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Review Article

Utilization of Digital Teaching Methods for Interactivity and Effective Delivery at Basic School Levels in Kaduna, Nigeria

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Abstract

Technology has found its way slowly but surely into the classroom. This calls for the need to write on the title "Utilization of Digital Methods of Teaching for Interactivity and Effective Teacher Delivery at Basic Levels in Kaduna State." Teachers are now exposed to using technological facilities in the instructional process to increase their abilities to use ICT gadgets for individualized instruction and assessment, arousing learners' interest, retaining attention, and facilitating assimilation, understanding, recall, interaction, and collaboration. COVID-19 has opened a new normal in the classroom, where the sudden closure of schools calls for virtual or digital instruction. This technology can be applied to inject content, ideas, or encourage interactivity with or without a teacher. Trainees and teacher educators need to be exposed to these digital methods of teaching to remain updated, relevant, and technology-compliant. The paper discusses the nature and characteristics of technology-based methods, identifies six digital instructional methods for effective facilitation in the 21st century, and presents the processes, resources, problems, and recommendations for effective utilization. These elements are discussed in the paper for innovation and sustainability in Teacher Education.

Keywords: Digital Teaching Methods, Interactivity, Basic Education, Digitalization.

INTRODUCTION

Advancement in technology is rapidly growing by the day. "It has ushered in a profound transformation across various facets of life, with academia being a notable beneficiary" (Sani & Bakura, 2023 p. 224). The growth in technology has led to an increase in creativity and innovation among classroom teachers. This has resulted in the introduction and adoption of internet-based approaches (technology-driven or programmed instructions) in the instructional process, where teachers are seen using various technological tools and techniques to interact with learners for effectiveness and efficiency in the teaching and learning process. Previous research, such as Sama (2017), highlighted the effect of information communication technology on effective teaching and learning. This paper highlights such technology-driven methods under the technology-based approach, including gamification (game-based), digital simulation, digital storytelling, digital field trips, flipped (video) instructional methods, and the digital seesaw method, among others.

These methods call for the need to integrate modern technology into the instructional process. Incorporating this modern technology into the classroom provides an avenue for making lessons interesting, flexible, motivating, real, permanent, meaningful, friendly, and interactive. Figure 1 presents some technological tools used in these methods.

Figure 1: Pictures of Devices for Technology-centered Methods

The above Figure 1 shows some pictures of devices used in receiving instruction. The use of these devices is flexible and portable. It offers the advantages of making teaching and learning more interesting, motivating, lively, individualized, interactive, meaningful, real, permanent, and collaborative. However, the methods are capital-intensive, require specific skills, and are often challenged by network issues, poor internet connection, unreliable power supply, and relevant software problems. The use of technology today is inevitable, essential, and a necessity rather than a choice.

Characteristics of Technology-Based Methods

Technology-Based Methods of teaching (TB) are effective and successful only if they fulfill the following qualities:

a. The methods require electricity or another power source to function.
b. They depend on other facilities such as computers, tablets, smartphones, projectors, and other multimedia tools.
c. Most of the methods require internet access or a strong connection.
d. They necessitate data subscription.
e. Users need technical know-how (the ability to use both the gadgets and the methods effectively).
f. Physical presence of the teacher may not be required.
g. Activities may occur outside the classroom or school setting.
h. Most of these methods provide immediate feedback.

Some Methods of Teaching under Technology-Based Instruction

Technology- or internet-based methods of instruction come in different forms. The following are some of the methods that fall under this approach:

Gamification Method of Teaching

Gamification involves transforming the typical classroom environment by incorporating gaming themes. It is a method where designers introduce game-play elements into non-gaming contexts to enhance engagement between and among learners. This process utilizes gaming devices to support teaching and learning (Buljan, 2021).

When implemented, gamification increases learner motivation, enhances knowledge retention, and encourages engagement. Additionally, it positively impacts learners by fostering cooperation and collaboration since games instill lifelong skills such as problem-solving, critical thinking, and social awareness. Gamification has also been reported to reduce boredom, lower dropout rates, and improve both cognitive abilities and academic performance (Buljan, 2021).

Elements that Motivate Games

Games in education can take two forms. As Blankman (2022) explains, these are: games designed for entertainment used in an educational setting, and educators adopting features of game design to enhance learning.

There are six (6) basic elements that motivate games, as proposed by Dr. Nick Yee in Blankman (2002). These are:

i. Action (e.g., Objectives)

ii. Social (e.g., Competition)
iii. Mastery (e.g., Scoring)
iv. Achievement (e.g., Awards)
v. Immersion (e.g., Roleplaying)
vi. Creativity (e.g., Customization)

Examples of Game-Based Packages (Applications)

a. Video games
b. Math 180 (awards achievements to students)
c. Real-world simulation and math-focused video games
d. Game show-like practice boards
e. Waggle (math and math expressions)
f. Minecraft EDU (for freeform building)
g. Oregon Game Project Challenge (competition)
h. Word puzzles
i. Spelling bee
j. Ludo (for counting and critical thinking)
k. Card games (counting, critical thinking, and problem-solving)
l. Clay (molding activities)

The game-based teaching method requires learners to download applications and follow simple, self-explanatory instructions. This method is suitable for all levels, depending on the task, the nature of the game, the learner's level, and the time available. It is particularly effective in teaching mathematics, English, natural sciences, and social sciences.

Digital Simulation Method of Teaching

Simulations are dynamic representations that allow students to form and test mental models through experimentation. In the digital simulation method, tools, gadgets, equipment, or facilities are used to present learning tasks. Rather than the learner performing the simulation, the process is often embedded in software, which can simulate roles, messages, or ideas through pre-programmed tasks or games.

The purpose of the simulation is introduced to learners to encourage exploration, brainstorming, and responses to thought-provoking questions. As Blankman (2022) suggests, the teacher can project simulations to the entire class by showing videos on an interactive whiteboard, modeling their use to facilitate student thinking.

Digital simulation is particularly useful for subjects that involve environments or concepts that are difficult to access, expensive, dangerous, or risky (e.g., chemical reactions in laboratories, workshop machinery, or military strategies in battle scenarios). As a form of representation, the simulation often uses pictures, motion graphics, or videos that closely mimic real-life scenarios, which is especially motivating for visual and audio-visual learners. It also promotes recall, mitigates risk, and reduces stigmatization. This method is especially relevant for science-based, technical, vocational, and skill-oriented subjects, as well as moral education.

Role of the Teacher in Digital Simulation

The teacher's role in this method involves preparation, creating a conducive learning environment, providing adequate and relevant resources, and ensuring the technical quality of the tools used. Teachers should have technical know-how regarding the equipment or arrange for the presence of a technician. Additionally, they must prepare thought-provoking questions based on what the learners observe and study during the simulation.

Digital Storytelling Method of Teaching

The digital storytelling method means using technology to tell a story. It is a record of a programmed story presented electronically using a machine (computer, smartphone, projector, etc.). Teachers use stories to arouse learners' interest at the beginning of a lesson, entertain learners to make the class lively and relaxed, generate curiosity, and convey messages to the learners. This was done orally by teachers in the conventional method. With the advent of technology, such stories are now programmed and stored for use by both teachers and learners. This appeals to diverse learning styles.

As programmed stories, the method brings together audio, images, and text to share information on a specific topic (Distance Education, 2022). The purpose is to create a stronger emotional connection with the audience by using spoken words and a blend of multimedia to convey a story. Additionally, combining spoken and written text, maps, and social media elements from the story enhances content comprehension by learners (audience).

Stages to Conduct Digital Storytelling:
The following are steps to follow for the successful use of this method:

a. Identify the objective of the story
b. Select relevant virtual storytelling software
c. Allow for viewing (whole class or individual)
d. Create engaging activities
e. Encourage challenging questions
f. Ask for feedback

Learners (whole class or individual) should listen attentively to the story, watch the images, read the text, comprehend the story's message, and respond to related questions. Subjects such as History, Religion, Social Studies, Art, Civic Education, Geography, and Government are most appropriate for this method.

In this method, the teacher is responsible for organizing the class, controlling noise and movement (any distractions), preparing the environment with the necessary facilities and materials, testing the materials beforehand, motivating learners to avoid boredom, asking relevant and meaningful questions, and reinforcing or rewarding responses. In this context, the teacher is no longer a reservoir of knowledge, as in

traditional storytelling. Most digital stories focus on a specific topic and feature a particular point of view. Educational digital stories typically last between 2–10 minutes (Bouchrika, 2023); if the time exceeds ten minutes, distractions may occur. Story tools could include Storyboard, Anchor Platform, Storybird, We Video, or Book Creator.

Digital (Virtual) Field Trip Method of Teaching

A digital field trip, also known as a Virtual Field Trip (VFT), is a guided exploration through the World Wide Web (WWW) that organizes a collection of pre-screened, thematically based web pages into a structured online learning experience (Foley, 2007). Virtual/digital field trips are a way of organizing the educational potential of the internet coherently, especially for primary and secondary education. These trips may contain a selection of topic-specific web pages bundled into grade-targeted packages. They are often provided by commercial distributors, such as Tramline (www.tramline.com).

According to Nix (1999), VFTs can be classified into two types:

A- Dynamic and Interactive VFTs: These are freely available but more expensive and up-to-date, such as astrobiology-related content at vft.asu.edu.

B- Non-Interactive VFTs: These consist of collections of images, supporting text, and/or other media delivered electronically via the WWW in a format that can be professionally presented to convey the essence of a visit to a time or place. As a live link with on-site experts in real-time, it offers students a real experience via LEARNZ VFT.

Conventional field trips carry risks, such as road accidents, inadequate funds for transportation, delays in accessing locations, and exposure to chemicals or animals. VFTs mitigate these challenges, easing the teacher's preparation time and reducing stress on school management.

VFTs bring the outside world into the classroom by projecting the actual scenes learners are expected to see, learn from, and react to. They provide opportunities for learners to explore places (mountains, seas, states, countries), things, and people—whether nearby or far away—that they might not encounter on a typical school day. This method allows students to experience the world without leaving the classroom.

VFTs can be accessed through websites like Discovery Ed, LEARNZ, Tramline, pilbara.org.edu.au, and nft.asu.edu, among others.

Stages to Conduct Virtual Field Trip

For a virtual field trip to be conducted successfully, the following six (6) strategies can be adopted in the following stages. They are:

1. Identify the objectives of the trip
2. Select the relevant virtual field trip (software)
3. Design an engaging experience
4. Use the "Know", "Want to know" and "Learn" (KWL) strategy
5. Encourage students to process and document their learnings
6. Encourage them to demonstrate what they learned

The roles of learners in this method are to: develop interest, concentrate, and pay attention. They are expected to be actively involved in the instructional process. They should display positive signals through smiling, nodding their heads, jotting down points (in case of whole-class viewing), raising questions, asking for clarification, making contributions, or responding to questions (depending on the learners' level and in case of individual viewing).

The roles of the teacher in this method are to: prepare him/herself, prepare the environment, provide the necessary materials and facilities, and ensure adequate and uninterrupted power supply. S/he must test the technical quality of the materials and facilities, organize and control the class, and select relevant websites, software, and learning tasks that the learners need. The teacher should also prepare engaging activities or questions that offer a feedback mechanism and monitor learners' participation. The method is relevant to subjects such as Basic Science, Basic Technology, Social Studies, Religion, Business Studies, Agricultural Science, English, and Cultural and Creative Arts, among others.

Digital Seesaw Method of Teaching

Seesaw is a digital platform or software application where teachers of all grade levels and content areas can create learning tasks and assignments for students (learners). Assignments can incorporate videos, photos, text, images, files, drawings, links, or PDFs. Similarly, Seesaw is used to create a class blog, communicate with students and families, curate activities, and assess students' work through digital portfolios (Barnwell, 2020). It also allows for the sharing of Google Meet or Zoom join links through the announcement feature.

Seesaw is an online interface that guides users through its various processes. However, it doesn't include a live video-streaming feature. Seesaw is a programmed instruction designed for teachers, learners, and families (Pieterse, 2021). While teachers and learners engage in teaching and learning through the Seesaw platform, parents, families, and caregivers use the Seesaw Parent and Family App, available for

Android and iOS. This app helps parents stay up-to-date on their children's learning, monitor progress, leave comments, and give encouragement.

Seesaw serves three primary purposes: feedback and reflection, assignment and assessment, and family engagement (Pieterse, 2021). Students use Seesaw to complete or engage with tasks through various sections:

Journal: Students can add a journal entry to their personal feed.

Activity: Students respond to assigned activities, leading to assignment completion under the Activity tab.

Blogging: If the teacher creates a class blog, students can post to an authentic audience, including classmates and beyond.

Inbox: This feature allows students to communicate effectively, sending and receiving messages with teachers and peers. It also supports peer-to-peer feedback on assignments and responses to comments from teachers, peers, or family members.

Stages to Using Digital Seesaw Method

Seesaw is a platform for classroom engagement that inspires students of all ages to actively and independently do their best to save teachers time. Barnwell (2020) came up with 6 steps to be followed by the teachers, students, and parents/families for the method to work successfully. These steps are:

1. Download the file from Google, create or join a link
2. Sign in account with the (given) code to view the file or get permission for access.
   - Open the app and choose e.g. "I am a student"
   - Use a QR code scanner, type code text, or clever badge
3. Explore journal activities
4. Post school work to journal
5. Show lessons or send to activity action
6. Show messages and notifications from the inbox

It should be noted that there could be other ways, processes, or steps that are more direct, easier, or simpler than those presented above. The teacher can, however, add students to a Seesaw class through methods such as email, Google account, home learning code, QR code, Clever Badge, and pre-K-2 QR code, which are the easiest options for younger learners. This allows teachers to frequently record videos to supplement learning independently. The method requires the availability of internet access, power supply, relevant software links, codes, or Google sites. It is appropriate for all subjects offered at basic levels and all levels of mature learners.

Flipped (Video) Instructional Method of Teaching

The use of flipped instruction in the educational process is the integration of technology into teaching and learning. Flipped video involves presenting live content of the lesson in recorded video format for learners to access at their own pace. The teacher plans, selects, and records learning content, sending it to the learners to study prior to the class meeting. After watching the videos, learners meet face-to-face in the classroom, via Google Meet, Google Teams, or Zoom for detailed discussions that support individual needs and clarify misunderstandings regarding the flipped content.

The method aims to transform how learners learn (Dith, 2021). Some teachers utilize platforms such as YouTube and TikTok to engage learners through channels they are familiar with (Dith, 2021). This method encourages a more visual approach to teaching. In this approach, the classroom serves primarily as a space where learners apply what they have learned, receiving face-to-face or one-on-one support when needed. A flipped video can cover various subjects, such as language (practicing speaking a language), writing, literature, history, science, dance (dance moves), and singing, among others.

According to Bergmann (2023), this method consists of two phases:

1. **The First Independent Phase:** This phase addresses the lower levels of the educational domain. It involves sending the recorded video to the learner to study a topic, task, or content at home.
2. **The Second Group Phase:** This phase targets the higher levels of the educational domain. It involves face-to-face discussions in the classroom or Zoom room, where clarifications are made regarding areas of difficulty, confusion, or misunderstanding.

Process of Using Flipped Video

The method can be used through the following processes.

1. Adequate teacher Preparations.
2. Creat platform | links | sites.
3. Get needed resources (tools, phones, etc).
4. Adopt good classroom management techniques.
5. Encourage technical training (teacher and learner access and utilization).
6. Assign content for homework (PowerPoint).
7. Direct learners to work on problems in the classroom.
8. Encourage independent learning.
9. Adopt pair tutoring (joining quick and struggling learners) to cooperate and support each other.

In using this method, it is beneficial for the teacher to record relevant messages, use appropriate tools (Google Classroom, PowerPoint slides), and share the videos with learners. The teacher then sends the

flipped video as notes, topics, and tasks, and arranges for an overview when needed.

Tools Needed for the Use of Flipped Video

The flipped instructional method requires the use of tools such as:

1. Video lessons, Google Classroom, social media
2. Sites to find content, Canva, YouTube
3. TikTok, Google links, online content, among others.

The flipped video method does not support punishment. If a learner is unable to watch the video or complete the task in their notes at home, such a learner should only be encouraged to do the task in class. A 5-10 minute video flip is sufficient to captivate and sustain the interest and attention of the learners on the task. Watching the video should not be a compulsory activity; however, the content should be engaging enough to motivate learners to develop the deliberate intention to watch the flip.

The advantages of flipped video include making the content of the lesson available to learners before class. A teacher could write and send questions for learners to engage with or solve, and learners may also raise lingering questions after watching the video for clarification during class discussions. Additionally, this method provides free time for teachers to teach individual learners at their convenience. Learners are equally comfortable with this method, as it allows them to personalize their learning.

Challenges of These Methods for Teachers and Learners

In general, technology-based approaches face some common challenges, as identified by Bara'u and Ibrahim (2023), which include:

a. Lack of learner motivation (interest) and commitment due to the busy schedules of learners and some teachers.
b. Lack of technical know-how among some teachers who are not familiar with certain devices and software.
c. Some software applications are not readily available, while others may not meet the local needs of Nigerian learners.
d. Some teachers and learners lack the technical know-how to use the tools and applications of the method.
e. Some tools are too expensive for schools, teachers, learners, or parents to afford.
f. General power failures
g. Lack of strong internet connectivity
h. High data consumption and subscription costs are among the factors that may delay or hinder the successful implementation of all methods under this technology-based approach.

RECOMMENDATIONS

The paper recommends that for these methods to work effectively and successfully, there should be:

The need for school management to adjust the busy schedules of teachers and learners to ensure they consider digital learning as motivating, friendly, and flexible. This will make it less burdensome or boring and may encourage commitment.

The need for practical teachers to engage in self-development through internet research to update themselves on new software and how to handle various digital methods. School heads, for their part, should organize relevant training programs on the use of these methods. School heads should also enhance the use of digital methods by motivating teachers who are digitally compliant. This could be done through verbal praise, awards, commendations, material gifts, data subscription bonuses, or opportunities for promotion.

The need for government, NGOs, subject specialists, curriculum experts, or even individual teachers to prepare and upload relevant software packages that will be readily available, accessible, affordable, and applicable to the local needs of both teachers and learners.

The need for school management and parents to provide and encourage both teachers and learners to use technological tools or gadgets, especially those related to digital instructional methods and media. Provisions should be made by the government, school heads, teachers, or even the parents of learners for tools such as computers, smartphones, projectors, spreadsheets, or interactive boards, as applicable.

The need for school management to encourage and welcome the involvement of NGOs, politicians, philanthropists, and affluent parents to make donations in cash or in kind for the expensive tools needed by schools. Similarly, tools that can be improvised should be encouraged by school authorities to facilitate adequate and relevant training for teachers and learners from different departments, so that such digital methods can be utilized and sustained appropriately.

The need for government, school management, communities, or NGOs to make adequate provisions for alternative power supply through solar installations, inverters, generators, and any other reliable source of electricity.

The need for government, school management, NGOs, community members, philanthropists, or concerned wealthy parents to install strong network connectivity that will extend throughout the school, including classrooms, offices, cafés, eateries, fields, hostels, and neighboring communities where students

stay off campus. This will enable them to access the internet for self-study, assignments, or research.

The need for school heads and unit heads to ensure uninterrupted data subscriptions. This should come in the form of weekly allowances for every teacher, categorized based on the nature of technology usage to motivate the users (teachers).

CONCLUSION

Digitalization has come to stay in Nigerian schools, specifically in teacher training institutions. Teacher educators need to embrace the use of technology in the instructional process; otherwise, they will become outdated. These methods are not the only ones available, as Artificial Intelligence (AI), Virtual Reality (VR), Augmented Reality (AR), and other related technologies were not captured here. However, it is crucial for everyone to accept technology sooner rather than later.

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