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TECHNOLOGY-ENABLED LEARNING AND ASSESSMENT: A CASE STUDY OF KANO UNIVERSITY OF SCIENCE AND TECHNOLOGY, WUDIL

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Abstract

Learners are actively engaged with learning objectives when different types of technology are used, including a virtual classroom. Technology tools have also made the assessment of educational goals very easy. However, these tools do not seem to be used in our schools. This research set out to find out if technology tools like virtual classrooms, interactive whiteboards, etc., are used in our institutions and to proffer solutions where the reverse is the case. The study used three research questions, and a survey design with structured questionnaires was used to collect the data. The result of the study shows that the lecturing staff in Kano University of Science and Technology, Wudil, do not engage in the use of many technology tools in their teaching. Hence, students are deprived of the opportunity of learning and acquiring hands-on experience using the tools. The second finding shows that most staff members are conversant with the required tools for use in the classroom. Thirdly, it was discovered that the institution itself does not support the use of technology tools. Hence, they are not provided. The study, therefore, recommends that the institution should endeavour to provide technology tools and internet for easy connectivity among others so that they can be used for learning and assessment.

Key Words: ***Technology-enabled learning, Assessment, Educational Technology in* Kano *University of Science and Technology, Technologiccal tools.***

Introduction

Technology is said to be applying scientific knowledge for practical purposes, especially in industry. When technology is used in education, it is called educational technology. Educational technology ensures the integration of technology into the educational process. According to Yu (2013), technology integration is using technology tools in general content areas in education to allow students to apply computer and technology skills to learning and problem-solving. It is one way to move teaching from teacher-centred to learner-centred. When technology is used to enhance the students' learning experiences, then it is said to be integrated. Learners are actively engaged with learning objectives when different types of technology are used, including a virtual classroom.

Learning and assessment take place across various fields worldwide, including industries, hospitals, the military, and education, to name a few. However, they are most commonly conducted in educational institutions. In these settings, subjects are taught and then assessed to measure understanding. Teaching and learning are dynamic processes that

occur simultaneously, fostering growth and knowledge acquisition. According to Afaor and Ogwa (2018), teaching ensures that the learner acquires cognitive processes whereby an individual acquires the professional and ethical values, behavioural and technological knowledge, reasoning and psychomotor skills necessary for professional competence. It causes relatively permanent change in the learner. Teaching employs different methods of delivery, and participant recipients are expected to learn what is taught. Pros et al. (2013) stated that Information and Communication Technology (ICT) had introduced PowerPoint, which has now become very popular for lecture presentation both within and outside the lecture rooms. PowerPoint, according to Afaor and Ogwa (2018), is an ICT software programme used in delivering presentations; it incorporates graphics, animation, and colour (imagery). Learning, too, is done through different methods, such as assimilation, observation, practice, and rote learning. Assessment is done to determine whether an individual has learnt what is taught. Learning is the acquisition of knowledge and its practice. Learning can be done through reciting, memorisation, constant practice, watching, etc. When a person learns a thing, he/she practices it. Learning is guided, and when teaching is done, students are guided to achieve the taught material.

Assessment is given or done after teaching has taken place, and learning is assumed to have taken place. Assessment is done through practical performance of the learnt material, recitation or reproduction of the material, etc. According to Omeje et al. (2018), assessment is mandatory to check students' performance and active learning activities within the instructional area/classroom. This, therefore, demands for different methods of assessment to be used to determine if the correct material is learnt and the level to which it is learnt. Learning and evaluation are done in school settings in different ways. However, they need to be assisted for practical use. Technology is one way that can enable or assist both learning and assessment.

Another suggestion for using technology to enhance teaching and learning is from Tiough (2020), who suggested using six emerging technologies to teach building technology education courses in Nigeria. The technology tools suggested by Tiough (2020) included drones, virtual reality, augmented reality, building information modelling BIM), 3D printing and robotics. Tiough (2020) stated that Drones, which are also called "Unmanned Aerial Vehicles" (UAVs), are used to collect data by flying over a site and taking high-resolution photographs and using photogrammetry. In this manner, skilled technicians can extract high-quality point clouds and 3D models from the photographs. Pickup (2018) further observed that drones can drastically improve the speed, accuracy and safety standards of many parts of the construction as well as achieve fewer errors and reduce timelines from months to days.

- Virtual Reality (VR) is usually used when we want to visualise an entire project and make critical changes. Pickup (2018) states that "an agent can tour multiple properties using VR handsets and using modelling technology to change colour schemes," designs, and potential refurbishments without visiting the sites. The use of VR in the Nigerian construction industry to identify problems and disasters likely to occur in construction will utilise its advantages and curb the issue of incessant building collapse in the country.
- Augmented Reality (AR) superimposes a computer-generated image of a user's world view. Georgiou (2020) asserted that augmented reality can display critical information about equipment while the user can look at the component or see display warnings when there are risks nearby. For example, AR can signal surfaces at high temperatures or that are electrically charged. AR helps in detecting design and coordination errors in complex buildings. It is used to discuss projects with clients where completed projects are overlaid on an empty site or inside an existing building so that the client

can clearly visualise the final results. This helps the client and designer to alter the design where necessary. This tool is also used in other areas of technology.

- Building Information Modelling (BIM). The BIM is a process that involves the generation and management of digital representations of the physical and functional characteristics of places. According to Long (2017), BIM provides space for better collaboration because each person and expertise area can add their piece to the same model, which avoids the need for multiple versions of a 2D paper drawing. BIM helps with problem-solving in the design and planning stages of a project by automating clash detection and providing a more complete picture of the project. The university and Nigeria can use this tool for teaching building and other engineering designs.
- 3D Printing. This tool allows wireless sensors to be embedded into the walls of a property, achieving the full integration of technology and the environment required for genuinely smart buildings (Pickup, 2018). It has been used to construct bridges, conduct lunar missions, and explore other destinations. It can also be used in other areas of technology education.
- Robotics. These are used for repetitive and labour-intensive construction activities, such as bricklaying and lifting heavy equipment and materials (Choudhary, 2018). The use of robotics in Nigeria will greatly help the construction industry complete projects on time and with ease.

Interactive whiteboards are also tech tools that are used in teaching and learning in schools. According to Johns (2006), interactive whiteboards are designed to allow students and teachers to interact with text, applications, annotation tools, and more. Interactive white boards include smart boards. Interactive white boards enable the teacher and student to utilise the touchscreen function to text, model solving problems, highlight important information, etc. Interactive white boards are also used as large projector screens to share large, full colour images and videos with students, which help illustrate a topic and allow students to experience something up close. They are used to store and save each slide and the notes or annotations you record during instructions (Johnes, 2006). Virtual classrooms are online spaces that share some features of normal classrooms but differ in some ways. In virtual classrooms, teachers interact with students in real time; students can voice their questions and interact with peers like in a regular classroom, albeit over the internet (Samuel, 2021). Virtual classrooms accommodate more students than a regular classroom. Virtual classrooms are also synchronous, as teachers and learners appear online simultaneously to facilitate immediate interaction. Assessment is usually done after teaching is completed or is in progress to determine the level of assimilation or understanding of the material being learnt.

Statement of the Problem

Technology is said to be applying scientific knowledge for practical purposes, especially in industry. When technology is used in education, it is called educational technology. Educational technology ensures the integration of technology into the educational process. Technology is said to be integrated when it is used to enhance the students' learning experiences. Learners are actively engaged with learning objectives when different types of technology are used, including a virtual classroom. Lack of technology tools prevents students from interacting with colleagues and resource persons online and worldwide when working on particular topics. Teachers and lecturers who would have connected to the net and shown students further examples of things they are teaching are also deprived of the opportunity. In the digital world, collaboration is key. Technology tools have also made the assessment of educational goals very easy. Without the technological tools, assessment becomes laborious and may lead to mis-assessment or wrong assessment

procedures. Though some technologies, like virtual classrooms, interactive whiteboards, 3D modelling, virtual reality and augmented reality, have been used in many other places, we do not know if our institutions are currently using them. If not, then what is the problem? This study is set to determine if technology enables learning and assessment in Kano University of Science and Technology, Wudil.

Purpose of the Study

The main purpose of this study was to find out if Kano University of Science and Technology, Wudil, uses enhanced technology gadgets or tools for teaching/learning and assessment. Specifically, the study seeks to:

1. Find the technology tools that lecturers use to teach and assess students.
2. Determine the technology tools lecturers use for teaching, learning and assessment.
3. Investigate if the university provides internet services and tech tools that can be accessed by staff and students.

Research Questions

1. What technology tools are you familiar with in teaching and assessing students?
2. Which of these tech tools have you used in teaching, learning and assessing students in your university?
3. What are your institution's efforts towards ensuring the provision of internet and tech tools for teaching, learning and assessment?

Methodology.

The study employed a descriptive survey design, using structured questionnaires for data collection. The questionnaires were sent to respondents through Google Forms to ensure quick return. According to Olaitan and Nwoke (1988), survey research design is a design in which one group of people or items is studied by collecting and analysing data from only a few people or items considered representative of the entire group. Data was collected from fourteen (14) respondents out of a population of sixty-five (65) staff of the faculty of Science and Technology Education. The researchers intended to study the entire population, but only fourteen could be reached due to unforeseen circumstances and time requirements. Mean and standard deviation were used to answer the research questions. No hypotheses were raised. The cut-off mark for acceptance of responses in questions 1 and 2 is two on a 3-point scale, while that of question 3 is 2.5 on a 4-point scale.

Findings

The research questions were answered using the data presented in the following tables.

Research question 1: What technology tools are you familiar with in the teaching and assessment of students?

Table 1 is used to answer research question 1.

Table 1: Mean and standard deviation of respondents on technology tools they are familiar with.

Item	Familiar (3)	Not Sure (2)	Not Familiar (1)	N
1. Interactive white board	8	3	3	14
2. PowerPoint	7	3	4	14
3. Drones	5	3	6	14
4. Virtual Classroom	10	3	1	14
5. Augmented Reality	6	3	5	14
6. Building Information				

	Modelling	8	2	4	14
7.	3D Printing	7	4	3	14

Table 1 shows the lecturers' responses on their familiarity with the listed technology tools. The lecturers are very familiar with most tools except item 3, drones. All the other tools are familiar to the lecturers. Therefore, it is agreed that the lecturers in Kano State University of Science and Technology, Wudl, are very conversant with the technology tools required for effective learning and assessment.

Research Question 2: Which of these tech tools have you used in teaching, learning and assessing students in your university?
Table 2 is used to answer research question 2.
Table 2: Mean and standard deviation of respondents on their use of technology tools for teaching, learning and assessment.

Item	Very Often Used (3)	Rarely Used (2)	Never Used (1)	N
1. Interactive white board	7	5	2	14
2. PowerPoint	8	3	3	14
3. Drones	1	5	8	14
4. Virtual Classroom	4	7	3	14
5. Augmented Reality	3	7	4	14
6. Building Information Modelling	3	5	6	14
7. 3D Printing	2	4	8	14

Table 2 shows that the lecturers are familiar with and have used interactive whiteboards, PowerPoint, and virtual classrooms for teaching, learning, and assessment at their university. However, they have not used drones, augmented reality, building information modelling and 3D printing for teaching, learning and assessment. This could, therefore, mean that though they are familiar with augmented reality, building information modelling and 3D printing, the tools are not made available in the institution, and that is why they cannot use them. As for the drones, they are not familiar with them, which is also because the institution has not provided them.

Research Question 3: What efforts has your institution made towards ensuring that technology tools are used for teaching, learning and assessment?
Table 3 is used to answer research question 3.
Table 3: Mean and standard deviation of respondents on efforts made by the university in ensuring that technology tools are used for teaching, learning and assessment.

Item	SA (4)	A (3)	D (2)	SD (1)	N
1. There is always constant power supply on campus					
2. University has internet services that can be accessed by all at any time	1	5	5	3	14
3. The university has trained some people in the use of the mentioned technology tools	2	1	6	5	14
4. The mentioned technology tools are purchased by the university for classroom use	1	5	5	3	14
5. The university expresses paucity of funds towards acquiring the technology tools for the system					

6. Individual lectures do not show interest in the use of the technology tools	1	3	8	2	14
	2	4	6	2	14
	4	2	4	4	14

Key: Strongly Agree (SA 4), Agree (A 3), Disagree (D 2), Strongly Disagree (SD 1).

Table 3 shows lecturers' responses to the efforts made by the institution to ensure that tech tools are used for teaching, learning, and assessment. Items 1 and 3 are on constant supply of electricity power on campus and staff training in technology tools. This shows that lecturers agree that there is always a power supply on campus that they can use and are trained in using tech tools. Furthermore, the lecturers indicated an interest in using tech tools, as seen in item 6, which is negatively composed. The lecturers have, however, disagreed with items 2, 4 and 5, which are the availability of constant internet services on campus, purchase of the technology tools and paucity of funds in the university. This, therefore, means that lecturers do not always have internet services, which they require to use technology tools. The institution does not even purchase the tech tools, but this cannot be attributed to a paucity of funds since the lecturers have refuted that.

Discussion

Table One shows that the lecturers are very familiar with the mentioned technology tools, except the drones. This shows a positive attribute of the lecturers. The finding is in line with Afaor and Ogwa (2018), who advocated for institutions to provide ICT facilities for use by both staff and students. They also stated that PowerPoint aids greatly in teaching and learning.

It is found in Table 2 that though lecturers are familiar with most of the tools mentioned, they are only able to use the interactive white boards, PowerPoint and virtual classroom. They are, however, unable to use augmented reality, drones, building information modelling and 3D printing because the institution does not provide them. This finding also aligns with Ukoha (2018), who noted that non-provision of technology tools and equipment in institutions hinders lecturers from presenting the latest technological skills to students using the latest technology tools. These tools are required to equip students with adequate skills to fit into the field of work.

Table 3 shows that though the university provides constant power on campus and has trained staff interested in the use of technology tools, the university has not provided some of the tech tools. Furthermore, no constant internet supply on campus could aid in using the tech tools. This finding agrees with Tiough and Imborivungu (2018), who also noted that the non-provision of ICT tools and lack of internet in institutions hinders students' acquisition of the latest job skills demands.

Conclusion and Recommendation

Emerging technology tools are essential for teaching, learning and assessment. It is, therefore, very important for institutions to try to acquire them for their use. Our students are into the world market, and if they do not have the required skills for the job, they will be unemployed. The university should, therefore, endeavour to provide ICT facilities and the Internet for staff and students. It is seen that staff are trained, but

they lack adequate tools to perform their job. Based on this, the following recommendations were made

1. Kano University of Science and Technology should ensure that there is constant internet service on campus for use by staff and students
2. The institution should purchase the required technology tools so that staff and students can practice.

References.

Afaor, N. N. (2018). Extent of availability and utilization of PowerPoint resources for enhanced instructional delivery of electrical/electronics technology education courses in tertiary institutions in Benue State. *Journal of Association of Vocational and Technical educators of Nigeria,* 23(2), 86-94.

Georgiou, M. (2020). 7 digital technology trends for the construction industry in 2020 (with examples). Retrieved from https://www.imaginovation.net/blog/construction-industry-technology-trends.

Jones, A. (2006). Scavenger hunt enhances students' utilization of blackboard. *Journal of Online learning, 2(2), 86-99.*

Long, B. (2017). 6 types of construction technology you will use in the future. Retrieved from https://blog.devicemagic.com/6-types-of-constryction-technology-you-will-use-in-the-future

Olaitan, S. O. &Nwoke, G. I. (1988). Practical research methods in education. Onitsha: Summer Educational Publishers Ltd.

Omeje, Okereke, Okekpa& Chukwu, (2018). Utilization of ARCHI-CAD for teaching and learning of building drawing: Imparative for best practices in TVET instructional delivery in Nigeria. *Journal of Association of Vocational and Technical Educators of Nigeria,* 23(2), 144-152

Pickup, O. (2018). Five technologies changing construction. Retrieved from https://www.racontewr.net/business-innovation/five-technologies-changing.

Pros, R. C; Tarrida, A. C. & Martin, M. M. B. (2013). Effect of PowerPoint methodology on content learning. *Intangible Capital,* 9(1), 184-198.

Tiough D. M. (2020). Revolutionizing building construction in Nigeria through emerging technologies. *International Journal of Benchmark,* 19(1), 87-93

Tiough, D. M. & Imborivungu, T. E. (2018). Improving the quality of TVET instructional program delivery in building construction technology courses in Benue State. *Journal of Environment, Design and Construction Management,* 13(3), 122-134.

Ukoha, A. U. (2018). Existing and modern technological tools and equipment in electrical installation: Implication for Nigeria Certificate in Education (Technical) Electrical/Electronic curriculum. *Journal of Association of Vocational and Technical educators of Nigeria,* 23(2), 95-106.

Yu, C. (2013). The integration of technology in the 21st century classroom: Teachers' attitude and pedagogical believes towards emerging technologies. *Journal of technology integration in the classroom,* 5(1), 6