



Digital Training and Learning in Covid-19 Pandemic Lockdown: Our Experience

Ify Evangel Obim

Department of Library and Information Science,
University of Nigeria, Nsukka

ify.obim@unn.edu.ng

Victoria Kelechi Izuakolam

Department of Library and Information Science
Clifford University

izuakolamv@clifforduni.edu.ng

Abstract

This study investigated the digital training and learning in tools during the COVID-19 pandemic lockdown. A case study research design was used for this study. A group of 160 participants enrolled for the digital learning while a purposive sampling technique was used to select a sample size of 132 participants. The Instrument for data collection was a well-structured online questionnaire. Data were analyzed using percentages, frequency counts and bar charts. The findings revealed that most learners did not know the digital tools used before the training. The results also revealed that most of the learners had not used smartphones for teaching or other services. Furthermore, it was found that by the end of the training most of the participants could use smartphones to create whiteboard animation, 3D explainer video, simple graphics, and WhatsApp stickers respectively. There is a need to conduct studies to ascertain learners' preference for different digital learning tools over others. There is therefore need to introduce more digital learning opportunities at learners' recreational hours in the post-COVID-19 era. Also, there is a need to open up other social media platforms for communicating with various learners while creating awareness of the need for acquiring digital skills. The study has been able to express the experiences of the researcher in training the learners in digital tools for teaching, learning, and other service delivery.

Keywords: digital training; learning; digital leaning; COVID 19; pandemic; lockdown

Introduction

COVID-19 is an emerging infectious disease caused by a novel coronavirus - SARS-CoV-2. The Corona Virus Disease of 2019, otherwise known as COVID-19, started in Wuhan, Hubei Province, China, in December, 2019. The World Health Organization (WHO), declared it a public health emergency of international concern on the 30th of January, 2020, and recognized it as a pandemic on 11th of March, 2020. Nigeria recorded her index case in February 2020, with an increasing number of cases every day. This led to a lockdown in Nigeria to prevent the spread of



the deadly virus. This total lockdown limited physical engagements among Nigerians as schools, churches, mosques, businesses, markets, and so on were closed down. Consequently, many communications and interactions were moved to cyberspace (online) most especially the teaching-learning process. This paper reports the experience of one such digital skills training class conducted by Vangellinks International Limited (RC 1328996) at the peak of the COVID-19 lockdown. The digital skills taught during the class were: whiteboard animation video on a smartphone, 3D animation video on a smartphone, 3D explorer video on smartphone, WhatsApp stickers on smartphone, and Graphic design on a smartphone.

These skills were imperative during the lockdown because almost every activity was online and possessing the above digital skills would help to add flavour to online activities like online marketing, online teaching, online preaching, online learning among others. Digital skill learning is a subcategory of e-learning which is a macro concept of education (Drigas & Angelidakis 2017). Also, Olufunmilola, Oladimeji and Ayuba (2016) stated that, new technologies are evolving, different ways of learning like mobile learning with the use of mobile applications are also gaining popularity. The use of multimedia components such as graphics, sound, videos, and animations can theoretically facilitate the learning process (Prinz, Bolz&Findl, 2005). The 21st century presents itself as a challenging time, demanding a particular set of skills (Esdras, Omar, Daniel, Bernd, and Henrique, 2018). These skills are prerequisites for any individual who desires to engage in online teaching, preaching, marketing, and so on. The digital skills taught during the online training class were to be used on the smartphone.

Smartphones are a class of mobile phones and multi-purpose mobile computing devices. They are distinguished from feature phones by their stronger hardware capabilities and extensive mobile operating systems, which facilitate wider software, internet (including web browsing over mobile broadband), and multimedia functionality (including music, video, cameras, and gaming), alongside core phone functions such as voice calls and text messaging. One important feature of smartphones is their compatibility with mobile applications. These mobile applications, according to Drigas and Angelidakis (2017) create demand for rethinking pedagogy. The major advantages of mobile technology in education include greater access to appropriate and timely information, reduced cognitive load during learning tasks, and increased interaction with other people and systems. It may be argued that networked mobile devices can help shape a culturally sensitive learning experience that can offer additional and, possibly, more powerful means of encoding, recall, and transfer. According to Hoyek, Collet, Rienzo, Almeida, and Guillot (2014), teaching tools and techniques are permanently evolving, and three-dimensional (3D) digital animations are now used for teaching. Also, According to VideoScribe (2020), Whiteboard animation is a style of video designed to look like the content is being hand-drawn on a school whiteboard or white background. It's a particularly popular way to communicate more complex information because the simple graphics are easy to understand. Originally whiteboard animations were created by filming someone physically drawing on a whiteboard surface. This was very time-consuming and required strong artistic abilities, thus, the need to acquire the skill to effectively use smartphones to create whiteboard animation videos with



ease. The need to organize online digital skills training was necessitated among other things by the COVID-19 pandemic (Igwela & Nsirim, 2020). The essence of this report is to share our experience during the digital skills class as well as the experience of the participants. This is important as it gives room for improvement, especially during the post-COVID era.

Purpose of the study

The main purpose of the study is to find out the digital learning tools and their uses among learners during the COVID-19 pandemic lockdown. Specifically, the study seeks to:

1. Examine the knowledge of using smartphones to create whiteboard animation video, 3D animation videos, and 3D explainer videos, simple graphic design and WhatsApp sticker designs among the participants before the digital skills online training class during the COVID-19 lockdown.
2. Ascertain the use of whiteboard animation video, 3D animation video, 3D explainer video, simple graphic design and WhatsApp stickers for services among the participants prior to the digital skills training class during COVID-19 lockdown.
3. Examine the knowledge of using smartphone to create whiteboard animation video, 3D animation video, 3D explainer video, simple graphic design and WhatsApp sticker designs possessed by the participants after the digital skills online training class during COVID-19 lockdown
4. Find out the level of satisfaction of the digital skills training class among the participants during COVID-19 lockdown
5. Ascertain the willingness of the participants to participate in similar digital skills online training.

Literature Review

One way that educators may help students succeed in the learning process is by using whiteboard animation programs that are based on videos. This will enhance learning and ensure that the process runs smoothly (Iswahyudi, Rusijono and Mariono 2023). The purpose of the whiteboard annotation application, according to Ryan and Deci (2020) is to let teachers explain concepts and provide illustrations to students directly without requiring them to visualize them. Teachers will find it easier to run the class more solely as a result. Smartphones, laptops, PCs, and other devices can all utilize this software. The ability of the students to comprehend and analyze what they are learning is emphasized (Rahmatabadi et al., 2018). The teaching and learning process is very essential with regard to education and can be carried out through the aid of video, especially in this digital era. According to Readhead et al., (2018), whether used in groups, individually, or in large forums, video is an alternate learning medium that makes use of music and visuals to pique students' interest in learning.

Previously only available on expensive workstations, 3D animation is now available on mobile devices apps like Blender for Mobile and Toontastic 3D. With the help of these apps, users



can make intricate animations right on their smartphones. Research by Iswahyudi, Rusijono and Mariono (2023) demonstrates that 3D animation tools for smartphones democratize creative chances, particularly in areas where traditional resources are few. Studies highlight how 3D animation can help students become more innovative and creative, especially in STEM and digital media education. Content producers may create captivating stories with 3D animation. Its potential for producing engaging material for social media and educational uses is demonstrated by research. Previously restricted to pricey desktop software, 3D animation is now available on smartphones to a larger audience, increasing learning and creative options.

Research shows that by offering immersive learning experiences, 3D explorer videos improve spatial comprehension and problem-solving abilities. According to educational scholars, these movies are useful resources for courses like biology, engineering, and geography since they allow for interactive study (Nguyen & Yang, 2022; Chen & Lin, 2020). WhatsApp stickers are graphic components that can be used to more expressively express feelings, responses, or messages. Because stickers allow users to communicate following their communication aims and topics, interacting with them is fun (Alhumaid et al., 2022). Even though the sender and recipient of stickers are in separate places, they can still communicate directly (Hasyim, Gusnawaty & Said, 2024). WhatsApp stickers enable users to highlight and communicate subtle nuances about the feelings they wish to convey, according to Sadia and Husain (2023). This encourages social interaction in discussions and enables people to reply informally. Another common application for WhatsApp stickers is to express lighthearted humor. As a result, stickers can be used to accomplish particular communication objectives in online interactions in addition to being a tool for self-expression.

There are numerous ways to communicate visually, and graphic design is one of them. The goal of graphic design work is to deliver the message content in a way that is appropriate for the target audience, the chosen media, and the financial climate. Information and learning material producers can help readers learn and communicate more effectively. Complex language will make it more difficult to interpret the information, whether it be in text or images. The fundamental ideas of information design are active voice, clarity, comprehensibility, consistency, legibility, accuracy, readability, reading value, simplicity, and organization. Digital technologies and digital forms have merged in recent decades, impacting advancements in video, music, literature, film, art, and design. Information presentations on visual displays, like television sets, smartphones and computer terminals, are quite constrained when compared to traditional graphic presentations (Rune, 2024).

Smartphones are now part of human life and are now being used for activities such as digital skill development. Digital skills are essential for both professional and personal growth in the age of the digital revolution. The swift advancement of digital technologies demands that knowledge and skills be updated regularly (Zervas & Stiakakis, 2024). In many professions, digital literacy is now a fundamental requirement rather than an optional talent. In many nations,



underemployment and unemployment are serious challenges that can be lessened by developing digital skills. Companies look for employees who can join the manufacturing process right away without needing a lot of on-the-job training (Harris and Clayton, 2020; Smith et al., 2021). A literature study shows that a sizable segment of the scientific community concurs with the idea that regular computer and smart phone use helps VET students build their digital skills. In EU nations, the usage of educational platforms became essential during the COVID-19 pandemic, aiding in better lesson planning (Zervas & Stiakakis, 2024).

There are several advantages to integrating these digital abilities into other fields. One of these advantages is giving students practical experience in creating content. Likewise, digital tools encourage creativity and innovation in teaching approaches (Kumar & Malik, 2022). Also, by using these abilities to produce expert material, freelancers and small businesses can lessen their reliance on outside organizations. In addition, user-generated material on sites like Instagram, YouTube, and TikTok is becoming increasingly important due to the ubiquitous use of smartphones for creative work (Singh, 2021). Discussions concerning the future of education have been sparked by the experiences gathered during the pandemic. To be ready for future disruptions, educators must receive ongoing training in digital tools and pedagogical techniques (Dhawan, 2020). A major shift in the educational landscape has been sparked by the COVID-19 epidemic, which has forced institutions to adopt digital training and learning. Even though there are still difficulties, the lessons learned can help to improve teaching methods in the future. To address the lingering effects of this change and create robust educational frameworks, more research is necessary.

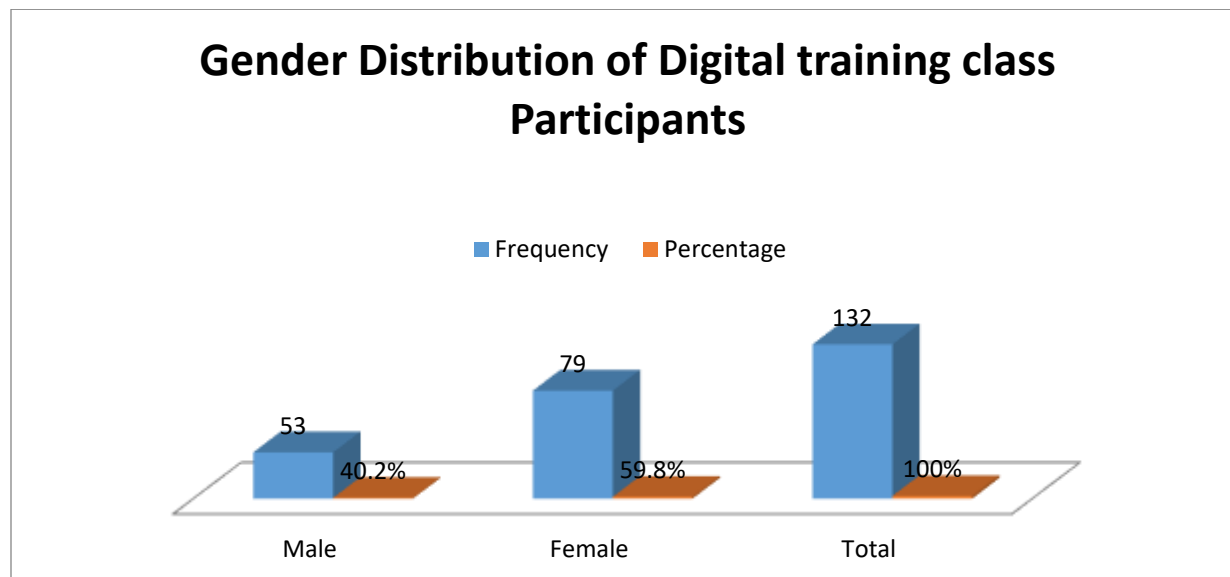
Methodology

The research design chosen for the study is a case study research design. According to Nworgu (2015), a case study is an intensive study geared towards a thorough and in-depth understanding of a given social unit. The social unit may be an individual, a group of individuals, a community, an institution, and so on. This design was deemed most suitable for this study as the study seeks to give an in-depth understanding of the digital training class series organized by Vangellinks International Limited (an information consultancy service company) during the COVID-19 lockdown in Nigeria. A total of 132 participants were studied after the series of digital training online classes on the skills needed to use smartphone mobile applications (app) to create whiteboard animation videos, 3D animation videos, 3D explainer videos, simple graphic designs and WhatsApp sticker designs. The participants were studied at the end of the training using Google Forms to examine their experience during the online classes and the skills acquired during the class. Data collected were analyzed and presented using frequency count, percentage, as well as bar chart using SPSS (version 22).

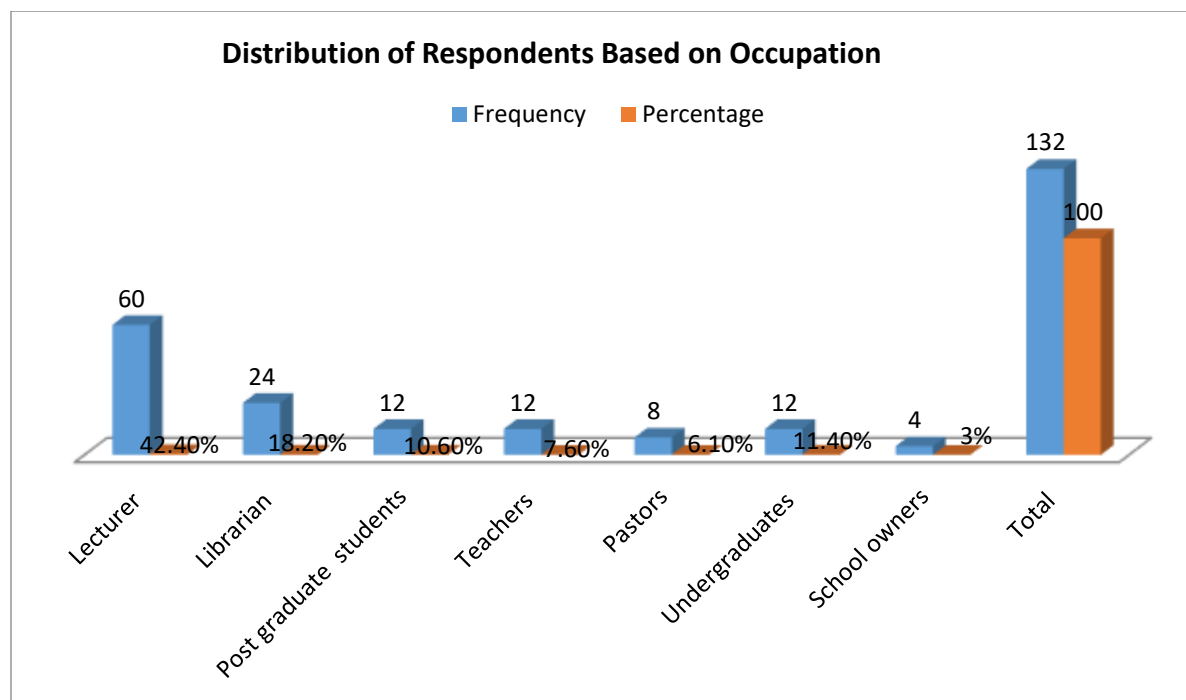


Results

The data analyzed and presented in this section were collected from 132 participants of digital learning training class series on the use of mobile applications during COVID 19 lockdown in Nigeria.

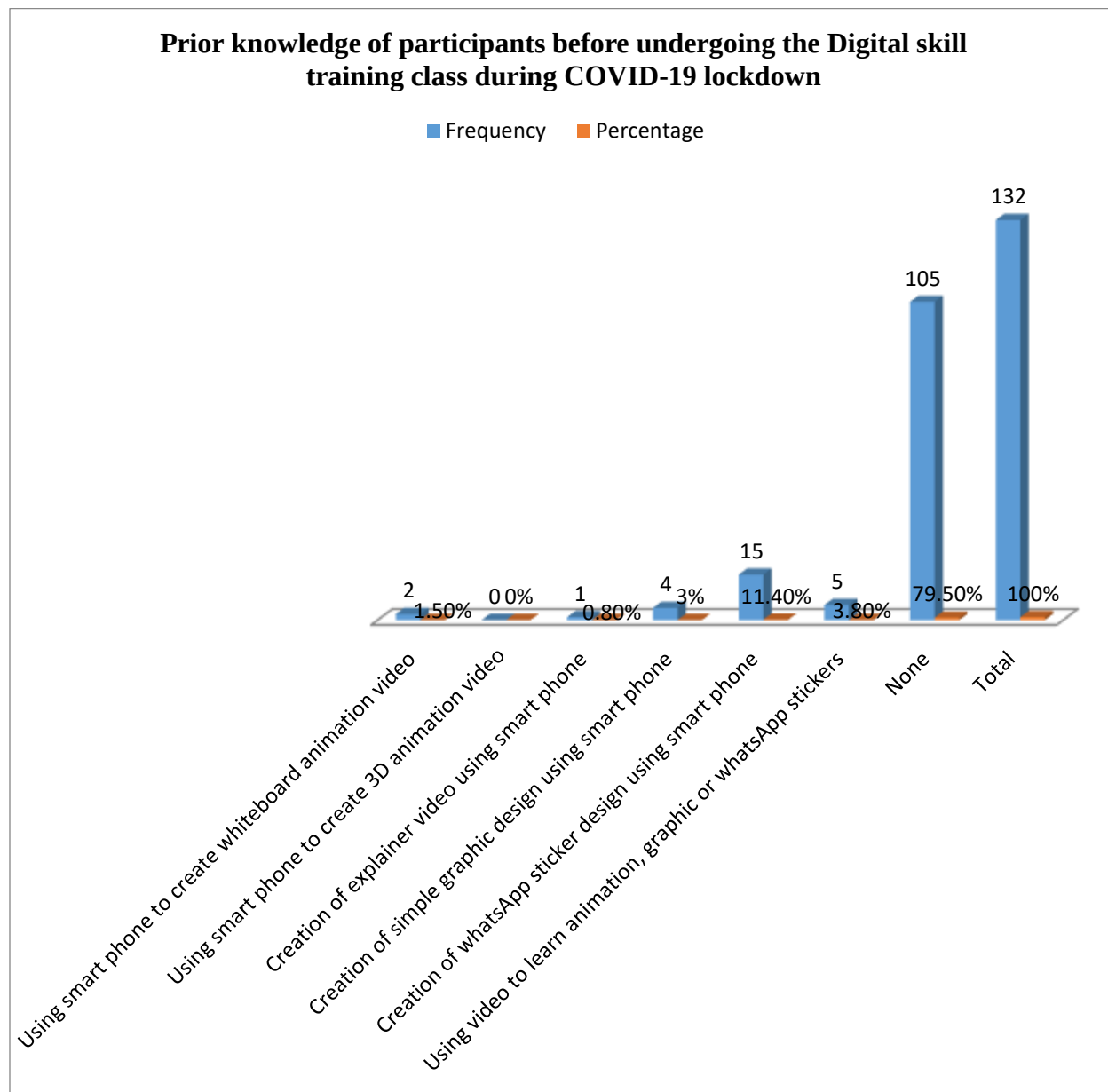


The chart 1 above shows the gender distribution of participants. Based on the table, out of 132 participants, 53(40.2%) were male while 79(59.8%) were female.





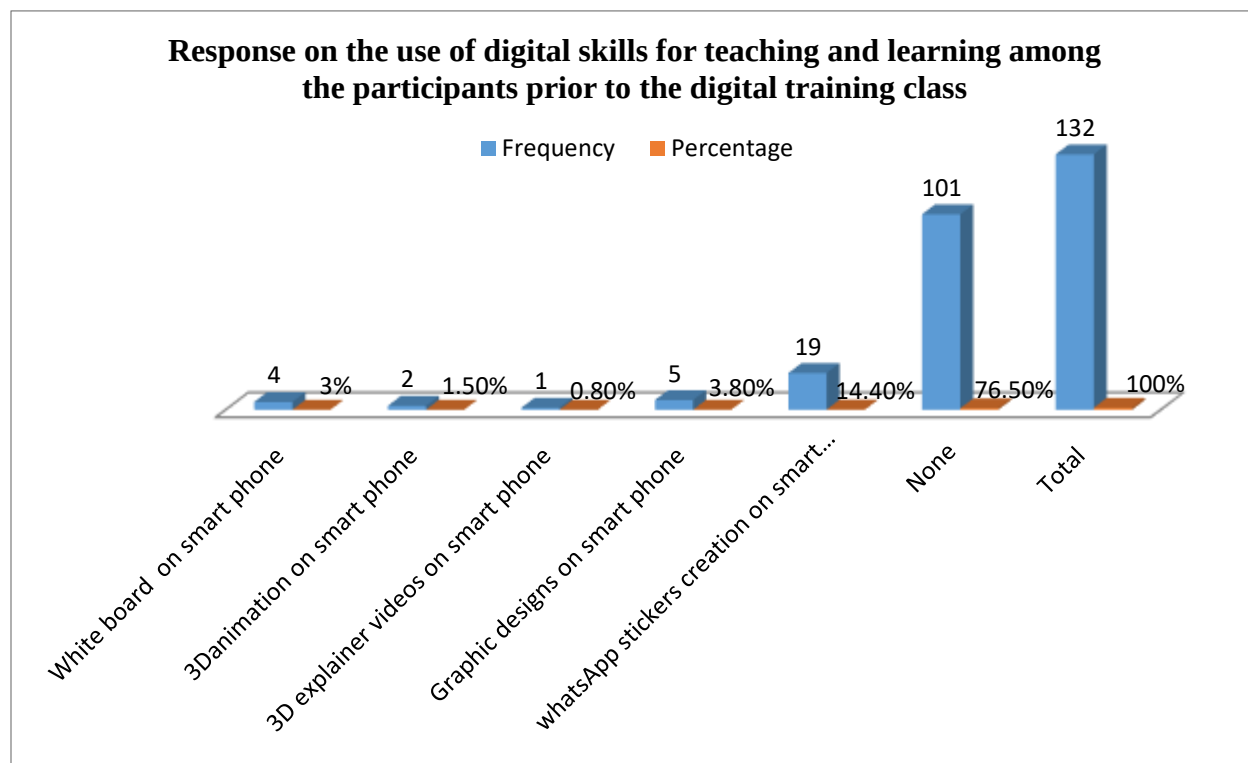
From the chart above, out of the 132 participants who responded to the survey, 60(42.4%) were Lecturers. 24(18.2%) were librarians, 12(10.6%) were undergraduate students, 12(7.6%) were teachers, 8(6.1%) were pastors, 12(11.4%) were postgraduate students while 4(3%) were school owners.



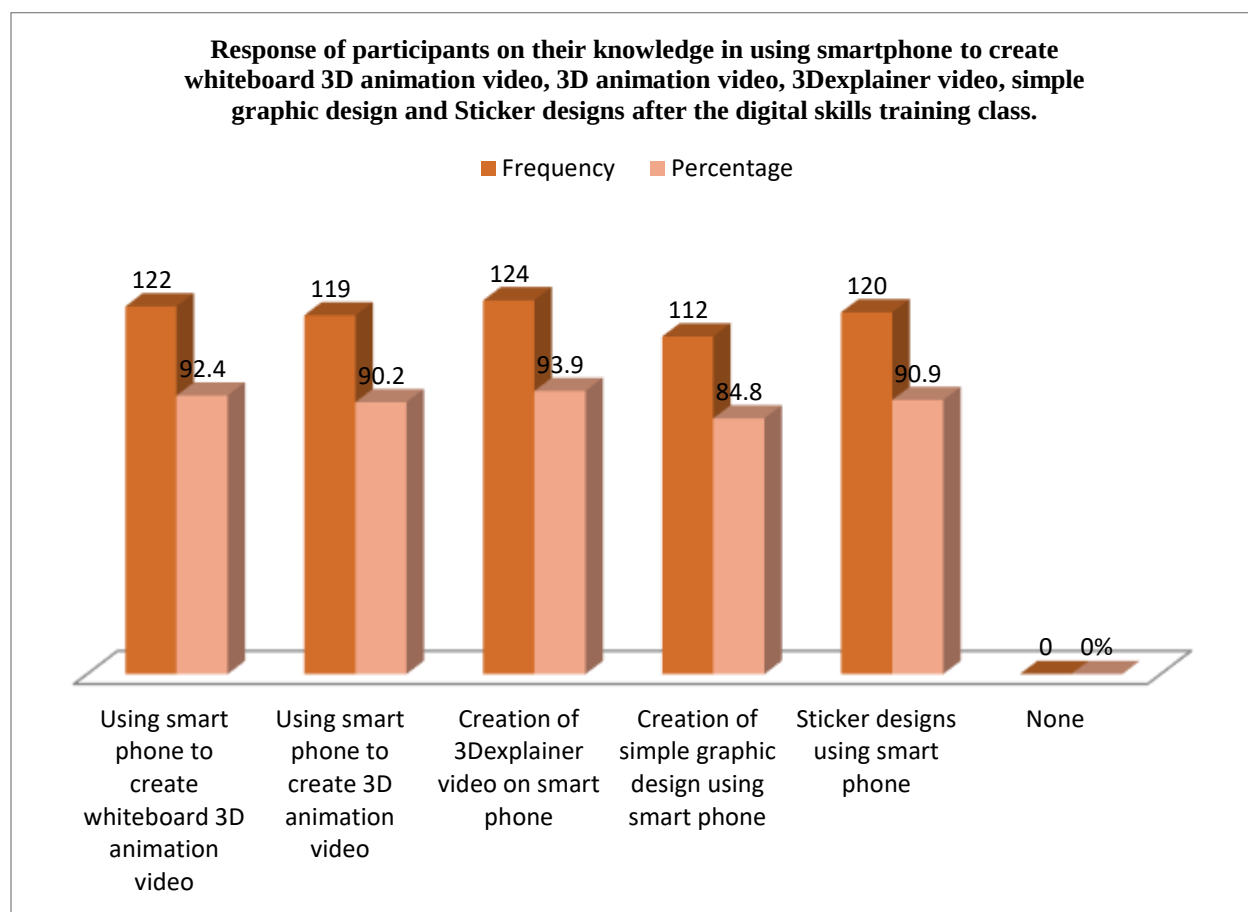
The chart above shows the response on the prior knowledge of participants before undergoing mobile application training class for digital learning during COVID 19. From the chart, out of 132 participants only 2(1.5%) used smart phone to create whiteboard animation video. 0(0%) used smart phone to create 3D animation video. 1(0.8%) for creation of 3D explainer video using smart phone. 4(3%) for creation of simple graphic design using smart phone. 15(11.4%) used smart phone



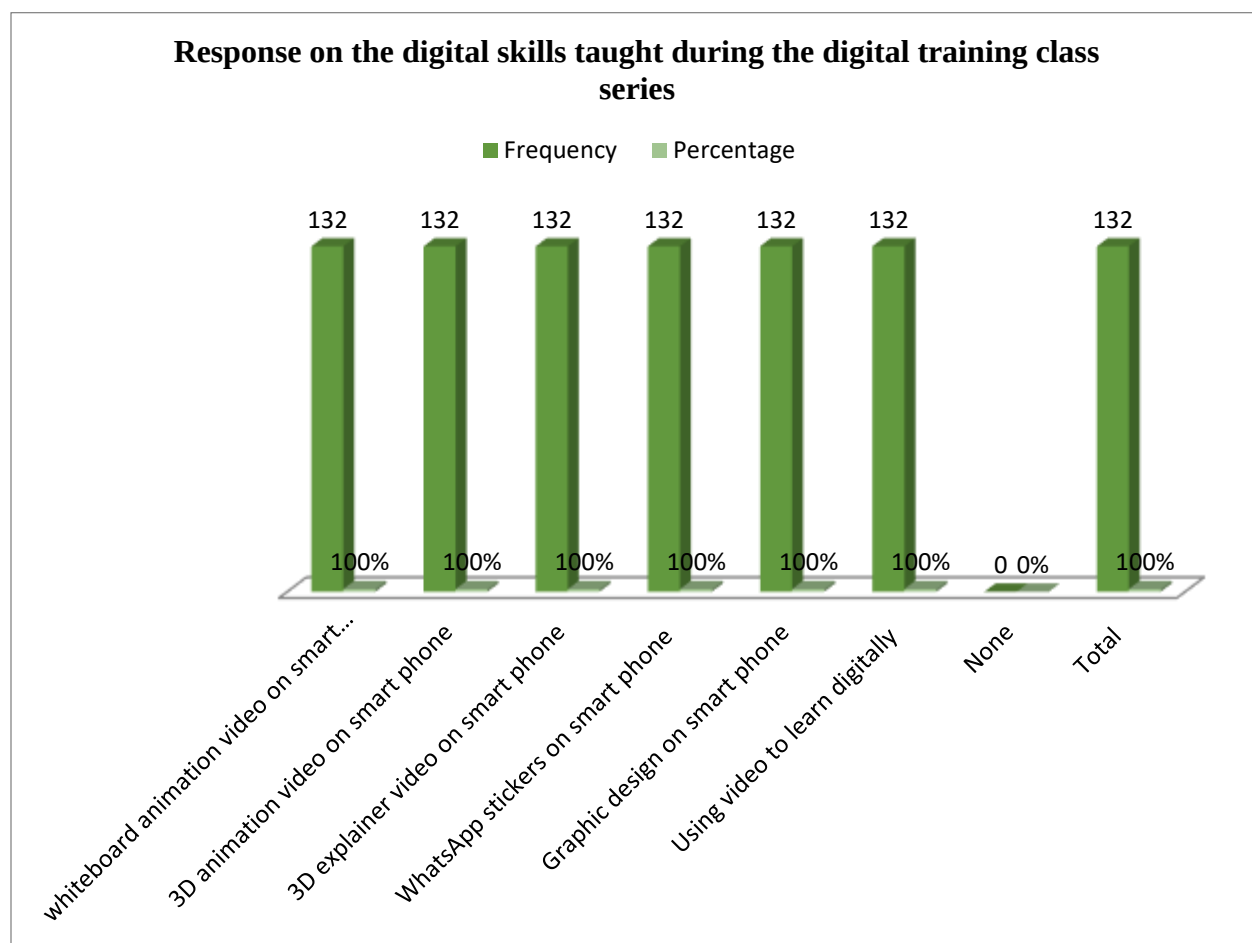
for creation of whatsapp stickers design. 5(3.8%) used video to learn animation, graphic or whatsapp stickers; while 105(79.5) had no knowledge at all.



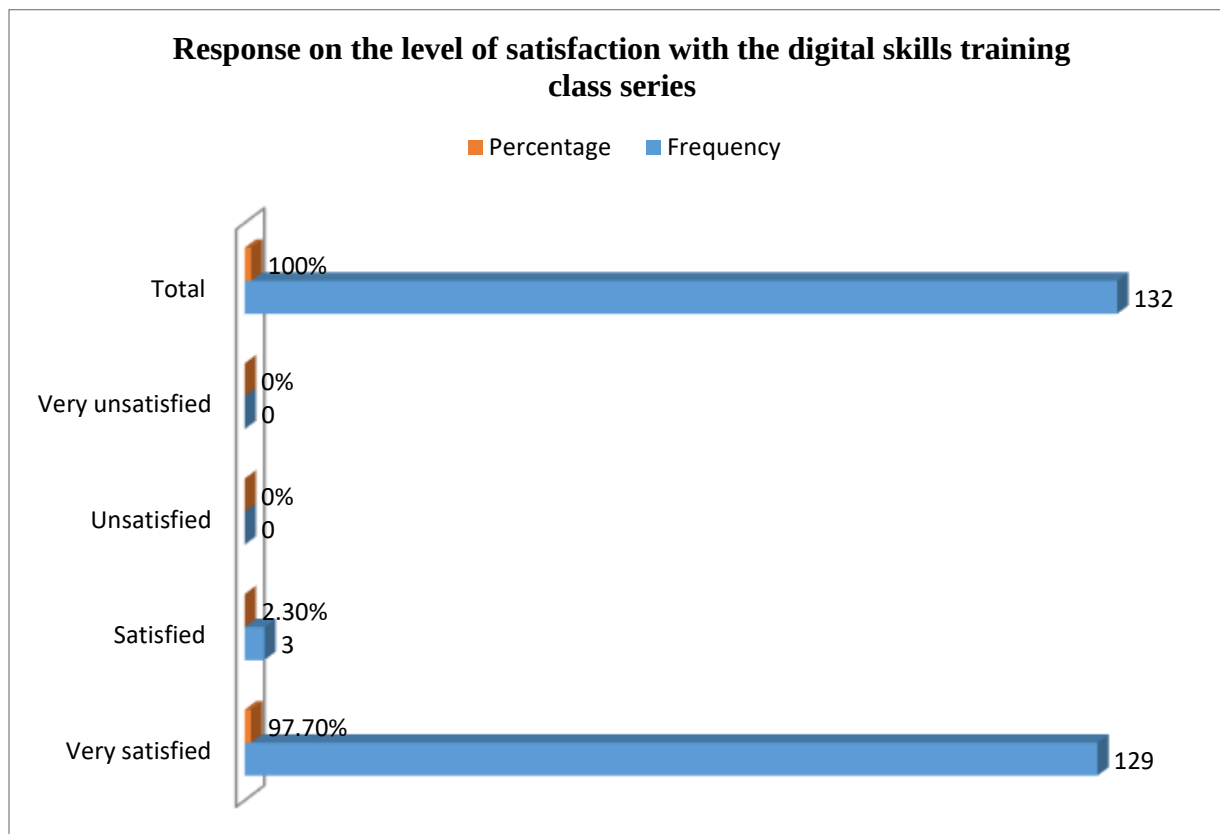
The table 4 shows the response on the use of digital tools for teaching and learning among the participants prior to the digital training class. From the table, out of 132 respondents, only 4(3%) of the participant have used Whiteboard on smart phone prior to the training. Also, only 2(1.5%) participants used 3D animation on smart phone. 1(0.8%) participant used 3D explainer video on smart phone. 5(3.8%) participants used Graphic designs on smart phone. 19(14.4%) participants used WhatsApp stickers on smart phone while 101(76.6%) had not used any.



The chart 5 above shows the knowledge in using smartphone to create whiteboard animation video, 3D animation video, 3D explainer video, simple graphic design and WhatsApp sticker designs after the digital skills training class. The results show that after the digital skills training class 122 (92.4%) of the participants can use smart phone to create whiteboard animation video. 119(90.2%) of the participants used smart phone to create 3D animation video. 124 (93.9%) participant created 3D explainer video on smart phone. Also, 112(84.8%) of the participants could create simple graphic design using smart phone while 120(90.9) participants were able to use smart phone to design stickers. In all, the participants were able to learn and acquire the skills as were taught.



From chart 6 above, all the participants of the digital skills training class during COVID 19 were taught such skills as creation of whiteboard animation video on smart phone, creation of 3D animation video on smart phone, creation of 3D explainer video on smart phone, creation of WhatsApp stickers on smart phone, creation of Graphic designs on smart phone, and using video to learn digitally.



From the chart 7 above, 129(97.7%) of the participants of digital skills training class during COVID 19 were very satisfied with the training, while 3(2.3%) were satisfied. None of the participant was unsatisfied or very unsatisfied.

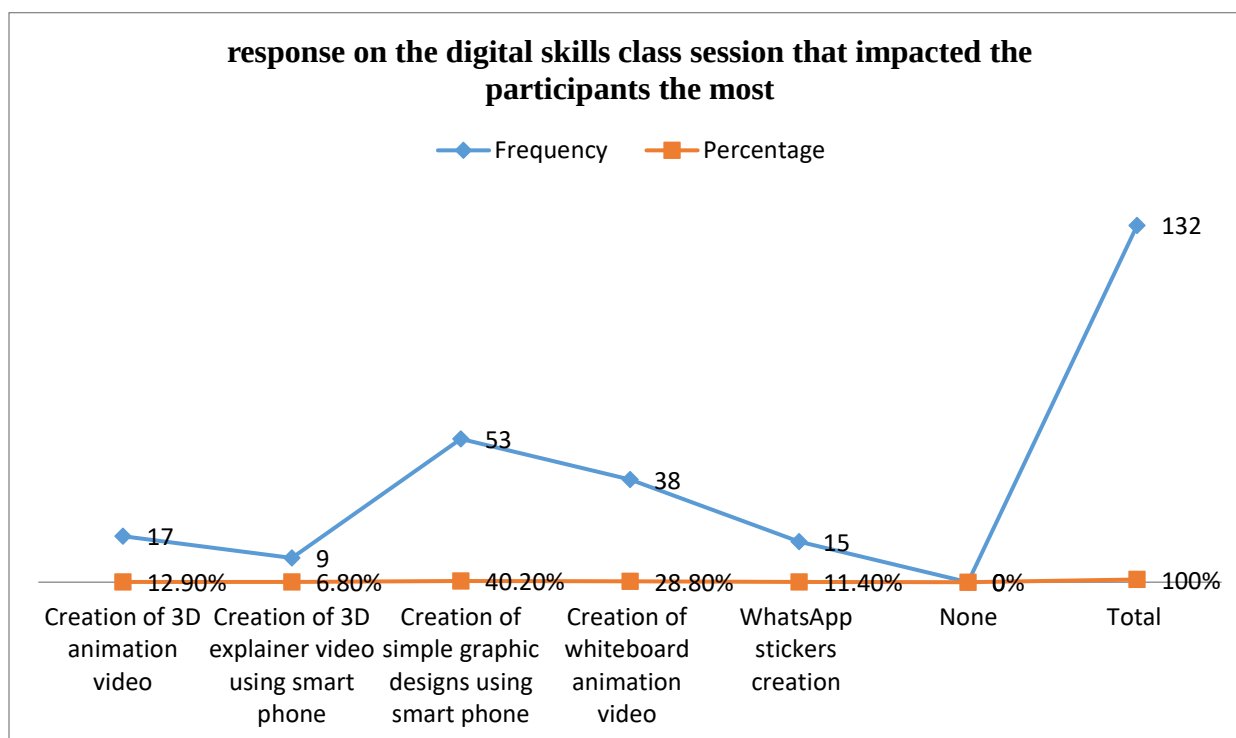
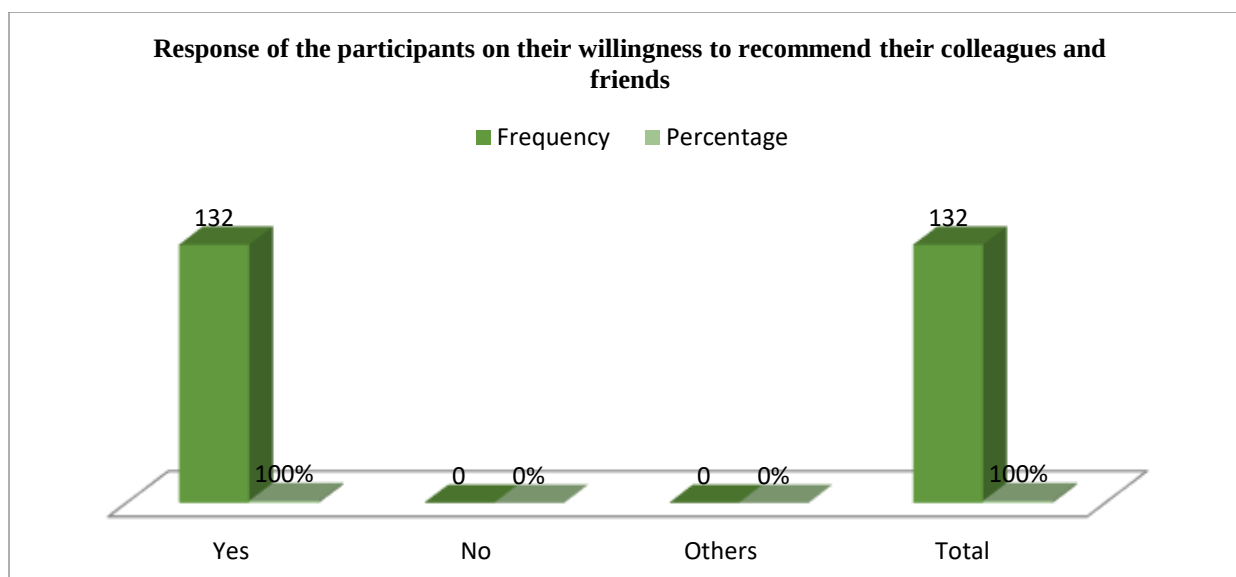
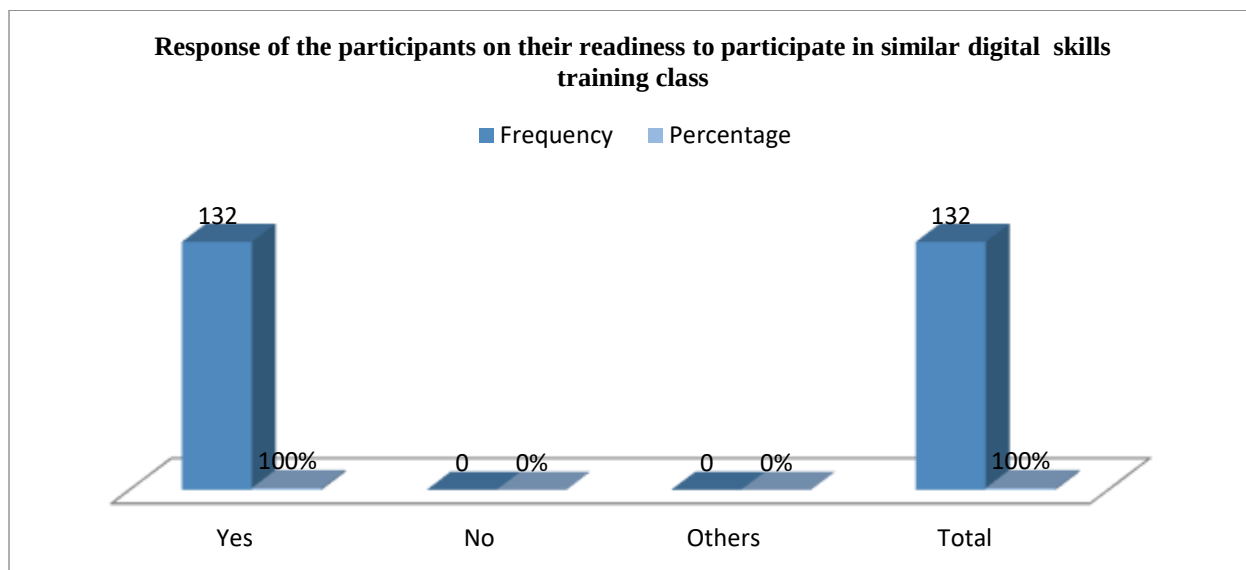


Chart 8 above shows the response on the digital skills training class session that impacted the participants the most. Based on the results, 17(12.9%) participants agreed that creation of 3D animation video impacted on them the most. 9(6.8%) agreed that, creation of 3D explainer video using smart phone impacted on them the most. 53(40.2%) accepted that creation of simple graphic designs using smart phone impacted on them the most; 38(28.8%) participants agreed that creation of whiteboard animation video impacted on them the most while 15(11.4%) participants agreed that WhatsApp stickers creation impacted on them the most. There were no participants that was not impacted on by the training.

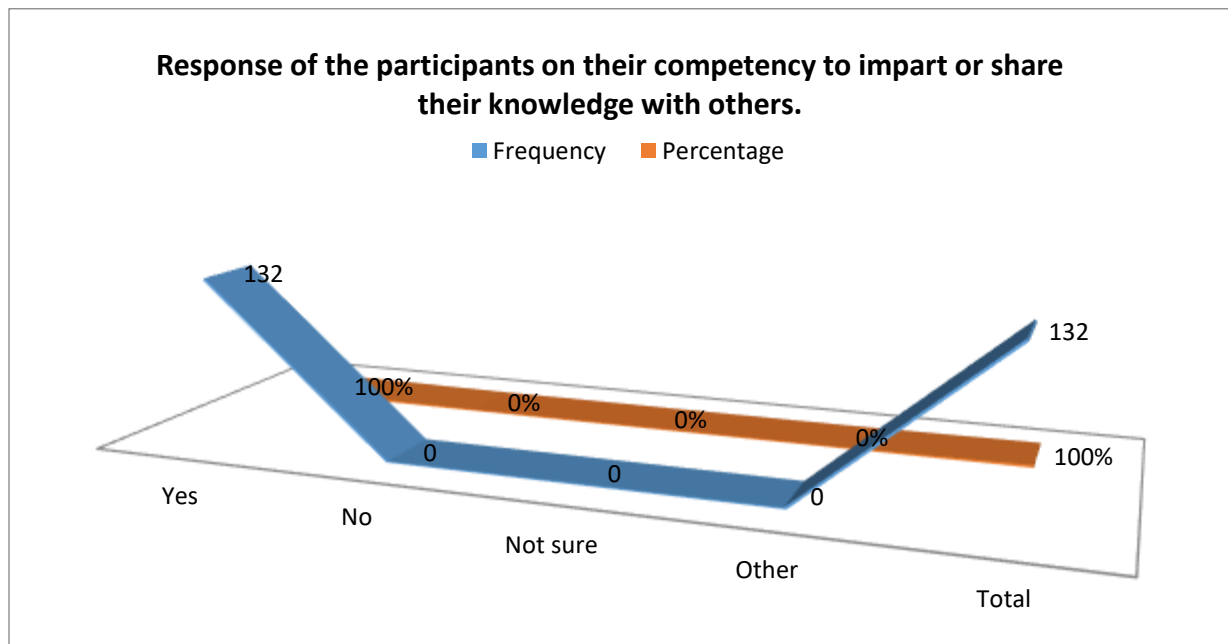




From the chart above all the participants agreed that they will recommend colleagues and friends to the digital skills training class series.



From the chart above all the participants are ready to participate again in similar digital skills training.



From the chart above all the participants have the confidence that they have acquired the knowledge required to impact on others.



Discussion of the findings

The findings revealed that the majority of the participants 105 (79.5%) which cut across lecturers, librarians, postgraduate students, undergraduate students, pastors, and school owners had no prior knowledge of using smartphones to create a whiteboard animation video, 3D animation video, 3D explainer video, simple graphic design and WhatsApp sticker designs. This lack of knowledge might be a consequence of a lack of previous digital training. This result is corroborated by the works of Iswahyudi, Rusijono, and Mariono (2023) which states that some educators are not sure how to use the whiteboard animation video for teaching. It also stated that the majority of SMK Negeri 1 Jeti students were unaware of how to use video-based whiteboard animation tools for teaching.

The second question the researcher asked (ascertain the use of whiteboard animation video, 3D animation video, 3D explainer video, simple graphic design and WhatsApp stickers for services among the participants before the digital skills training class during COVID-19 lockdown), due to the lack of prior knowledge among participants, most of them 101(76.5%) had not used whiteboard animation video, 3D animation video, 3D explainer video, simple graphic design and WhatsApp sticker designs for service delivery before. Hence, the result showed that out of 132 respondents, only 4(3%) of the participants had used the Whiteboard on the smartphone before the training. Also, only 2(1.5%) participants used 3D animation on smartphones. 1(0.8%) participant used 3D explainer video on smart phone. 5(3.8%) participants used Graphic designs on smartphones. 19(14.4%) participants used WhatsApp stickers on smart phone while 101(76.6%) had not used any. These findings are in line with the work of Kumar, Jayanthiladevi, Sathiamoorthy, and Praveen (2023) which stated that teachers and students are not sufficiently aware of the utilization of 3D animated clips. For the proper application of 3D animation in the educational process, a variety of sophisticated teaching resources are accessible. However, teachers and students are not as aware of the utilization of 3D animated video as they should be.

For the third question on the questionnaire (examine the knowledge of using a smartphone to create whiteboard animation video, 3D animation video, 3D explainer video, simple graphic design and WhatsApp sticker designs possessed by the participants after the digital skills) the findings revealed that after the digital skills training class which lasted for months during the COVID-19 lockdown most of the participants acquired the skills to effectively use smartphone to create whiteboard animation video, 3D animation video, 3D explainer video, simple graphic designs and WhatsApp sticker designs. The data collected through the survey after the training revealed that out of 132 participants who responded to the survey, 122(92.4%) acquired the skill to use a smartphone to create whiteboard animation videos. 119(90.2%) acquired the skill of using smartphone to create 3D animation video. 124 (93.9%) also acquired the skill to create 3D explainer videos using a smartphone. Another 112 (84.8%) could use a smartphone to create simple graphic designs, while about 120 (90.9%) acquired the skill to use a smartphone to create WhatsApp sticker designs. These testimonies show that the digital skills training class during the



COVID-19 lockdown was effective and practical-oriented. The results corroborate with the study of Hayat (2021) which states that before the intervention (the introduction of video animation), 8.3% of people could wash their hands with soap. Following the intervention, all 44 responders (73.3%) showed an improvement in their ability to wash their hands with soap. Therefore, following the use of video animation, a 65% boost in skill was noted.

With regards to question four (Find out the level of satisfaction of the digital skills training class among the participants during COVID-19 lockdown) when asked about their level of satisfaction, the majority of the participants 129(97.7%) responded to be very satisfied with the training, while 3(2.3%) were satisfied. This is not consistent with a study by Emblemsvåg (2021) on experiences from online teaching and learning during the Covid-19 pandemic and noted that students were not satisfied. For question five (ascertain the willingness of the participants to participate in similar digital skills online training), all the participants 132(100%) agreed to recommend their friends and colleagues for similar training. This implies that they found the training worth participating.

Conclusion

The study reported several months of digital skills training during the COVID-19 lockdown in Nigeria by Vangellinks International Limited. The study concluded among other things that the digital skill training was effective and practical oriented as most of the participants learnt the digital skills taught during the training. Based on the results of research conducted, most of the participants acquired the skills of using smartphone to create whiteboard animation video; 3D animation video; 3D explainer video; simple graphic design and WhatsApp sticker designs after months of training during the total lockdown in Nigeria. This was proven by the result of this study. Based on the result, participants had no prior knowledge of using smartphone to create the various forms of video, simple graphic design and WhatsApp sticker designs. It was observed that after the introduction of the digital skills during the COVID 19, all the participants were able to learn and acquire the skills as were taught. It indicated that after implementing the digital skills training, the participants were able to achieve better knowledge and skills, hence were impacted. The skills taught will be used for online marketing, teaching-learning process, especially in this era of the new normal, office administration and online evangelism, among others by the participants.

Recommendations

Based on the findings and the conclusions reached, the following recommendations were suggested:

1. That all the participants apply their skills of using smartphones to create whiteboard animation video, 3D animation video, 3D explainer video, simple graphic design and WhatsApp sticker designs for effective service delivery at their respective profession or career.
2. Also, since the training was effective and productive, lecturers can engage their students through same medium so as to bridge the gap between the students and learning created by the COVID-19 lockdown.



3. The government should support the organizers of the digital skill training with funds and other facilities so as to continue with the skills training even after the COVID-19 lockdown. This will help in the acquisition of 21st century skills among Nigerians.

References

- Allhumaid, K., Alnazzawi, N., Akour, I., Khasoneh, O., Alfaisal, R., & Salloum, S. (2022). An Integrated Models for the Usage and Acceptance of Stickers in WhatsApp through SEM-ANN Approach. *International Journal of Data and Network Science*, Vol 6 (4), 1261-1272. <https://doi.org/10.5267/j.ijdns.2022.6.008>
- Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. *Journal of Educational Technology Systems*, 49(1), 5-22.
- Drigas, A. S. & Angelidakis, P. (2017). Mobile Applications within Education: An Overview of Application Paradigms in Specific Categories. *International Journal of Interactive Mobile Technologies (iJIM)*, 11(4), 17-29. <https://doi.org/10.3991/ijim.v11i4.6589>
- Emblemsvåg, M. S. (2021). Experiences from online teaching and learning during the Covid-19 pandemic: implications for future digital education. *International Journal of Social Policy and Education*, 3(7), 22-37.
- Esdras, P., Omar, C., Daniel, B., Bernd, M., & Henrique, R. (2018). Exploring gamification To support manufacturing education on industry 4.0 as an enable for innovation and sustainability. *ProcediaManufacturing*, 21, 438-445.
- Harris, R., & Clayton, B. (2020). The value of vocational education and training. *International Journal of Training Research*, 18(3), 185–190. <https://doi.org/10.1080/14480220.2020.1860309>.
- Hasyim, H., Gusnawaty, G., & Said, I. M. (2024). Language variation of sticker usage among students on whatsapp. *Journal of Education, Social & Communication Studies*, 1(3), 121-126.
- Hayat, F. (2021). The effect of education using video animation on elementary school in hand washing skill. *Acitya: Journal of Teaching and Education*, 3(1), 44-53.
- Hoyek, N., Collet, C., Rienzo, F. D., Almeida, M. D., & Guillot, A. (2014). Effectiveness of Three-Dimensional Digital Animation in Teaching Human Anatomy in an Authentic Classroom Context. *Anatomical Sciences Education*, 7, 430–437.
- Igwel, J. N. B., & Nsirim, O (2020). Work-from-home directives and the adoption of blended learning by LIS educators in the wake of COVID-19 pandemic in Nigeria. *Communicate: Journal of Library and Information Science*, 22(2), 68-84.
- Iswahyudi, I., Rusijono, R., & Mariono, A. (2023). Utilization of Whiteboard Animation Application as Video-Based Learning Media. *al-fikrah: Jurnal Manajemen Pendidikan*, 11(2), 337-351.
- Kumar, B. S., Jayanthiladevi A., Sathiamoorthy R., Praveen, A. K. (2023). Effectiveness of 3D Animation in Education. *International Journal of Creative Research Thoughts (IJCRT)*, 11(4), 577 – 580. <https://ijcrt.org/papers/IJCRT2304083.pdf>



- Kumar, R., & Malik, A. (2022). Fostering Creativity and Innovation in Education through Digital Tools: A Comprehensive Review. *International Journal of Educational Research*, 113, 101-118.
- Mayer, R. E. (Ed.). (2005). *The Cambridge handbook of multimedia learning*. Cambridge university press.
- Nguyen, T., & Tran, H. (2021). Animation software for beginners: A review of mobile applications. *Technology Review Quarterly*, 8(3), 112-127.
- Nworgu, B.G. (2015). *Educational Research: Basic issues and methodology* (3rdEd.). Nsukka: University Trust Publishers.
- Olufunmilola, O. O., Oladimeji O. F., and Ayuba S. D. (2016). Individual and Technological Factors Affecting Undergraduates' Uses of Mobile Technology in Univesity of Ilorin. In: *Digital Education Review*, 29, 124-133. <http://greav.ub.edu/der>
- Prinz, A., Bolz, M., & Findl, O (2005). Advantage of three-dimensional animated teaching over traditional surgical videos for teaching ophthalmic surgery: a randomized study. *British Journal of Ophthalmology*, 89,1495–1499. DOI: 10.1136/bjo.2005.075077
- Rahmatabadi, D., Tayyebi, M., Hashemi, R., & Faraji, G. (2018). Microstructure and mechanical properties of Al/Cu/Mg laminated composite sheets produced by the ARB proces. *International Journal of Minerals, Metallurgy, and Materials*, 25(5), 564–572. <https://doi.org/10.1007/s12613-018-1603-x>
- Readhead, B., Haure-Mirande, J.-V., Funk, C. C., Richards, M. A., Shannon, P., Haroutunian, V., Sano, M., Liang, W. S., Beckmann, N. D., Price, N. D., Reiman, E. M., Schadt, E. E., Ehrlich, M. E., Gandy, S., & Dudley, J. T. (2018). Multiscale Analysis of Independent Alzheimer's Cohorts Finds Disruption of Molecular, Genetic, and Clinical Networks by Human Herpesvirus. *Neuron*, 99(1), 64-82.e7. <https://doi.org/10.1016/j.neuron.2018.05.023>
- Rune, P. (2024). *Graphic Design*. Institute for Infology, © Sweden, Tullinge, ISBN 978-91-85334-29-4
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a selfdetermination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Sadia, H., & Hussain, M. S. (2023). Use of Emojis and Stickers for Online Interaction Facilitation: A Gender-Based Semiotic Discourse Analysis. *Global Digital & Print Media Review*, VI(II), 109-128. [https://doi.org/10.31703/gdpmr.2023\(VI-II\).09](https://doi.org/10.31703/gdpmr.2023(VI-II).09)
- Singh, A. (2021). The Impact of Smartphones on User-Generated Content Creation: A Study of Instagram, YouTube, and TikTok. *Journal of Digital Media Studies*, 14(3), 215-230.
- Smith, E., McRae, K., Semple, G. (2021). Enhancing Vocational Training in the Post-COVID Era through Mobile Mixed Reality. *Sustainability*, 13(11), 6144. <https://doi.org/10.3390/su13116144>
- Videoscribe (2020). *Whiteboard animation*. Retrieved from <https://www.videoscribe.co/en/whiteboard-animationon> 02/12/2020.



Zervas, I., & Stiakakis, E. (2024). Digital skills in vocational education and training: Investigating the impact of Erasmus, digital tools, and educational platforms. *Journal of Infrastructure, Policy and Development*, 8(8), 8415.