

Review of Instructional Technologies and Instructional Activities for Effective Teaching and Learning in Nigerian Schools

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Abstract

Instructional technology can be a valuable resource for supporting and enhancing teaching and learning. It is important for teachers to be familiar with the different tools and resources available and to use them in ways that are meaningful and effective for their students. This paper discusses on the types of instructional technologies used in teaching and learning, importance of instructional technologies in teaching and learning, guidelines for proper selection and use of instructional technological devices, importance of instructional technological devices in pedagogical activities, problems and challenges facing instructional personnel when using instructional technological devices during instructional activities, possible solutions to the problems and challenges facing instructional personnel when using instructional technological devices during instructional activities, and improvisation and innovation of educational technology devices: challenge to teachers among others.

Keywords: Instructional Activities, Schools, Technological Devices, Teaching and Learning.

Introduction

The application of technology in educational processes improves teaching and learning ideas (Abdulrahman, *et al.*, 2020). The basic goal of instructional technology is to design motivating learning experiences using the technology that is currently accessible. Designing, developing, utilizing, managing, and evaluating procedures and learning resources is known as instructional technology (Abdulrahman, *et al.*, 2020). There are many advantages to using instructional technologies in school effectively. When complicated ideas and information are blended with students' own experiences and past knowledge to generate personal and distinctive understandings, Coffman (2018) claims that instructional technologies support meaningful learning. When a student understands the connection between what they are learning and prior knowledge, learning becomes meaningful.

Constructive learning happens when we reflect on our learning experiences and give them context. When students are able to recognize the learning objectives and are conscious of their advancements toward actively fulfilling the objectives, intentional learning takes place. Genuine learning happens when it is complicated, context-based, and applicable to everyday life. Working together and being a part of a learning community are two ways that cooperative learning takes place (Grabe & Grabe, 2017). Examples of these instructional technologies are magnetic chalkboards, computers, flip charts, overhead projectors, the

utilization of videos, radios, etc., according to Kadzera (2016) and Wikipedia (2018). Obidiegwu (2018) categorizes this as projected media, printed and non-printed media, and audio-visual media.

The use of instructional technologies is crucial for education, but in Nigeria, observations suggest that this is either nonexistent or insufficient for teaching and learning due to a number of issues and problems that prevent its efficient implementation. According to Kadzera (2016), the utilization of instructional technologies was greatly influenced by aspects including training (pre-service and in-service), availability, support, and access (serving as barriers). The use of instructional technologies in teaching and learning can be influenced by a variety of factors, including training, adequate supplies, support from peers and administrators, and access to these tools. However, there can also be other obstacles, such as a lack of preparation time and financial incentives, which can hinder the use of these tools. Similarly to this, where technology is present but the teachers lack the skills to use it, learning that could have been boosted by the use of technology will not take place (Kadzera, 2016). Staff members must be trained in using these technologies and must continually update their skills. The current study's review of instructional technologies and instructional activities for effective teaching and learning in Nigerian schools is necessary for light of all of these factors.

Literature Review

Instructional Technologies Used in Teaching and Learning

According to Edmonger (2021), there are three different types of instructional technology: synchronous and asynchronous, linear learning, and collaborative learning. The first two types of educational technology are synchronous and asynchronous. Students can learn inside or outside of the classroom because new inventions are created every day. With the use of various online tools, synchronous and asynchronous learning are both possible for self-directed learning. Through virtual classrooms and distance learning programs, students can now learn online. The term "synchronized learning," which literally means "existing or occurring concurrently," refers to people conversing about ideas and knowledge related to specific topics at the same time. Examples of situations where individuals collaborate online include face-to-face meetings, chat rooms, online classes, real-time instruction and feedback sessions, Skype conversations, etc. The fact that the students are working in groups allows them to expand their thinking by hearing what others have to say about similar subjects. Additionally, by studying more and accumulating more information, they will increase their knowledge.

Not in real time is what asynchronous means. As a result, blogs, emails, online textbooks, audio/video courses, hypertext papers, wikis, etc. are the main tools used for asynchronous learning. Students are able to learn at their own pace with this kind of educational technology. They can read the lesson again if they don't immediately understand it to avoid falling behind in class. Through online courses, students can complete their program while

doing internships, work, or sports, or if failed, they can repeat their course without any embarrassment of being in the same class with younger students.

Liner Learning is the second number in educational technology types. *Linear Learning* is all about Computer-Based Training (CBT), where the information about the Programme is sent to students' computers, tablets, or smartphones. It looks much like reading an online manual or book. It is frequently used in teaching static processes, like using software or completing mathematical equations. The training is similar to Web-Based Training (sent over the Internet using a web browser). CBT is different from traditional learning as there is no classroom, textbooks, or manuals. Instead, videos and animation can be included in CBT which will help students understand the topics more precisely. Furthermore, with the help of Computer-Based Training, assessments such as multiple-choice questions, drag-and-drop, and others can be stored easily and recorded using online software and providing feedback/results simultaneously to users. Lastly, users can get the result online in the form of a certificate. However, there are some challenges, as creating the required CBTs requires significant resources. Sometimes, the CBT may be complex to use. Also, there is no interaction between students or teachers, resulting in no exchange of thoughts and knowledge.

Collaborative means *'to work with another person or group to achieve or do something'*, so Collaborative Learning is how learning is done in groups by working together. Problem-solving, learning new concepts or completing tasks are, provided in groups of two or more to work together. In this way, individuals can learn through collecting data, listening to others' thoughts rather than simply learning the provided resources. This way, they are dependent on teachers (the primary source of skills and knowledge).

Importance of Instructional Technologies in Teaching and Learning

Technology is evolving and scholars in the areas of Information Technology (IT) and education technology are continuing to study how instructional technologies can be harnessed for the enhancement of teaching and learning. A software tool can be used to expand teaching and learning in various fields. It is important to provide students with practical experience in most fields of learning.

The importance of instructional technologies and its applications in education as teaching or learning tools cannot be over emphasized. This has been confirmed in several studies that have investigated the impact of instructional technology to the education system. Capuno *et al.*, (2019) demonstrated the importance of using instructional tools in Mathematics classes and found that the instructional tools greatly enhances students' learning. Several works exist that show that multimedia enhances students' learning (Al-Hariri and Al-Hattami, 2017; Dalacosta et al., 2019; Keengwe et al., 2018b; Kingsley and Boone, 2018; Shah and Khan, 2015).

Instructional technology communication has close similarities to face-to-face communications. It is less restricted than text and ensures better understanding (Pea, 2021). Instructional technology helps simplify abstract content, allows for differences from

individuals and allows for coordination of diverse representation with a different perspective. The use of the computer-based technique as an interface between students and what they are learning with suitable fonts and design can be very valuable. Certainly, multimedia technology brings about improvement in teaching and learning, however, there are a number of limitations in this technology for educational purposes. Some of these limitations include unfriendly programming or user interface, limited resources, lack of required knowledge and skill, limited time and high cost of maintenance among others (Al-Ajmi and Aljazzaf, 2020; Putra, 2018).

Guidelines for Proper Selection and use of Instruction Technological Devices

The following rules of thumb in connection with effective selection and use of instructional technology devices for instructional process should be adhered.

- Always consider the nature of the task, objectives, characteristics of the learners and the media available.
- Do not run after sophisticated media but always use the simplest and the cheapest but effective ones available to you.
- Use instructional media as creatively as possible.
- Remember that objects, pictures of objects are easier to handle and better remembered in most cases than their names.
- In teaching new concept, instructions should begin concretely and then proceed toward abstraction as competencies is gained.
- When using multi-channel presentation, remember that combining words and related illustrations, mostly gives greater result.
- Always aimed at providing opportunities for learners to interact with whatever concept, memory, skills etc.
- Make sure instructional devices are ready and tested to ascertain their effectiveness and fault-free, before instructional activities started.
- Recording the success and the failure encountered after the program for correction and improvement were necessary.
- Managing the time, when using the devices, to avoid ending the class in chaos.
- Instructional materials must make learning more real and meaningful to the learner.
- The materials should not be substitute for learning but must contribute to the learning process itself.

Importance of Instructional Technological devices in pedagogical activities

1. The essence of producing instructional materials, is to facilitate the teaching learning process. The essence is not to use such instructional materials as objects of decoration in our classroom or as objects to be presented during award winning national exhibitions on improved instructional materials. If the essence of producing instructional materials is to use such materials to facilitate teaching learning, it therefore seems logical that the best approach to adopt in any production exercise

is to predict out production on research findings on how individuals learn. Besides, there are for instance, many factors that affect attention of human beings. There are also ideas about how we perceive objects. Hence, for a classroom teacher, who wants to produce instructional materials, his production has to be on sound principles.

2. While presenting various learning theories, one has to be sure that a classroom teacher is guided by expert ideas during his production and utilization of instructional materials.
3. They supply a concrete basis for conceptional thinking and reduce meaning less work responses for pupils as it makes learning more permanent.
4. Instructional materials have a high degree of interest for the learner; for they offer a reality of experience, which stimulates self-activity on the part of pupils.
5. Instructional materials develop a continuity of thought, this is especially true of motion pictures, as they provide experiences not, easily obtained through other materials and contribute to the efficiency, department and variety of learning.

The significance of Instructional Technological devices in teaching and learning process can never be emphasized, generally, it makes the teaching process easier. Rhert Heinich - et al (2011) outline the importance and reasons of considering their usage as follows:

- the use of Instructional materials help to gain and hold the attention of the learner
- Provide visual aspects to a process or techniques
- Focus attention on highlight of key points
- Create impact
- Facilitates the understanding of abstract explanations. They give visual access to something which may be inaccessible to clarify abstract information which may be difficult to communicate verbally. Examples are model picture, photo, posters and diagrams.
- Provide a common experience to a large number of learners
- Stimulate reality
- Instructional materials in teaching help to concretize the learning process.
- To condense large quantities of information e.g. diagram and handout.
- To promote mental activities of students; examples are handout, textbooks, films and picture.
- To teach language pronouncement e.g. audiotapes.
- To support work of the teachers e.g. sound recordings. They make learning more interesting, more real and lively.

At all level of education, instructional technological devices are very important in the attainment of desired goal and objectives.

Problems and Challenges facing Instructional Personnel when using Instructional Technological devices during Instructional Activities

The logic in the use of Instructional Technological devices is to deliver valuable assistance in the teaching learning process to attain the best academic results through the available

technological and non-human resources, this may not be achieved without encountering some possible hitches. A lot of research literature came up with explanations on the problems and challenges facing instructional personals in the selection and use of Instructional Technology garget during instructional activities in schools.

- The problem related to Digital Culture Deficiency & Digital Dichotomy:
- Resistance to change and phobia by the educational stakeholders and instructional personnel
- Lack of technical support and inadequate content developers and specialist
- Resources constraint and cost
- In adequate harmonization of technology resources cost
- Inadequate infrastructure and power supply
- Problem associated with curriculum design and implementation
- Inadequate practical knowledge on the operation of the new instructional technological devices
- Inadequate time allocated when using instructional technological gadget.

Possible Solutions to the Problems and Challenges facing Instructional personnel when using instructional technological devices during Instructional activities

- Providing the knowledge/awareness on computer and digital skills
- Design a frequent seminar to the educational and instructional personnel on the important of using technological tools in educational system
- Provide enough technical personnel and content specialist that will response quickly over the problems may arise when using instructional technological tools in administrative and pedagogical purposes
- Provide adequate educational technological devices that will be used in the administrative and instructional purposes
- State the additional policy on the necessity of using the new technology innovation in the educational system.

Improvisation and Innovation of Educational Technology Devices: Challenge to Teachers

Instructional technology devices are sometimes lacking, not available or not suitable. This is because they are very expensive and some are sophisticated to come by to our locality. However, teachers should endeavor to improvise most of the materials with available materials in and around the school and in the domestic environment. Improvisation become necessary when their originals are not readily available. And innovation in educational technology refer to the new ideas, systems, approaches, machines and devices innovated to solve educational problems, to change the traditional method of instruction to the more interactive ones and to enhance instructional process and administrative activities.

Learning is facilitated and consolidated effectively when instructional materials are properly selected, organized on relevancy and adequately structured into the lesson

activities. Proper coordination and judicious use of instructional materials, make learning retention more permanent in the minds of pupils/students than the use of only verbal instructions. The task of teachers is to realize that verbal language is no longer enough, teachers must master the use of instructional material to present concept, principles, laws and theories to their pupils/students. And should improvise when necessary. Improvisation is the technique and skills acquired by teacher(s) or resource person(s) in the provision of instructional materials using locally available resources with the help of expert. It is the act of making teaching and learning material from the locally available resources (Olawajun, 2014). Teachers should make use of raw materials in their environment, waste and realizable material and students/pupils collections and assistance from the local repairers such as carpenter, painter, blacksmith etc to facilitate improvisation to aids meaningful teaching and learning.

Basically, there are two forms of improvisation as identified by Bomide (2019).

- **Role substitution:** - the originals material(s) or item requires little modification before it can be used by the teacher to suit the needs and level of the learners. Example teachers used Kerosine stove in place of Bunsen burner, glass tumbler as a beaker.
- **Simulation:** This is the actual construction of a new improvised material as an emergency measure especially when the actual or needed instructional materials is either too expensive or not available. Example wooden tripod stand, test tube tracks etc constructed by carpenter.

Rationales for Improvisation

- To ensure the achievement of educational objectives by providing opportunities to develop necessary attitudes and skills.
- Improvisation promotes creativity and self-reliance among teachers and students/pupils
- Improvisation enable teachers to widen their mental horizon in rethinking and research on what to improvise using locally available materials.
- It helps in bridging the gap between the practical and theoretical knowledge.
- Improvisation is importance when and where the equipment or materials are available but not affordable, expensive or technical expertise for repairmen is lacking or even the spare parts.

Conclusion

A lot of work has been done to highlight the effectiveness of instructional technology as a teaching and learning aid. This paper provides a systematic review of studies on instructional technologies in teaching and learning in order to identify the tools being commonly used to aid teaching and learning. The paper did a systematic review of extant literature that reported studies that have been carried out to determine the extent to which instructional technology has been successful in improving both teaching and learning, and challenges of using them in learning and teaching. It is obvious from the review that

researchers have explored several instructional technologies in order to develop teaching and learning tools either based on the web or standalone using different technologies. It is observed that there exist several instructional technologies in education, but the proliferation of the tools is attributed to the evolvement of technologies over the years and the continuous teachers' efforts to improving knowledge delivery with respect to the subject areas and target audience.

Recommendations

1. Federal/State Government, UBEC and SUBEB should support teachers' utilization of printed and non-printed instructional materials in schools, this could be achieved through adequate funding and procurement of materials needed in teaching at both primary and junior secondary schools.
2. Head teachers/Principals should also improvise the required printed and non-printed instructional materials required by teachers in their schools with constant supervision and staff training on their usage to improve teachers' utilization and technical know-how to aids effective teaching and teaching in schools.
3. Teachers should develop positive attitude improvisation and utilization of instructional materials in order to aid effective teaching and learning in schools.
4. Stake holder in education including, Parent Teachers Associations (PTA) should device and adopt possible strategies in the provision of available instructional materials as well as enhancing and improving teachers' utilization of these materials for effective teaching and learning in schools.

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