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Use of audio visual aids for effective teaching of biology at secondary schools level

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ABSTRACT

The purpose of present study was to explore and to compare public and private biology teachers' views about use of audio visual aid in teaching of Biology at secondary school level. The data for the study was collected from secondary schools teachers of biology. The results of present study show that there is a positive relationship between facility of audio-visual aids and the teacher's attitude. The findings report that secondary schools teachers of biology do realize the importance using audio visual aids in teaching of biology. However, findings reported that teachers of public sectors were more familiar about the importance of use of audio visual aids for teaching of biology than private sector teachers. It was concluded that in public sector school all teachers were trained as only trained teachers were appointed at public sector schools at secondary level. Finding further reported that there were no proper facilities of audio visual aids for biology teaching. Results further inferred that utilization of audio-visual aids in teaching of biology was very effective as it increases the level of interest and enhances motivation for learning in students and the only visual aid available at maximum secondary school was black board.

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Introduction

At present education is under constant changing and multiplicity in policies, methods and procedure can be clearly observed. At different levels of education system change is always welcomed as per required but change should always be in harmony with certain aspects i.e. society, religion, state etc.

The present situation calls for comprehensive change in almost every level of education so that practical and dynamic approach can be given to existing and new field of education. The crux of this modern education is to awaken the hidden curiosity and interest of the learner, nourishing his behaviors, attitudes and believes in order to develop basic and essential skills of life long learning and ability to think critically and to judge himself and others in a more beneficial manner.

Students should be given confidence to ask, inquire, explore and be creative and initiators. Infect an inquisitive mind is the beginning to life long learning that surely leads to success. Before modern education was incorporated students was passive listener and teacher was autonomous body who knows what, when and how of education. But in recent years the superiority is shifted towards students. Use of audio-visual aids is preferred as they are considered as 85% of whole teaching and learning (Jadal, 2011). They keep the individual learner focused on what is being taught by the teacher in the classroom session.

Audio-visual aids make a lesson or a lecture more interesting and a memorable experience not only for students but for teachers as well. They play a vibrant role in focusing the attention of individual student towards the teacher or the topic. Human beings' five senses are the doorway for effective learning, especially seeing, hearing and touching brings maximum knowledge for the individual.

Jerome Bruner a psychologist at New York University advocates, research has shown that people remember,

- 10% of what they hear
- 20% of what they read
- 80% of what they see and do (Lester, 2012)

Audio-visual aids are most effective tools for developing flawless communication and interaction between student and content as well as student and teacher. These aids not only help to save the time of teacher but also help in developing and arousing curiosity, creativity & motivation. It emphasizes on the comprehension of knowledge and concept as well as keeps working on developing sound foundations for higher and further studies.

History of Audio-Visual Aids

While turning the pages of history we find people learning through their sense perception almost since the dawn of human civilization. Infect the concept of using audio-visual aids to communicate has long been used when man was hunting for food in jungles, they track and run after the wild animals, while chasing and going deep in to jungle; man places a kind of symbol stone or any other identified piece of mark that can help the other members to follow the exact path (Sampath, Pannneerselvam, Santhan, 1998).

Archaeologist discovers different cave paintings that almost depict the whole civilization. The people of that time utilize carving and painting to communicate their culture and traditions to coming generations. In the same manner Egyptian pyramids and sphinx represents the statue of a pharaoh with the body of lion and a human face. These huge visual aids try to communicate, to every new generation, the pharaoh's autonomy and sovereignty.

Man is successfully using audio-visual aids while searching and discovering new fields of knowledge ranging from mathematics, sciences, and astronomy to the discovery of continents and other places. Ibn Battuta, Zheng He, Columbus

and many other voyagers use maps, charts, and compass to define their position. All of these are widely used today by teachers in teaching learning sessions (Prasad, 2005)

Desiderius Erasmus a Dutch writer and teacher (1466-1536) strongly opposes the concept of memorizing and naming it as learning rather he suggest to teach children through the use of pictures or other visual aids (Selvi, 2007)

J.A. Comenius (1592-1670) entirely reformed the existing education system by preparing the first "Picture/visual Textbook". The book contains almost 150 pictures portraying everyday life. The book receives so much of publicity that it was used world wide for childhood education (Pannneerselvam, 1998).

Rousseau (1712-1778) also advocates the use of pictures and things instead of mere teacher's words. Pestalozzi (1756-1827) put the theory into action in "Object Method" proposed by Rousseau i.e. "Teaching process must be directed to the learner's natural curiosity" (Pannneerselvam, 1998).

British educator Eric Ashby (1967) identified four revolutions in education system (Singh, Sharma, Upadhy, 2008);

- 1st: Task of education shifted from parents to teacher and from home to school.
- 2nd: Adopting written words as tool of education.
- 3rd: Advancement and invention of print media i.e. printed textbooks.
- 4th: Induction of electronic technology in education and improved means of communication

Many attempts were made for the effective use of audio-visual aids in teaching learning sessions, but serious development can be viewed by the mid of 19th century. By 1929 sound motion films were used in classrooms for teaching purposes (Pannneerselvam, 1998). Beyond doubt audio-visual aids proved to be very beneficial in almost all the field of knowledge. They appeal to the senses especially hearing and looking. It is not wrong to say that human senses are doorways to acquire knowledge, therefore when something appeals to senses curiosity increases which lead to clear and concrete understanding of the concept.

Defining of Teaching Aids

In educational literature more than few terms can be used, alternatively, for audio-visual aid i.e. educational technology, audio-video media, and instructional technology, learning resources, audio-video equipments, communication technology and educational media (Selvi, 2007)

Basically all these terminologies lead to the same edge i.e. teaching aids that are widely used by teachers, guide, facilitators and tutors to complement their words that ultimately helps learner to improve learning and to stay focused, clear and curious always.

In early years the only term used for teaching aids was audio-visual aids but with the advancement and opening of new horizons in the field of electronic technology and communication media, new and improved equipments and aids for teaching and learning was developed, instead of mere teaching aids improved terms were used i.e. educational or instructional technology etc.

Educational technology refers to the use of any technology in classroom which helps in increasing the pace of learning and results in helping teacher to teach less and learner to learn more (Singh, Sharma, Upadhy, 2008).

Audio-visual aids are good means of communicating with people and students. Audio-visual aids facilitate and assist the regular and traditional teaching session. They help in

maintaining and retaining student's interest almost till the very end of the classroom session.

The use of audio-visual aids in classroom or other training sessions improves the performance of the students. When a teacher gives maximum exposure along with different perspectives; using variety of audio-visual aids for particular concept maximum students receives success in comprehending such lecture.

Audio-visual aids are tool or mechanics used to facilitate the learning experience of the individual and to make it more realistic and dynamic (Kinder, 1959)

Pros of Audio-Visual Aids

An old Chinese proverb goes like one picture had more worth then thousand words, indeed if teacher uses words along with pictures students are better able to grip the crux of the concept earlier.

When an audio-visual aid is practiced by the teacher, there must be some benefits and advantages of using it. Some commonly known pros of using audio-visual aids are expressed in opinions of following scholars:

Helps in comprehension by bringing the child in a direct contact with the concept and how it actually works in real life situations (Kinder, 1959).

Student is more attentive, motivated and interested as compared to that classroom session that is in function without the use of audio-visual aids (Sampath, Pannneerselvam and Santhan, 1998).

Conceptualizing is clearer and concrete as the use of audio-visual aids appeals, activates and utilizes the five senses of individual student i.e. see, hear, touch, taste and smell (Prasad, 2005).

While use of audio-visual aids provide freedom to the students i.e. students discuss, comment and express their opinion which they cannot while a typical teacher lecture is in progress; at the same time this discussion helps them in developing language other then mother tongue, gaining confidence by probing and showing tolerance to opposite opinions (Sampath, Pannneerselvam and Santhan, 1998).

Using audio-visual aids improves teachers' performance by saving time and energy (Brown, Lewis and Harclerod 1985).

Prasad (2005) advocates that audio-visual aids provide basic means of planning, organizing and invigorating the curriculum.

The basic aim of education must be to lead students towards self learning and life long learning and this aim can be achieved through the use of audio-visual aids as it improves the learning capacities of individual students i.e. learning experience that is worth memorable (Singh, Sharma, Upadhy, 2008).

Retention rate of the students increases by the use of audio-visual aids (Prasad, 2005).

Activity based learning leads to critical thinking, reasoning, creativity and the development of inquisitive mind which is the real aim of education. Audio-visual aids entail activity for teacher as well as for students that keep them attentive and motivate them to think and inquire resulting in deep comprehension about what is being taught (Mangal S, 2008).

Handling and manipulating of audio-visual aids by students help them develop working habits (Kinder, 1959).

Use of audio-visual aids provides students with opportunities to think speak and interact without fear and hesitation with teacher and peers resulting in students' personality development (Brown, Lewis, Harclerod, 1985).

Audio-visual aids help in maintaining the class discipline as every of the student is focused and attentive towards learning. When teacher lecture the students they get bored and start

whispering that brings indiscipline in the classroom (Prasad, 2005).

Cons of Audio-Visual Aids

Using of audio-visual aids seems very essential in today's education; individuals of 21st century belong to virtual age brackets. They experience video games, online learning and computerized programming ranging from classroom learning to every shopping mall. It is often experienced in daily life that children love to watch an educational movie than to read a book. To meet this end teacher incorporate audio-visual aids i.e. models, video presentation, power point slides show etc in the classroom sessions. But all these and other teaching aids carry along with them many disadvantages, therefore along with merits one must keep the demerits of using audio-visual aids in mind. By an effective and timely use of audio-visual aids one can better able to eliminate following deserting aspect of using audio-visual aids in classroom:

While any specific audio-visual aid is in operation for say, Over Head projector; any technical problem may hit all of sudden. Projector bulb may burn out. Desired sound and color missed while using a multimedia or if using a Digital Video Disc (DVD) or Compact Disc (CD) they may not well-match your players. Therefore possibility of technical problems is higher (Prasad, 2005).

Critiques believe that audio-visual aids carry high rate of attractiveness that results in child being diverted from desired path of learning and lost in recreation and fantasy (Mangal S, 2008).

Most of the schools suffer budget constraints and as the fact is clear i.e. audio-visual aids are expensive; it is impossible to make adequate availability of such aids in every classroom (Kinder, 1959).

Brown, Lewis and Harclerod (1985) states that activity supplemented by audio-visual aids is completely mere waste of time and resources if choice of desired audio-visual aids is not possible. Suppose a teacher is to teach about specific culture of a particular area using a map is a waste full activity rather charts with pictures of traditional dresses, food and life style etc can be beneficial.

Preparing audio-visual aids require substantial amount of time. Making your very own transparencies, slides, films, posters, charts or any other teaching aid is very time taking. While arranging them teacher totally overlooks the importance of developing clear and well-organized lesson plan (Sampath, Pannneerselvam and Santhan, 1998).

Displaying too many of audio-visual aids simultaneously in a single class can be very confusing for students and even for teachers' as well. Concepts can overlap and can lead to misunderstanding and poor retention (Sampath, Pannneerselvam and Santhan, 1998).

Mangal S (2008) describes that selection of appropriate audio-visual aids in relation with the age group of students is very rare. Often teachers are not aware about particular audio-visual aids that are most suitable for young kids, grown-ups and higher grade students. Suppose flashcards and pictorials are good for young taught but if a teacher selects them for 9th grade level it will surely be not appropriate.

Teachers when use audio-visual aids overlook the aspect of explanation rather consider audio-visual aids as self-explanatory. But explanation at every level of learning is a must. Suppose if a diagram of heart is shown to the students and if it is wrongly labeled, instead of passing concrete concept it will lead to misinformation (Prasad, 2005).

The human being is curious by nature so as student too. Students are always enthusiastic and eager to see, touch and hear new things. When a teacher chooses to supplement the lecture with audio-visual aid; managing the class happened to be very difficult task. Suppose if a teacher is to show model of atom then controlling the excitement of the students is must, and if not the teachers' effort go in vain (Prasad, 2005).

Using inappropriate audio-visual films creates aggression and develops destructive behaviors in students. A common practice at toddlers' school is to use cartoon films. Childs' adopt maximum of violence from those cartoon movies. Therefore the uses of such audio-visual aids are strongly criticized by psychologist and educationist (Kinder, 1959).

Classification of Teaching Aids

Using audio-visual aids and other technologies developed in this modern scientific era for the purpose of achieving concrete education proves beneficial for teacher and student and educational system as whole. It brings diversification in methods of instruction. They are equally useful at all levels of education. Appropriate use of audio-visual aids in teaching of English, Geography, History, Science, Languages, Art, Agriculture and many other technical and vocational subjects is increasing day by day.

Prasad (2005) contend that audio-visual aids and their use are not only limited to educational purposes rather if we go back in history we find Martin Luther suggesting to use empty walls for the promotion of Protestant movement. Infact this idea leads to the invention of writing board or black board which is used today in almost every school world wide. Some other social objectives are also achieved through the use of audio-visual aids i.e. in an awareness campaign about Human Immunodeficiency Virus (HIV) audio-visual aids are used.

While studying the broad umbrella term of audio-visual aids, one can easily came across different types of audio-visual equipments ranging from simple hand-made charts to highly sophisticated projectors. The classification of audio-visual aids is presented graphically as under:

In the broadest sense audio visual aids can be categorized under two heads i.e.

1. Projected Aids
2. Non-Projected Aids

Audio-visual material contributes valuable experiences for teachers and students. Almost every form of instruction is based on verbalism, but the use of audio-visual aids minimizes the verbalism and facilitates students to concentrate and motivate them towards abstract thinking and imagination to better understand the concept.

Projected Aids

According to Sampath, Pannneerselvam and Santhan (1998) projected aids involves an enlarge image of the material or text projected on a screen which is at a distance from the projector. While using projected aids (film strips, slide projector, overhead projection, opaque projection) the room is either totally dark or may be partially dark. The bright colors and images on the screen catch the attention; sound and motion will make presentation more dynamic as compared to non-projected aids. Projected aids are equally effective for every age group as well as small or large group. Equipments used for projection requires eclectic power. A clean white wall can be effectively used for front projection. Projected aids include:

Filmstrips

Filmstrips are connected series of pictures, drawings, photographs and diagrams joined together to illustrate a single concept, story or a lesson. According to Holmes (1968) the

filmstrips differ from moving films as there is no appearance of movement.

Slide Projector

According to Sampath, Pannneerselvam and Santhan (1998) slides are commonly used instructional device to complement verbalism. They involve projection through the passing of strong light on transparent slide. Slide projector is a light house with a hauler for holding the slides. Slides projector proves valuable where motion in pictures is given less importance for comprehension. Slides require little more space for storage than filmstrips (Holmes, 1968).

Overhead Projector

Overhead projector is used to present large size transparencies with normal daylight condition (Botham 1967). The way slides require total or partial darkness; overhead projector does not require blackout. Students can take notes in the normal mode as they do when working without overhead projector. The teacher or facilitator is completely facing the students; whereas the projected image or text is behind and over her/his head (Sampath, Pannneerselvam and Santhan, 1998).

According to Brown, Lewis and Harclerod (1977) the speaker has full control over the timing and choice of why, when, what and how of presentation when using overhead projector.

Opaque Projector

Slide and filmstrip projectors and overhead projector can only be operational for projecting transparent material but opaque projector can be effectively used to project opaque material i.e. book or magazine any drawing or pictures on a solid paper etc (Mangal S, 2008).

The projection made by opaque projector depends upon the distance at which the projector is from the screen. An important feature of opaque projector is that text, maps, diagrams and other materials available in books or magazines can appropriately be projected without removing them from their original source.

Non-Projected Aids

Most commonly used teaching aids which do not employ the use of projectors to project enlarged images of objects or text are grouped under non-projected teaching aids. They are inexpensive to use and are relatively less sophisticated as compared to projected aids. Non-projected aids are further subdivided into five heads i.e. graphic aids, display boards, 3-d aids, activity aids and audio-visual aids (Sampath, Pannneerselvam and Santhan, 1998).

Graphic Aids

Graphic aids are commonly used to describe ideas and concept with little or no verbalism. Like other teaching aids graphic aids help student to better understand and retain the information. Some basic types of graphics aids are:

Photographs & Pictures

A picture or photograph gives an accurate concept or idea of any object or concept. Good photograph can effectively communicate the whole story without using a single word. Pictures and photographs can be colored as well as black & white. Colored pictures and photographs are relatively more eye-catching (Prasad, 2005).

Flash Cards

Prasad (2005) describes flashcards as potential medium of visual education. If a teacher is to introduce new words, using flashcards can meet the purpose. They commonly involve photographs and pictures to communicate a new idea or a word. They are widely used at toddlers' level and elementary schools. Flashcards are usually in a large number and they are flashed to

the students' one by one while teacher verbally explains what is contains.

Charts

Charts are widely used visual/graphical aids to present concepts and ideas that are complicated and that cannot be comprehended easily by just mere words no matter written or oral. Charts are mixture of different types of graphics i.e. pictures, diagrams, cartoons, graphs, written text or drawings. Teacher usually restricts one idea per chart and thus making concept clear without ambiguity (Brown, Lewis and Harclerod 1985).

Diagram

Diagram is a simple and explanatory drawing showing inter-relation and explaining ideas and concepts by using lines, symbols and geometrical forms. Diagrams go beyond mere representation rather they are self-explanatory or self describing (Mangal, 2008).

Globes & Maps

Use of maps and globes along with other audio-visual instructional material, will help students develop better understanding about the different continents and countries along with oceans and poles and the people living there. Globe is a mini Earth nothing more nothing less. It is widely used in understanding the concepts related to land and water and that the Earth is nearly round and is rotating on an inclined axis round the sun; which results in changing of day and night, seasons, food eaten and clothing worn across the world and many more are directly and indirectly affected (Kieffer & Cochran, 1955).

Along with globes, maps can be introduced to make students well understand the globe as map is a flat representation or diagram of earth or some part of it as per scale (Prasad, 2005). An effective map includes pictorial symbols to depict specific area, desert, ocean, mountains etc.

Graphs

Graphs are widely used to represent complex information and numerical data in a more simple, quick and effective way. The graphs are shown on two axis i.e. x and y. Rate of understanding and interpreting the graph is high as compared to other aids. Basically line, bar, circle and pictorial graphs are used to represent the data (Prasad, 2005) (Sampath, Pannneerselvam and Santhan, 1998).

Cartoons & Comics

Cartoons are metaphorical presentation of an idea in the form of a picture or sketch (Prasad, 2005) (Sampath, Pannneerselvam and Santhan, 1998). It is an effective means to communicate news, situation, concept and people etc through pictorial representation. Mostly cartoons are thought provoking and they carry a particular hidden message along with them. Comics are a kind of pictorial cartoon series presenting a story in an orderly manner.

A modern illustrated story book is developed using comic-book techniques. Thorndike finds that child who reads one comic book every month will read and retain approximately twice as many words per year as the regular textbook contains (Wittich & Schuller, 1967).

Posters

Poster is a pictorial representation of an idea or concept in striking bold colors to attract the viewer. Posters are usually displayed out in open for the purpose of awareness in general public. Posters not only serve as a means to décor the class rather it stimulates interest in students to learn about different countries, art, historical places, science, industries and whatever the posters are about (Brown, Lewis, Harclerod, 1985).

Poster is likely to bring the learner to first two steps i.e. attention & interest and to go through them as well. Poster is not meant to educate rather stimulating interest and action immediately is the ultimate goal.

Symbols

According to Brown, Lewis and Harclerod (1985) symbols are a universal language. Through graphic symbols students can experience a wide range of learning. Walking down a dark alley; symbols on the poles by the side of the road communicates specific idea. By studying those graphical symbols communication and understanding can be improved

Display Boards

For the purpose of displaying information display boards are widely used. In well-designed schools special areas are allotted for display boards/areas, partition walls between two classes serves as good source to display, ceilings are also utilized for planet, stars and moon projection. The school grounds can be designed so that they represent a learning laboratory i.e. botanical garden, soil plots, aquatic areas and geological paths etc. all these work much more than mere bulletin board and comes under the umbrella of display area (Sampath, Pannneerselvam and Santhan, 1998). Displays can be categorized into following types:

Black/Chalk Board

The most simplest, convenient and cheapest way to display information to a number of students is to use black/chalk board. It is considered as one of the oldest visual aid in teaching. The convenient surface of the black/chalk board facilitates the teacher to display the subject-matter visually and at the pace that suits students learning (Sampath, Pannneerselvam and Santhan, 1998).

White/Marker Board

White boards are large white sheets of plastic material with a clean clear surface to facilitate writing or drawing while using felt pens or erasable markers available in different colors.

Flannel/Felt Board

Flat panels of heavy cardboard, Masonite board or plywood are utilized and flannel cloth is stretched and glued over the surface to make a felt/flannel board. Graphic materials i.e. pictures, writing on a hard paper, photographs etc can be placed on flannel board by using sand papers pasted on their backs and they are called as flannel graphs (Mangal, 2008) (Sampath, Pannneerselvam and Santhan, 1998).

Bulletin Board

As the name implies bulletin boards are commonly used to display news, circulars, results and admission announcements, bulletins and other varied items that catches students' interest. The board might be covered with soft insulation that allows pinning of photographs, charts or factual sheets etc. the boards may or may not be encased with glass shutters (Prasad, 2005).

Magnet Boards

The magnet board makes use of iron or any other material that attract the magnet. Steel backed chalkboards can either be used as chalkboard as well as magnetic board or can be used in combination too. Small sized magnets can be pasted at the back of display cut-outs using fevicol or similar glue and then to be displayed on the magnetic board (Sampath, Pannneerselvam and Santhan, 1998).

Peg Board

As name implies boards that have hooks or pegs attached and opaque and flat items can be hanged from are peg boards. The peg boards are usually attached to wall. They are mainly used for games and displaying information.

D Aids

Models are imitations and replicas of any original object. These 3-D models can be reduced or enlarged in sizes as compared to original items. Models present simplified form of abstract and complex concepts. Different types of models used in teaching and learning session are discussed here under:

Models

Three dimensional and recognizable miniature representation of real thing is model (Wittich & Schuller, 1967). Using models in teaching is very effective as they are shortcuts to understand a complicated concept. Models may be complete in details but they are simple than the original objects.

Objects

Teacher can utilize real objects to supplement typical teaching

Specimens

Specimen can be a part, sample or small piece of the real object. Even a tiny piece of real object stimulates interest in students to learn more and more i.e. specimen of a leaf or birds feather can be very eye catching and stimulating.

Mock-Ups

A working and operating model that is designed to be used by students for particular training is a mock-up. Infact it is a working replica of original. Models carry the recognizable attribute whereas mock-ups may or may not be recognizable with original. Mock-ups are chiefly used in giving training in complex and difficult skills.

Dioramas

A 3-D model that involves variety of other 3-D objects and figures in a natural environment are dioramas. Dioramas can be setup with the use of different materials i.e. plaster of Paris, dried plants and miniature cars etc to make the scene more realistic and natural. Diorama can be artificially lightened to highlight the finer details. Dioramas are effectively used at construction sites and industrial units. Dioramas are equally effective in education as the present information in a very realistic way and in natural settings. Concepts regarding zoo, underwater animals and jungle animals etc can be presented very easily through dioramas.

Puppets

According to Prasad (2005) puppets are powerful medium of mass communication. They provide dynamic experience of education to the learners. Puppets have been used as an expression of art and source of communicating traditional stories and other information to people all over the world. Puppets prove to be valuable in the field of entertainment, education and social services.

Activity Aids

Activity aids provide real life experiences to students (Prasad, 2005). When students are to face difficulties in real life situations they learn different social skills i.e. cooperation, decision making, communication skills etc. taking part in competitions, field trips, exhibitions etc all comes under activity aids. Some basic activities are discussed below:

Field Trips/Study Tours

Further Prasad (2005) says that field trips provide opportunity to observe natural beauty, industries and their operations and many other places that are of interest to teacher and student. Children respond better about any theory they have learned when they see how it works in real world. Field trips and study tours should be arranged in advance and later they must be followed up by a discussion or report to retain information gathered.

Exhibitions

Exhibitions are not mere gathering of display material rather they are a comprehensive source of information. Exhibitions are planned to communicate some valuable concept to community, parents and students. When students go through or participate in exhibitions they express themselves and their display material, this not only helps in speech training rather confidence and tolerance to opposite opinion can be observed. Infact conducting exhibitions increases cooperative efforts along with focus on ethical, cultural, disciplinary, vocational and aesthetical values (Sampath, Pannneerselvam and Santhan, 1998).

Demonstrations

The activity where teacher shows how to perform a specific thing and students keep a keen eye on what is going before them is a demonstration. Later students made attempts to perform the same act as done by their teacher.

Demonstration by teacher along with other aids makes a healthy recipe for effective auditory and visual learning of taught. Demonstration supplements the spoken words of the teachers (Sampath, Pannneerselvam and Santhan, 1998).

The basic element of demonstration is to ensure that students well understand the whole procedure; therefore teacher must explain each and every step clearly.

Dramatization

Demonstration has utility in improving retention power. It also helps in bringing out the hidden creativity of the students while developing their social skills. Infact dramatics enculturate the students (Prasad, 2005).

Audio and Visual Aids

All those teaching aids through which information can be heard and seen simultaneously are audio-visual aids. Teaching aids that only utilizes one sense at a time; might be hearing or seeing is audio or visual aids.

Results achieved by bringing together these two devices are very encouraging i.e. high level learning and high retention power as compared to when they are used separately. Some largely used audio & visual aids are discussed here under:

Radio and Television

Educational broadcast is an old concept developed during the period of 1960s and 1970s when a suggestion to broadcast school was welcomed. By broadcasting lessons thousands of learners can be educated (Thomas & Kobayashi, 1987). Through radio and television programmes education to any age group can be targeted.

Further Thomas & Kobayashi (1987) advocates that broadcasted programmes specifically those on television can introduce preschoolers with alphabets and numbers; they can help build their vocabulary and introduce them with other fields of knowledge i.e. physical and natural sciences, moral values, social events, religion etc.

Programmes or lessons on radio and television covering almost the whole school curriculum can equally be broadcasted in schools and to listeners and viewers of all ages in remote areas who are not in school (Thomas & Kobayashi, 1987).

Cassette/ Record Player/ Tape-Recorder

The use of record players, cassettes and tape recorder for educational purposes is highly encouraged especially in language learning, poetry and literature. Dramatized plays from history and valuable knowledge of music can also be gain through these mediums/aids (Sampath, Pannneerselvam and Santhan, 1998).

Use of these audio aids for learning proves beneficial for blind and handicapped students. Tape-recorder is utilized to record sounds on a magnetic tape or cassette. This recording can

be reused when ever required and if a new recording to be made; old recoding will be automatically erased.

Video

When teacher supplements his teaching with some video films it refers to as video-aided teaching. Advantage of utilizing video cassette is observed when teachers has full control over equipment and learning i.e. beginning, ending and reviewing of the film and the attached learning that occur by watching that particular film.

Multimedia

The term multimedia is used for an electronic device that makes use of different elements i.e. audio, graphical, text, animation and visual. It is an advanced shape of slide projector. It is commonly used to project movies, slides, animation, images etc along with complete sounds. Use of multimedia helps in managing and administrating the classroom as well as the lesson. It increases the higher level thinking skills and makes comprehension easy and quick.

According to Fenrich (1997) as cited in Masnan (2005) multimedia is such a combination of computer hardware and software that allows one to join together videos, animations, audios, graphics, and test materials to develop an effective presentation on a desktop computer.

Research Studies

Many authors have been writing on the effective use of audio-visual aids to improve and supplement teaching that results in desired social and behavioral change.

The teaching aids have been recognized to have different names such as instructional material (Kinder, 1959), instructional technology (Brown, 1985), instructional media (Heinrich, et.al, 1989) and audio-visual material (Dale, 1969) (Saettler L. 1990).

Mohan, L et al. (2010) opine in a study at India that 85% of the students are in favor of teaching methods that employ audio-visual aids as compared to typical lectures delivered without the use of audio-visual aid.

Adeyanju (1997) as cited in Jimoh (2009) agrees and based on investigation that learning is reinforced with teaching aids i.e. audio-visual aids; as they motivate and stimulate the students interest along with holding his/her interest during the whole instructional process.

Bozimo (2002) as cited in Iwu, Rosemary, Ijioma, Blessing, Abel, and Nzewuihe (2011) advocates that the use of following criteria to select an instructional material or teaching aids will be very beneficial:

1. Teaching aids should be appropriate enough to meet the instructional objectives.
2. Used and selected teaching aid should be free from biasness and prejudice.
3. Quality should be considered in selection of photos, sounds, formats and prints.
4. Variety must be present in instructional material (teaching aids).
5. Good and sound knowledge of how to operate the instructional material (teaching aids).
6. Ensuring the availability of instructional material or device (teaching aids).
7. How reasonable the time and efforts put by teacher are for both teacher and student.

A research conducted by Adeyanju (1997) at the University of Winneba Ghana, a survey sample of teachers with experiences ranging between 3 years to 25 years, claims that instructional material or audio-visual teaching aids improve teaching methodology. Further more Adeyanju (1997) asserts,

teachers claim that audio-visual aids helps in reducing the talk and chalk method. Others point out the improved and increased attentiveness of students just because of teacher using variety of teaching aids other than mere textbook. In addition, attentiveness generate positive attitude of students that stimulate interest for the lesson taught; finally resulting in students increased participation in classroom activities.

There is a positive relationship between academic performances of the students with availability and use of instructional material or audio-visual aids in schools. Jamison et al. (1981) as cited in Dahar & Faize (2011) states that physical facilities and availability of instructional material along with the level of teacher education, all collectively develops the quality classroom and quality learning that predicts or forecasts the students achievements.

Like wise Mwamwenda & Mwamwenda (1987) as cited in Dahar & Faize (2011) states that school facilities that includes textbooks are very influential elements that contribute to the students' achievements.

Gillani (2005) agrees summarized that when instructional technology is applied as supplementary approach in teaching of Biology; the students of experimental group were more attentive because the use of instructional technology stimulates interest and enhanced the motivational level of students. Use of instructional technology in Biology proves equally effective and beneficial for both low and high achievers. When the teacher teach Biology through concrete examples and instructional technology to experimental group; retention of the students is much better than that of the control group. The researches conducted on the effectiveness of audio-visual aids in learning of students provides solid grounds to conduct further researches in the area, therefore, researcher decided to conduct a comparative study on the use of audio-visual-aids in teaching of biology at public and private schools of secondary level.

Procedure of the study

The current study was descriptive in nature and data for the study was collected through use of questionnaire. This questionnaire was developed under supervision of expert teacher Dr. Sufiana K. Malik. Some suggested amendments were made in the questionnaire. When expert validated questionnaire it was administered on required sample for data collection. Data for the study was collected through personal visits of sample institutions. The researchers personally informed respondents about the purpose of the study; assured them about the secrecy of information they would provide on questionnaire and requested them for their cooperation. The respondents, who were willing, they filled questionnaires.

Analysis of Data and Interpretation

The main purpose of the study is to compare the use of audio-visual aids in secondary level schools of public and private sector. This portion discusses the data analysis and its interpretation.

Demographic Information about Respondents

Table No. 1 Reliability of Instrument Used

Cronbach	Alpha Number of Items
0.807	23

The about table shows that the reliability of the instrument used for data collection was quite reliable for collection of data

for the present study. It reliability at cronbach alpha was found .80.7 that was very good.

Table No. 2 Status of the School in Sample of the Study

Status of the School	Number	Percentage
Public schools	30	50%
Private schools	30	50%

Results in Table 2 reveals that 50% of the sample has been taken from secondary schools of public sector and 50% of the sample has been taken from secondary schools of private sector.

Table No. 3 Gender wise Information about Respondent.

Gender	Number	Percentage
Male	12	12.0%
Female	88	88.0%

Table 3 depicts that there is high percentage (88.0 %) of female teachers in sample and only 12.0 percent are male teachers.

Table No. 4 Information about Respondents Teaching experience.

Experience	Number	Percentage
1-2 Years	21	21.0%
3-5 Years	30	30.0%
5-10 Years	27	27.0%
More than 10 Years	17	17.0%

Table 4 reflects that the majority 30.0 percent of respondent have 3-5 years experience of teaching and 27.0 percent have 5-10 years of teaching experience. There is very low percentage of respondents who have more than 10 years of teaching experience (17.0). 21.0 percent of teachers lie in teaching experience range of 1-2 years.

Table No. 5 Respondents views about the textbook of Biology

Status of text book	Number	Percentage
Interesting	62	62.0%
Easy	11	11.0%
Challenging	10	10.0%
As normal as others	17	17.0%

Table 5 indicates that majority of teachers (62.0%) consider teaching of Biology textbook as interesting. There is no difference between teaching of Biology and textbooks of other subjects taught at secondary level.

Descriptive Analysis of Data

Table No. 6 Status wise Opinions of the Respondent

Variables	Status of the School	Number	Mean	Std. Deviation
Facility	Public	50	6.80	1.948
	Private	50	6.76	2.395
Knowledge	Public	50	3.02	1.684
	Private	50	2.74	0.965
Benefits	Public	50	13.20	5.202
	Private	50	12.12	4.094
Disadvantages	Public	50	2.02	0.515
	Private	50	1.98	0.428
Attitude	Public	50	6.16	0.866
	Private	50	6.12	1.586
Time management	Public	50	1.59	0.810
	Private	50	1.56	0.951
Total	Public	50	32.78	7.704
	Private	50	31.28	7.296

Table 6 shows the difference in public and private school teachers' views on various variables for use of audio-visual aids. Results show that teachers of public sector secondary schools have more knowledge about use of audio-visual aids then private sector secondary school teachers.

Mean score of public and private sector teachers on availability of audio-visual aids, facility (Public 6.80, Private 6.76) and attitude (Public 6.16, Private 6.12) of teacher about using audio-visual aids is to great extent the same. It means that as facility of audio-visual aids is very less in both public and private sector secondary schools so as why teachers of both public and private sector have very low mean score on attitude towards use of audio-visual aids.

Table No. 7: Gender Wise Comparison of Opinions of Respondents on Various Variables Regarding Use of Audio-Visual Aids.

Variables	Gender	Number	Mean	Std. Deviation
Facility	Male	12	7.83	1.992
	Female	88	6.64	2.167
Knowledge	Male	12	3.25	1.138
	Female	88	2.83	1.400
Benefits	Male	12	15.08	5.664
	Female	88	12.33	4.477
Disadvantages	Male	12	2.25	0.622
	Female	88	1.97	0.441
Attitude	Male	12	6.58	1.564
	Female	88	6.08	1.224
Time management	Male	12	2.00	1.044
	Female	88	1.51	0.844
Total	Male	12	37.00	9.303
	Female	88	31.35	7.017

Table 7 describes the findings of the variable gender, from this table it can be seen that the male teachers consider audio-visual aids as more beneficial as compared to the female teachers. Mean score of male (6.58) and female (6.08) attitude towards the use of audio-visual aids is approximately same and positive. Results show that if the facility of audio-visual aids is available then time management is not a serious issue. The table depicts that male teachers show high mean score (15.08) on audio-visual aids as more beneficial and helpful in teaching of biology and that they make concept more clear and understandable, whereas, female teachers show low mean score (12.33) on benefits of audio-visual aids. Findings reveals that there is a positive relationship between facility and availability of audio-visual aids with attitude of male and female teachers i.e. the attitude of teachers changes because of the surrounding environment, if facility of audio-visual aids is available; tendency to use the aids changes to a greater extend. Score of male (3.25) on knowledge of audio-visual aids is higher as compared to female mean scoring (2.83). The table shows that male teachers have high mean scoring on various variables then female except attitude towards use of audio-visual aids, where the mean score is almost the same (Male 6.58, Female 6.08).

Table No. 8 Experience wise Respondents Opinions about Use of Audio-Visual Aids

Job experience		Facility	Knowledge	Benefits	Attitude	Time	Total
1-2 Years							
N	21	21	21	21	21	21	21
Mean	7.10	2.90	13.38	2.10	6.29	1.67	33.43
Std. Deviation	2.119	0.995	5.074	0.301	1.146	0.913	7.717
3-5 Years							
N	30	30	30	30	30	30	30
Mean	6.90	2.80	13.40	2.00	6.33	1.73	33.17
Std. Deviation	2.171	0.961	5.928	0.525	1.213	1.015	8.482
5-10 Years							
N	27	27	27	27	27	27	27
Mean	6.85	3.26	11.93	2.00	5.96	1.52	31.52
Std. Deviation	2.013	2.177	3.292	0.555	1.160	0.802	5.860
More than 10 Years							
N	17	17	17	17	17	17	17
Mean	6.06	2.65	11.47	1.88	5.94	1.41	29.41
Std. Deviation	2.633	0.702	4.064	0.485	1.819	0.795	8.345
Total							
N	100	100	100	100	100	100	100
Mean	6.78	2.88	12.66	2.00	6.14	1.57	32.03
Std. Deviation	2.172	1.373	4.689	0.471	1.271	0.879	7.503

Table 8 indicates the difference in the perception of different age group teachers' score depending on their teaching experience on the use of audio-visual aids. From this table it can be seen that perception of younger teachers are more positive towards the use of audio-visual aids. The older teachers have low scores towards the use of audio-visual aids. As the job experience increases so as the teaching is taken light by the teachers, it becomes their automatic daily activity. The teachers with teaching experience of more than 10 years have least total mean score (29.41) as compared to other age groups. The level of knowledge on the use of audio-visual aids is less in teachers with teaching experience of more than 10 years. Young teachers lying under the age group of 1-2 years and 3-5 years have high

mean score in relation to the level of knowledge on the use of audio-visual aids, as they have more knowledge about the use of audio-visual aids they have positive attitude towards using them in classrooms. It means young teachers are highly motivated and energetic towards correct teaching as compared to other two age groups.

Table No. 9 Opinions of Respondents about various Audio-Visual Aids

	Facility	Knowledge	Benefits	Disadvantages	Attitude	Time	Total
WB, Model, Picture, Specimen							
N	28	28	28	28	28	28	28
Mean	6.25	3.29	12.14	1.96	6.11	1.32	31.07
Std. Deviation	1.602	2.123	3.997	0.576	1.227	0.723	6.688
BB, Model, Picture, Specimen							
N	25	25	25	25	25	25	25
Mean	6.36	2.44	11.56	1.92	6.44	1.48	30.20
Std. Deviation	2.706	0.768	3.874	0.400	1.850	0.872	7.632
BB, Model							
N	32	32	32	32	32	32	32
Mean	7.97	2.72	14.28	2.19	5.97	1.84	34.97
Std. Deviation	1.840	0.958	5.990	0.397	0.782	0.954	8.521
WB, Model, Specimen							
N	12	12	12	12	12	12	12
Mean	5.67	3.08	11.00	1.75	6.08	1.42	29.00
Std. Deviation	1.969	0.900	1.044	0.452	1.165	0.900	2.089
Total							
N	100	100	100	100	100	100	100
Mean	6.78	2.88	12.66	2.00	6.14	1.57	32.03
Std. Deviation	2.172	1.373	4.689	0.471	1.271	0.879	7.503

Table 9 shows high mean score (34.97) on the use of black board and models by teachers. It means that up to greater extend black board and models are available teaching aids both in public and private sector secondary schools. Teachers of both public and private sector secondary schools agree that blackboards and models facilitate teaching and learning become more conceptual and understandable. Through the use of models abstract ideas and concepts are made clearer to the learner.

Major Findings of the Study

On the basis of data analysis the study found that:

1. Audio-visual aids are an important tool of teaching learning process, and they make teaching-learning process more successful and interesting.
2. The knowledge about the correct use of audio-visual aids enhances the understanding of the students in the classroom and helps improve teachers' role in realizing the learning outcomes.
3. Teacher may likely to motivate student better with the use of audio-visual aids in teaching learning process.
4. Use of audio-visual aid helps in supplementing the attention level of the students while increasing their understanding and intellectual capacity.
5. Benefits of using audio-visual aids in teaching-learning sessions was found convincing from the responses collected from respondents who endorsed the beneficial effects of using audio-visual aids on students learning achievements.
6. The results of present study show that there is a positive relationship between facility of audio-visual aids and the teacher's attitude. Because of surrounding environment; teacher's attitude changes i.e. if facility of audio-visual aids is

available in schools then teacher's attitude towards using them changes to a greater extend.

As we see that in current study in public and private sector teachers mean score on availability of facility of audio-visual aids (Public 6.80, Private 6.76) and their attitude (Public 6.16 , Private 6.12) towards using them is approximately the same.

7. Students are more inclined towards learning activities in the classroom when teachers make proper use of audio-visual aids.

8. It is found that public sector teachers are well trained as compared to private sector teachers. This results because of eligibility criteria for public school teachers' i.e. professional teacher training course or other professional teacher education certificate/degree.

9. Experienced teachers take teaching very light, whereas, new and fresh teachers are more sincere and motivated towards their profession and are ever ready to take new challenges to bring something new in existing setup.

10. Public sector schools provide better audio-visual facilities as compared to private sector schools.

Discussion and Recommendations

The study reported that the use of audio-visual aids (a. v. aids) brought positive and constructive change in the learning achievements of the students. The teachers showed awareness about audio-visual aids, their use and their effectiveness on learning outcomes but teachers were not motivated to use them in the classroom as facility of such audio-visual aids is very limited. We think availability of a.v aids is the major factors for motivation of using a.v.aids. When a.v. aids are not present in the classroom environment how can teachers become motivated in use of a.v aids in teaching of any subject. On this point the findings of the present study are related to real situations of respondents. Proper use of audio-visual aids by the teachers makes difficult concepts and abstract ideas crystal clear to the students and they took keen interest in the classroom teachings. Learning environment is more active an interactive through the use of audio-visual aids whereby students are highly alert in the classrooms; instead of mere passive listener they took active participation in the learning activities, thus enhancing the level of retention, understanding and comprehension. The study inferred that proper use of audio-visual aids shows the professional attitude and interest of the teachers towards teaching as a profession. Intentional use of audio-visual aids not only develops teachers but also students level of motivation and interest in classroom teaching and in other learning activities that encourages the attainment of desired learning outcomes. In contrary to those teachers who do not use appropriate audio-visual aids in the teaching-learning process; they not only lose interest in their teaching but they also fail to stimulate and encourage the students towards learning hence they are unable to achieve desired learning outcomes.

Recommendations

On the basis of data interpreted, findings and conclusion of the study following recommendations are made:

1. Appropriate use of audio-visual aids is a skill; therefore teachers may be trained in use of traditional as well as new technology based through pre-service programs and in-service teachers' professional development programs.
2. Teachers may be encouraged to use audio-visual aids in order to enhance the interest and motivation of the students and keep them attentive in the class.
3. Curriculum planners and policy makers may realize the importance and effectiveness of audio-visual aids and can make it a part of the teacher education programs so that teachers are trained in proper use of audio visual aids.

4. Special funds and grants may be reserved for provision of latest audio visual aids (subject-wise) to secondary schools.

5. This research article has opened new horizons for other researchers to study the importance and use of audio-visual aids on the same lines in other subjects of the curricula taught at different levels of education and find out effects of use of audio visual aids on students' learning and their motivation for learning.

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