Original Article

Innovative Pedagogical Approaches in Science Education in the Post Covid-19 Pandemic World

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Abstract

This paper discusses innovative teaching methods in science education after the COVID- 19 pandemic era. Due to the COVID- 19 epidemic, schools and institutions have been forced to move to online learning and have encountered several difficulties. As a result, scientific education has started to rely more and more on modern pedagogical approaches that are more adapted to distance learning. This study examines several innovative educational practices, the issues the epidemic presents, the effectiveness of those techniques in addressing those challenges, and prospective prospects for advancing science education. In doing so, it will examine innovative methods for teaching science, point out the need for more varied approaches, and evaluate how novel pedagogical approaches affect student engagement and knowledge acquisition. Conventional teaching methods take care of learners centred and media interactions for example teaching with zoom and other varied examples.

Keywords: Innovative, teaching, method, science, education

Introduction

On January 30, 2020, the World Health Organization (WHO) proclaimed COVID-19 a pandemic (Sohrabi et al., 2020), and since then, the outbreak has significantly impacted many global sectors and systems. The COVID-19 consequences have affected the entire global educational system, from preschool to university, and have even caused academic conferences to be cancelled or postponed. The COVID-19 consequences have affected the entire global educational system, from preschool to university, and have even caused academic conferences to be cancelled or postponed. (Impey, 2020 and Panesar et al., 2020). Similarly, Teachers and lecturers have started avoiding the conventional approach of mastering the contents and verification to prepare better professionals who can think critically and reflexively and solve problems. On the part of the teachers, we anticipate competency-oriented abilities and the capacity to encourage students to actively engage in the learning process (Hoffmann & Koifman, 2013). Therefore, online teaching methods like

Zoom were born even in Africa, and we started learning and practicing Zoom teaching in classrooms and conferences in Institution (Okeke, 2023)

Also, research has shown that the conventional lecture method used in classrooms for teaching and learning is inefficient since students play a passive role and lose focus 15-20 minutes later (Damodharan & Rengarajan, 2015). The results of effective concentration are enhanced learning. Therefore, there is a need for alternative and cutting-edge teaching strategies that will incorporate student participation in the teaching and learning process actively, eliminating the aspect of passivity. Additionally, the plan must be able to clearly communicate its message and guarantee that its goal is achieved. Furthermore, Nwafor (2017) defined innovation as a method, notion, action, or thing that a person or another unit perceives as a novel. According to Microsoft (2009), innovation creates or disseminates something new.

Additionally, it represents a fresh idea or method. Additionally, innovation is a change in how things are thought about or the practical implementation regarding or the actual application of findings and innovations (McGeown, 2011). Innovation must never be mistaken for a simple modification because it is an intentionally accepted general change. Any sustained alteration in individuals recurring behaviour patterns within a recognizable social system is called innovation. It represents a fresh break from an established practice which can be maintained if situational and applicable to a specific group at a specific time and location. It turns into a reform when it is universally accepted.

Therefore these definitions suggest that innovation may have occurred whenever discoveries and innovations arc successfully applied or if a better product or approach is introduced. A process of renewal or improvement is sometimes referred to as innovation. To improve or increase the effectiveness of an existing idea, it introduces new ones. Never consider it a straightforward tweak because it is an intentional overall shift. A process of renewal or improvement is sometimes referred to as innovation. It adds fresh concepts to an earlier one to enhance or increase its usefulness. It is an intentional broad modification that the students should not view as simple. Innovative pedagogy refers to the use of novel teaching techniques and how they impact student

learning. A thorough understanding of pedagogy is necessary to create young people who will go on to become lifelong learners with in-depth subject knowledge and a variety of social skills. Learning must be all-encompassing, comprehensive, inclusive, pleasurable, and engaging, according to the National Education Policy (2020). Therefore, this article aims to explore cutting-edge pedagogical approaches that science educators in Nigeria can apply, along with their benefits and drawbacks and the teaching methods that are now available to them. It will further detail any advantages it may have over traditional approaches.

Innovative Practice Model

According to the social constructivist paradigm, learning, according to Nicolaides (2015), is a social process that is not exclusive to an individual. Coordination and communication are necessary for the advancement of knowledge. With innovative lecturing, the educational focus shifts from "talk and chalk" to student-centered, engaging learning.

The novel practice model put forth by Nicolaides (2015) is composed of three steps that chronologically frame essential issues concerning the purpose behind course design, the manner in which lectures are actually delivered, as well as what students should learn. The input to the model for the first stage is fulfilling the fundamental education requirement, commonly called the education policy. It unites the primary objectives of the courses. It defines their structure so that crucial concerns are thoroughly considered (for example, culture, teaching and learning methods, student and instructor/designer attitudes, outside influences, etc.).

The methodology suggests three components: brief lectures, simulation, role-playing and problem-based learning, and learning portfolios. A problem-solving case study is the main emphasis of this creative short lecture format, encouraging an interactive learning environment and active student participation. Students develop into engaged team members who jointly use their past knowledge and critical thinking skills to create new information. Students are given an actual workplace setting to experience and apply their lessons through problem-based learning and simulation role-playing. Working together to solve the problem enables students to improve their social skills and create content knowledge. Students can reflect on their learning experiences in learning portfolios, which are crucial for formative evaluation. The portfolio actively makes learning visible

(Nicolaides, 2015), with students gathering and assimilating key components to report in the portfolio, proving the influence of these methods on the learning process and experience. Innovative practice models for education promote an improvement of instruction that results in the growth of students intellectual and creative talents. Instructors transfer ownership of the curse to students. As a result, students are gaining ownership of them.

Innovative Pedagogy in Science Education

It is widely acknowledged that science education is a requirement for advancing science and technology. ft offers students the chance to gain practical information and abilities related to scientific procedures necessary to grow science and technology. Students are urged to learn and put their scientific talents to use in science classes. Science education aims to provide solutions to issues to comprehend and interpret natural occurrences (Eze & Akubue, 2015). To accomplish these goals, science teachers must transform scientific instruction into a game and educational process that will pique students interests and encourage them to stick with science rather than abandon it. Instead of being a burden and a source of monotony for the pupils, science education should become exciting and engaging. Any society's ability to thrive and advance is fueled by its commitment to science education. In addition to transferring knowledge, skills, and values, it promotes the growth of human capital, which nurtures, propels, and establishes the direction of technological innovation and the economic success of any country (Eze & Akubue, 2015). Information and knowledge are essential for survival and growth in the modern world. There are so many Innovative Pedagogical approaches, but this paper aims to discuss six types and they are:

(a)Online Teaching

Because of the past pandemic, digital platforms have become essential. Innovation is frequently inextricably tied to the internet. During the last COVID-19 Pandemic, they are imparting life lessons in part. The usage of several programmers for online classes has grown widespread. and the most important ones are user-friendly and straightforward to use. Even if their jobs vary and social media is utilized for various reasons nowadays, practically everyone utilizes it. Students can avoid the hassle of driving to school with online education. You can communicate with many individuals in an online classroom by clicking a button for example using zoom teaching

Flexibility, lower costs, the opportunity for networking, simplicity of paperwork, and access to knowledge are notable advantages. Tools that operate on the cloud, such as Google Does, are now essential. It makes lessons more engaging and educational by allowing students to upload files like papers or include audio and video content (Kalyani & Murugan, 2021).

(b) Role-playing

This cutting-edge approach is increasingly used in science education since it allows students to engage academically and physically in activities while learning new ideas. In class, activities are planned where a group of students can play the part of atoms or molecules to learn a chemical reaction, or they can play the role of a scientist group to illustrate the laws of the particular scientist. Students learn new experiences through role- playing that enables students to perceive the knowledge they currently possess (basic knowledge) in a novel, practical manner. The effectiveness of Play- Simulations and Teaching-With Analogy (PSTWA) on Chemistry success among secondary school students in the Owerri Education Zone of Imo State was examined in a study. The results revealed that PSTWA-taught chemistry students performed better significantly outperformed their counterparts in the control groups regarding academic performance (Onwukwe, 2010).

(c) Computational Thinking

It is a sophisticated method for enhancing critical thinking and problem-solving abilities. The approach includes decomposition, or division of complex issues into smaller ones, as well as comparing pattern recognition-related issues that have previously been successfully resolved. Algorithms take a step-by-step approach to solving a problem, while abstraction ignores unimportant details, and debugging, which improves these stages, are all examples of computational thinking skills. They could teach students the art of problem-solving, known as computational thinking, in various contexts, including mathematics, science, and the humanities. Individuals should be taught how to think like computer scientists and learn to code to overcome challenging problems in all facets of their lives.

(d)Multimedia Learning

Process: The term "multimedia" refers to a program or presentation that combines various digital media types, such as text, images, audio, and video, into a single integrated multisensory interactive piece. (Wideman, 2014). The interactive multimedia teaching technique comprises imparting knowledge through sensory-activated games and simulations. The instructor modifies the material's contents using multimedia and various media co Those media components can be digitally transformed, changed, and personalized for the presentation. Since they use a variety of senses, the pupils are better equipped to learn when digital media components are included in the project. Microsoft PowerPoint, which is slide-based and can create many standard multimedia features, including graphs, sound, and video, is one example of a multimedia tool. The method is helpful while teaching numerate science because it may display graphs and charts in vivid pictures that will grab students' attention and improve understanding.

Teachers could make videos depicting significant life processes, such as plant germination and reproduction. Teachers can use it to educate life sciences. Teachers teach these topics more effectively by encouraging students to research already-made videos on pertinent subjects from the resources found online and present them in class. Before the teacher does anything, learning will take place thanks to the enthusiasm the project has inspired. Teachers who used this approach reported feeling both professionally and personally very satisfied because they could teach in a way that they thought was more relevant and adequate and could see their works beneficial effects on pupils (Wideman, 2014).

(e)Learning By Science Or With Remote Labs:

Innovative pedagogy enables you to develop science inquiry skills and boost motivation by interacting with real scientific equipment, such as operating remote laboratory experiments or telescopes. Remote use of specialized equipment originally designed for scientists and academic institutions prospective teachers who wish to use it for their purposes can now do so.

Remote lab systems can improve student learning by providing chances for observation and hands-on learning that supplement textbook instruction. These solutions also close the gap between in-classroom and out-of-classroom science instruction. For instance, in science classes, students can utilise far-off telescopes to observe the night sky during the day.

Student can theoretically enter an animal or plant part without physically doing so by using detailed schematics. images. or up-close photographs. You can experiment with chemical reactions without getting burned, and you may deliberately study biological dissections with a virtually hands-on experience without worrying about odor.

(f)Learning by Discussions

For students to absorb knowledge rather than receive it, a discussion is crucial to understanding all subject areas. Discussions are often vibrant and enlightening and generate learning opportunities. However, they need planning and preparation like any other class activity. Students comprehension of science and mathematics is deepened through discussion and debate because it encourages them to consider opposing viewpoints and clarify their arguments. Publicizing technical reasoning also teaches students how scientists work together to support or deny assertions.

Conclusion and Recommendations

This research shows that science educators have access to various teaching strategies and are not limited to the "talk and chalk" method. Since exposing students to knowledge is at the heart of teaching, it's critical to involve them in the process on a hands-on basis. Innovative teaching strategies that encourage student participation are required. Any innovative pedagogical for education and learning is not a panacea or quick fix. It should be used in conjunction with conventional teaching strategies in the classroom. However, it is evident from the literature that creative teaching techniques provide students with more experience in handling the problems connected to the working world that they run into innovative teaching approaches will result in a learning society where students' intellectual and / creative capacities will enable them to achieve the objectives of transformation and development.

Based on this therefore, the researchers recommend the following:

1. Constant and continuous use of communication equipment.
2. Train the trainers' workshop should continuously be employed for different groups in

different institutions.

3. Translations of different languages in different use in workshops and seminars for teaching methods and techniques.

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