
TOWARDS THE TRANSFORMATION OF CHEMISTRY EDUCATION IN THE NIGERIA COLLEGES OF EDUCATION THROUGH THE USE OF AUDIO-VISUAL MATERIALS

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Abstract

The effective use of Audio-Visual materials in teaching and learning is crucial in improving the performance of learners especially when it comes to the teaching of difficult concepts in chemistry. This paper highlights the background of the need for the full application of Audio-Visual (AV) materials in the classroom. The definition, advantages and characteristics of good Audio-Visual aids are given. Some problems responsible for the lack of use of AV materials in the Colleges of Education (COE) were identified to be teacher-, school management- and parents-based. The following recommendations are made: the use of Audio-Visual aids should be encouraged; curriculum instruction and Audio-Visual aids Centres should be established and adequately equipped in Nigeria COE; training of both students and staff in COE on how to improvise, use and maintain Audio-Visual materials should be done.

Audio Visual (AV) materials are resources that are effectively employed to facilitate the teaching and learning processes. Invariably, it can be said that Audio Visual materials are means of achieving qualitative education. Hearing (audio) and seeing (visual) senses contribute to learning activities. We retain 10% of what we read, 20% of what we hear, 30% of what we see and 50% of what we see and hear according to Santos and Nishida (1994). In line with this, it can be understood why AV materials are indispensable tools in classroom environment if the teaching and learning process must be successful.

Over the years, teaching and learning of chemistry at both O' and A' levels of education have yielded poor outcomes. Some factors have been identified to include the abstract nature of chemistry concepts (Ezeudu, 1998); the rote learning of chemistry concepts (Shaibu, 1986) and the teaching methods (Nwoso, 1982). Despite the numerous researches conducted in order to improve the quality of teaching and learning chemistry,

these have not shown impressive results as evident in the low achievement scores of learners. The study conducted by Ezeudu (1998) revealed that from 1981 – 1990, not more than 39.15% of those that sat for West African School Certificate Examination (WASCE) obtained credit and above in chemistry.

In view of antecedents of the quality of the present chemistry educational system, it is necessary to consider the teaching approaches that can transform and yield better results in the achievement scores of students in chemistry. In place of traditional methods of teaching such as lecture method, modern methods that make use of educational technology are being adopted. These methods provide educational gains. However, the application of this technology in the teaching and learning of chemistry in the (COE) in the country is not the practice. This is why the writer intends to highlight the advantages, features of good AV materials and encourage the use of this technology through this paper.

The Concept of Audio-Visual Materials and Educational Technology

Educational Technology is defined as an array of tools to include educational television and other audio-visual media-programmed instruction and computer-assisted instruction (Santos & Nishida, 1994). This means that the focus is to facilitate learning and teaching using technologies. Educational technology also provides a medium that exposes its effects on learners and the organizations.

“Audio-Visual” means possessing both sound and sight components such as slide-tape presentations, films, television programs, church services and live theatre productions (Wikipedia, 2016).

Blog Archive (2010) defined Audio-visual aids as supplementary devices by which the teacher, through, the utilization of more than one sensory channel is able to clarify, establish and correlate concepts, interpretations and appreciations.

This is to say in other words, that, AV aids are devices that provide sound and images which can be used to initiate or activate and reinforce learning. A majority of students have perceived chemistry as a difficult subject. Hence, there has been persistent and low number of students enrollment in chemistry, SSCE examinations over the years. Furthermore, the poor achievement scores in SSCE chemistry obtained by secondary school students is not only attributed to the difficult nature of chemistry but also to faulty methods of teaching employed by teachers. These issues can be resolved through the use of audio-visual aids. In a study conducted by Ashaver and Igyuve (2013) it was revealed that lecturers in the Colleges of Education in Benue State rarely use audio-visual resources in teaching.

The lack of use of AV resources in the Colleges of Education in Nigeria has been an endemic problem generally. There are factors that are responsible for this. Given below are the factors that obstruct the use of AV aids in schools.

Obstacles in the utilization of AV Aids in Schools

The obstacles of AV aids utilization in schools are teacher-, parent- and school management-based.

Teacher-based and school management-based obstacles

The teachers in most schools use traditional methods of teaching due to their inability to use Audio Visual aids because they were not trained enough on the use of AV aids or they lack dedication to their work. According to Awasthi (2014) teachers and school management have complete interest focused on marks obtained in examination rather than learning. As a result they consider investment in AV aids as time and money wastage.

This is an erroneous perception because the effects of AV aids usage in academic program are tremendous gains that cannot be compared to their costs and time involvement.

Existing teacher training programmes are not planned and organized properly to train teachers on how to use the teaching aids effectively in and outside classroom (Awasthi, 2014).

No wonder, the National Policy on Education, (2004) said that “no education system can rise above the quality of its teachers”. When the teachers, are fully trained, they will be effective and their products will be superb. There is need therefore to adequately organize teacher training programmes according to our educational needs in order to transform the educational system.

Schools find it difficult to provide funds for the purchase and maintenance of Audio Visual aids because they are costly.

Parents-Based Obstacle

Parents’ ignorance also contributes to the problem of AV aids utilization. Awasthi (2014) found out that some parents do not understand the concept of using teaching aids in the classrooms. They feel that their wards should be taught in the way they were taught twenty or thirty years ago.

Parents and guardians must remember that through researches there are now new approaches to pedagogy which have been developed to enhance learning which are better than the ones used in the classrooms during their school days.

Types of Audio-Visual Aids

AV resources are divided into audio, visual and audio - visual resources and others which can be either in a projected or non-projected form (Ashaver & Igyuve, 2013).

Dike (1993) grouped audio-visual materials into audio resources such as records, tapes and cassettes and radio broadcasts. Visual resources include models, real objects, the chalkboard, bulletin board, graphs, diagrams, charts, maps, cartoons, posters and projected forms like transparencies, slides, filmstrips and films. Audio-visual combination, e.g., sound film and filmstrips, television programmes, video tapes and dramatization. Others include educational programmes/games, programmed instructions, demonstrations and field trips.

The Benefits of AV Aids

The benefits of AV aids in teaching and learning process cannot be over emphasized. The benefits of AV resources are presented below:

1. Extending Experience

Ashaver & Igyuve (2013) gathered that AV aids help to break the barrier of communication and distance. According to Dike (1993), “once the phenomenon is visualized, the picture and knowledge become very clear and permanent”. This is in line with the assertion of a 20th century Chinese philosopher who declared that, “one picture is worth a thousand words”. In other words, AV aids provide near realistic experience.

2. Encouraging Participation

With the aid of AV resources, the learners are actively engaged in solving problems. According to Natoli (2011), while students are actively engaged in solving meaningful problems, their communication skills development is enhanced

3. Stimulating Interest

Through the use of instructional aids, the attention of the learner is caught and his/her interest is also won and he/she gets ready to learn. This agrees with Martin (2009) when the writer stated that a learning takes place effectively when the teacher sets out to provide a learning situation in which a child will learn because of his natural reactions to the provided -materials. Invariably, it can be said that AV aids can motivate students to learn.

4. Individual instruction

Through programmed instruction and tapes, the learner is enabled to learn at his pace and on his own. According to Dike (1993), “the machine frees the teacher to work with individual students, since he or she is not now required to carry out

routine drills. This entails that AV materials can meet individual demands. They are also useful and effective in the teaching of large classes.

5. **Information dissemination**

Audio visual aids are good sources of information especially those provided from our locality. When they are presented in the class by the teachers, their familiarity offers solid background for knowing the information (Ashaver & Igyuve, 2013).

It should be expected that such knowledge got from this familiar Audio-visual aids should make a long lasting impression, making learning permanent and interesting. Also clarity of information presented from familiar A.V materials is enhanced because learners not only hear but visualize what is taught. Hence there is a saying: what I hear, I forget, what I see, I remember, what I do, I know.

Characteristics of good Audio- Visual aids.

Good AV aids are:-

1. Meaningful and purposeful
2. Motivating
3. Accurate
4. Simple and cheap
5. Realistic
6. Relevant
7. Comprehensive (Ashaver & Igyuve, 2013; Farooq, 2014).

There is need to check and ensure that when A.V. resources are prepared or improvised, they must possess these qualities. This entails that, chemistry teachers in particular, and teachers in general need special training in this area of A.V aids development and utilization.

These characteristics are elaborated as follows:

1. **Meaningful and Purposeful**

After some trials of presentations of A.V. aids in the classroom, there should be enough evidence of being effective before they can be considered to be meaningful and purposeful. A.V. materials should be used for no other reason or purpose other than for meaningful education, which is, productive learning.

2. **Motivating**

The utilisation of A.V. aids in the classroom is not meant for entertainment but to motivate learning. A good A.V. material should be exciting and interesting to the learners. A good A.V. aid should be able to stimulate the eye, ear and other

senses. Hence, students' ability to arrive at abstract concepts can be facilitated by A.V. aids through perceptual experience.

In order to capture the attention and interest of the learners so as to get them ready to learn, the teacher ought to provide the learning situation through the use of A.V. materials. As the learners naturally react to the provided learning situation, the attention of the learners is captured and learning process is initiated.

3. **Accurate**

The barrier of giving accurate information by the use of verbal explanation is conquered through the utilization of A.V. aids. For example the required conditions of some chemical reactions can be visualized in the classroom with the aid of video tapes, television etc. Once the picture or phenomenon is visualized, understanding and knowledge of the phenomenon becomes simple and permanent.

According to Farooq (2014) a good diagram of the real object might be more accurate and valuable than an accurate photograph depending on whether the diagram aids in the comprehension of the concept to be learnt. What is important here is the accuracy of understanding rather than the accuracy of the presented materials.

4. **Simple and Cheap**

The ease and cost of preparing A.V. aids determine how good they are. For instance, varieties of inexpensive ways of preparing transparencies are available and should be adopted in order to be projected on an overhead projector. The teacher has to avoid the use of costly equipment such as the opaque projector.

5. **Realistic**

Farooq (2014) quipped that nearly all the audio-visual aids lack one of the characteristics of good A.V. aids which is necessary in making a concept clear to the learners. On the contrary, the actual sample clarifies the concept in question due to realism. This implies that audio-visual aid must possess the quality of developing real concepts of the things being studied. For instance, the teacher tries to develop in the students the concept of "matter is made up of small particles that are in a state of constant motion". The teacher illustrates this to the best of his/her knowledge with the use of diagrams. When the students are shown the actual film on sublimation, which is a natural phenomenon, a different concept will be developed after they must have been able to view the constant motion of small particles that make up matter.

6. **Relevant**

A visual aid could be of no value even if it is accurate and interesting without being relevant to the concept which needs to be developed. The extent to which an aid is directly related to the understanding of a concept is very crucial. For example the teacher has a chart of the periodic table of elements and he/she is trying to make clear the concept of atomic number of group elements. No matter how accurate and captivating the chart may be, it will lose its effectiveness because of the presence of the atomic numbers of elements in the other groups outside group I. A good A.V. aid should not possess irrelevant materials.

7. **Comprehensive**

A.V. aids should be in line with the mental level of the students. It is at this level, that A.V. aids will be able to facilitate students' understanding of the concept in question.

Transformation of Chemistry Education through A.V aids utilization

Full application of A.V aids in the teaching and learning of difficult concepts in chemistry at the COE is rare. However, from the foregoing sections, we have seen that proper application of A.V resources (Educational Technology) as a supplement to the common instructional materials, that is, chalkboard or whiteboard and textbooks in the classroom is very crucial.

Audio-Visual resources have been in existence longtime ago. Yet they are often being under utilized. According to Prostano & Prostano (1999), the advent of A.V aids is long ago, but its use was scarce until in the 1960s and 1970s when libraries realized its use and started collecting them for use.

In developed countries the use of A.V aids in teaching and learning date far back as 1920s, the United State of America is an example (Ashaver & Igyuve, 2013). Hence her educational programmes are result oriented. In Nigeria the importance of using A.V resources in enhancing educational programs has been realized of recent and efforts are being made to ensure that educational technology resources are utilized effectively to promote teaching and learning. For example, the University of Nigeria, Nsukka as asserted by Ashaver & Igyuve (2013) has established Curriculum Development and Instructional Materials Centre to promote the utilization of various types of A.V materials and media in the school. In the same vein, the old paradigm of lecture method in our COE should be discouraged where chalkboard/whiteboard are the main A.V material and an interactive high-structure learning environment encouraged by the establishment and equipping of instructional materials centers or libraries with a collection of AV materials.

The creation of high-structure learning environment in chemistry classes in COE through the use of A.V aids will be a step towards transformation of this program for the desired results. Also the incorporation of courses in the NCE minimum standards that are geared at grooming the prospective teachers on the improvisation, use and maintenance of AV resources is necessary as another step towards the transformation of chemistry education. Hindrances to the use of A.V aids in the COE which include non-availability, lack of supporting infrastructure and staff training contribute to the dearth of quality in Nigeria's educational system. A step towards surmounting these barriers by the educational stakeholders will be a reality in the transformation of the sector.

Conclusion

The application of Audio-visual materials in teaching and learning in developed countries has culminated in the transformation of chemistry education, for example in Carolina USA (Krumper & Bleim, 2013). In these transformed classrooms, students have been able to understand tough concepts by working problems together unlike in traditional lecture classroom environment. Hence teaching and learning of chemistry in Carolina have improved and more students were empowered to continue in chemistry. This is not the case in Nigeria, therefore, our educational activities, especially at the tertiary levels (COE) require over hauling in order to incorporate the use of Audio-visual resources.

Recommendation

There is a low level of A.V aids utilization in teaching and learning in the COEs in Nigeria. Thus the following recommendations are made to ensure that A.V resources utilization and application are popularized so that Nigeria can also join the other developed nations of the world, especially, in this period of the Federal Government transformation agenda:

1. The use of A.V materials such as computer, internet services, films, tapes, etc should be encouraged and incorporated in the curriculum.
2. Curriculum development and A.V aids center should be established and equipped in Nigeria's COE.
3. Students and teachers should be trained on the use, improvisation and maintenance of A.V materials.
4. A.V materials should be provided by the educational stakeholders. There should also be an ETF intervention scheme for COE for efficient funding for AV resources.

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