



## **Optical Board as an Artificial Technology for a Peer Teaching Class in a Nigerian University**

**\*Associate Professor Azidah Abu Ziden; & \*\*Dr Adu Ifedayo Emmanuel**

\*Universiti Sains Malaysia \*\*Department of Educational Technology  
Bamidele Olumilua University of Education, Science and Technology Ikere  
Nigeria

### ***Abstract***

This study investigated the optical board as an artificial technology for peer teaching in a Nigeria university. A design and development research (DDR) design was adopted, which entailed the planning and testing of instructional design models adopted to produce the optical board. This research population involved twenty-five (25) peer teaching students at a Nigerian university consisting of theatre arts, religion and language education related discipline. Also, using random sampling technique this study selected eight (8) students to work on the optical board. Besides, this study introduced a research instrument titled lecturer assessment rubric containing a 30-mark metrics for evaluating student's teaching with the optical board. In this study it was discovered that the optical board affords students acquisition of self-employment skills through their exposure to the peer teaching course, which is a teacher training module in Nigerian universities. It is evident in this study that students were able to coordinate their design and effectively develop the optical board without lecturer's interference. This kind of achievement in this research shows that the Nigerian university curriculum had been designed with contents meant to spur students to create jobs after graduation and effective implementation of the readily available curriculum contents is enough to imbue students with the needed entrepreneurial skills. It was recommended that the Federal Government of Nigeria (FGN) must discourage poor implementation of Nigeria university curriculum and invest more in the betterment of the readily available curriculum instead of considering a

synonymously acclaimed new curriculum for regurgitated teaching and learning process.

**Keywords:** Optical board, Artificial technology, Peer teaching, Educational technology, Nigeria, Malaysia, University, Glass, Wood, Electrical, Improvisation.

## Introduction

There is an increased call for curriculum that imbues self-sufficient skills and prepares students to be self-employed after graduation. The post-COVID-19 has witnessed numerous challenges with some people struggling to keep their jobs and securing jobs for newly graduated youths has become difficult due to scarcity of funds. The universities both internationally and locally are saddled with this responsibility of running a system that works towards achieving this self-sufficiency goal. For instance, the Universiti Sains Malaysia was bestowed an entrepreneurial university award in the year 2018 for her immense contribution towards student's self-employment skills acquisition (Aisyiyah et al. 2020).

Notwithstanding, the feasibility of seeing an optical board in a classroom is rare and this study reports the processes and methods adopted for the design and development of an optical board for a peer-teaching practical in a Nigerian university. This optical board is significant to lecturers, high school teachers, and students locally and internationally. The optical board breaks

new record with its transparent glass surface, wooden structure and electrical technology unlike chalkboard, whiteboard, or interactive whiteboard. Self-employment skills are paramount issues that must be adequately implemented through student's curriculum activities (Nazir & Lone, 2022).

### Research Objectives

1. To design an optical board.
2. To develop an optical board.

### Research Questions

1. What are the steps involved in designing an optical board?
2. What are the steps involved in the development of an optical board?

### The Meaning of an Optical Board in Educational Technology

An optical board is an educational technology equipment made of transparent surface with its function relying on the principles of optics (see figure 1 for details). Besides, the word optics derives from a scientific concept

that allows the experimentation with light. Notwithstanding, optical board is an adjectival clause signifying an instructional gadget that uses light in connection with teaching and learning processes. The words optical and optics are transdisciplinary as they are both applicable to subject area like Physics. Thus, optical board is an innovative instructional media that transforms the way instructional activities are conducted. Optical board brings variety to the classroom activities. It adds up to the teaching methods adopted for daily instructional activities. However, optics is a scientific term that deals with the culture of transmitting and experimenting with light for the benefit of mankind (Kadir & Yaacob, 2022).

Also, the optical board is an instructional media, which is meant to work on electrical procedures to ensure the lighting system is powered for use. The optical board transparent surface allows users to write on it using a temporary marker and could be easily erased. The instructional board design has gone through different era from dark surface slate to chalkboard and whiteboard. However, the optical board (see figure 1 for details) answers the question on how to introduce innovation to writing in the classroom and likewise empower students with 21<sup>st</sup> century skills. The improvisation skills were adopted in the design and development of the optical board as it entails sourcing for locally available materials. Notwithstanding, available literature shows that improvisation skill is paramount for the improvement of teachers' instruction (Adu & Adu, 2014).



Figure 1. Optical board

### Why Optical Board?

The research and adoption of the chalkboard and interactive whiteboard has come of age, and it is time to introduce more innovative teaching and learning equipment to the classroom. Besides, this post-covid 19 time has thrown new challenges that must be tackled through rigorous student

centered instructional gadgets to attain the stated curriculum goal on a global scale. Some of this curriculum goals must ensure students self-reliance and provide them with entrepreneurial skill after graduation. The research published on interactive whiteboard (IWB) shows that the call for increased adoption of this IWB technology in the United Kingdom schools took place 18 years ago, which is quite an age (Beauchamp, 2004). Also, Stefik, Foster, Bobrow, Kahn, Lanning, and Suchman (1987) study on Colab technology, which critiqued chalkboard as an obsolete teaching media with limited writing space was conducted 35 years ago.

The word optical have been adopted in varieties of studies to explain scientific application of light for an artificial technology. However, there is scarcity of literature on optical board related issues within educational technology context, which makes this study to fill a unique gap in the design and development of an instructional equipment. For instance, Tuchin, Zhu, and Genina (2022) worked on optical imaging without considering issues on optical board. Likewise, Alionte, Ungureanu, and Alexandru (2022) study investigated optical face scanner with limited consideration of optical board related matters.

### **What is Peer Teaching?**

Peer teaching is a student centered method of training the trainee teachers on the intrigues of teaching as a profession. It is a course designed to allow students to group one another, write lesson note, design instructional materials, and record presentation with immediate evaluation by lecturers. Peer teaching is a micro teaching presentation, which normally involves between six (6) to eight (8) students. Peer teaching is the process, which allow trainee teachers teach their classmates at the same level (Barlow, Elam, Elam, & Eagler, 2022; Yunusa, Jaafar, Ismail, & Othman, 2022).

### **Why is Optical Board an Artificial Technology?**

Optical board is an artificial technology since it was made by human beings and not natural. Also, it is an equipment that is utilised in writing the thoughts naturally domiciled in peoples' heart. Hence, the optical board is an equipment for writing out and creating awareness of the educational contents imbued in the affective domain of human minds in artificial manner. For instance, the optical board can afford the representation of verbal educational related communication in written form for peoples reading pleasure. The optical board is an artificial technology due to its wired connection for powering the lighting system. Besides, the optical board adopted glass and wood technology components to design the surface and produce the equipment wooden structure. Thus, the combination of man-made electrical, glass and wood technologies in the production of the optical board makes it an artificial technology.

Artificial technologies have demonstrated their ability towards the improvement of instructional activities (Su & Yang, 2022).

### **A Critique of the Optical Board, Whiteboard and Chalkboard**

There exist numerous differences between the optical board, whiteboard, and chalkboard. For instance, an optical board has a transparent surface. However, the whiteboard and chalkboard both have opaque surfaces. Also, the optical board is electronically based unlike the whiteboard and chalkboard. The optical board functions based on optics principle since the whiteboard and chalkboard work on manual principles. These differences are summarised in the following table 1 as follows:

<b>Optical Board</b>	<b>Whiteboard</b>	<b>Chalkboard</b>
<b>1</b> It has transparent surface	Opaque surface	Opaque surface
<b>2</b> Electronically based	Not applicable	Not applicable
<b>3</b> Optics principled	Manually principled	Manually principled
<b>4</b> Artificial technology based	Not applicable	Not applicable
<b>5</b> Adopted glass technology-based material	Not applicable	Not applicable

Table 1. Summary of the differences between optical board, whiteboard, and chalkboard.

Notwithstanding, there also exist numerous similarities between an optical board, whiteboard, and chalkboard. For instance, these three instructional boards are meant for teaching and learning purposes. Also, optical board, whiteboard and chalkboard are thick and flat 2-dimensional surface equipment for instructional purposes. These similarities are summarised as follows:

1. The optical board, whiteboard and chalkboard are for teaching and learning purposes.
2. The optical board, whiteboard and chalkboard are for note writing in the classroom.
3. The optical board, whiteboard, and chalkboard are 2-dimensional surface instructional equipment.
4. The optical board, whiteboard and chalkboard adopted wood technology-based materials.

### **Strengths, Weaknesses, Opportunities and Threats (SWOT) Analyses of the Optical Board**

#### **i. Strengths**

1. The optical board is an innovative instructional media for modern day teaching and learning activities.

2. The optical board has an attractive, neat, and smooth surface.
3. The optical board is electronically based to meet the 21<sup>st</sup> century teaching and learning demands.

**ii. Weaknesses**

1. The optical board does not incorporate digital functions
2. The optical board does not afford the storing and retrieving of texts after erasure.

**iii. Opportunities**

1. The optical board affords the future incorporation of digital features for networking within and outside the learning environment.
2. The optical board affords the future incorporation of texts storage and retrieval system.
3. The optical board prototype affords the future incorporation of texts translation features.

**iv. Threats**

1. Erratic power supply militates against the extensive testing, usage, and validation of the optical board in Nigeria.
2. Incessant lecturers' industrial action in Nigerian universities militates against the quality control of the optical board through the involvement of research participants in Nigerian based universities.
3. High cost of goods and services affected the procurement of materials for the final production of the optical board in Nigeria.

### **Theoretical Framework**

This research adopted the analysis, design, develop, implement and evaluate (ADDIE) model. The analysis was done at students level. The design was planned by the lecturer and given to the students to develop. The implementation was done through the optical board use for a 20-minute peer teaching presentation. The evaluation was conducted by the lecturer using the assessment rubrics containing lesson note, teaching, and instructional materials. However, the ADDIE is an instructional design model that was formulated by the Florida State University for military defence in 1970's (Spatioti, Kazanidis & Pange, 2022).

### **Methodology**

#### **Research Design**

This research adopted the design and development research (DDR) design. Design and development research design involves the production of unique knowledge and the validation of existing practice. It is a means to utilise, design, develop,

implement, and evaluate materials, tools, programs, and models using instructional design framework (Durak & Güyer, 2022).

### **Population**

This research population involved twenty-five (25) peer teaching students at a Nigerian university. These students' population were consisting of theatre arts, religion and language education related discipline.

### **Sampling Technique**

This study adopted random sampling technique to allow equal chance of participating in the study. Students were grouped into different groups based on their discipline and their discipline were written in crumpled paper and dropped in a bowl for selection. Hence, the language students' group was selected at random consisting of eight (8) students to work on the design and development of optical board with writing as a topic of choice.

### **Research Instruments**

This research utilised practically oriented instruments like hammer, hacksaw, workbench, G-clamp, 6 inches nail, painting brush, block plane, tape rule, and glass cutter. Also, there was a research instrument titled lecturer assessment rubric containing a 30 mark rubric for evaluating teaching: 10 marks, lesson note: 5 marks and instructional materials: 15 marks. Thus, this evaluation was in accordance with ADDIE model prescription. Paint application was adopted as a software for designing the optical board.

### **Research Procedure**

This study was conducted as part of a regular second semester course for education students. Notwithstanding, there was due consultation with the university authorities before the commencement of this research as part of the course.

### **Ethical Issues**

This research ensured that ethical issues were duly followed, and no participant was forced to participate in this enquiry. Also, the participants were intimated of their right to withdraw from this study if they felt threatened.

## **Results**

### **Research Question One**

1. What are the steps involved in designing an optical board?

Drawing and labelling were the two steps taken in designing the optical board. Hence, a creative software known as paint application was employed in achieving this objective and answering research question one. The major components imbued in this educational equipment is shown in figure 2 that follows:

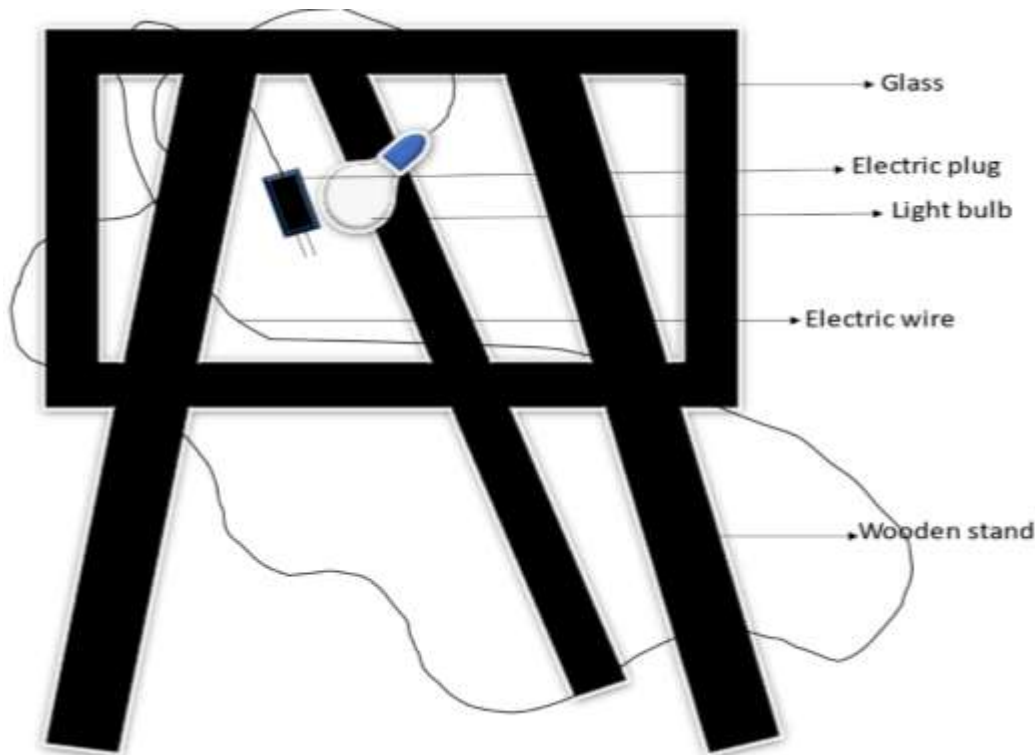


Figure 2. Steps involved in designing an optical board

### Research Question Two

2. What are the steps involved in the development of an optical?

The development of this study's optical board witnessed various workshop activities such as sawing and nailing of the wooden frame and stand. Painting and smoothing of the wooden material utilised for the optical board. Cutting and placement of the glass surface for the optical board. All these workshop practices were in accordance with the design planned for the optical board.

### Discussion

The research questions one and two shows that an instructional technology production could be actualised if the design and development procedures are in order. Also, this study findings shows that university students could perform wonders and become very creative if they are supported by their lecturers within an enabling university setting. This study findings shows that realising a sustainable and entrepreneurial skill acquisition curriculum is already in place and



it is believed that it will spur more student's self-sufficiency after graduation from their studies. Also, it is evident in this enquiry that the peer teaching course empowers the Nigeria university students in actualising the 21<sup>st</sup> century skills based on its ability to effectively inspire students to harness artificial technologies from electrical, glass and wood sources for the improvement of teaching and learning processes. This research is consistent with Wynn and Maier (2022) study on design and development processes.

### **Conclusions and Recommendations**

There is high demand for digital instructional materials nowadays and the whiteboard has limited relevance to present day teaching and learning processes. The optical board presents an innovative opportunity towards improving classroom practice. Also, it opens door for the introduction of digital equipment to support the classroom instructional system. It is expected that the improved version of the optical board is characterised with internet system that allows the scanning and sharing of written texts to larger audience. The improved optical board can have interactivity features and touch-screen surface that allows the copying, pasting, and saving of texts for future use. Also, language translation capabilities can be incorporated in subsequent design of the optical board.

This study optical board needs improvement through quality control and testing. It is anticipated that the resultant product incorporates low emission diode (LED) system for better clarity of texts. Besides, the optical board, whiteboard, and chalkboard are note writing media for students and lecturers, which require constant erasure of unwanted texts. However, the optical board improved design must meet the demands on how these texts can be stored and retrieved after cleaning of the board surface.

There is high demand for digital instructional materials nowadays and the whiteboard has limited contribution to 21<sup>st</sup> century instruction delivery. It is on this note that the optical board was conceived as a better replacement for whiteboard. Future research will improve the optical board design to meet the digital initiatives for propelling the demands of computers skills in schools. Presently, little is said of transforming the means of writing in the classroom as dealt with in this research. However, the optical board will take a lead above interactive whiteboard based on its harnessed artificially based sources of technologies derived from electricity, glass, and wood. Besides, it will experiment with light and incorporate translation capabilities, which whiteboard and chalkboard do not afford.

It is recommended that the Federal Government of Nigeria (FGN) and Nigeria university administration must discourage poor implementation of Nigeria university curriculum and invest more in the betterment of the readily available curriculum

instead of considering a new curriculum for regurgitated teaching and learning process.

## References

- Adu, F. O., & Adu, E. I. (2014). Improvisation as a tool for improving the teacher's knowledge in Basic technology. *Journal of Research & Method in Education (IOSR-JRME)*, 4(1), 14-18.
- Alionte, C. G., Ungureanu, L. M., & Alexandru, T. M. (2022). Innovation Process for Optical Face Scanner Used to Customize 3D Printed Spectacles. *Materials*, 15(10), 3496.
- Aisyiyah, S., Aliyu, O. A., Alter, T. R., Alves, H., Atherton, G., Azizan, S. N., ... & Crosling, G. (2020). Introduction to Sustainable Development Leadership and Strategies in Higher Education.
- Barlow, S. J., Elam, P. S., Elam, S. W., & Eagler, L. A. (2022). A Feasibility Study for Utilizing a Peer-teaching Experiential Learning Activity to Alter Student Perceptions of Attributes Present in Effective Clinical Instructors. *Internet Journal of Allied Health Sciences and Practice*, 20(2), 2.
- Beauchamp, G. (2004). Teacher use of the interactive whiteboard in primary schools: Towards an effective transition framework. *Technology, pedagogy and education*, 13(3), 327-348.
- Durak, H. Y., & Güyer, T. (2022). Design and development of an instructional program for teaching programming processes to gifted students using scratch. In *Research Anthology on Computational Thinking, Programming, and Robotics in the Classroom* (pp. 127-155). IGI Global.
- Kadir, N. S., & Yaacob, M. I. H. (2022). The Development and Usability of Optics Kit as a Teaching Aid among Physics Trainee Teachers. In *Journal of Physics: Conference Series* (Vol. 2309, No. 1, p. 012040). IOP Publishing.
- Nazir, S., & Lone, M. A. (2022). Impact of Individual Factors on Entrepreneurial Intention: An Empirical Investigation. *Journal of Positive School Psychology*, 6(8), 3492-3514.
- Stefik, M., Foster, G., Bobrow, D. G., Kahn, K., Lanning, S., & Suchman, L. (1987). Beyond the Chalkboard: Computer Support for Collaboration and Problem Solving in Meetings. *Communications of the ACM*, 30(1).
- Spatioti, A. G., Kazanidis, I., & Pange, J. (2022). A comparative study of the ADDIE instructional design model in distance education. *Information*, 13(9), 402.
- Su, J., & Yang, W. (2022). Artificial intelligence in early childhood education: A scoping review. *Computers and Education: Artificial Intelligence*, 100049.
- Tuchin, V. V., Zhu, D., & Genina, E. A. (Eds.). (2022). *Handbook of tissue optical clearing: new prospects in optical imaging*. CRC Press.
- Wynn, D. C., & Maier, A. M. (2022). Feedback systems in the design and development process. *Research in Engineering Design*, 1-34.
- Yunusa, S., Jaafar, W. M. B. W., Ismail, A., & Othman, W. N. B. W. (2022). A Study on the Relationship between Family Peer Group Media and Career Decision Making among Undergraduates in Nigeria. *International Journal of Academic Research in Progressive Education and Development*, 11(1), 319-330.