PRE SERVICES TEACHERS AWARENESS AND READINESS TO USE VIRTUAL LEARNING PLATFORM FOR TEACHING AND LEARNING BIOLOGY IN TERTIARY INSTITUTIONS NIGER STATE.

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A PROJECT SUBMITTED TO THE
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ABSTRACT

The study was determined to assessed "pre-service biology teachers awareness and readiness towards the use virtual learning platforms in Tertiary Institutions of Niger State". The specific objectives of the study is to assess Pre –service teachers awareness and readiness in the use of virtual learning for teaching and learning biology, Pre-service teacher readiness in use of virtual learning for teaching and learning biology and the attitude of pre-service teacher towards the use of virtual learning for teaching and learning biology. The population of this study will comprised of pre-serviced biology teachers from the two tertiary Institution from Both Ibrahim Badamasi Babangida University, Lapai and Federal University of Technology Minna, Niger state. The study concluded that most of the pre-service teachers have low awareness on virtual learning platforms. The study recommended that the pre-service teachers should increase their participation in trainings of virtual learning platforms, the attitude of the pre-service teachers should be positive to virtual learning platform, the pre-service teachers should always be ready to use virtual platforms to teach in the classroom.

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CHAPTER ONE

1.0   **INTRODUCTION**

1.1   **Background to the Study**

The role of Information and Communication Technology (ICT) to the development of any nation in recent times cannot be over emphasized. ICT has brought significant changes to all aspects of human social-economic activity in which the educational sector is not left out. Notable changes often occur as technology advances, with the inception of the electronic learning paradigm, there have been improvements in the qualities of teaching, of learning, accessibility, and efficiency in higher education through access to resources, services, remote exchanges and collaborations. Electronic learning whose acronym is e-learning can simply be explained as learning online or offline through CD / DVD type coursework instead of the conventional classroom teaching and learning. It comprises of a wide range of technologies, majorly the Internet and computer. Virtual technology is a subset of Information and Communications Technology (ICT) encompassing the application of information technologies, and communicating same through electronic devices. Virtual technology is a good tool for enlightening biology teaching and learning and an access path to research materials (Naidoo, 2014).

Stressing more on the benefits of virtual technology, Adekunle (2015) stated that it makes delivery of biology instructions very flexible, interactive, learning and lasting. Eya (2016) basically perceives virtual technology as the use of computer-aided-gadgets to aid biology learning. Rees (2014) perceive virtual technology as the use of advanced learning technology that is computer based, and that makes delivery of biology knowledge flexible, interactive and long lasting. Eya (2016) recaps that virtual

technology is the largest and the most challenging application of ICT in the delivery of education. The author sees virtual technology as the process of e-literate teachers interconnecting with e-literate learners with up-to-date books and information using electronic skills.

In a transformed teaching and learning environment, there is a shift from teacher-centered, task – oriented, memory-based education, to an inclusive and integrated practice where learners work collaboratively, develop shared practices, engage in meaningful contexts and develop creative thinking and problem-solving skills (UBEB, 2014). Saidu, (2000) further point out that technology can play a part in supporting face-to-face teaching and learning in the classroom. There has been a national concern in Nigeria due to the relatively lower performance of Biology in the national examination and due to the fluctuating levels of enrollment (candidature).

Due to the low enrolment teachers would consult them individually and the little or few ICT equipment available can be sufficient in matching their number hence more conceptualization. Hayes, (2003) as cited in Nyaga (2011) notes that poor performance in science may be attributed to several factors such as attitude, teaching approaches/ method, content and resources mobilisation and management.

According to Marques, (2013) states the evolution of technology and new learning experiences have always been closely related, therefore the virtual technology revolution emerged from other educational revolutions such as; the reading and writing invention, upspring of the Scholar/ teacher profession ,print technology development and electronic technology development .According to (Adefolalu, 2015) the word virtual technology was first used in October 1999, during a CBT Systems seminar in

Los Angeles, when a strange new word was used for the first time in a professional e-Learning' environment.

Associated with such expressions as online learning or virtual learning, the word was meant to qualify a way to learning based on the use of new technologies allowing access to online, interactive and sometimes personalized training through the Internet or other electronic media such as intranet, extranet, interactive TV, CD-Rom, etc. in order to develop competencies while the process of learning is independent of time as well as place.

Virtual technology is a platform among the many e-learning platforms. virtual technology aimed at large-scale interactive participation and open access via the web. Virtual technology differs from Open Courseware and Open Education Resource in that it opens up opportunities for learners to participate in learning activities, rather than making resources or courseware openly available. Virtual technology provide participants with course materials that are normally used in a conventional education setting such as, lectures, videos, study materials, examples and problem sets. Virtual technology also offer interactive user forums, which are very useful in building a community for students, teaching assistants and professors. Virtual technology development has seen in recent times in education. It is an idea of offering quality education to massive number of students across globe through internet. The first virtual technology emerged from the open educational resources (OER) movement (Wikipedia. 2013).

1.2 Statement of the Problem

Despite all the efforts by the Government and many non-governmental organisations to encourage and facilitate ICT integration in teaching and learning,

research shows that in most of the educational institutions, there is very little integration, especially in science subjects (Hardman *et al.,* 2013; Shehu 2012).If there is to be effective ICT integration in teaching and learning, the teacher must be prepared both intrinsically (sufficient ICT integration skills and positive attitude towards ICT integration) and extrinsically (be provided with sufficient ICT resources and be accorded the necessary support by the administration). It is against this background that the researcher found it useful to investigate teachers' readiness to integrate ICT into the process of teaching and learning, considering that the teacher is a key player in the success of any educational program.

1.3 Aim and Objective of the Study

The aim of this study is to assess pre-service biology teachers awareness and readiness towards the use virtual learning platforms in Tertiary Institutions of Niger State. The objective of the study is to assess;

1. Pre –service teachers awareness and readiness in the use of virtual learning for teaching and learning biology

2. Pre-service teacher readiness in use of virtual learning for teaching and learning biology.

3. The attitude of pre-service teacher towards the use of virtual learning for teaching and learning biology

1.4 Research Questions

The following research questions were raised and answered in this study are as follows;

1. Are the Pre –service teachers aware and ready on the use of virtual learning for teaching and learning biology?

2. Are the Pre-service teachers ready in use of virtual learning for teaching and learning biology?

3. What are the attitude of pre-service teacher towards the use of virtual learning for teaching and learning biology?

1.5 Scope of the study

The study will be restricted to tertiary institutions in Niger State i.e Federal university of Technology Minna and Ibrahim Badamasi Babangida University, Lapai. The study will focus towards the use virtual learning platforms in Tertiary Institutions of Niger State.

1.6 Significance of the Study

The findings of this research will be significant to teacher training institution, Curricullum developer, postgraduate researcher and teacher

Teacher training institutions in the designing of their curriculum so as to thoroughly prepare the teacher-trainees to be able to be relevant to the learners in this information age.

The findings will also be of great significance to bodies that design and revise the curriculum such as the Nigeria Institute of Education (NIE) in that the findings will look into details on whether or not the current curriculum allows the teachers to integrate ICT effectively in teaching and learning.

The findings would also be significant to the practicing teachers because the study looked into barriers and enablers of ICT integration. This would help the practicing teachers embrace the enablers and overcome the barriers thus helping them to be more effective in their practice. The research will also be of great benefit to learners once ICT integration tendency is improved among the teachers, the learners' conceptualization would be improved and therefore lead to their academic performance.

The findings would also inspire Postgraduate researchers   to carry out more researches in this field. This would further, expand the literature related to the field of ICT integration, thus greatly contributing to the body of knowledge on the same.

1.7 Operational Definitions of Terms

The following key terms are used in the research:

Awareness: is a state of being conscious of one's self and one's surroundings. It is perception and cognitive response to a situation or circumstances.

Readiness: is the state of being fully prepared for virtual technology utilization.

Pre service teachers: Are student's teachers in which educational training is provided for them before they undertake teaching.

CHAPTER TWO

2.0   LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Virtual Learning

Most of learning theories have been developed and emerged from 2500 years; all of these theories generally depend on the application of learning in a fixed classroom mediated by a teacher. Just a few educational thinkers have developed theories based on out of the classroom environment, including Argyris (Argyris & Schön, 1996), Freire (Freire, 1972), Illich (Illich, 1971), and Knowles (Knowles & Associates,1984), but none of them have stressed mobility of learners and learning (Sharples, Lonsdale, Meek, Rudman & Vavoula, 2007). Innovations and developments taken place in internet and wireless technology enable learning to be anywhere and anytime instead of fixed place and time.

The term of virtual learning is still developing day by day and its' exact mean is still unclear. In spite of its ambiguity, there are some keywords to explain it. Traxler (2007) offered some keywords such as personal, spontaneous, situated, private, context-aware, bite-sized, and portable to explain virtual learning. Quinn (2000) also identified virtual learning as the integration of virtual computing and e-learning (electronic learning): "accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment."

Virtual learning is a popular term and it is commonly used in different purposes in life. Traxler (2007) claimed that virtual learning term covers the individualized, connected, and interactive use of handheld devices in different purposes such as in classroom environment, in collaborative learning, in fieldwork, and in counseling and guidance.

Furthermore, Traxler (2007) said that virtual devices support collaborative training for virtual workers and support different fields of daily life such as teacher and nurse training, health education and composition of music.

The virtual learning currently applied through both virtual telephones and some of the other portable devices, which are iPods, tablet PCs, PDAs, iPads MP3 players, e- book readers (Taylor, 2010). With the students' increasing demands to access to internet by using virtual devices causes for increasing demand to virtual learning materials and resources, in addition more participation and synchronize communication in the learning process. Thus, Corbeil and Corbeil (2007) claimed that virtual devices could enhance interaction among learners and instructors; reduce communication barriers between faculty and students by using synchronous and asynchronous communication channels.

2.1.2 Educational Impacts of Virtual Learning

Virtual learning and its applications are used in different learning types such as formal, informal learning, classroom teaching, distance teaching, and different educational levels such as K-12 and higher education (Park, 2011). Park (2011) also claimed that while popularity of virtual devices is increasing day by day, many practitioners such as researchers or teachers use this improving technology in their teaching and learning environments. Since virtual technologies have brought new changes in working and learning because of some characteristical features such as independence of place and time (Peters, 2007).

Virtual learning provides independency on time and place for learners instead of fixed classroom environment (Valk, Rashid & Elder, 2010). This is a great advantage for students in rural and remote areas that cannot go to school because of environmental

challenges and infrastructure challenges. Feasibility of virtual learning in out-of-school settings in rural, underdeveloped areas were examined by Kumar, Tewari, Shroff, Chittamuru, Kam and Canny (2010). They conducted a study that lasted 26 weeks to investigate voluntariness of rural children use of their usage to access instructional content. The result of study showed that academic learning levels and motivation of children towards to the course was increased.

Visser and West (2005) suggested that virtual learning could enhance access in those situations where cost plays a significant role in learning. Virtual learning provides effective ways to convey educational programs to large populations (Valk et al., 2010). Virtual learning also allows a method of educational delivery that could be more cost-effective than e-learning methods (Motlik, 2008). Dholakia and Dholakia (2004) wrote that virtual networks could deliver educational content to regions with difficult geography or poor economic conditions more cost effective ways than fixed networks.

Virtual learning makes education more effective by facilitating both instructional methods and learning process (Valk et al., 2010). Virtual learning provides assessment centered learning by assessing students during the learning process, provides continual feedback for them and formative guidance about what students learned during the educational process (Geddes, 2004). Furthermore, virtual learning also provides immediate feedback for students so it causes for constant motivation (Valk et al., 2010). Other researchers also investigated immediate feedback characteristics of virtual learning. Islam (2005) investigated how virtual phones could be used to enhance interactivity and thus overcome the problems encountered in distance education in Bangladesh. Fifty-two students were divided into two groups that were control group and experimental group. While the control group was establishing face-to-face conversation with the teachers, the experimental group watched the instructor with a

projection screen and used SMS to communicate with the instructor. According to the results of the study, virtual learning might be attractive way to educational access in Bangladesh. Moreover, students that joined the study liked interactivity of virtual learning and claimed that immediate feedback was the great motivator for them.

From the perspective of social context, virtual learning is a key element to solve the socio-economic problems that are about the health and family care (Sharples et al., 2007). Perraton (2000) compiled two important virtual learning projects about family care and health. In Gobi Desert Project in Mongolia, 15000 nomadic women were educated in family care, income generation, basic business skills, and livestock rearing techniques by using virtual devices. The radio program includes visiting teachers was broadcasted and women listened program by their radio. Second project is MERMAID (Medical Emergency Aid through Telematics). The aim of the project is to transfer medical expertise via satellite to distant and isolated populations where there are no experienced doctors. Furthermore, public and private emergency centers around the world are connected with telematics network for delivering 24-hour multilingual telemedicine system of surveillance. In brief, virtual learning has changed the character of education and generated new learning style that is more personalized, learner-centered, situated, collaborative, ubiquitous, and lifelong (Sharples et al., 2007).

2.1.3 Evolution of Virtual Learning

Communication technologies and virtual information are the two major elements of new social structure. First generation of truly virtual devices was small and portable devices that combined different components such as virtual telephony, data input, diaries, email, and Word (Peters, 2007). Sharples (2000) stated that in early 1970's, as learning began to change to learning-centered, collaborative and continuous cause for

Information and communication technology (ICT) has become more personalized, user centered and virtual. In 1980s, the Electronics Revolution related to development of telecommunications industry constituted e learning. In this period, distance teaching, World Wide Web and Internet were evaluated by increasing speed of chips developments in broadband technologies. In 20th century, virtual learning was improved because of the virtual and Wireless Revolution (Lam et al., 2010). Moreover, Keegan (2002) claimed that characteristic features of distance education were altered from electronic revolution to virtual learning. Distance education become face-to-face and group-based by changes in electronic revolution in 1980s.

Furthermore, the virtual revolution in 1990s has ensured learners alternative choices for distance education with virtual technologies instead of traditional college education. Kukulska-Hulme and Traxler (2005) divided virtual learning into 6 categories;

- Technology-driven virtual learning: Recent innovations in technology are used in educational settings. For example, Wireless network technologies like Wi-Fi or 3G can be integrated into virtual learning in this type of virtual learning.

- Miniature but portable e-learning: Virtual devices are used for flexible and conventional solutions. For example, delivering educational content to the learners who were out of the classroom environment and reaching content via their virtual devices such as tablets or virtual phones.

- Connected classroom learning: Similar technologies are used in classroom environment for providing collaborative learning or connecting classrooms each other's. For example, students in different classroom in the world may join the webinar services via their tablets. Webinar services bring to classrooms together. Webinar services can help instructors to present web seminars and product demonstrations to students from anywhere in the world at any time.

- Informal, personalized, situated virtual learning: Virtual technologies are supported for being operational. Location-awareness and video-capture may be given as examples of this feature. For example, FutureLab (2005) declared that virtual devices enhanced the opportunities of informal learning that is students can communicate with their instructors and with each other while they are out of the classroom.

- Virtual training/ performance support: Virtual technologies are used for increasing job performance of workers in some occupational areas. For example, Ragus (2004) tested the use of PDA in botanical gardens or nursing.

- Rural development virtual learning: The technologies are used to delivering course content and making education more effective in some geographical areas in where environmental and infrastructural challenges could be lived. The students living in rural areas are benefited from opportunities of virtual learning via their virtual devices in cost-effective ways.

2.1.4 Technological Attributes and Pedagogical Affordances

Virtual learning has technological features that provide positive pedagogical advantages for learners (Park, 2011). Hardware advances are one of two key attributes to the emergence of virtual learning, the other being networking (Caudill, 2007). Portability, small screen size, computing power, diverse communication networks, a broad range of applications and data synchronization across computers are the major features of handheld devices (Pea and Maldonado, 2006). Wireless networking is the second technological component which contributing to virtual learning success (Caudill, 2007). While some virtual learning resources can be worked in offline environment, many

depend on access to the internet to share information, exchange information, communication, and collaboration.

Virtual learning framework mainly depends on three features that are personalization, authentication, and collaboration. One of the important features of virtual learning is the personalization. Learner choice, agency, and self-regulation are the key options associated with personalization (McLoughlin and Lee 2008). Learner can control pace, location, time and set the goals of the instruction. Learners also enjoy convenience and intimacy with their virtual devices and individuality of virtual learning activities leads sense of ownership of one's learning (Traxler, 2007).

Another important feature of virtual learning is authenticity. Authentic tasks provide real world conditions and personal meaning to the learner (Radinsky, Bouillion, Lento & Gomez., 2001). Task and process authenticity features of virtual learning also provide learners to engage with contextual tasks involving ''real-life'' practices (Kearney et al., 2012). Hence, learners can generate their own contexts with the help of their virtual devices (Pachler, Bachmair, & Cook, 2009).

Last key feature of virtual learning is the collaboration. Virtual learning allows learners to participate in social interaction, conversation, and dialogue. It also offers collaboration by establishing connections with other people and resources by a virtual device. Learners engaging with virtual learning communicate easily with their teachers, peers, exchange to share information by the help of networking and social media (Gikas & Grant, 2013).

Virtual devices also produce unique educational affordances, which are portability, social interactivity, context sensitivity, and individuality that depend on three main features of virtual learning (Klopfer & Squire, 2008). Especially, portability is the key

factors that make virtual devices different from other emerging technologies and another attributes such as individuality and interactivity are related to this factor (Park, 2011). For example, Marcus Ragus (2006) examined the usage of PDA in different environments such as biology, music, and health. According to the Ragus, students instructors recognize and employ virtual devices as an important asset in their training systems and students wanted to use them in their studies.

Another affordance of virtual learning is social interactivity. Hsu and Ching (2013) examined virtual technologies for providing connectivity between students. According to the results of this study, Web 2.0 activities and social media facilitate collaborative working between the students and it support knowledge sharing. Students learn best after they learn the subject, they construct their knowledge by sharing their understanding with others (Resnick, 1987; Soloway, 1996). Virtual computer supported learning environments help students to construct their knowledge and share their understandings with other students (Gay & Reiger, 2002).

Virtual technology provides face-to-face communication by helping of virtual devices in the classroom environment Ownership of virtual devices by participants in some research studies makes using these devices in the educational settings (Park,

2011).

Context sensitivity is another affordance of virtual learning. Context sensitivity feature that senses virtual learning environment and responses to versatile context during the learning process. Through the help of context awareness of virtual devices, learner can interact with learning more than conventional instruction (Wang,

2004). Furthermore, context-awareness function of virtual learning has become increasingly crucial because of the continually changing learning settings in the

learner's virtual learning environment lead to many different instructional contexts (Nagella & Govindarajulu, 2008). Wu et al. (2012) developed context-aware virtual learning system for nursing training course. During the learning activities, each students used own virtual devices and used devices to detect whether student conducted to operate correct location of the dummy patients' body. In this process, virtual devices both gave immediate feedback to the students and guide students to perform operation in procedure. The results of the study showed that the students' learning outputs are significantly enhanced by applying the virtual learning system for nursing training.

Last affordance of virtual learning is individuality. Individuality feature can provide scaffolding that is adapted to the path of investigation of individuals (Klopfer, Squire & Jenkins2002). Participatory simulations are the examples of individuality and connectivity features of handheld computers (Klopfer, Yoon & Rivas 2004). Participatory simulations give information about the participants' role in the simulation and learner can scan other participants' role with in broader simulated system (Klopfer & Woodruff, 2002).

Widespread use of virtual devices in societies changes the nature of knowledge and ways of delivering the information. Learning that used to be delivered 'just-in-case,' can now be delivered 'just-in-time,' 'just enough,' and 'just-for-me'. Virtual technologies also changed the nature of work. Virtual devices used for training and performance support of knowledge workers. This causes the generating new concept called as "virtual workforce" and "connected society." Virtual technologies are generating many innovations on commerce and many other economic activities as well (Traxler, 2007).

2.2 Virtual Readiness

Technology is not a new term for the field of education and using virtual technology in education is increasing its popularity among the instructors. Virtual phone or other virtual devices such as an IPod, laptop are widely used among students for entertainment and socializing (Ally, 2009). However, the question is whether students and teachers are ready to use these virtual technologies for instruction (Rahamat *et al.*, 2011).

Virtual learning readiness is one of the important construct investigated in this study and the term is defined by the Oxford Advanced Learner's Dictionary as "The state or quality of being ready; preparation; promptness; aptitude; willingness. Prepared for what one is about to do or experience; equipped or supplied with what is needed for some act or event; prepared for immediate movement or action". Readiness can be considered as students' capacity of adapting themselves to technological innovations, collaborative learning, and self-paced training (Schreurs, Ehler & Moreau, 2018).

2.2.1 Pace of Readiness

As with the new developed technology, learner' pace of readiness is at relatively different rates. While some learners easily to be ready to use technology, others may less eager to adapt new technology (Stockwell, 2008). Wang and Higgins (2006) argued that technology acceptance takes some time and users can learn how to use new technology at different rates. There may be some reasons for different readiness periods for each learner. According to the Dias (2002), some prejudices against virtual learning such as perceiving virtual learning as intrusion may limit the degree of acceptance of virtual learning. Dias (2002) stated that learners might see virtual learning as an intrusion to their own personal space, which may limit their readiness and aceptance of

using virtual devices. Stockwell (2008) conducted another research about pace of readiness. According to the Stockwell (2008), how eager to use the virtual technology is not depend people to have own virtual phones and actually use it. Stockwell (2008) also claimed that patience of instructor with learners is the most important for the early stage of development into virtual learning. Thus, instructors can empathize with the learner, and let the learner investigate and get used to virtual technologies. Moreover, Stockwell (2008) added that learners who did not want to use new technologies at the beginning could see their advantages after observing other learners over time.

2.3 Theoretical Framework

2.3.1 Unified Theory of Acceptance Model

In the past decade, a most successful model was Unified Theory of Acceptance Model after modification and changes applied on the Technology Acceptance Model. UTAUT model has four main determinants that are performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). As shown in Figure 2.2 that is below, four main moderators of UTAUT model affect the four direct determinants directly: gender, age, experience, and voluntariness of use. Eight prominent models were used for developing UTAUT for investigation of information technology acceptance of users.

These models were: Theory of Reasoned Action (TRA),Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TPB), Combined Technology Acceptance Model and Theory of Planned Behavior (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT). After the examination of UTAUT, 70% variance was

accounted in user intention and it was outperformed the eight individual models (Venkatesh et al., 2003).
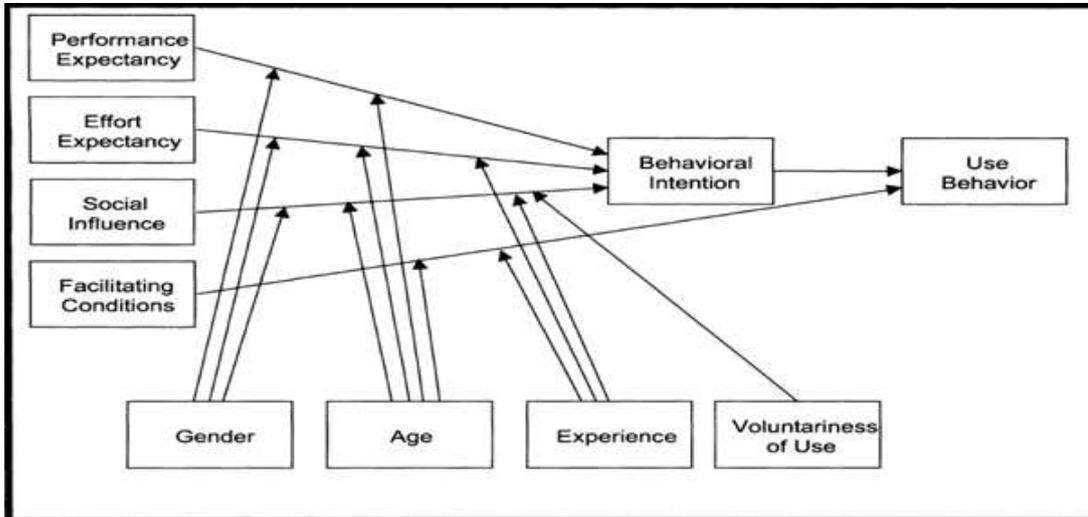
Figure 2.1 Research Model. (Venkatesh et al., 2003)
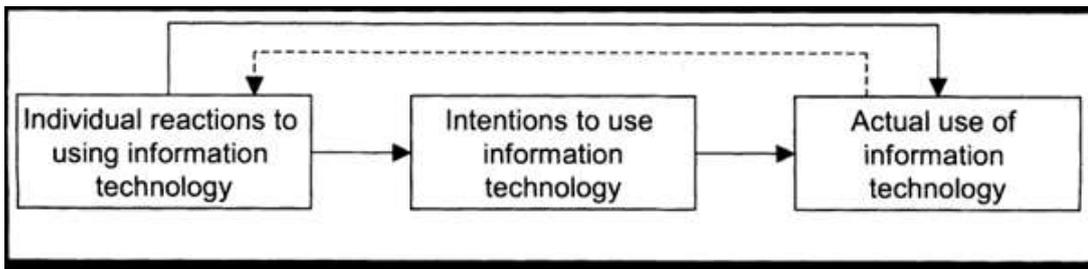
Figure 2.2 Basic Concept of User Acceptance Model. (Venkatesh et al., 2003)

2.4 Related Empirical Studies

Considering the evaluation of the effects of virtual learning, Evans (2008) carried out a study to investigate the effectiveness of virtual learning in the form of podcasting with undergraduate students in Higher Education. In this study, two different groups that were consisting of 200 first-level students were provided with podcasts after finishing of Information Technology course. During the subscription process, students were required to complete an online questionnaire about their experience. The results of the study indicate that students think that when compared with textbooks, podcasts are more

effective revision tools and when compared with their own notes, they are more efficient to help them learn. Results also showed that they are eager to have the instructional material as a podcast form when compared with conventional materials.

Regarding designing a virtual learning system, Schwabe and Göth (2005) introduced the scenario and created prototype called Virtual Game to explore the effects on supporting learning by using an orientation game in a university environment. The paper focused on evaluating design aspects and the effects observed in tutorials. The main design issues were difficulty in interface questions and the requiring real-time response time. Furthermore, paper also shows that 'map-navigation' and 'hunting and hiding' functions of the game cause for enthusiasm and fun. The success of the game was depending on the motivational design of the game.

In order to investigate the factors affecting Virtual Learning Readiness, Hussin et. al. (2012) conducted a large-scale questionnaire and semi-structured interviews. The findings stated that the students were highly familiar with computing skills and they were in favor of virtual learning integration in education. The research also showed that the learners were not sure about cost of software and hardware requirements of virtual learning. Most of students intended to use virtual learning in their future courses because they had basic skills in using virtual devices.

Furthermore, to investigate the factors affecting readiness pace of virtual learning, Stockwell (2008) tried to answer the questions that were: Were students ready to use virtual phones in language learning activities? When and where did students who preferred to use virtual phones use them, and why did they preferred them? He assigned 75 English learners in Japanese University for vocabulary learning activities and offered them two options as virtual phone or desktop computer to complete the activity. After

that, he investigated reasons why and when people used virtual phones. According to the study results, while some learners were willing to use a new technology, others were less keen on adopting the technology. To be ready to adapt to virtual learning activities, reluctant learners may need time. Moreover, learners who did not want to use new technologies in the beginning might find later that they could see their advantages through observing other learners.

Liu (2010) inspected driving factors of virtual learning acceptance. According to Liu (2010), although virtual learning was becoming popular research area in many parts of the world, the researches about the factors that affected acceptance of virtual learning were limited. Liu and his colleagues used a hypothesized model based on Technology Acceptance Model and collected data from 230 undergraduate students by a survey questionnaire. The results of the study indicated three important determinants on virtual learning acceptance that are perceived near-term/long-term usefulness and personal innovativeness. Moreover, the research revealed that perception of near- term usefulness of students was mainly aroused from a positive feeling of long-term usefulness. Of these factors, perceived long-term usefulness was inspected to be the most important moderator of use intention. Hence, an improvement of perceived long-term usefulness played important role in the successful implementation of virtual learning, as it would enhance both the near-term usefulness perceived as well as the usage intention. In addition to these, this study indicated that personal innovativeness was also a significant predictor of both the perceived ease of use and perceived long-term usefulness as well. This result was also consistent with one of the previous study on personal innovativeness. According to the previous study about personal innovativeness that was conducted by Crespo and Rodriguez (2008),

innovative learners were more prone to use virtual learning activities and developed immediately positive beliefs on new technology.

In order to inspect the effects of age or gender differences in the virtual learning acceptance, Wang et al. (2009) collected data from 330 students in Taiwan. The results of the study indicated that performance expectancy, effort expectancy, social influence, perceived playfulness, and self-management of learning were important moderators of behavioral intention to use virtual learning. Moreover, researchers investigated the effect of gender and age differences on moderators of virtual learning acceptance in the study. According to the researchers, there were three main results about effects of gender and age differences on virtual learning acceptance of pre-service teachers. First, no gender or age differences on behavioral intention although effects of performance expectancy and perceived playfulness on behavioral intention were significant. Second, the effect of social influence on usage intention was moderated by gender and age. That is, effect of social influence of usage intention was significant for men and older users, but insignificant for women and young users. Finally, the effect of self-management of learning on intention was moderated by gender. That is, the effect of self-management of learning on intention was more significant for women than man.

In another research, Liu (2008) stated that the factors on adoption of virtual learning is not fully understood by the researchers, so he inspected a research model about adoption model of virtual learning that depended on Unified Theory of Acceptance and Use of Technology to reveal the factors that affect virtual learning. According to this research, there are nine items affecting virtual learning acceptance: Performance expectancy, effort expectancy, self-efficacy, social influence, facilitating conditions, mobility, self-management of learning, attainment value, perceived enjoyment. Liu used key constructs of UTAUT model in his research model. The model

aimed to provide an insight into adoption theory in the context of virtual learning. It was clear that the model was likely to be a useful framework for future research design. In addition, this model served as a basis for our future survey and analysis of data.

Another research study was conducted by Timothy Teo (2008) to construct a model for predicting technology acceptance levels of pre-service teachers in Singapore. Data was collected from 475 pre-service teachers by using a survey questionnaire. This study examined the relationship of variables that affected the virtual learning acceptance. To test the model fit, structural equation modelling was used in the study. According to the results, perceived usefulness, attitude towards computer use, and computer self-efficacy had direct effect on technology acceptance levels of pre- service teachers, whereas perceived ease of use, technological complexity, and facilitating conditions affect technology acceptance indirectly. This study provided an alternative framework model for the researchers. Moreover, this study had several implications for the both school administrators and instructors. The teachers who were inexperienced in using virtual devices, they may meet some limitations if they do not participate in professional development. Since according to the Sugar, Crawley, and Fine (2004) when learners had experienced the advantages of technology in their instruction, they would expect technology take place all times in their learning environments, this may cause anxiety and insecurity for teachers. To support instructors in their use of technology, school administrators need to develop strategies that cause for effective successful experiences.

2.5 Summary of Literature Reviewed

At first glance in the literature, virtual learning seems a developed technology and there are many researches about virtual learning and its applications. Compared to studies of virtual learning and applications, limited number of studies was conducted on virtual

learning acceptance and virtual learning readiness. While designing a model system for virtual learning, evaluating the effects of virtual learning and the influence of learner characteristics in the virtual learning process were the most selected research field, gender differences on acceptance of virtual learning and developing a model for assessing virtual learning acceptance are the least focused research field in the literature.

As for virtual learning readiness, relatively few studies have investigated factors affecting virtual learning readiness. There were insufficient information and research studies about gender and age differences on virtual learning readiness. Furthermore, except research about age and gender differences on virtual learning readiness, studies about virtual learning readiness of instructors have not been carried about adequately.

3.0   RESEARCH METHODOLOGY

3.1 Research Design

This research adopted a descriptive survey research design, where survey research design is one of the important area of measurement in applied research. The broad area of survey research encompasses any measurement procedures that involved asking questions from respondents. Krosnick (2012) A "survey" can be anything, that can form a short-paper-and-pencil feedback form to an intensive one-on-one in depth interview will begin by looking at the different types of surveys that are possible (Paul 2011).

3.2   Population of the Study

The population of this study was comprised of pre-serviced biology teachers from the two tertiary Institution from Both Ibrahim Badamasi Babangida University, Lapai and Federal University of Technology Minna, Niger state. This is shown in table 3.1 below.

Table 3.1: Distribution of the population of the study

S/N	Tertiary Institution	Pre-Service Teachers
1.	Federal University of Technology Minna	85
2.	Ibrahim Badamasi Babangida University, Lapai	65
	TOTAL	**150**

3.3 Sampling and Sampling Technique

No sampling technique will be use to sample the population of the study because it is of a manageable size.

3.4 Research Instrument

A Research instrument will be designed titled 'Assessment of pre-service biology teachers awareness and readiness towards the use virtual learning platforms in Tertiary Institutions of Niger State.' that will be use for data collection using four modified likert rating scale and it's contains four sections as well as the same scaling for all sections. Section "A" will be made up of the demographic data of the respondent , section "B" will contain 29 items, while section "C" will contains 11 items and section "D" will contains 13 items. With response mode of Highly aware rated as 4, moderately Aware as 3, Slightly Aware as 2, and Not Aware as 1 point pertinently.

3.5 Validation of the Research Instrument

After drafting the instrument it will be validated by one lecturers in the Department of Science Education Federal University of Technology Minna, Niger state and one lecturer in department of Educational Technology, Federal University of Technology Minna, Niger state to ensure face to face validity of the instrument. As well as the validate of this study and their comments will be used to readjust the instrument.

3.6 Reliability of the Instrument

The reliability of the instrument was determined by selecting 20 students apart from the selected sample consisting of pre-service male and female teachers to determine the reliability of the instrument. Using Cronbach-alpha, the result computed was generated to 0.76.

3.7 Method of Data Collection

After permission is sorted, copies of the questionnaire was directly administered to the respondents with the help of research assistant to be filled and data will be collected and all copies was be retrieve.

3.8   Method of Data Analysis

The data collected was analyzed using Mean and standard deviation to analyze the research questions.

CHAPTER FOUR

4.0   **RESULTS AND DISCUSSION**

4.1 Research Question One

Are the Pre –service teachers aware and ready on the use of virtual learning for teaching and learning biology?

Table 4.1: Mean Responses of respondents on Pre –service teachers awareness and readiness on the use of virtual learning for teaching and learning biology?

N=150

S/N	ITEMS	$\bar{X}$	SD	REMARKS
1.	3P learning	2.14	1.11	Not Aware
2.	Bloomz	2.52	1.05	Aware
3	Buncee	2.26	1.08	Not Aware
4.	Class Dogo	2.27	1.09	Not Aware
5.	Decks Toys	2.23	1.08	Not Aware
6.	Dial pad	2.17	1.1	Not Aware
7.	Edmodo	2.53	1.05	Aware
8.	Od puzzles	2.32	1.1	Not Aware
9.	Edu Lastic	2.38	1.06	Not Aware
10	Edu Planet	2.16	1.11	Not Aware
11	Flip Grid	2.22	1.05	Not Aware
12	Genially	2.25	1.08	Not Aware
13	Google Classroom	2.27	1.09	Not Aware
14	Haybts	2.23	1.08	Not Aware
15	Hapara	2.17	1.1	Not Aware
16	Kahoof	2.33	1.05	Not Aware
17	Kapwing	2.32	1.1	Not Aware
18	Managed Methods	2.38	1.06	Not Aware
19	Microsoft teams	2.51	1.08	Aware
20	Parlay	2.27	1.09	Not Aware

S/N	ITEMS	$\bar{X}$	SD	REMARKS
21	Pronto	2.23	1.08	Not Aware
22	See saw	2.17	1.1	Not Aware
23	Slack	2.36	1.05	Not Aware
24	Shidy bee	2.32	1.1	Not Aware
25	Sutori	2.38	1.06	Not Aware
26	Webex	2.16	1.11	Not Aware
27	Wooclap	2.22	1.05	Not Aware
28	Ziplet	2.25	1.08	Not Aware
29	Zoom	2.62	1.18	Aware
	Grand Average	**2.29**	**1.08**	**Not Aware**

Decision=2.5

Table 4.1 above revealed the results on grand mean average (2.29) which indicated that there is low awareness on pre –service teachers awareness and readiness in the use of virtual learning for teaching and learning biology.

4.2 Research Question Two

Are the Pre-service teachers ready in use of virtual learning for teaching and learning biology?

Table 4.2: Mean Responses of respondents on the Pre-service teachers ready in use of virtual learning for teaching and learning biology

N=150

S/N	ITEMS	$\bar{X}$	SD	REMARKS
1.	Use of M.S Word to process professional or personal Document	2.55	1.06	Aware
2.	Use of Internet to compose relevant mails	2.57	1.09	Aware
3	Use of e-mail for sending professional or personal Messages	2.57	1.09	Aware
4.	Use of e-mail for receiving messages	2.72	1.11	Aware
5.	Use of electronic address book	2.65	1.05	Aware

	(subscription to mailing list)			
6.	Sending attachment to e- mail	2.59	1.11	Aware
7.	Forwarding of e-mails	2.53	1.05	Aware
8.	Use of GSM to book appointment or discuss personal problem with teachers	2.52	1.1	Aware
9.	Use of Computer to search for information for assignment	2.51	1.05	Aware
10	Use of Computerized diagnostic assessment to assess learners performance	2.53	0.99	Aware
11	Use of Computer to provide feedback to learners	2.57	1.09	Aware
12	Use of computer for simulation	2.72	1.11	Aware
13	Use of multimedia to present lesson in the classroom	2.65	1.05	Aware
14	Use of computer to practice principles and procedures to learn	2.59	1.11	Aware
15	Use of computer for statistical analysis	2.53	1.05	Aware
16	Use of multimedia to present reports of research	2.52	1.1	Aware
17	Use of computer for self- education	2.51	1.05	Aware
18	Use of Computer to diagnose learning problems	2.53	0.99	Aware
19	Use of computer to chart or discuss assignments with colleagues online	2.57	1.09	Aware
20	Use of computer to discuss assignments with teachers online.	2.72	1.11	Aware
21	Use of recorded video for teaching and learning process	2.65	1.05	Aware
	Grand Average	2.59	1.07	

Decision=2.5

Table 4.2 above revealed the results on grand mean average (2.59) which indicated that there is high awareness on pre-service teachers ready in use of virtual learning for teaching and learning biology.

4.3 Research Question Three

What are the attitude of pre-service teacher towards the use of virtual learning for teaching and learning biology?

Table 4.3: Mean Responses of respondents on the attitude of pre-service teacher towards the use of virtual learning for teaching and learning biology

N=150

S/N	ITEMS	$\bar{X}$	SD	REMARKS
1.	Virtual learning is useful for education overall	2.59	1.10	Aware
2.	Virtual learning enables me to accomplish the tasks more quickly.	2.57	1.00	Aware
3	Virtual learning improves my performance in online.	2.56	1.07	Aware
4.	Virtual learning increases my productivity.	2.58	1.10	Aware
5.	Virtual learning is an alternative to conventional learning.	2.80	1.09	Aware
6.	my university is not ready for Virtual learning using mobile devices (mobile phone,Tablet PC etc.) facilities.	2.59	1.09	Aware
7.	Virtual learning will save my learning time.	2.75	1.08	Aware
8.	Virtual learning is an alternative to web based learning.	2.77	1.00	Aware
9.	needs to learn how to use my mobile devices (mobile phone, Tablet PC etc.) for Virtual learning.	2.63	1.06	Aware
10	looks forward to engage in virtual learning in biology practicals	2.57	1.00	Aware
11	I am afraid I will spend more money on my mobile devices (mobile phone Tablet PC etc.) bill because of Virtual	2.56	1.07	Aware

	learning.				
12	Virtual learning will make life difficult	2.68	1.10	Aware	
13	I prefers conventional learning than Virtual learning	2.57	1.00	Aware	
14	Virtual learning is good for working adults who are pursuing their higher education	3.1	1.56	Aware	
	Grand Average	**2.63**	**1.05**	**Aware**	

Decision=2.5

Table 4.3 above revealed the results on grand mean average (2.63) which indicated that there is high awareness on the attitude of pre-service teacher towards the use of virtual learning for teaching and learning biology

4.4 Summary of Major Findings

The major findings are outline below;

1. Low awareness on pre –service teachers awareness and readiness on the use of virtual learning for teaching and learning biology

2. high awareness on pre-service teachers readiness in the use of virtual learning for teaching and learning biology

3. High awareness on the attitude of pre-service teacher towards the use of virtual learning for teaching and learning biology

4.5 Discussion of Results

The results revealed that there is low awareness on pre –service teachers awareness and readiness on the use of virtual learning for teaching and learning biology. The findings of the study with Schreurs, Ehler & Moreau, (2018) virtual learning readiness is one of the important construct investigated in this study and the term is defined by the Oxford Advanced Learner's Dictionary as "The state or quality of being ready; preparation;

promptness; aptitude; willingness. Prepared for what one is about to do or experience; equipped or supplied with what is needed for some act or event; prepared for immediate movement or action". Readiness can be considered as students' capacity of adapting themselves to technological innovations, collaborative learning, and self-paced training.

The results revealed that there is high awareness on pre-service teachers readiness in the use of virtual learning for teaching and learning biology. The findings of the study agreed with Wang and Higgins (2006) argued that technology acceptance takes some time and users can learn how to use new technology at different rates. There may be some reasons for different readiness periods for each learner. According to the Dias (2002), some prejudices against virtual learning such as perceiving virtual learning as intrusion may limit the degree of acceptance of virtual learning. Dias (2002) stated that learners might see virtual learning as an intrusion to their own personal space, which may limit their readiness and aceptance of using virtual devices. Stockwell (2008) conducted another research about pace of readiness. According to the Stockwell (2008), how eager to use the virtual technology is not depend people to have own virtual phones and actually use it. Stockwell (2008) also claimed that patience of instructor with learners is the most important for the early stage of development into virtual learning. Thus, instructors can empathize with the learner, and let the learner investigate and get used to virtual technologies. Moreover, Stockwell (2008) added that learners who did not want to use new technologies at the beginning could see their advantages after observing other learners over time.

The result revealed that there is high awareness on the attitude of pre-service teacher towards the use of virtual learning for teaching and learning biology. The findings of the study corroborate with Liu (2010) inspected driving factors of virtual learning acceptance. According to Liu (2010), although virtual learning was becoming popular

research area in many parts of the world, the researches about the factors that affected acceptance of virtual learning were limited. Liu and his colleagues used a hypothesized model based on Technology Acceptance Model and collected data from 230 undergraduate students by a survey questionnaire. The results of the study indicated three important determinants on virtual learning acceptance that are perceived near-term/long-term usefulness and personal innovativeness. Moreover, the research revealed that perception of near- term usefulness of students was mainly aroused from a positive feeling of long-term usefulness. Of these factors, perceived long-term usefulness was inspected to be the most important moderator of use intention. Hence, an improvement of perceived long-term usefulness played important role in the successful implementation of virtual learning, as it would enhance both the near-term usefulness perceived as well as the usage intention. In addition to these, this study indicated that personal innovativeness was also a significant predictor of both the perceived ease of use and perceived long-term usefulness as well. This result was also consistent with one of the previous study on personal innovativeness. According to the previous study about personal innovativeness that was conducted by Crespo and Rodriguez (2008), innovative learners were more prone to use virtual learning activities and developed immediately positive beliefs on new technology.

CHAPTER FIVE

5.0   **CONCLUSION AND RECOMMENDATIONS**

5.1 Summary of the Study

The study assessed pre-service biology teachers awareness and readiness towards the use virtual learning platforms in Tertiary Institutions of Niger State. The specific objectives of the study is to assess Pre –service teachers awareness and readiness in the use of virtual learning for teaching and learning biology, Pre-service teacher readiness in use of virtual learning for teaching and learning biology and the attitude of pre-service teacher towards the use of virtual learning for teaching and learning biology. Three corresponding research questions were raised to guide the study. The study adopted a descriptive survey research design. The target population of the study is one hundred fifty (150) pre-service teachers.

5.2 Conclusion

The study on assessment of pre-service biology teachers awareness and readiness towards the use virtual learning platforms in Tertiary Institutions of Niger State concluded that most of the pre-service teachers have low awareness on virtual learning platforms.

5.3 Recommendations

Based on the findings of the study, the study recommends that;

1. The pre-service teachers should increase their participation in trainings of virtual learning platforms

2. The attitude of the pre-service teachers should be positive to virtual learning platform

3. The pre-service teachers should always be ready to use virtual platforms to teach in the classroom\

5.4 Contributions to Knowledge

The study contribute to pre-service teachers awareness and readiness in the use of virtual learning platforms in the classroom. It also contributes to the utilization of virtual learning platforms for self learning.

5.5 Suggestions for Further Studies

1. Impact of virtual learning platform in junior secondary schools in Bosso Local Government Area.

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APPENDIX

RESEARCH INSTRUMENT VALIDATION FORM

Sir/Ma,

The candidate OLADEPO RASHEEDAT with Admission Number 2017/3/69323BC is a student of the department. You are requested to make amends or inputs that will improve the quality of the instrument. Your professional expertise is expected to assist the researcher towards the award of the degree.

Thank you.

Dr. Rabiu M. Bello

HOD (Signature, Date & Official)

Title of the Research Instrument: Pre-service teacher's awareness and readiness towards mobile technology for learning biology in tertiary institution Minna Niger state

SECTION A

1. Appropriateness of the Research Instrument title: The instrument is appropriateness for its level.

2. Suggest amendment if not appropriate: None

3. Completeness of Bio-data Information: complete

4. Suggest inputs if incomplete: None

5. Suitability of items generated: The item is suitable for its level

6. Structure of the questionnaire/ test items generated: The item is well structured.

7. Structure of the instrument in line with the objectives of the study: The item is structured in line with the objective of the study

8. Items coverage and distribution across constructs and domains measured: Items covers the constructs and domains measured

9. Appropriateness of the instrument in relation to the type of data to be collected: The instrument type of date to be collected is okay

10. What is the general overview and outlook of the instrument? Good.

11. Rate the instrument between 1-10: 8

SECTION B

Name of the validator: Dr ALABI Thomas Omotayo

Designation/Rank: Lecturer | Ass Professor

Name of institution: Federal University of Technology Minna

Department/School: Education SSTE

Telephone No/GSM No: 08038573000

E-Mail Address: Omotayalabi@futminna.edu.ng

16/6/2024

Signature, Date and stamp (if available)

RESEARCH INSTRUMENT VALIDATION FORM

Sir/Ma,

The candidate OLADEPO RASHEEDAT with Admission Number 2017/3/69323BG is a student of the department. You are requested to make amends or inputs that will improve the quality of the instrument. Your professional expertise is expected to assist the researcher towards the award of the degree.

Thank you.

Dr. Rabiu M. Bello

HOD (Signature, Date & Official stamp)
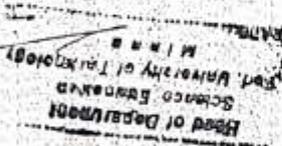
Title of the Research Instrument: Pre-service Biology Teacher's Awareness and Readiness to use Virtual learning platforms in Tertiary Institution of Niger state.

SECTION A

1. Appropriateness of the Research Instrument title: _Appropriates_

2. Suggest amendment if not appropriate: _Already Done_

3. Completeness of Bio-data Information: _Okay._

4. Suggest inputs if incomplete _Already Done_

5. Suitability of items generated _Suitable._

6. Structure of the questionnaire/ test items generated _Adequate_

7. Structure of the instrument in line with the objectives of the study. _Adequate_

8. Items coverage and distribution across constructs and domains measured _Okay._

9. Appropriateness of the instrument in relation to the type of data to be collected _Okay._

10. What is the general overview and outlook of the instrument? _The instrument is okay and can be administered._

11. Rate the instrument between 1-10

40

SECTION B

Name of the validator: _____ Dr. Rabiu M. Bello

Designation/Rank: _____ Snr. Lecturer.

Name of institution: _____ Futminna.

Department/ School: _____ Dept. of science educat...

Telephone No/GSM No: _____ 08035927009.

E-Mail Address: _____ rrabiu@futminna.edu.ng.

30/06/21

Signature, Date and stamp (if available)

41

Federal University of Technology, Minna

P.M.B 65, Minna, Niger State.

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