not consider the level of difficulty of the exercises (329).
- We do not clearly understand what is said through plasma TV; we have language problem for communication, may be pronunciation problem to understand (28).
- We are not comfortably utilizing the support of the teacher. No sufficient time for the teacher for his/her introduction, guiding students in class activities, summary and conclusion. More than that, it makes the teachers lousy; some of them simply open and sit and finally close the TV. It pushes the teachers not to work and improve themselves, they forgot the teaching. Some teachers do not help us when the plasma teacher gives us class work and they concentrate on the process. Some of them usually come to class with out preparation (27).
- The power interruption is frequent, at that time we lose the session difficult to rewind, discontinue in the middle of the lesson either due to power

failure or simply by itself connection or failure from the transmission (33).

- In-appropriate provision of exercises sometimes, very easy exercises and sometimes very hard that discourages us, not balanced. Sometimes the issues are not relevant, they are out of the text. It does not give enough notes. All exercises are from the text, it must include additional exercises out of the text book (8).
- The presentation system is not appropriate. The TV presenter is like news reader, there is no action or movement. It is boring to listen to it all the period, it affects our eyes. It makes us weak, frustrated, some of us do not like it. It makes us to dislike mathematics. We feel that we can not pass any examination of mathematics after learning by TV. Sometimes the sound is difficult to hear, not clear. It has no capacity to attract the attention of students. We spend lots of time to find the channel (12).
- It is not appropriate for those students who are sometimes absent due to convincing/justifiable reasons like those coming from very far distance (2).
- Other weakness like: teachers should support the TV properly when the **lesson is** below standard; we simply sit and look at it. Plasma is not good. It will destroy generation, no chance to ask plasma TV teacher when we have some questions (14).

Reasons why the understanding of TV lessons is poor (rarely or not at all)

1. It is too fast when speaking and seems media reading (3)
2. The junior high school background of students is weak and so it is our own weakness (2)
3. No clear image during some presentations in the class (2).
4. Teachers do not get enough time to interfere and support the TV, and hence no enough discussion time. Since we are

large in number, we could not get enough support from the teacher (7).

5. There is a disturbance outside the class while the TV class is going on. There is also interruption (3).

How the TV technology is used appropriately when presenting graphs, formulas, animated, colorful etc

- They are very small and fast to be seen (10)
- It is appropriate, good and colorful (9)
- Too long formulas are presented. Hence it is difficult to catch up (3)

The Role of teachers in supporting plasma TV lessons without which the Plasma TV cannot teach completely

- Teachers explain concepts more and answer questions for things we do not understand. They give us appropriate examples and change them right away when there is a need to moderate the class. Teachers could read from our faces when we do not understand (119).
- Class management and control of discipline can only be done by teachers, late comers could only be seen by teachers (107).
- 3. Best teachers could make the class interesting, enjoyable as flexible as possible. TV works mainly to finish the subject or topic but the teacher focuses more on understanding (6).

Why the teachers role is poor or very poor?

- Some teachers do not do their job properly; they do not get prepared due to TV presentation. They think TV reduces their work and it makes them lousy. They sometimes come late after the TV started (123)
- Some teachers are below standard. Most teachers are not happy with the TV. We do not know the reasons. If they are asked questions they will say I am looking to the TV like you. It would be better if you shut up and pay attention to the TV (3)

- In the TV lesson, the time given for the teachers to play their roles is too short (27).
- Students attention will be diverted from the TV if the teacher interferes (1)

Changes to be made on TV lessons regarding the activities listed in the questionnaire :

Students were asked to suggest their views on modification of the TV lessons given some specific teaching and learning activities.

1. **In line with time management**

- To fast to follow, understand and do exercises. It has to give more time for activities and discussion (309).
- Avoid repetition and adjust the time given when contents are difficult to understand (8)
- Give time to the teacher for introduction, conclusion and consolidation. Equal time should be given for TV and the teacher (3)

2. **In line with Teachers' task**

- Teachers must get prepared before coming to class. They must give proper introduction, conclusion and summarization. Teachers must interfere while TV lesson is going on (11).
- Special support like tutorial must be given to students after TV for reinforcement. Teachers should have close relationship with students and help them (6).
- Teachers must be alert and active in the class. They should help students and give variety of exercises (9)
- Students should get enough text books and materials (2).

3. **Regarding material change**

- Provide some more teaching aids (9).
- Students should get text books, and student guide (4).

4.**Lesson plan**

- Teacher should prepare and follow lesson plan regularly (51)
- Teacher should give a lot of exercises, drill in the plan (3).

5.**Communication**

- We have problem in English communication with TV. So the TV presenter has to use simple English, slow when speaking, and adjust the pronunciation and make it clear (165).

- Teachers who did not use English at junior level must use English to give us base in understanding English (3).
- We ourselves must work hard (1)

6. **Students active learning**

- The active learning is very low, must use verity of activities, exercises. Teachers should participate (6).
- Students participation must be encouraged and improved (137).

7. Class work /exercises/

- Sufficient time must be given to do class work (148)
- Class work must be given frequently (36)
- The TV does not help students to do the class work so teachers should help to do class work (14)
- Let plasma instructor give hints while we are doing the exercises. We students should do class works by ourselves (6)
- Additional challenging problems must be given, and the teacher must help students while students are during exercises (5)

8. **Home work**

- So far very few home works are given but it must be given regularly and checked. It has to give sufficient explanation before giving the homework and we must get feedback from our homework trials (181).
- Plasma is too fast when doing the home work. Make it slow. We need guidance on how to do the home work (3)
- We students must work hard and try the given home work. Usually we come to class without trying the homework. Challenging problems must also be added (3).

9. Other modification on the TV lessons

- When classes are conducting in full day give additional classes to support the lessons given by the plasma television (2)
- The TV teacher is talking only, she/he must be active.
- Try to solve the problem of power interruption .
- The TV lesson must be planned in such a way that it should take into account individual

differences **(**slow, average, and fast learners)

- Add some tutorial classes.
- Teachers must come early to class before TV starts and give introduction; specially in mathematics and English.

10. How appropriate is the TV lesson in general terms (general comments)

- It is in general good (193)
- Very good (15)
- The graph presentation is beyond our capacity there must be enough space and it has to show how the graph is done (6)
- Formulas should be written in short form (3)

II: Results from Teachers' Response

All the mathematics teachers of the six high schools were approached to respond through the self administered questionnaire distributed as planned, but some teachers were not voluntary to give their response to the questionnaire. Even though the number of mathematics teachers in each school ranged from 3 to 10, only 30 of them responded. The maximum respondents were observed in Jimma Technical and vocational and Agaro. Fortunately, 4th year mathematics students of JU who experiencing the plasma TV lesson during the teaching practice were involved in the study giving their view on plasma TV. As a result, a total of 49 teachers responded for the study of which 30 were school teachers while the rest 19 fourth year student teachers. Only 3 female students participated out of 48 respondents who indicated their sex. The youngest teachers were of age 21 while the oldest 49 years old, the average 31 years old (st. dev. 9.5). Majority of the teachers were young and below 40 of course 19 out 47 of them were prospective graduates of JU.

Of these respondents 62.2 %(28) of them were 1st degree holders where as 19 of them were senior students JU graduating soon. But when taking the school teachers only the degree holders and diploma holders were fifty - fifty, that is, 53%(16) diploma holders. Of the total 29 school teachers who responded for their teaching experience the minimum was 2 years service and maximum 26 years, at the mean of 16.62 (st. dev. 7.3).

Teachers were asked to estimate the maximum and minimum number of students per class in their schools. Accordingly, the maximum was seen (110 students / section) in Jiren high school while the minimum 40 students / section in Agaro school. Usually the preparatory schools had the minimum number of students while 9th grade consists of the maximum number of students per section. School wise the highest maximum number of students per class was found in Jiren (110) while the least maximum in Jimma Preparatory School (58); where by the highest minimum was found in Jiren school (96) and the least in Agaro school (40). At an average estimation the highest average number of students was found in Jiren school (100) while Jimma preparatory consisted the lowest average number of students (50) in a class (Table-5).

Average No of students in class **Table- 5**

Number of students in section	Frequency	%
≤50	11	25.6
51-70	9	20.8
71-90	20	46.5
>90	3	7.1
Total	**43**	**100**

Like in the students questionnaire, several items were raised to know as to how the plasma TV lesson in mathematics changed the teaching learning activities. Teachers were asked to give their response by saying yes or no, and their agreement or disagreement on the weaknesses of the TV listed (Table-8).

Accordingly, 91.8%(45) teachers supported that the TV lesson changed the teaching learning activity positively in general. In particular, 85.7% said that the lessons were interesting, 95.8% said

it minimized cost of materials, where by 77.1% said the lessons were supported by sufficient teaching aids. More than that, 79.6% suggested that the lessons were well organized, 77.6% suggested that the lessons were understandable, 91.7% supported that the TV lessons made the contents to be covered in appropriate time, and 98% agreed that it supported the teachers' teaching activities. On the other hand, 51.1% said students were not active and alert, 55.1% of them said that the lessons presented will not be covered with in the given period of time.

Change or Improvement of mathematics class made by plasma TV rated by teachers

Table-6

Issues on teaching activities	Yes		No		Total
	#	%	#	%	
It changed the teaching learning process	45	91.8	4	8.2	49
It encourages students to participate	26	55.3	21	44.7	47
It motivates the students learning	27	58.7	19	41.3	46
Minimizes material (cost) wastage	46	95.8	2	4.2	48
Students are disciplined	26	54.2	22	45.8	48
The lessons are interesting	42	85.7	7	14.3	49
Sufficient teaching aids are presented.	37	77.1	11	22.9	48
It gives chance to students to discuss in groups.	24	51.1	23	48.9	47
The lessons are well organized.	39	79.6	10	20.4	49
The lessons are understandable.	38	77.6	11	22.4	49
It makes students alert and active.	23	48.9	24	51.1	47
The lesson is appropriate with the given time.	22	44.9	27	55.1	49
It finishes a content (topic) with in the allotted period of time.	44	91.7	4	8.3	48
It gives appropriate class exercises that students can do.	32	68.1	15	31.9	47
It gives appropriate home work.	38	77.6	11	22.4	49
It supports the teacher involvement to help his/her students.	48	98.0	1	2.0	49
It gives time for the teacher involvement to help his/her students.	26	54.2	22	45.8	48

As to the question raised to suggests on how often students understood the TV lesson, () 18.4% teachers suggested that students understood the TV lesson often, where by 48.9% supported that students understood the lessons rarely and not at all. For this 48.9% responses were required and accordingly, 42.9% (21) of the teachers commented that the problem was not only the TV was too fast to follow but also students have language problems. Since the TV presentation was assumed to be very fast, teacher were asked to evaluated its tome management in each presentation of a session; given to evaluate very poor, poor, fair, good and very good. As a result, 52.1 %(25) of them suggested that it was good and very good while 27.1% said poor and very poor. Similarly, teachers were asked to rate different items observed during plasma

TV presentation using the rating value; always, most of the times, sometimes, rarely, not at all. Accordingly, 64.6%(31) of them supported that it utilized variety of materials and teaching aids while only 4.2% said rarely. Similarly 53%(26) of them said that they often introduce their next lesson. On the contrary, only 27.1% (13) said the TV lesson interrupted at least rarely, the rest 73% said the lesson interrupted sometimes (64.6%) most of the time and always. The quality of the TV presentation in line with utilizing the maximum possible available technological facilitates was inquired by raising questions to evaluate as to how written materials, statements, mathematical formulas were used or attributed in the screen. For this, five choices were given where by a respondent could select more than one. So, 16.3% (8) said it was presented just like on the blackboard, 57.1(28) said words and formulas were magnified by glittering, animated, moving and colorful presentations while 59.2% (29) confirmed it was appropriate to be seen from every corner of the class.

Eleven items assumed the weakness of the TV lesson were listed to be rated by the teachers using the parameters, strongly agree, agree, disagree, strongly disagree (Table-9). Thus, 55.1% (27) disagreed that the TV lesson was having poor time management, while 73.5%(36) supported the same parameters against the idea that TV lesson communication was not understandable, but 58.7% (27) agreed it was too fast to lessen. Similarly majority of the respondents disagreed or strongly disagreed on weakness like; lessons were not audible (93.6%), exposed for external disturbance (66.7%) not clearly observable/clear image (93.8%), class work difficult to solve (71.4%). On the contrary, majority of the teachers agreed or strongly agreed on the TV weakness such as, no time to get teachers support (75.5%), too fast to take notes(95.9%), no sufficient time to do class works (79.6%), one can not replay it back (79.2%).

The weaknesses of plasma TV in mathematics class rated by teachers

Table-7

Expected weaknesses	Strongly agree	Agree	Disagree	Strongly disagree	Total	%	
						AG+	DA+G
Poor time management	11	11	19	8	49	44.9	55.1
Communication is not understandable.	3	10	29	7	49	26.5	73.5
Communication is too fast to listen.	6	21	17	2	46	55.1	44.9
Class works are difficult to solve.	4	10	30	5	49	28.6	71.4
No time to get the teacher support.	15	22	12	-	49	75.5	24.5
Too fast to take notes.	27	20	2	-	49	95.9	4.1
It does not give enough time to do class work.	13	26	10	-	49	79.6	20.4
The lessons are not audible.	1	2	25	19	47	10.2	89.8
Can not replay it back.	16	23	9	1	49	79.6	20.4
Exposed for external disturbance.	2	14	24	8	48	34.7	65.3
Not clearly observable/ clear image.	1	2	24	21	48	8.2	91.8

*AG+: Strongly agree and DAG+: Strongly disagree and disagree

Important issues facilitating the teaching learning activities were raised to be evaluated by assuming yes or no. Hence, 7**3.3** % (33) said that there was no teacher guide at individual level, 78.3% (36) confirmed that they did have the objectives of the next session to be on air, 95.9% (47) did think that the concepts of the TV lesson and the text are the same, 52.2% said students had no texts at individual level, the existence of the external disturbances were 50 - 50 in percent, 85.4% (41) did not think the time given to do class exercise was sufficient, 97.9% confirmed that the TV assisted the teacher in teaching , 68.8% no enough time for introduction, 89.6% there existed enough exercises to help understanding, 74.5% no enough time to discuss main points (Table-8).

The existence of activities and materials to facilitate effective teaching and learning rated by teachers

Table-8

Issues /Materials	Yes		No	
	#	%	#	%
Availability of teachers guide at individual level	12	**26.7**	33	**73.3**
Teachers know objectives of the next session to be aired	36	78.3	10	21.7
TV and text book concepts are the same	47	95.9	2	4.1
Students have texts at individual level	22	47.8	24	52.2
There are external disturbances of TV lessons	22	50.0	22	50.0
The time given is sufficient to do class	7	14.6	41	85.4
The TV assists the teacher in teaching	47	97.9	1	2.1
There are enough time to give introduction	15	31.3	33	68.7
There are enough exercises to help understanding	43	89.6	5	10.4
Do you have enough time to discuss main paints with students	12	25.5	35	74.5
There are enough home works	21	44.7	26	55.3
Students do attend the TV lessons properly	17	36.2	30	63.8
Students copy key terms during TV program	20	41.7	28	58.3

Teachers response on open ended questions

Like that of the students, teachers were also given open ended questions on some important issues to give their views freely. Some of the important points focused on were; strong and weak points of the TV lesson, what to improve on the issues of interest, etc the detail presented below.

Teachers view on strong parts of the plasma TV

The following strong points of plasma TV lessons were suggested by teachers the numbers showing the frequency.

- **Supports effective teaching and learning activities** 75.5%(37)

Plasma TV introduced advanced technology which is enjoyable for both rural and urban students bringing younger generations close to the new world. Further more it is a special type of material supporting the teaching learning process showing variety of appropriate teaching materials, quality presentations, precise graphs, charts, drawings, words and formulas expressed beautifully, colorful; demonstrations, exercises, home works given with enough explanation. Implicitly it minimizes material cost.

- **Nationally centralized curriculum** 83.7% (41) and syllabi, and topic coverage timely The syllabi are covered in time, uniform and standardized nationally which provides equal opportunity to rural and urban students; it encourages learning. Effective use of time. **It** saves time **in** drawing graphs and charts.
- **It supports the teacher** 83.7%(41)

It supports the teacher by providing appropriate teaching materials. The TV teacher speaks English fluently. It encourages students and teachers to develop their language proficiency. It also motivates students to work hard and to be active and attentive. It minimizes teachers work load. It gives a well organized lesson to students.

Teachers views on weak parts of the plasma TV

- **The plasma TV lesson has inappropriate time plan** 91.8% (45)

Its time management in general is not good where by the time given for class exercise is not enough for students to do the exercises by themselves and to discuss with their friends. Moreover, the students could not get enough time to interact with their teachers, it is just too fast. Despite these limitations of time, the time given for simple exercises is relatively too much. It forgets the main purpose which is students understanding. Students are not able to take notes of important points due to time factor, no

time for the teacher involvement to support them.

- **Language and communication problems** 49%(24)

Students have very serious language problems, on one hand it is fast to follow, on the other hand they could not understand the meaning of what the plasma teacher says and have a difficulty to follow the pronunciation and so on.

Moreover it is a one way communication that students cannot (impossible) ask the TV teacher. This forces them to be passive learners. It neglects the psychological consideration in the class like individual differences. It cannot control students interaction

- **Teachers problem** 18.4%(9)

It does not give sufficient time to teachers interaction. Teachers do not have enough time to interact and support the TV lesson, it makes them sit and monitor the TV. Teachers do not have sufficient guiding books to support the TV lesson, students with no sufficient text books are also faced the same problem for teachers to coordinate the TV lesson and students understanding pace. Teachers need to give continual assessments but no session is given for tests and examinations coordinated with the TV lesson.

- **Utilizing the technology facility** 14.3% (7)

The TV has no a sort of stick or indicator to show important areas or terms, when discussing technology facilities not well utilized. It does not work selective problems of home works. Some topics are not in the back up (the CD) for revision, say three units of social science in 11^{th} grade, and two units in natural sciences of the same grade are missing; besides this some lessons are not well organized. The number of broadcasting is limited. It reduces student teacher interaction, makes them dependent on material (the TV) than human.

- **Program interruption** 6%(3) is a very serious problem it does not start where it stopped

What must be improved ?

Suggestions were given on what must be done to improve the facility.

- **Time management** must be well planned and balanced (26) specially , the teacher must support the students by interfering the TV lesson, make it 20, 20 minutes, equal share for the teacher and TV or 30 minutes for the TV as it is and 20 minutes for the teacher changing the period length from 40 to 50 minutes. Class exercise, discussion, taking notes need reasonable time. There must be specific time plan for tests, examinations etc.
- **The teacher must equally participate**, while TV lesson is going on (13). He/she must get prepared before coming to the TV lesson and support students even continue teaching while power interruption occurs. Materials like teachers' guide, text book must be available in advance. There must be proper plan for the teachers' task while TV is going on. The disc back up must include all the units.
- TV lesson programming (planning) must consider the following (5)

Consider assessment sessions like quiz, test, examination and make the final exams nationally uniform if possible. All channels must work, only few are working currently. Give appropriate problems for home works and do give feedbacks for selected ones. Home work is given orally by the TV, please write it. It would be better if it is written on the screen.

- **Technical improvements** like avoiding power interruptions (3) Plasma screens are very small for some long mathematical formulas .

Students language problems number of broadcasting is limited, make it 12 presentations a day.

Other Open ended issues /factors /reasons

- Time and language problems are factors for not understanding the TV lesson (3)
- Teachers guide is not available due to resource problems (material problem, money) (22)
- The teachers are not ready for the next lesson because he/she has no guiding material (6)
- Students are not attentive to TV lessons because, it is very fast, language problem, background problem and lack of willingness (28)
- Students are not coming with their text books. The reason is that since the lessons are a given by TV, most of them coming form rural areas and texts are heavy to carry, inconvenient size even for urban (15)
- Students do not take notes of key points due to language must be worked out. The problem, mainly TV is to fast to follow and some have no idea how to take short notes (24)

What the teacher shall do to solve some of the problems

- When plasma interrupted teachers continue the lesson, give exercises open discussions 89.9%(44)
- When students do exercise provided by the TV teachers assist the students going round the class, facilitate discussions, and start writing important points on the blackboard 95.9%(47), taking care not to students attention from the TV.

Discussion

I: Discussion on Students result

As the aim of this study was to suggest shift of teaching methods in teachers training institutions for the support of plasma TV lesson, six high schools which are partners for practicum exercise of education faculty students of Jimma university, implementing TV lesson in several subjects specially in mathematics were involved. Even

though all departments supposed to be involved on how teaching methods should be geared to support the TV lessons, it was fortunate that the mathematics unit took the first initiation which could be base line for extensive study of the rest. The high schools under this study hosted, some of them 9th and 10th grades only, some 9th to 12th (including preparatory) and some preparatory only. As the study manifested, the number of intake of students increased from time to time since the magnitude increased as we go to lower levels. For example, the study conducted in 2004 for selecting practicum sites showed the enrollment of 1172 students in 12th grades, 8352 students in 10th grades, 18471 students in 9th grades of 22 high schools under the study round JU [10]. This also showed the expansion of the schools as the number of section increased. Even though females are not yet given sufficiently equal educational opportunity to that of males, this study indicated that their participation increases from year to year supported by the rates 44%(67) and 33.6%(51) of total females respectively in 9th and 10 grade levels contrary to 14.5%(22) and 7.9%(12) in 11th and 12th grades.

Coming to the effect of implementation of the TV lesson, the study showed the majority of students were concerned about it and suggested the pros and cons during the lesson. About 70% to 80% of students suggested that there was improvement in general teaching and learning process due to the plasma TV lessons; supported by sufficient teaching aids and student teacher active participation through well organized preparations minimizing cost that completed the contents in time. Nevertheless, many of them as well (about 50% to 60%) did not deny to complain the problems they encountered, such as, the lesson presentation very difficult to understand, the time planned was not appropriate to the lessons presented and many others shown in the tables which need solutions to handle. In particular, only 36.7% students have an understanding of the TV lesson properly (often and very often) implied the existence of a serous problem on the program. For these some of the reasons like too fast to follow, language problem, audibility of sound and clarity of images, interruptions of programs could easily be planned and modified.

Many of the students complained too much on the time management of the lesson, too fast presentation on the screen, difficult to catch up the language and take appropriate notes. Students complained they did not have enough time to work their class exercises and discuss it among themselves which is very important in mathematics. Besides, the TV lesson plan was commented that it did not properly share its time to the teacher who was important support for lesson with out whom learning would be very difficult.

As the result indicated teachers role in supporting students during exercise and discussion besides difficult introduction and conclusion very less which would have affected the students learning negatively, a danger in mathematics if not in other subjects. Though introducing the TV lesson has got many strong sides like variety of activities, utilization of modern technology, variety of materials observed though the screen, finishing the syllabi in time, uniform presentation through out the nation etc.; it was observed that the technology was not utilized to the maximum might be short of professionals in the area or lack of serious planning and creativity. Some of the comments in this line were, important mathematical terminologies, phrases and formulas would have been given emphasis by animation either by movements, blinking or colors, the size of fonts to see them from every corner, should be given attention so that important concepts, formulas etc. could be identified clearly. In general the presentation lacked creativity in utility of the technology, it was just as using chalk and board when texts were written. The presenter (TV instructor) was even commented that showed no movement, facing the screen as news readers, taking the screen view un-necessarily. In this line the TV instructor supposed to leave the screen for texts while speaking with in, to give more time for students to see, listen and take not simultaneously. To mention one example observed in mathematics TV lesson on relation and function, showing domain and range, the relation R= {(1,3), (7,5) (a, b), (c, d) } was simply shown on the screen just like on the black board, and the speaker / TV instructor talking the set containing 1,7,a,c, is called domain and the set containing 3,5,b,d is range, with no single animation on the screen or even two different colors; say, red for the domain green for the range or blinking

1,7,a and c while explaining domain and the altering for the range. Moreover in teaching probability it would be better colors balls was shaded with their corresponding colors like blue balls by blue colors and it has to use color contrasts in drawing lines. This serious creative plan is essential in this line of course to be improved year after year.

- Language is a very serious problem to understand the TV presentation though students agreed it would force them to improve their communication it would work hard. But on the other hand teachers were expected to support it by frequent utility of English as media of instruction which supported their background. Of course, 62% of students agreed that teachers used English communication always or most of the time, but the others did need them (teachers) to use English all of the time.
- Other technical problems like external disturbances and power/program interruption while TV lesson going on would need the support of the management sections up to high government levels. Here the issue of creating a system to rewind the lessons which are missed or wanted to be repeated was a very sensible one that the top programmers at national level shall consider.
- From the student suggestion discovered that comparing the lessons given by the teachers and the TV. A very important and genuine generalization in this regard could be the support of the teacher to the TV lesson was found inevitable that a student could not learn solely by the TV without the teachers support at least for simple reason like entreating questions, managing class activities, etc. On the other hand, the TV lessons supported the teaching and learning activities in many angles mentioned above. As a result, the program of the TV should be planed in such a way that sufficient time and place given to the teacher support, the teaching method revisited accordingly.

Discussion on Teachers result

Teachers observation indicated that plasma television lacked in the instruction to consider individual differences. Since students did not get enough text books individually and did not get enough time to copy the main points, students will face difficulty in understanding the subject content. Interestingly however, teachers of high schools have often been criticized to teach students on traditional methods, the plasma instructor which is nationally accepted had also a problem which forced students to be passive learners.

In addition, 70.2% admitted that they didn't have teachers' guide individually. This showed that teachers had limited resources even if most of them (78.3%) knew the objectives of the next lesson. The teachers' guide which served as one's main resource which provided adequate ideas to teachers for the preparation of the next session. Moreover, when power is interrupted, teachers would continue the lesson instead of waiting until the power comes as if it is impossible to do anything when power is off. That was why they were forced to look into the plasma television like students instead of helping the students. Surprisingly, almost all teachers said that the plasma is helping them in their teaching. As the reality showed most of the teachers did not get time to make not only an introduction but also to discuss main points with students. One reason why they said that it helped them in their teaching was that teachers got a lot of time to rest instead of being tired teaching for long period of time. In this line, the plasma television had to give time for teachers to help their students. Otherwise through time teachers would feel that they would be fully replaced by the plasma television and no more such large number of teachers will be needed by the country. Similarly student teachers in their practicum courses observed that almost all of the lessons were covered by the plasma television they might also raise the issue that why 1/3 of students enrolled in a university join faculty of Education not to contribute much for the development of the country.

The teachers were asked to describe their views on the strong parts of the plasma TV. Most of them said that it supported their teaching -learning activities. Moreover they added that, it

covered the given topic timely and it also supported the teacher by giving a well organized and nationally prepared lesson.

Even if most of the teachers supported the idea that it covers the given topic within the allotted time, the teachers also forwarded that the time to copy notes, to do exercises and to give support in the class is too short. Although the class is a mathematics class discussions were more expected between teachers and students, teachers did not have time to help their students.

The teachers were also asked to list their views on the weak parts of the TV and most teachers claimed that students had a difficulty to understand what plasma instructor says; not only his/her vocabulary but also the pronunciation. When students have a problem they wanted only to ask the plasma instructor because they accepted that the school teacher could not do any thing to help them. Some teachers said that technology was not fully utilized. They expressed why they said like this, that it has to use different colors and fonts to discuss or show the important areas or terms. Moreover some topics were not in the CD that may be needed another time for revision or to broadcast for students while the power was off.

Most teachers acknowledged that the plasma television was a big help for students. It was supported by sufficient material aids; yet more has to be done to improve its weak points like usage of contrast colors, showing how to draw the graph and so on. Certainly there is a need to improve the lessons given by the plasma television soon. However the focus of concern of this research is to see the advantages and disadvantages of plasma television and to forward suggestion for the optimum use of it.

General Discussion on both parties Response

The self administered questionnaire which was filled by both students and teachers showed that the introduction of plasma television changed the teaching learning positively was supported by most students and teachers. Moreover most students and teachers acknowledged that it supported the teaching-learning process by presenting sufficient teaching aids, organized lessons, finished content within the

allotted period of time and supported the teachers teaching activity.

Similarly almost half of students and teachers agreed that plasma television encouraged students to participate, students were disciplined, motivated students, gave chance to students to discuss in groups, and made students alert and active. When asked teachers whether the lessons are understandable or not most of them (77.6%) revealed that the lessons were understandable. But this was inconsistent with what was revealed by students in which less that half (42.5%) complained that the lessons were understandable. Could this be an underlying reason why teachers could not make an effort to help their students by using different methods and students complained that teachers did not helped them in the teaching learning process.

Almost half of the students agreed that the plasma television gives appropriate home work and the lessons are interesting. On the other hand these issues were supported by most teachers. Similarly the support it gives appropriate class exercises that students can do was supported by most students and almost half of the teachers. Hence one can say that the exercises which were given to the students might be assumed by the students only to be done on classroom but not as homework. Besides this, since the plasma television does not write the whole statement of the homework and did not give feedback the next session, students might assume that there was no homework given to them in the previous session.

The weak parts of the plasma television should be examined to use it effectively and improve its utility. Most students and teachers agreed that plasma television is too fast to take short notes from it, neither gives time to get teacher support nor to do class work. But almost half of the students agreed that the lesson presented is not audible and could not see clear image. On the contrary almost all teachers did not agree with the above mentioned issues. But as we have observed the lesson was audible in the classroom and one could see clearly the statements written on the blackboard. This might be because almost half of the students stated that the class was exposed to external disturbance and have a problem of communication which was not acknowledged by teachers. Generally the problem of time

management and the usage was highly stressed both by teachers and students.

Plasma Television incorporated those tools and materials that present, support, and reinforced teaching. From such beginnings came thousands of tools and devices to help teachers teach. However, it should be borne in mind that new plasma television does not reduce the need for teachers but changes their role in relation to the learning process and that the continuous dialogue that converts information into knowledge and understanding becomes fundamental [4, 5]

Conclusion and Recommendation

Countries like Ethiopia should consolidate on the technologies already introduced in their educational systems. Studies have shown that educational radio and educational television have been used in almost all the countries in the developing world as a means of reaching remote learners and cutting the cost of education. Plasma Television is a recent technology. Any measures to reduce the cost of education should be supported and exploited fully. Unfortunately most of these technological innovations have not been sustained. Reasons for the breakdown of the systems are largely related to technical know how in both utilization and maintenance [4]

The number of students increases as we go down to the lower grade levels showing the expansion of intakes year after year resulted inappropriate student classroom ratio, still rate of female participation not satisfactory. Here we recommend the expansion of school infrastructure as the student population increases to avoid congested student population in a class. Female student's ratio must be increased by creating awareness program to parents.

- Implementing plasma TV at high school levels has several strong parts which must be encouraged. Some of these strong points are;

-It changed the teaching learning activities by technological support specially for those of students in remote areas bringing the teaching and learning activities of the country at a very closer standard.

- The contents of the subject planned of the year will be completed in time and presented in a well organized manner supported

by variety of materials and activities. - It supported the teacher sharing the plan and presentation; and demonstrating laboratory or practical works which could not be done at the teachers level.

- Encourages the students to improve their English communication and work hard in class exercise and home works, and use their time properly.

- Contrary to its strong sides, the implementation of plasma TV created several problems which needed to be alleviated for effective implementation of teaching and learning. The main weaknesses or problems of the TV implementation in mathematics class are:

1. Students encountered difficulty to understand the TV lessons due to shortage of time management, too fast to follow, language problem, the screen not clearly observable from every corner
2. The time allotted to a lesson is not appropriate, for the teachers interference and support specially for introduction and conclusion where by mathematics needed exercises and tutorials.
3. It makes some teachers negligent, not punctual, not active, coming without preparation
4. Some mathematical exercises are not appropriately designed according to the level of understanding of the students for average, fast and slow learners'.
5. The technology is not utilized to the maximum like making the lesson interesting by animation specially for mathematical formulas and concepts.
6. It does not help absent students, even when interrupted and no means of rewarding the missed lessons.
7. Disturbance of the attention of students by external factors, other students outside, power interruption, program interruption etc.
8. Students can not ask the TV if any, and it cannot control the classroom situation.
9. The presenter of TV instructor unnecessarily takes the screen while speaking.

As the study suggested certain modification and changes must be made to overcome the above weaknesses.

1. As suggested by the students themselves teachers must

encourage to improve their language proficiency by using the English media always right at junior level, and the TV lesson also must be planned to make it slow corresponding to the grade levels taking care for pronunciation, it has to use simple English and repeating important concepts.

2. The screen utility must be appropriate to be observable from far behind using big fonts and color contrasts for important concepts and formulas.
3. The TV technology must be creative to use its facility to the optimum like animation, colors, blinking etc.
4. The TV program interruption at the station must be supervised seriously, power interruption could be handled by automatic supportive generators.
5. A sort of back ups or extra hour programs must be designed for replay and revision purposes.
6. The TV presenter should avoid its picture to appear on the screen frequently, must give the screen for exercises, and mathematical formulas, avoid stand still positions show some movements or activities.
7. The daily lesson plan must be done in such a way that teachers can support the TV lesson sufficiently by giving introduction, activities supervision, discussion control, conclusion or even substitute when power is out. As seen from class observations smart teachers usually write important concepts terminologies, formulas and exercises on the board while the TV speaks, and conversely the teacher speaks giving supportive explanation when TV sound out, alternately. For this the teacher must prepare his /her plan before hand, knowing the content and planning how to coordinate with the TV, punctuality on teachers' side is mandatory.
8. The TV can not be effective with out the support of the teacher; so teachers must be responsible to fill in the gap and make the TV lovely by working actively with it.

Tutorial support for the students must be part of the school schedule, specially in mathematics and Science classes.

9. Students must be supported by reading materials like texts, manuals work sheet etc, make it available in the library at least.
10. The time given for the teacher and the TV nationally must be revised, they have to share it appropriately 20 minutes for the TV and 20 minutes for the teacher support at intervals giving more time for class exercises specially in mathematics; or the TV 30 minutes and the teacher 20 minutes the period length modified to 50 minutes. Teaching through plasma TV for 4 days of the week and then tutorial for
11. It has to give time for teachers to give tests and quizs to develop the confidence of students .
12. Train teachers to improve their competence in using the new technologies in their instructional activities.
13. Modules(Workbooks) should be prepared and distributed to students so that they come to class and concentrate on the understanding the content instead of running to copy notes.
14. Train prospective users in use of new and emerging technologies
15. Provide guidelines for adoption and adaptation of new technologies.
16. Train and assist teachers in producing teaching and learning resources
17. Run sensitization workshops to promote new technologies in Faculty of education.

- In general the teaching methods that have been used previously do not all work when TV is implemented. So, modification of techniques must be done. Say, the teacher must plan including the TV presentation in his plan. For this he/she has to get the TV plan in a booklet form before hand. The 5th day

with out the TV could also be another.

- The activities of a mathematics teacher will be introduction before TV presentation, support the TV during the presentation, consolidation, conclusion with in each class, and tutorial sessions some other time. When we say support the TV it means write important points while the TV speaks and explain while the TV is silent and putting texts on the screen or supervise and help the students going around when class exercises are given by the TV. Here relatively sufficient time must be given when deep and challenge problems are given. Besides, the teacher must be careful when using the black board for important points and formulas while the TV is going on; not to disturb them from the TV; they have to be told to use the board only when the TV is fast and cannot take the points. The teacher also can encourage pair wise and triple discussion and give the feed back of the exercise and home works even if TV discusses them, and can at least post it on a notice board for reference and self assessment.
- The teacher must know what teaching materials are presented by the TV and produce some more teaching aids for some sessions where he/she feels it is needed and neglected or assumed elementary by the TV. In mathematics, the students even could prepare materials by themselves during tutorial sessions.
- In general, methodology courses at training institutions (TEI's) must be redesigned to suit the plasma TV programs, both in general and subject methodology courses. More over, the plasma TV must be planted in every teacher training institutions like faculty of education in our case for appropriate training exercise and assisting the TV lesson programming by sending constructive comments, suggestions and modification

both from university instructors and students.

- The Ministry of education should encourage and support researches to be conducted on Plasma television for its implementation in other subject areas too.
- The central planning unit for TV lesson must be alert to update itself regularly, creative and flexible to adjust the lesson plans according to the needs investigated.

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