Investigating The Introduction of Interactive Tablets In the Zambian Classroom By Understanding The Challenges Faced in Orchestration of Teaching and Learning

By

Hazel Bowa (2018164333)
Prudence Mwendaluta (2018211226)
Towela Kalikeka (2018169092)
Rector Njobvu (2018217216)

Supervisor:

Dr. Lighton Phiri

A report submitted to the Department of Library and Information Science, The University of Zambia, in partial fulfilment of the requirements of the degree of Bachelor of Information and Communication Technologies with Education

The University of Zambia

Lusaka

2022

Abstract

Classroom Orchestration are the activities that are carried out in the classroom, they consist of classroom management activities like monitoring of the pupils, distribution of work, taking of attendance and many other activities. Therefore this report focused on two main areas; Understanding Classroom Orchestration and the challenges faced. Challenges are known to be faced in situations where many individuals are involved and each is unique to the environment. However, similarities do tend to exist in environments that have common constraints. The challenges we aim to identify are unique to the zambian primary school classroom. After identifying the challenges we then aim to introduce an interactive tablet to mitigate these challenges. This study used an online questionnaire that was shared via different social platforms and targeted towards primary school teachers . Purposive sampling was used to select the sample of this study. The study used a quantitative method approach, data was analysed using SPSS software. The results indicated that among the challenges faced by teachers in the classroom during orchestration, was classroom monitoring with 31% as the highest frequency. This shows that many teachers have challenges in monitoring a classroom. Followed by catering for each pupils' learning needs, marking assessments and distributing homework questions represented by 25% and administering classroom activities represented by 21.1% of teachers who find it very challenging. According to the respondents these are challenging activities during orchestration of teaching in the classroom. The results indicated that out of the challenges identified, two of them could be mitigated with the tablet through taking attendance . A sample size of 30 University of Zambia Students were asked to simulated taking attendance using two methods then had to fill in a questionnaire. The responses were then analysed using excel spreadsheet and an average of the total responses was arrived at as well as the time they took to perform each activity. Settling on this activity does not mean that it can be the only way to face the challenges identified but instead act as a starting point to combat all the challenges.

Keywords: Interactive tablets, Classroom Orchestration, Zambian Classroom.

Acknowledgements

We would like to express our sincere gratitude to everyone who gave us the opportunity to complete this report. Participants' contributions during the study helped coordinate the project, especially in writing this report, by providing responses..

Additionally, Dr Lighton Phiri for his guidance, comments and advice during the course of this research study.

Table of Contents

List of Figures

List of Tables

Acronyms:

ICTs- Information and Communication Technologies

GLUEPS-AR- A system for the Orchestration of Learning situations across spaces using Augmented Reality.

ULEs- Upper Lower Extremities

SDGs- Sustainable Development Goals

TAM- Technology Acceptance Model

1. Introduction

As we progress as a society, so does our need to improve our education system. Many studies have taken place to understand how learning takes place and what exactly facilitates learning. These studies range from determining whether learning takes place better in a teacher centred classroom, or perhaps a classroom setup that is centred on the pupil. Despite there being many views of how learning best takes place, the end goal of these studies is to find a way of bettering the teaching and learning experience. As technology advances it is also being introduced in the classroom setup. In the beginning it was added as a subject on its own to give the pupil a chance of understanding how computers work and how to operate them, this was seen as a way of preparing them for the future of technology. However as we progress, technology can be used as a way of bettering the teaching and learning experience. Unfortunately, it is not as straightforward as it would seem because a way of effectively introducing technology into the everyday classroom setup has to be established.

Introducing technology to the classroom can be done by understanding Orchestration of teaching and learning. The term Orchestration of learning has been coined to further understand classroom dynamics of learning[8] referred to as the coordination of activities performed while applying learning technologies to an authentic setting. With the understanding of Orchestration of learning, the goal is to better the learning experience for the learners and make sure they get the most of their pursuit for knowledge. It does not only focus on the learners but also makes the teaching experience for the teacher better. As Orchestration of learning is further understood, technology can become a major part in the everyday activities of the classroom.

1.1 Background

By investigating an effective way of introducing interactive tablets in the Zambian classroom, the teaching and learning process is made more effective. However, before we introduce the tablets in the classroom we first need to see where they are needed and this can be done by understanding Orchestration of learning and teaching, once adequate investigations have

taken place and it has been determined how best the tablets fit into the classroom, they then can be implemented.

1.2 Problem Statement

Understanding classroom Orchestration of a Zambian class starts by firstly understanding the challenges that are faced. Once the challenges have been identified, can interactive tablets then come in to help mitigate these challenges.

1.3 Objectives

1.3.1 Main Objectives

To Identify the challenges faced in the Classroom Orchestration of the Zambian environment.

1.3.2 Specific Objectives

1. To identify challenges associated with Orchestration of teaching and learning.
2. To investigate how interactive tablets can aid in the challenges faced in class Orchestration

.

1.3.3 Research Questions

1. What are the challenges faced with classroom orchestration?
2. How can interactive tablets aid in classroom orchestration?

1.4 Significance of Study

The importance of carrying out this study is identifying the challenges that are faced in the classroom. Through the challenges identified we aim to determine the use of interactive tablets in the classroom, that will help teachers with many classroom management activities performed by and ultimately make them more efficient.

2. Related Work

2.1. Investigating the Usefulness of Interactive Tablets in Facilitating Teaching and Learning Activities: The case of Mwabu Tablet

Kuyela[11] conducted research investigating the usefulness of Mwabu interactive tablet in facilitating teaching and learning activities in selected private primary schools in Zambia. The survey was conducted in eight private primary schools in Lusaka District. According to his findings with iSchool Zambia, there were 21 primary schools in Lusaka District, which used these Mwabu tablets for teaching and learning purposes. Of the 21 schools using Mwabu interactive tablets in the Lusaka District, a study focused on schools with two classes in grade 7,6 and 5 found that 8 schools had one class in these grades. It turns out that the schools were eight which had one stream of those grades. The target population consisted of teachers who were familiar with the Mwabu tablet. Results were presented in line with three objectives of the study, with the majority of teachers, 23 (40%) and 49(44%) students agreeing that the Mwabu interactive tablet was helpful in their teaching and learning activities, indicating that they can use it. Also 35(31.5%) frequently used the interactive tablet for story telling, 38(34.2%)frequently used it for games, 34(30.6%) frequently used it for maths, 32 people (28.8%) indicated that they were using it. The Mwabu interactive is frequently used for spelling, 47(42.3%) frequently use it for tests and quizzes, and 34(30.6%) use the Mwabu tablet very frequently for homework.

He further urged researchers to use surveys, interviews, focus groups and other techniques to conduct further research that can assess the benefits and challenges of integrating interactive Mwabu tablets into public school teaching and learning processes.

2.2 Shared Orchestration Within and Beyond the Classroom

Sharples [12] adopted the nQuire which was an approach of sharing responsibility between the teacher, the students and the technology. In this form of orchestration, the teacher and all the students have similar computer toolkits designed to guide the students through a productive learning activity- the nQuire is an inquiry learning cycle, by the means of an

activity guide rather than a dynamic lesson plan. Normally the teacher will select a prepared activity guide and this can be modified in advance or on the fly by either the teacher or the students. In the nQuire the entire class or collaboration groups can alter inquiry questions, decide on the method of investigation, select measures, change the visualisation. The activity guide is not a 'learning environment' with a few parameters to tune, but a guide to conducting open scenarios: recording findings, engaging in debate, creating shared outcomes. Students start the activity in the classroom, guided by the teacher and then continue it beyond the 50 min lesson, as homework or an outdoor activity. The responsibility for orchestrating their learning and enacting the activities lies with the students. Back in the classroom, the students share their findings in small groups and then present their conclusions to the class.

The advantage of this orchestration approach is that the orchestration technology does not try to do this. It does not mediate between students and teachers, but acts as a personal guide for each student and teacher. Activity guides run on the web browsers, so individuals do not have to run a scenario. Students and teachers can use their favourite tools available and conveniently.

This study had challenges in that all teachers and students needed to be familiar with working with orchestration technology. However, it was found that students could cope with this little difficulty. Teachers need to know that students are still in control of their learning, beyond the classroom but also to any homework. It was also found out that this type of coordination instruction imposes additional demands on the teacher. If student groups are given the responsibility of synthesising and presenting their results. Teachers also need to concentrate on supporting difficult people with peace of mind

2.3 The Role of Design and Enactment Patterns in Orchestration: Helping to Integrate Technology in Blended Classroom Ecosystems

Dimitriadis, et al[13] the use of ICTs does not guarantee effective learning and teaching in the classroom until proper orchestration of technologies is performed. He conducted research on five primary school classrooms where a new collaborative software was alongside existing classroom technologies. This was conducted in a duration of six months. During the study, teachers conducted classroom activities in technologically enhanced environments. The study

helped in revealing limited elements of content delivery when it came to orchestrating learning. The relationship with the current study is that both studies are concerned with the integration of ICTs for effective learning and teaching in a real time classroom environment.

Limitations to the study were that the phrase "Design for Classroom Orchestration" implied that the orchestration itself does not include design even if the instructional designers were in an open classroom. Design and lesson planning were linked to this process. There was a need for a deeper analysis of the complementary roles of design and real- time management throughout the entire learning activity lifecycle, therefore,greater focus would have been placed on the function of design even though the term orchestration is used in a more narrow meaning.

2.4 Supporting Teacher Orchestration in Ubiquitous Learning Environments

This study presents the evaluation of the orchestration support provided by GLUEPS-AR, a system aimed to help teachers in the coordination of across-space learning situations carried out in ULEs. The evaluation, following an interpretive research perspective, relied on a study where a pre- service teacher designed and enacted an authentic across- spaces learning situations carried out in ULEs. The evaluation following an interpretative research perspective, relied on a study where a pre-service teacher designed and enacted an authentic across-spaces learning situation in a primary school. The situation which illustrates the orchestration challenges of ULEs, was aimed at fostering orienteering skills. It spanned five sessions taking place in the classroom, in the school's playground and at a nearby park, using multiple technologies and devices. The evaluation showed that GLUES-AR helped the teacher in multiple aspects of orchestration, including implementation of his pedagogical ideas, adaptation of runtime, and sharing of orchestration load with students. Teacher awareness during outdoor activities was the main aspect to improve on. It is related to the current study in such a way that it tackles some of the challenges associated with orchestration of learning[7].

The pre-service teacher found it difficult to conceptualise the design of the situation in a ULE due to the new opportunities provided by GLUEPS-AR in across-space scenarios. It was also

observed that ULEs may be particularly vulnerable to unforeseen circumstances and technological breakdowns.

2.5 Teacher Experiences of integrating Tablets in One-to-One Environments: Implications of Orchestrating Learning

The study examined how teachers felt about using tablets in the one-to-one classroom and how they behaved when doing so. Thirty- seven instructors from seven Korean rural public schools participated in seven focus groups interviews. Semi-structured interviews were mostly used to gather data, and were evaluated in content analysis. The study context was an ongoing initiative to transform traditional classrooms in rural schools into tablet based classrooms that offer one-to-one computing settings by fusing educational technology [6].

These findings to this study had certain restrictions. This investigation only focused on teachers' and students' impressions of how well tablets work in the classroom , which may not be related to the teaching style and how students learn while using tablets and relevant technology in education. additionally , as instructors pedagogical expertise and skills may have a greater impact than other factors on students' experiences with tablet integration on students in one- to -one environments, we may examine the relationships among teachers' pedagogical competence, students experiences and their integration of tablets and relevant technologies in the future.

2.6 Using Tablet on Education

This study offered a literature review of what was available and investigated the openings and subjects in regard to utilising tablets in education. The application of the tablets in the education sector is not restricted only to disburse them amid students to be appropriate independently. The use of tablets alters the style of your multimedia presentation, interprets slides while discussing and also document presentations. Tablets permit drawing, interpreting and documenting using a variety of colours of ink by the infinite number of pages. Researchers have always explained how the application of tablets suits well with learner's diverse learning styles that motivate them to use more time discovering their learning abilities. The importance of using tablets in schools was to bring about new

possibilities in the teaching as well as the learning environments, this was intended to help the learners to gain knowledge by assisting the learners to be able to make informed decisions so as to make accurate choices. [16].

2.7 Use of Tablet Computers to Improve Access on Education in a Remote Location

This study was carried out in using mobile learning to increase access to education. The project is contributing to the achievement of Goal 4 of the Sustainable Development Goals (SDGs), which is to "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all''. This project was implemented in a pakistan school among the three grades with a total of 74 Grade 8,9 and 10 students involved in the project. A positive impact on the students was reviewed. The teacher acknowledged that students were taking more interest in the classroom learning and concentrated on their tablets during studies. The study involved testing the students before and after being supplied with content on their tablets. The results showed that the post-test were higher than the pre-test scores, indicating that the use of the tablets in schools improved the performance of the students. As technology emerges wearable devices and 3D glasses, there will be opportunities for using augmented and virtual reality so that students in remote locations and refugee camps can get real life experience in different contexts through virtual worlds[18].

2.8 Tablet use in schools: a critical review of evidence for learning outcomes

In this research, the general increase in popularity of tablets led to uptake in education. They hypothesised how tablets can viably support learners in completing a variety of learning tasks, the fragmented nature of the current knowledge base and the scarcity of rigorous studies, make it difficult to draw firm conclusions. The generalisability of evidence is limited and detailed explanations as to how, or why, using tablets within certain activities can improve learning remain elusive. They aimed at determining when and how using tablets might impact on the learning outcomes. The researchers investigated what it was about tablets that support students to learn should seek to establish ways in which technology can be used more effectively than other devices so as to promote learning. Its significance was to bring a positive learning outcome with the use of technology. [17].

2.9 Summary

Putting into consideration Dillenbourg's broader set of constraints assessment must be part of orchestration. Imaginative forms of assessing collaborative and constructive activities need to be built, such as peer and group assessment, formalising these as design patterns for classroom management[4].

Dillenbourg [4]uses the term 'orchestration' inclusively, and mentions some of these interpretations , making a more narrow interpretation of the initial use of the orchestration term as "real -time management of multiple activities and multiple constraints" in a physical classroom. Besides that, Dillenbourg also proposes a new representation or model based on a learning kernel surrounded by rings of events subject to several types of constraints.

Shaples argues that designing of orchestration will not reduce time and that there is no evidence that adding the orchestration layer will save classroom time. Instead, he proposed looking for ways of increasing the time on task by expanding the learning beyond the 50 minute lesson [14]. However, increasing the time on task means more resources and this can affect other priorities. Unless such situations are taken into account as early as possible to avoid the delaying of other priorities on the concerned educational space.

According to Prieto[15], the use of ICTs in learning does not guarantee effective learning and teaching in classrooms until proper orchestration of technologies is performed. The study he conducted helped in revealing limited elements of content delivery when it came to orchestrating learning.

3. Methodology

3.1. Introduction

Chapter three of this study area focuses on the theoretical analysis of the body of methods and principles associated with the branch of knowledge. It will present the research design, target population, sampling technique, procedure, instrument for data collection, data analysis, ethical considerations.

3.2 Research Design

This study employed a qualitative research approach. Qualitative research can be defined as the study of the nature of phenomena and is especially appropriate for answering questions of

why something is (not) observed, assessing complex multicomponent interventions, and focussing on intervention improvement [3].

3.3 Identifying Challenges of Classroom Orchestration

3.3.1 Targeted population

The targeted population is defined as all the individuals' a researcher is interested in to carry out a study and who have specific characteristics in common [6]. Population in this study is the entire group that you want to draw conclusions about. The targeted population of this study were primary teachers from different schools across the country. They were targeted because of their experience in the field of teaching hence, they can help us understand challenges which are associated with orchestration of teaching in a classroom setting**.**

3.3.2 Sampling technique

The sampling technique that was used for this survey study was purposive sampling. The sample consisted of primary teachers only.

3.3.3 Procedure

An online Questionnaire was created using the google forms platform, an online questionnaire was chosen as an instrument for this research because they are a reliable and quick method of collecting information from as many respondents as possible in an efficient and timely manner. Furthermore, this instrument was chosen due to the constraints such as time and resources. It was distributed via different social media platforms such as email, whatsApp groups and teachers groups on facebook.The questionnaire consisted of 3 sections. Section A is about the demographic details of the respondents consisting of 10 items that includes gender, age group, academic qualification, teaching experience, type of school, school area, location province, pupils grade level, pupils age group and number of pupils in the classroom. The other 2 sections in the questionnaire focus more into classroom and teacher's challenges during this orchestration. Classroom activities were identified and the respondents were to rate how challenging they found them based on a 5-Likert scale ranging from 5= Very Challenging, 4= Most Challenging, 3= Neutral, 2= Not Challenging, 1= Manageable.

3.3.4 Data Analysis

3.3.4.1 Statistical Analysis

Analysis of data is a process of inspecting, cleaning, transforming, and modelling data with the goal of highlighting useful information, suggesting conclusions, and supporting decision making [2]. It is also defined as a process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data. Even when trying to analyse data there are a number of issues that researchers should be aware of with respect to data analysis, to keep mention of a few included are the following; determining statistical significance, lack of clearly defined and objective outcome measurements, providing honest and accurate analysis, manner of presenting data, data recording method etc. In this research study, the software called Statistical Package Social Science (SPSS version 21) was used to present and interpret data using frequency distribution tables, percentages, pie charts, and bar charts. This method has incredible capabilities and flexibility of analysing data within seconds and generating an unlimited range of simple and sophisticated statistical results.

Analysing data using this method involved categorising the different responses from the participants according to the themes; furthermore, comparisons were made, evaluating the similarities, differences and constants in the answers given in order to see different challenges associated with orchestration of teaching in the classroom environment from each teacher. This technique was devised for data analysis in this research because it involved various participants.

3.3.4.2 Online Questionnaire

3.3.4.2.1 Demographic Details of the participants

Table 1. Demographic Details of Respondents

Factors	Frequency	Percentage (%)
Gender		
Female	12	63.15
Male	8	42.10

Age Group		
20 - 24 Years	6	31.57
25 - 30 Years	3	15.78
30 Years and above	11	57.89
Academic Qualifications		
Certificate	1	5.26
Diploma	9	47.36
Degree	8	42.10
Masters' Degree	2	10.52
PhD	0	0
Teaching Experience		
Less than 1 Year	1	5.26
3 - 5 Years	8	42.10
5 - 7 Years	2	10.52
7 - 9 Years	1	5.26
10 Years and above	7	36.84
Type of School		
Government	11	57.89
Private	5	26.31
Community	2	10.52
Missionary	1	5.26
Trust	0	0
School Area		
Urban	13	68.52
Rural	7	36.84
Province		
Central	2	10.52
Copperbelt	2	10.52
Eastern	2	10.52

Luapula	0	0
Lusaka	9	47.36
Muchinga	1	5.26
Northern	1	5.26
North Western	1	5.26
Southern	2	10.52
Western	0	0
Pupils Grade Level		
Grade 1	1	5.26
Grade 2	1	5.26
Grade 3	5	26.31
Grade 4	1	5.26
Grade 5	3	15.78
Grade 6	3	15.78
Grade 7	6	31.57
Pupils Age Group		
4 - 7 Years	1	5.26
8 - 10 Years	7	36.84
11 - 12 Years	8	42.10
13 Years and above	4	21.05
Number of Pupils in Classroom		
Less than 20 Pupils	3	15.78
20 - 30 Pupils	4	21.05
31 - 40 Pupils	4	21.05
41 - 50 Pupils	2	10.52
Above 50 Pupils	7	36.84

Table 1 gives a summary of the findings. From the overall population (n=20) based on gender, there are 12 female respondents with a percentage of 63.15% as compared to only 8 male respondents with a percentage of 42.10%. From the overall population based on the age group, the highest frequency is 11 which indicates the percentage of 57.89% of the respondents who are 30 years old and above, followed by 24 - 30 years with 6 (31.57%), then 3 respondents who are 25 - 30 years with 15.78%. From the overall population based on the academic qualifications, most of the respondents are diploma holders with 9 (47.36%), followed by those who are degree holders 8 (42.10%), then 2 (10.52%) are Master's degree holders 2 (10.52%) and only 1 (5.26%) of respondents are certificate holders, none of the respondents have a PhD in the field of teaching. From the overall population based on the teaching experience in years, teachers have different working experiences, with the majority 8 (42.10%) having 3-5 years of experience, followed by 7 (36.84%) who have 10 years and above of teaching experience, the other share 2 (10.52%) have 5-7 years of teaching experience and the least 1 (5.26%) was 7-9 years and 1 (5.26%) have less than 1 year of teaching experience.

In addition, From the overall population based on the type of the school, the majority of the respondents 11 (57.89%) are classified to be from government owned schools, followed by 5 (26.31%) who are from private owned schools, then 2 (10.52%) are from the community based schools and 1 (5.26%) from the missionary schools, non respondents are from any trust school. Findings on the population based on school areas indicates that, the highest share 13 (68.52%) of the respondents are from the urban areas and those who are from the rural areas had only a portion of 7 (36.84%). Findings from the overall based population indicates that the majority 9 (47.36%) are based on Lusaka province, followed by Central, Copperbelt, Eastern and Southern provinces who shared an equal portion of 2 (10.52%) of the respondents respectively. Muchinga, Northern, North Western province had 1 (5.26%) of the respondents respectively and none of the participants are from Luapula or Western province.

Furthermore, From the overall population based on the pupils grade levels, the majority 6 (31.57%) of the respondents are grade 7 teachers, the second highest shared portion 5 (26.31%) of the respondents are grade 3 teachers, grades 5 and 6 teachers among the respondents are 3 (15.78%) respectively, followed by grades 1, 2 and 4 teachers among the

respondents who are 1 (5.26%) respectively. Findings from the overall population based on the pupils' age group, the highest frequency 8 (42.10%) in table 1 summarises that the majority of pupils are at a range of 11-12 years old. The second highest frequency 7 (36.84%) of the pupils as presented in table 1, are at a range of 8-10 years old, followed by 4 (21.05%) of the pupils who are 13 years and above and the least pupils age group is 1 (5.26%) with a range of 4-7 years old. The final findings on the demographic details of the respondents from the overall population was the numbers of pupils in the classroom. The findings show that the majority 7 (36.84%) of the classrooms have more than 50 pupils, followed by 20-30 and 31-40 pupils classrooms with 4 (21.05%) respectively. There are 3 (15.78%) of classrooms with less than 20 pupils, then 2 (10.52%) of the classrooms have 41-50 pupils.

4.1.2 Classroom Activities And Technology

4.1.3 Taking Classroom Attendance

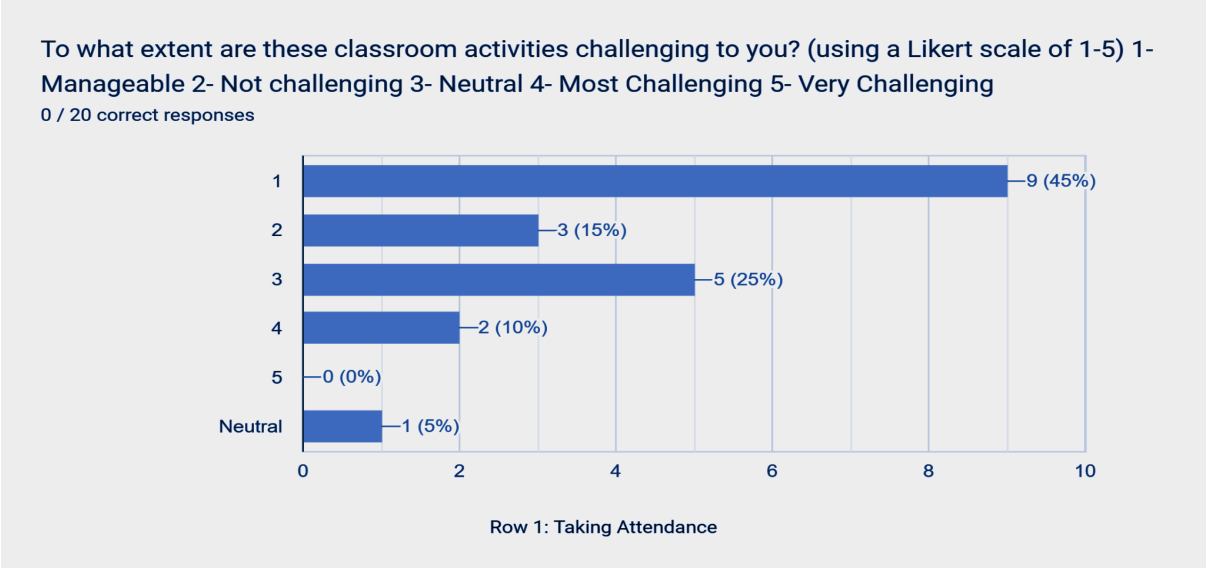


Figure 1: **Taking Attendance**

Respondents were asked to indicate the challenging extent to which classroom attendance was for them. The findings from Figure 1 above, on the population based on taking classroom attendance indicates that 9 respondents representing (45%) find it manageable, 6 respondents

representing (30%) find it neutral, 3 representing (15%) find it not challenging, 2 respondents representing (10%) find it most challenging and none of the respondents find it very challenging.

4.1.4 Creating a Lesson Plan Each Week

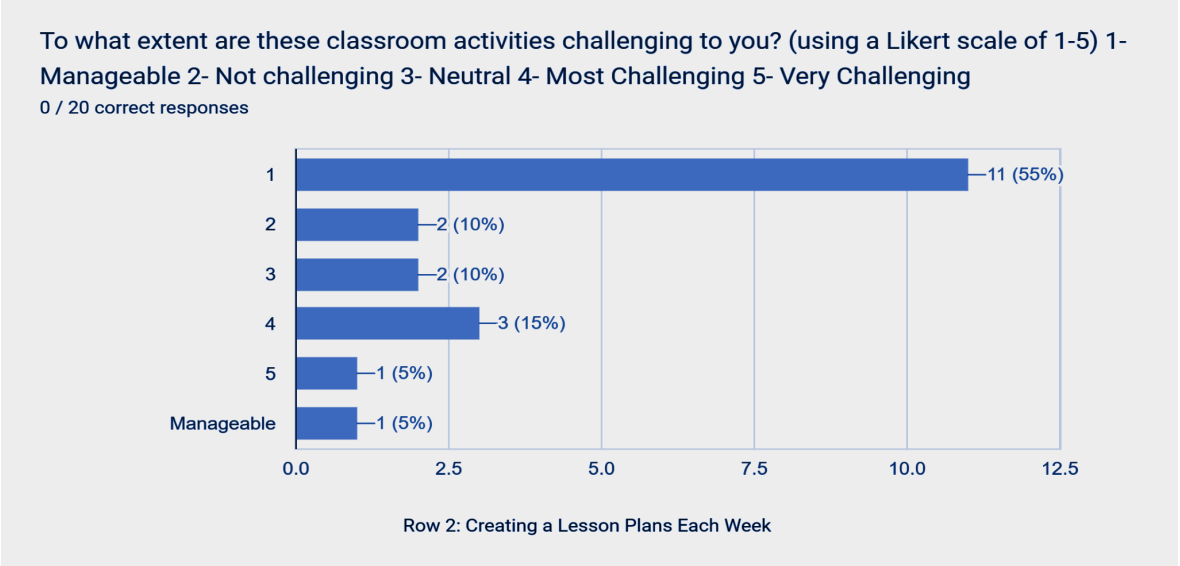


Figure 2: **Creating a Lesson Plan**

Findings as indicated in Figure 2, from the overall population (n=20) 12 of the respondents representing (60%) find creating a lesson plan manageable, 3 of the respondents representing (15%) find it most challenging, 2 of the respondents representing (10%) find it not challenging, 2 of the respondents representing (10%) find it neutral, 1 respondents representing (5%) find it very challenging.

4.1.5 Time Management

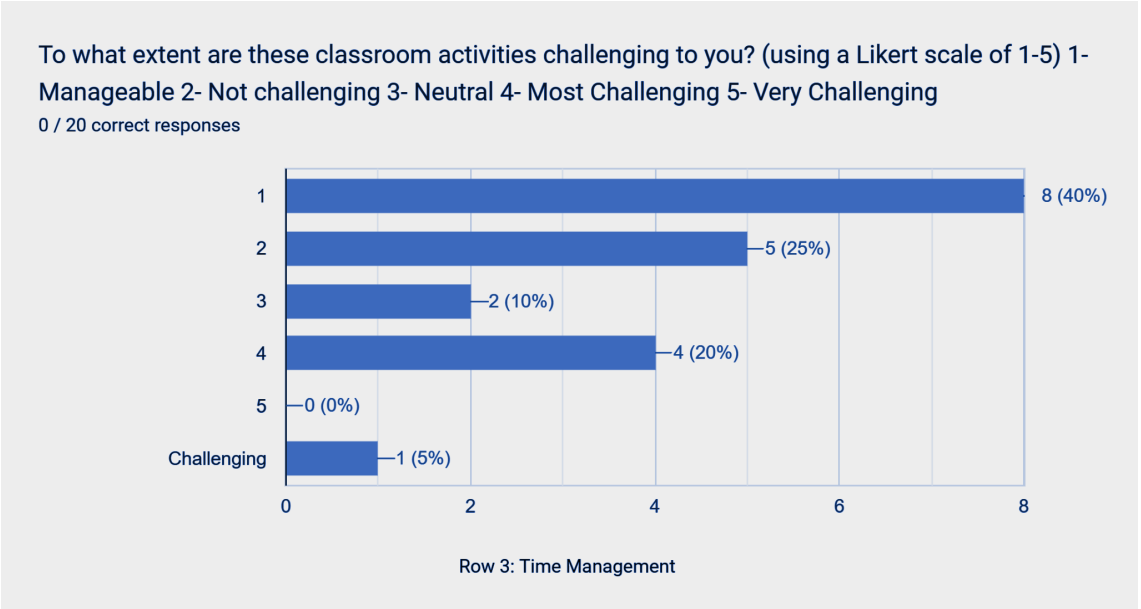


Figure 3: **Time Management**

The findings in Figure 3 shows that, from the overall population (n=20) 8 of the respondents representing (40%) find time management in classroom manageable, 5 respondents representing (25%) find it not challenging, 4 of the respondents representing (20%) find it most challenging, 2 of the respondents representing (10%) find it not challenging, 1 of the respondents representing (5%) find it challenging, none of the respondents find time management very challenging.

4.1.6 Catering For Each Pupils Needs

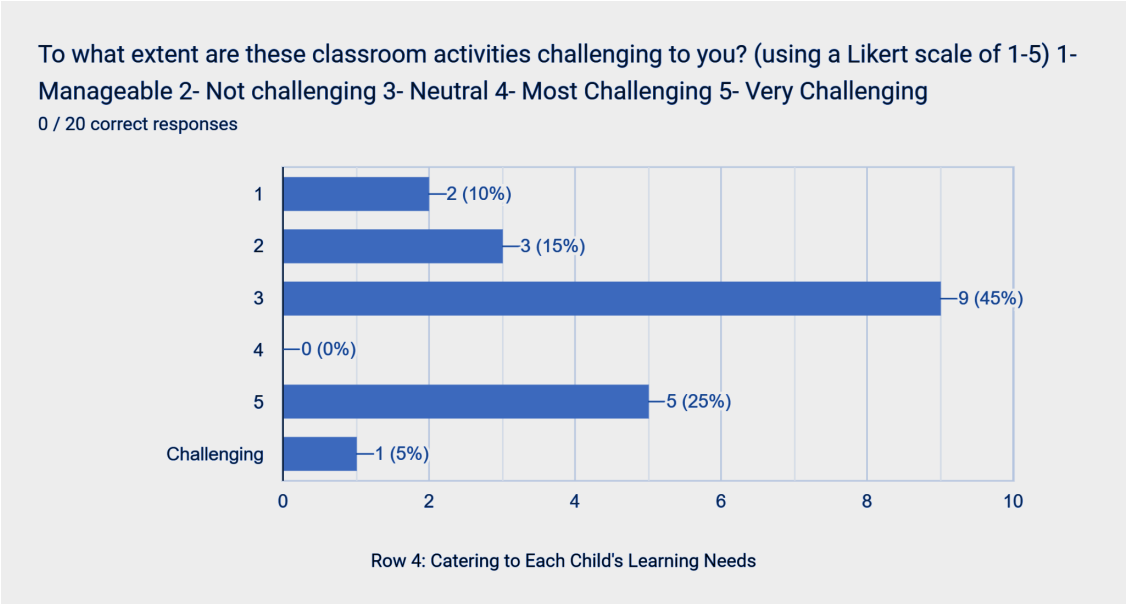


Figure 4: **Catering for Each Child's Learning Needs**

According to figure 4 above, the findings indicates that from the overall population (n=20) 9 of the respondents representing (45%) finds catering each students learning needs in the classroom neutral (nor manageable or very challenging), 5 of the respondents representing (25%) who find it very challenging, 3 of the respondents representing (15%) find it not challenging, 2 of the respondents representing (10%) find it manageable, 1 of the respondents representing (5%) find it challenging and none of the respondents find it most challenging.

4.1.7 Delivery of a Lesson

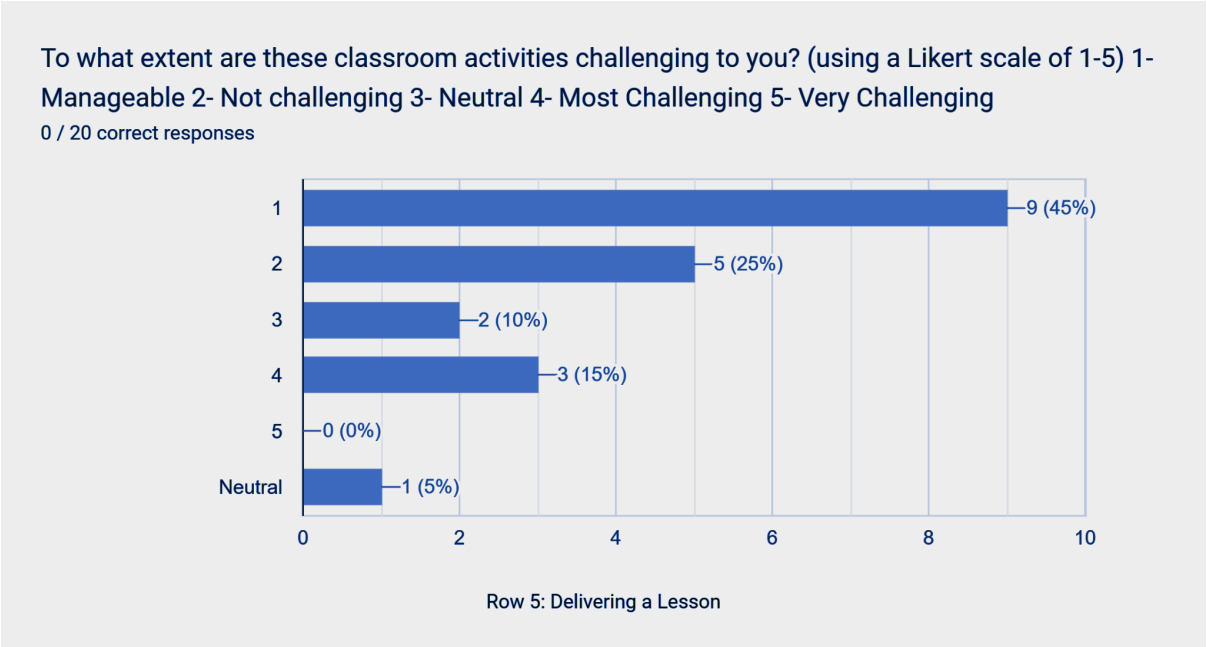


Figure 5: **Delivering a Lesson.**

The findings in Figure 5 above indicates that, from the overall population (n=20) 9 of the respondents representing (45%) responded that delivery of a lesson is manageable, 5 of the respondents representing (25%) implies that it is not challenging, 3 of the respondents who are represented with a percentage of (15%) reveal that it is most challenging, 3 of the participants who are representing with a percentage of (15%) responded that delivery of a lesson is neutral and none of the participants find delivery of a lesson very challenging.

4.1.8 Marking Assessments

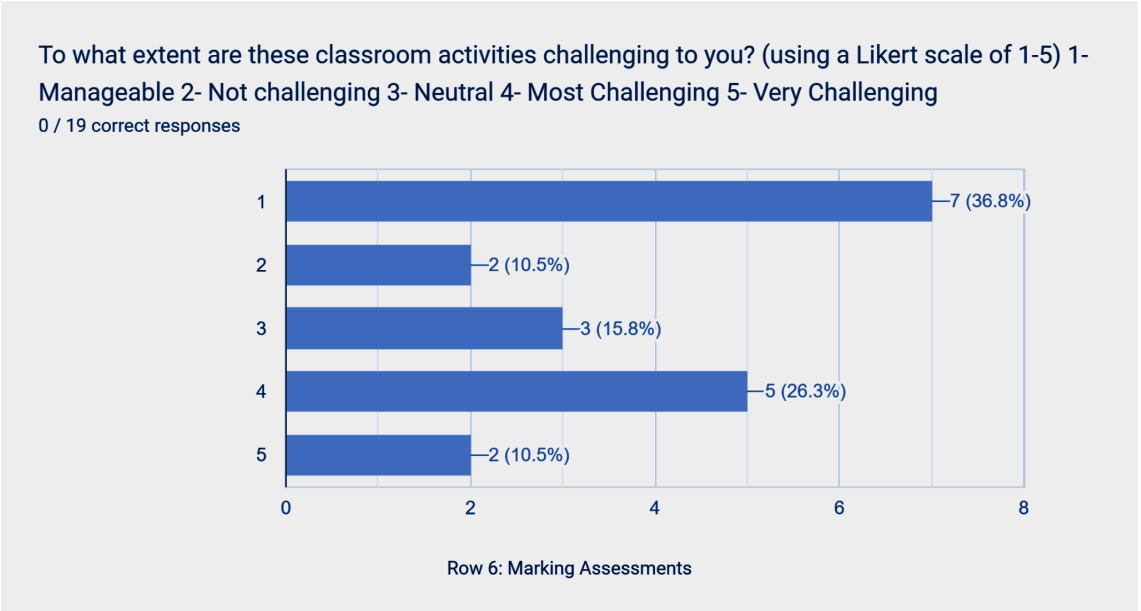


Figure 6: **Marking Assessments.**

Findings in Figure 6 illustrates that, from the overall population (n=20) 7 of the respondents representing (36.8%) responded that marking assessments is manageable, 5 of the respondents representing (26.3%) find it most challenging, 3 of the respondents representing (15.8%) responded that marking assessments is neutral, 2 of the respondents representing (10.5%) find ii very challenging and 2 of the total respondents representing (10.5%) find marking assessment not challenging.

4.1.9 Pupils Monitoring

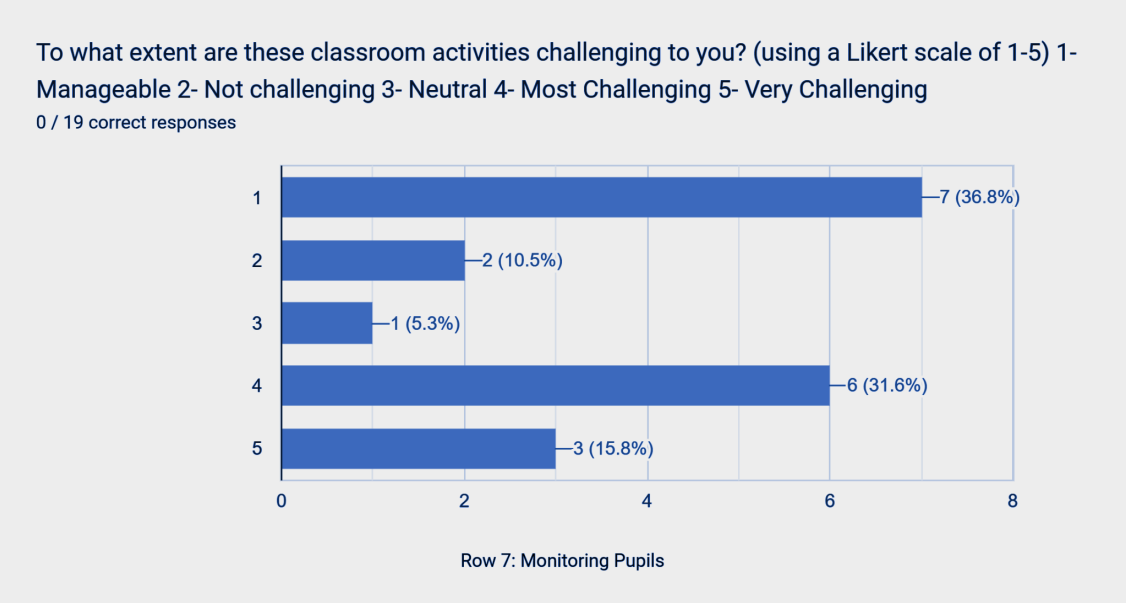


Figure 7: **Monitoring Pupils**

The findings in Figure 7 shows that, from the overall population (n=20) monitoring pupils is manageable according to 7 of the respondents represented with (36.8%), 6 of the respondents representing (31.6%) finds monitoring most challenging, 3 (15.8%) of the respondents responded that monitoring pupils in the classroom is very challenging, 2 (10.5%) respondents finds monitoring of pupils not challenging and 1 of the respondents representing (5.3%) responded that it is neutral.

4.1.10 Distributing Homework Questions

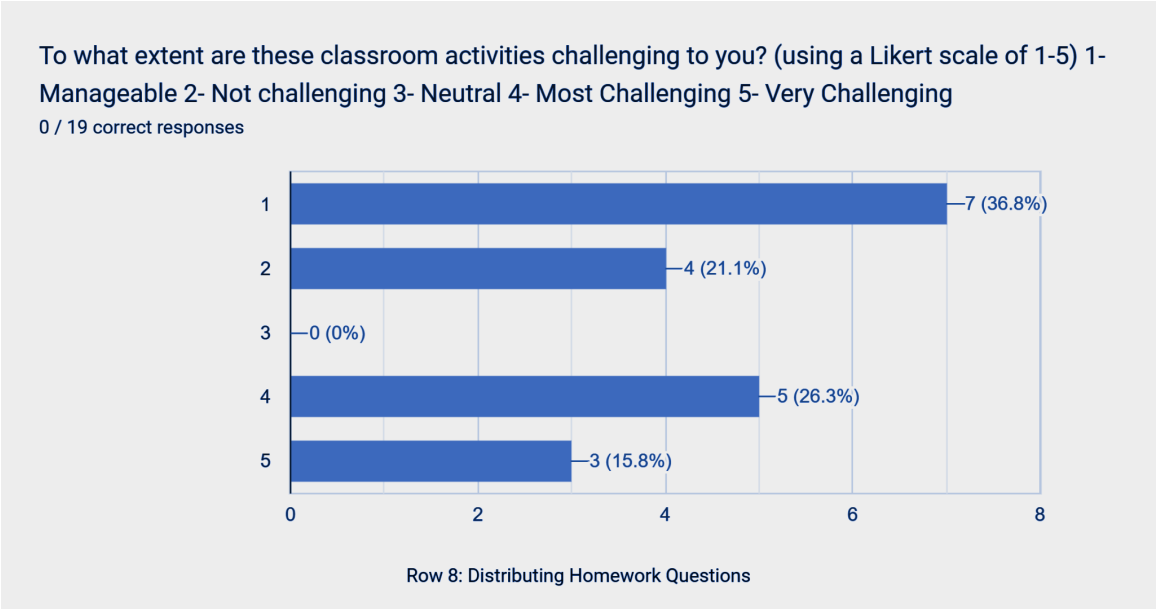


Figure 8: **Distributing Homework Questions.**

Results in Figure 8 above shows that, 7 (36.8%) of the respondents finds distribution of homework questions to the student is manageable for them, 5 (26.3%) of the respondents indicates that distributing is most challenging, 4 of the respondents representing (21.1%) of those who have no challenges in distributing homeworks in classroom, 3 of the respondents representing (15.8%) finds it challenging and none of the respondents finds distributing of homework questions manageable nor challenging (neutral).

4.1.11 Administering Classroom Activities (eg. quizzes)

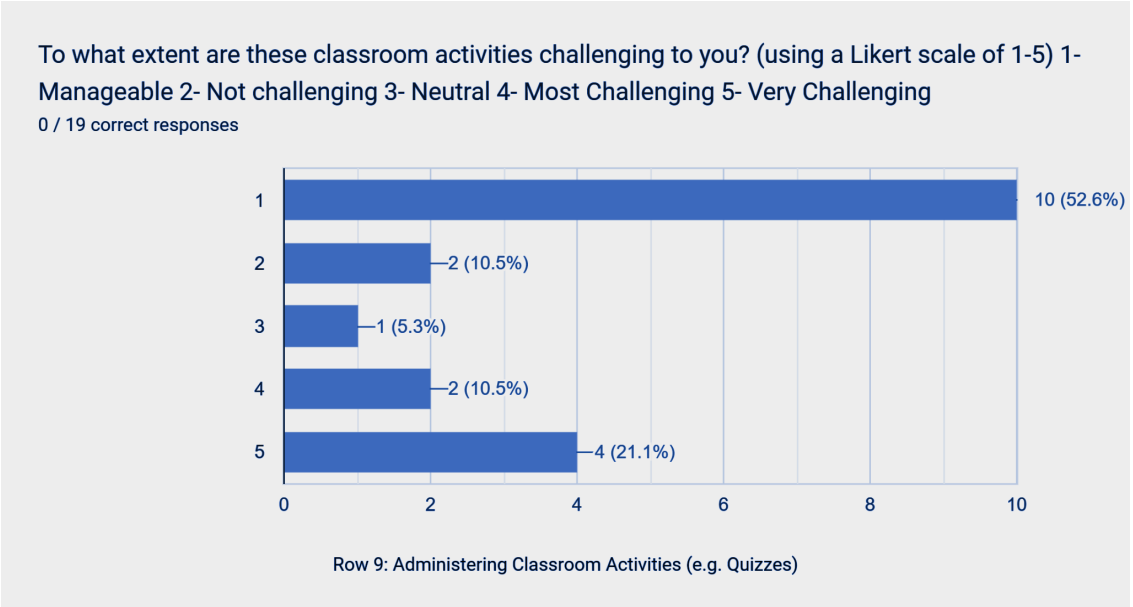


Figure 9: **Administering Classroom Activities.**

The figure 9 above shows that, from the overall population (n=20) 10 of the respondents representing (52.6%) finds administering classroom activities manageable, 4 of the respondents representing (21.1%) finds it very challenging, 2 of the respondents representing (10.5%) finds it not challenging, 2 of the respondents representing (10.5%) finds it most challenging, 1 of the respondents representing (5.3%) finds it not challenging.

4.1.12 Experience in Teaching with Technology

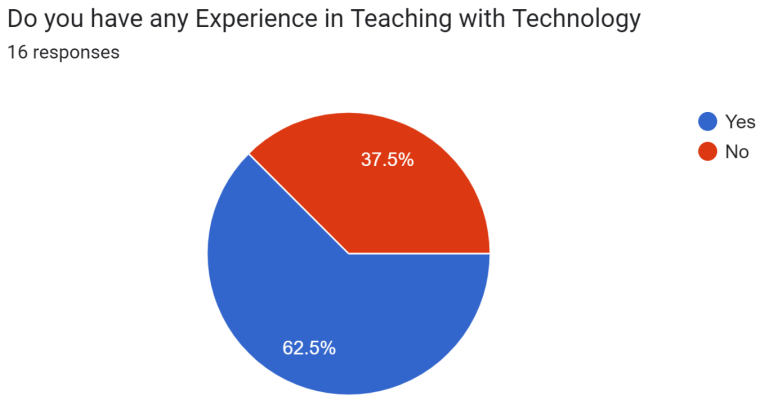


Figure 10: **Experience in Teaching with Technology.**

Respondents were asked if they have any experience in teaching with technology. Figure 10 above shows that, from the overall population (n=20) (62.5%) of the respondents have experience in teaching with technology and only (37.5%) of the participants have no experience in teaching with any technology in the classroom.

4.2.11 Technological Teaching Device Used by the Respondents in Classroom before.

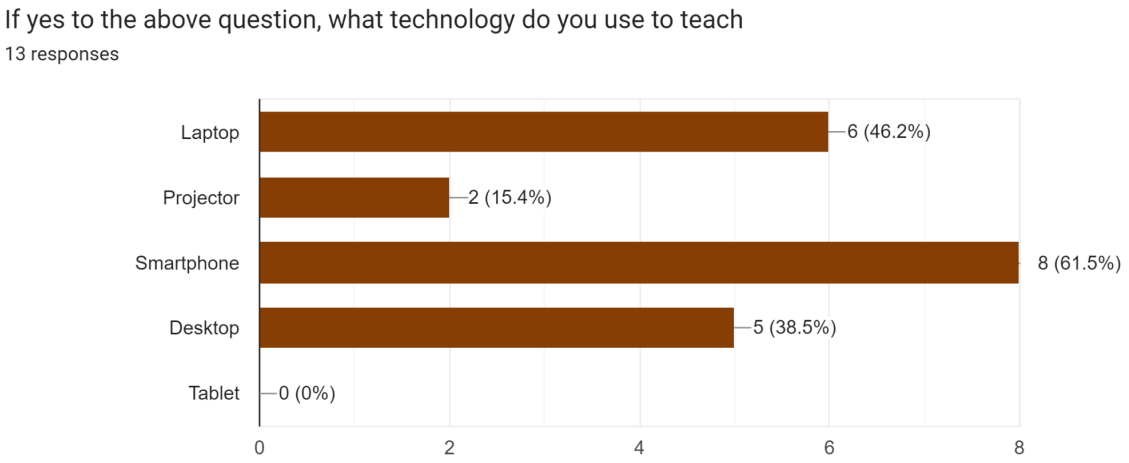


Figure 11: **Technological Teaching Device Used Before.**

Figure 10 above shows that, from the overall population (n=20) 6 of the respondents representing (54.5%) have used smartphones as a technological tool for teaching before, 5 of the respondents representing (45.5%) have used a desktop before in classroom, 4 of the respondents representing (36.4%) have at least used a laptop for teaching, only 1 of the respondents representing (9.1%) have used a projector for a lesson before and none of the respondents have used a tablet to teach in classroom before.

3.4. To investigate how interactive tablets can aid in classroom orchestration.

3.4.1 Target population

The targeted population of this study were the University of Zambia students. This population was targeted because it was easy to access for research, and that this population had an idea of the activities that were to be conducted and it was cost effective using this population.

3.4.2 Sampling technique

This study employed a randomly sampling technique in which participants were randomly selected for the study. Probability based (random sampling) requires a defined population, where each possible participant has a known possibility of being selected [9].

3.4.3 Procedure

This study was done in a simulated classroom environment consisting of a sample of 30 students who were selected using purposive sampling. Each student was asked to take attendance using two methods; using an application on the tablets called attendance tracker and a paper with names printed on it. These methods were counterbalanced among the participants . Once the participants consented to taking part in the study by signing a consent form handed to them, they were then given an information sheet that explained the situation they were in and why they were using the tablet. The information sheet asked them to imagine themselves as teachers that have been teaching for a certain number of years. both methods and at the end of the whole activity they were then asked to fill in a questionnaire. The measurement instrument for OUR study came from the study "A Theoretical Extension of the Technology Acceptance Mode:lFour Longitudinal Field Studies:"[10]. The questionnaire consists of a likert scale whose values were; where 1 strongly disagrees, 2 moderately disagree, 3 somewhat disagree, 4 neutral (neither disagree nor agree), 5 somewhat agree, 6 moderately agree, and 7 strongly agree. As well as themes that will help us arrive at a final conclusion, based on the number of questions in one particular theme each has a maximum value that can be reached. The first theme contained two questions to the maximum value that could be reached was 14, this was what was done for the remaining 8 themes instrumental processes. Perceived usefulness is defined as the extent to which a person believes using the system or in our case tablet will enhance their Job performance and perceived ease of use is the extent to which the person believes using the system or tablet will be free of any effort. The factors are important to us because they determine how the tablet will be utilised in the classroom if introduced.This model of TAM addresses the fact that even

if the system is introduced to the job, will it be used by the people at the job,and what factors come into play for them to use the systems. The main purpose of the extension of TAM study is understanding and creating the conditions under which information systems will be embraced by human organisations is a high priority research issue [10]

The reason for introducing the interactive tablet in the Zambian classroom by taking attendance is because it is the first step in them being part of the classroom. Introducing a system that completely changes the way teachers have been teaching for the past years may lead to the tablets being rejected by the teachers.We also took into account that it is highly most teachers belong to the ICT literacy level one, which is intermediate, ICT literacy is an individual's ability to use digital technology, communication tools and networks devices[5]. The teachers will have a basic understanding of technology and can slowly integrate it to their teaching or classroom management.

3.4.4 Data Analysis

When analysing data for this study we grouped the participants into two groups, those that started with a tablet and those that started with the printed piece of paper. The response they gave for each question helped us arrive at a final value for each theme covered in the questionnaire.The figures were then added for each similar theme,and the average of each of them from the two groups was calculated.

3.4.4.2 Statistical Analysis

Analysis of data is a process of inspecting, cleaning, transforming, and modelling data with the goal of highlighting useful information, suggesting conclusions, and supporting decision making [2]. In this study, Excel was used to present and interpret data using frequency distribution tables, percentages, pie charts, and bar charts. This method has incredible capabilities and flexibility of analysing data within seconds and generating an unlimited range of simple and sophisticated statistical results.

3.4.4.1 Demographic Details

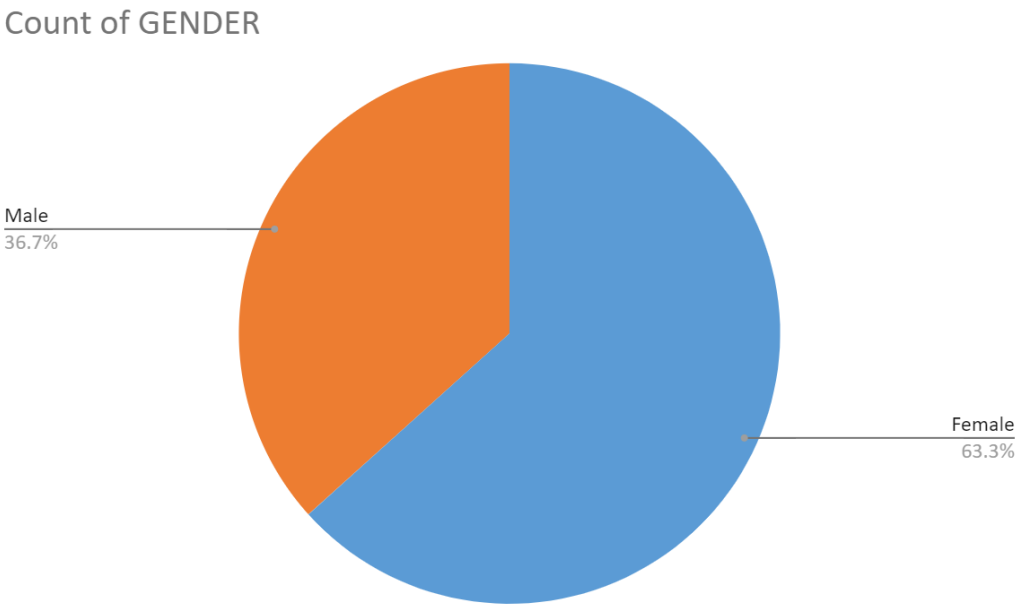


Figure 12: **Gender Distribution.**

Figure 12 is a pie chart showing the percentage of gender in the study. There were more female participants than male participants, with females consisting of 63.3% while the male were the remaining 36.7% from the overall population (n=30).

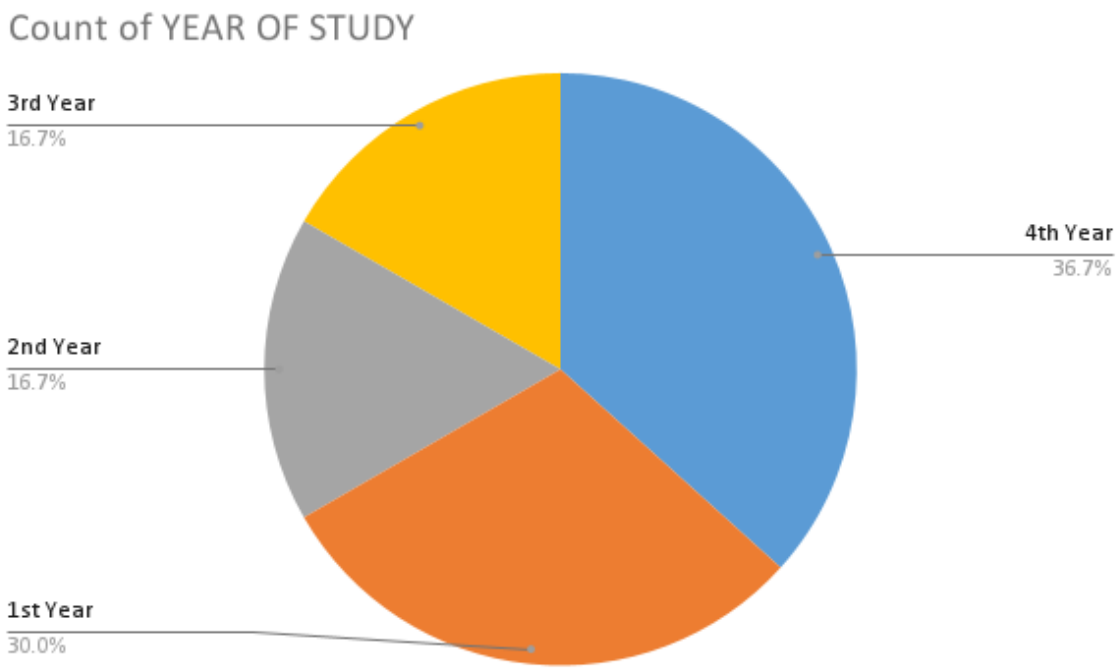


Figure 13: **Year of Study.**

Figure 13 shows a pie chart with the distribution of the years of study for the participants, most of the participants were in their 4th Year making up 36.7% of the participants. They are followed by 1st Years who make up 30% with the least percentage of participants being in their 3rd and 2nd year both making up 16%

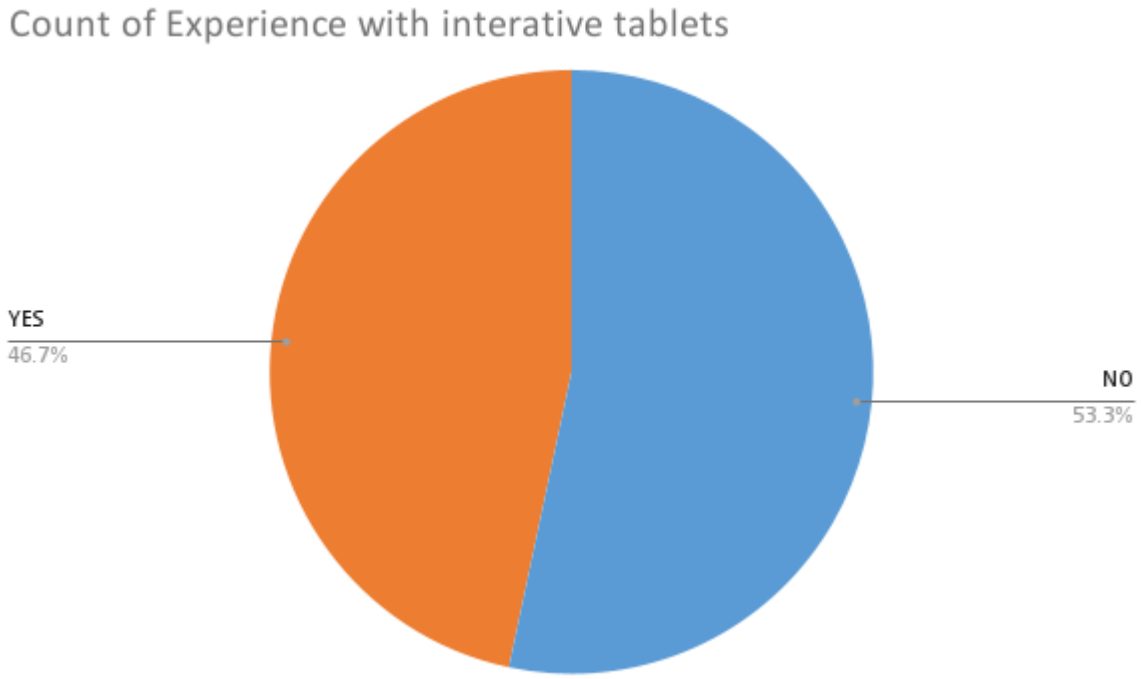


Figure 14: **Experience with interactive Tablet.**

Figure 14 above shows the percentage of participants that have experience with interactive tablets and out of the total population (n=30), (53.3%) said they had experience with interactive tablets. The highest percentage (53.3%) consisted of females in their 3rd and 4th Year, and the percentage of (46.7%) had no experience with interactive tablets also mostly consisted of females in their 4th Year.

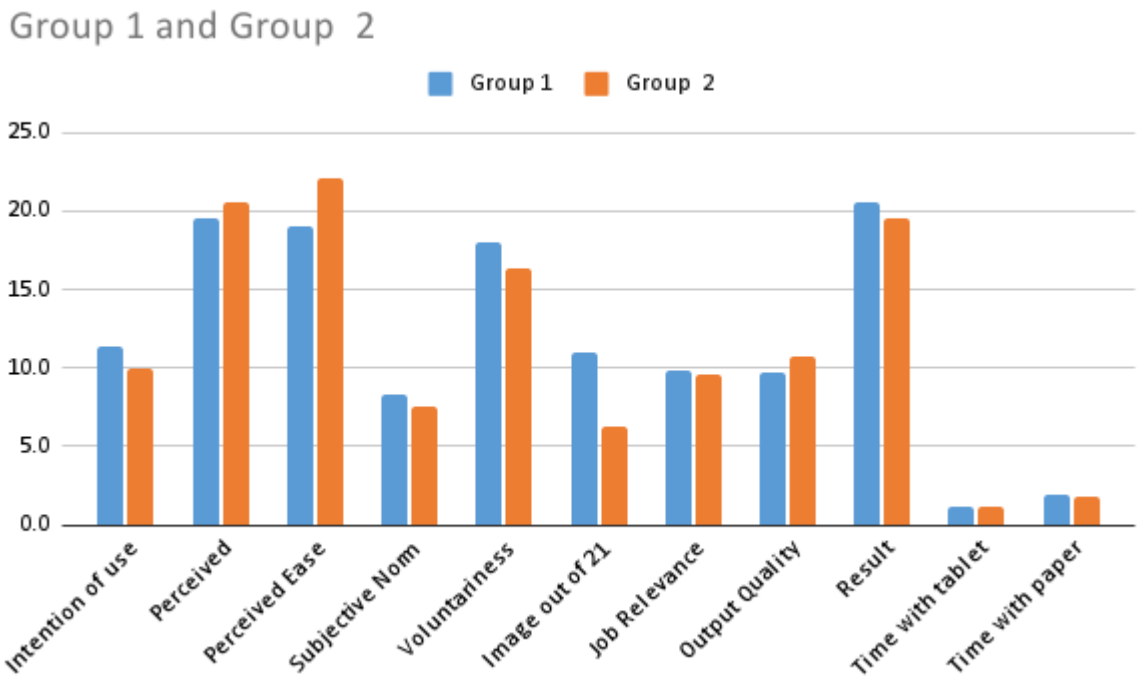


Figure 15 **Averages of responses**

Figure 15 shows the two groups the participants were split into and the total average for each theme.Group 1 are the participants that started taking attendance with the tablet and Group 2 are the participants that started with a printed piece of paper. The values each participant gave for each theme of the questionnaire was what was used to arrive at the average of the themes The difference averages of the themes between the two groups is not large, they are all within a similar range.This can be noted especially for the theme of intention of us ,subjective norm and job relevance.A pattern can not be noticed because group 1 has a higher average for some themes compared to group two and the same can be said for group two.However, it can be noticed that for both groups they took a shorter time to call attendance with the tablet than they did with the paper

3.5 Ethical Considerations

In every research study that involves human participants has a mandate to include ethical considerations. Ethical considerations are defined as a set of principles that guide your research designs and practices. In this research study Deontology Ethics were applied. The

deontological class of ethics theories state that “people should adhere to their obligations and duties when engaged in decision making when ethics are in play.” This means that a person will follow his or her obligations to another individual or society because upholding one’s duty is what is considered ethically correct [1]. It is important to adhere to ethical norms in research because it promotes the aim of the research, such as knowledge, truth, and avoidance of error.

It also involves a great deal of cooperation and coordination among many different people in different disciplines and institutions. Ethical standards promote values and fairness. Hence, many ethical norms in this research, such as guidelines for authorship, copyright and patenting policies, data sharing policies and confidentiality in peer review, were designed to protect intellectual property interests while encouraging collaboration. Most researchers want to receive credit for their contributions and do not want to have their work ideas stolen or disclosed prematurely. Ethical considerations helped to ensure that the researchers were held accountable to the public, helped in the building of public support for research. Therefore, ethics such as consent letter presentation before interviews, anonymity, confidentiality, integrity, accountability, and sensitivity to the type of language that was used in this research were considered vital to promote and achieve the objectives of this research.

4. Results and Discussion

4.1 Identifying Challenges associated with Classroom Orchestration

To identify the challenges we created the online questionnaire found in Appendix 1, it was shared on many social media platforms and consisted of a set of closed ended questions.Classroom activities were listed and the were asked to rate how challenging they found the activities, these are the results starting from the most challenging to the least challenging.

Monitoring the pupils was viewed as being most challenging, with 31.6% of the respondents settled on Most Challenging and 15% on Very Challenging. The remaining 36.8 % , 10.5 %, and 5.3% of the population gave its scores of not challenging, manageable and neutral respectively. The next is catering to each child's learning needs with 25% of the respondents

settled on Very challenging and 45% were neutral towards this activity.The remaining 15% and 10% settled for manageable and not challenging respectively.

Marking Class assessments is number 3 on the list because,26.3% of the respondents cited it as being Most Challenging and 10% called it very challenging. Most of the remaining population which is the remaining 36% called it manageable. Administering classroom activities like tests, group work and many more follows next on this list, with 21% of the respondents viewing it as being very challenging and 10% viewing it as being most challenging. 52% do view it as being manageable and the remaining 10% and 5% of the respondents view it as not challenging and are neutral.The next Activity is distributing homework Questions with 26% settling in Most Challenging and 15.8 % settled on very challenging,while out of the remaining respondents majority picked manageable with 36.8%.

Creating a lesson plan falls 6th with 55% finding it manageable and the other 15% and 5% percent finding it very challenging and most Challenging. It is then followed by Time management with 20% finding it very Challenging and 40% saying it was manageable.The remaining 25% and 10% found it not Challenging and neutral respectively.

We then talk about taking attendance with 10%of the respondents finding it very Challenging and the majority 45% finding it manageable.The remaining 15% and 25% found it not Challenging and neutral respectively. The least challenging was said to be delivering a lesson with majority of the respondents settling for either manageable or not Challenging, while 15% of the respondents did find it very challenging

4.1.1Challenges Faced

The main challenges we faced with this study was the reluctance of respondents to answer the questionnaire giving us reasons like ‘not having enough bundles’ or how they would rather answer a hard copy questionnaire or they did not have time.Since answering the questionnaire is voluntary we settled for the response we received and did not force respondents to answer. We however did not reach our desired target but got enough to analyse the data and come up with a conclusion .

4.2 To investigate how interactive tablets can aid in classroom orchestration.

At the end of the Activity that we performed the participants were asked to answer the questionnaire we provided for them.The questionnaire was structured in such a way that it

had themes it was arriving at. Each theme had questions that the respondents had it give a score from the 7 point likert scale, and the scores were added to come up with the final value for each theme.When conducting the study despite the fact that the participants used both methods to take attendance, we counterbalanced between starting to take attendance with the tablet and a a printed pieces of paper.Then when analysing the information we put the participants into two groups, those that started taking attendance with the tablet being group 1 and those that started with the paper as group 2.

The group average for each theme was then calculated and compared to each other.The difference in averages for the groups was not large but it was noticeable.We noticed that for the theme of intention of use Group 1 had a slightly higher average that group 2, this is not the case for themes perceived usefulness and perceived ease of use group 2 higher averages that group 1. What we can get out of this group 2 is that the group that was introduced to the already existing system first, which is taking attendance with a piece of paper, had a lower intention of use than group one they did recognise that it was easy to use and is more useful in the situation than group 1.

We also aimed to improve efficiency so while the participants were taking attendance we timed how long they took for each activity. The average time taken for each method was also calculated for the two groups and also compared. We noticed that for both methods both groups took about the same amount of time for each method, and the method that took the longest was the taking attendance with a printed piece of paper.With this result we can argue that the system does improve on the teachers efficiency.

With this method of introduction we can argue that two challenges of classroom orchestration have been countered, the taking attendance activity and the time management activity. Time Management because using the tablet makes them become more efficient in terms of the time they take on the activity and overall time management.

5. Conclusion

With technology becoming part of our everyday life it is important that it also becomes part of the education system. However, taking into account that we are a country that's not yet fully acquainted with technology, the way in which they are introduced is important.

Introducing technology does not mean completely changing the already established teaching way but integrating it in a way that ensures that it does not completely get rejected by the teachers meant to use it.

Through identifying the challenges that are associated with classroom orchestration, that consisted of classroom management activities. These were unique to the zambian classroom and were responded to by individuals from different parts of the country, this however showed us the frequency of challenges faced in the classroom throughout the country. It was determined to face one Classroom orchestration challenge at a time and the challenge faced was taking attendance.With that a study was conducted , which was the simulated classroom of taking attendance consisting of 30 participants that were picked randomly at the university of Zambia. The participants were counterbalanced and the information was individually analysed.The information we collected helped us further understand the fact that introducing a system that completely changes the way teaching is done would not be well received but instead we need to integrate the tablets to the already standing system.Once it has been established then more classroom orchestration challenges can be countered using the tablet in the classroom with a less chance of it being rejected.This is just the first step of many that will be taken in combating the challenges faced .

References

[1] Bharucha, A.J., London, A.J., Barnard, D., Wactlar, H., Dew, M.A. and Reynolds, C.F., 3rd 2006. Ethical considerations in the conduct of electronic surveillance research. *The Journal of law, medicine & ethics: a journal of the American Society of Law, Medicine & Ethics*. 34, 3 (Autumn 2006), 611–9, 482.

[2] Bryman, A., Becker, S. and Sempik, J. 2008. Quality Criteria for Quantitative, Qualitative and Mixed Methods Research: A View from Social Policy. *International journal of social research methodology*. 11, 4 (Oct. 2008), 261–276.

[3] Busetto, L., Wick, W. and Gumbinger, C. 2020. How to use and assess qualitative research methods. *Neurological research and practice*. 2, (May 2020), 14.

[4] Dillenbourg, P. 2013. Design for classroom orchestration. *Computers & Education*.

[5] Khosrow-Pour, D., B.A. and Mehdi 1AD. Encyclopedia of Information Science and Technology, Fourth Edition (10 Volumes). (Jan. 1AD). DOI:https://doi.org/10.4018/978-1-5225-2255-3.

[6] Mackenzie, N. and Knipe, S. 2006. Research dilemmas: Paradigms, methods and methodology. *Issues in educational research*. (2006).

[7] Munoz-Cristobal, J.A., Jorrin-Abellan, I.M., Asensio-Perez, J.I., Martinez-Mones, A., Prieto, L.P. and Dimitriadis, Y. 2015. Supporting Teacher Orchestration in Ubiquitous Learning Environments: A Study in Primary Education. *IEEE Transactions on Learning Technologies*.

[8] Orchestration in learning technology research: evaluation of a conceptual framework: *https://journal.alt.ac.uk/index.php/rlt/article/view/1688/xml_14#:~:text=The%20term%20'orchestrating%20learning'%20is,and%20what%20aspects%20it%20entails.* Accessed: 2022-11-17.

[9] Tashakkori, A. and Teddlie, C. 2010. SAGE Handbook of Mixed Methods in Social & Behavioral Research.

[10] Venkatesh, V. and Davis, F.D. 2000. A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*. (2000).

[11] Kuyela K M 2022. *Investigating the Usefulness of Interactive Tablets in Facilitating Teaching and Learning Activities:The case of Mwabu Tablet* dissertation .

[12] Mulholland,P.2012. NQuire :Technological Support for Personal Inquiry Learning.*IEEE Transactions on Learning Technologies*.5,2(2012), 157-169.
[13] Dillenbourg,P.2013. Design for classroom orchestration. *Computers & Education*
[14] Sharples, M. 2013. Shared orchestration within and beyond the classroom. *Computers & Education,*
[15] 2011. Recurrent routines: Analyzing and supporting orchestration in technology-enhanced primary classrooms. *Computers & education*. 57, 1 (Aug. 2011), 1214–1227.
[12] Sharples, M. 2013 .Shared orchestration within and beyond the classroom, *Computers & Education*,
[13] Dillenbourg,P.2013.Design for classroom orchestration. *Computers & Education*
[14] Sharples,M .2013. Shared orchestration within and beyond the classroom. *Computers & Education.* 69,(2013), 504-506.
[13] Sharples,M. 2013. Shared orchestration within and beyond the classroom. *Computers & Education*. 69(2013), 504-506.
[14] Dimitriadis, Y. et al. 2013 The role of design and enactment patterns in orchestration: Helping to integrate technology in blended classroom ecosystems. *Computers and Education*.69,(2013), 496-499.
[15] Sharples,M.2013. Shared orchestration within and beyond the classroom. *Computers and Education*. 69 (2013), 504-506.
[16] Algoufi. Using Tablets on Education. *World Journal of Education* (2008).
[17] Haßler et al. Tablet use in schools: a critical review of the evidence for learning outcomes. *Journal of Computer Assisted Learning* (2015)
[18] Ally et al. Use of Tablet Computers to Improve Access to Education in a Remote Location. *Journal of Learning for Development* (2017)

APPENDICES

Appendix 1: Questionnaire For Primary School Teachers

Technology in the Classroom

Dear Respondent,

We are Information, Communication and Technologies undergraduate students at the University of Zambia, Great East Road main campus researching on, "Teaching With Tablets Through Understanding Classroom Orchestration"

Please be assured that the information you will provide in this survey is purely for academic purposes only and will be treated with the utmost confidentiality. Your participation will be highly appreciated.

This Questionnaire Is Intended For Primary School Teachers in Zambia.

Yours sincerely,

Hazel Bowa
0965969469
2018164333@student.unza.zm

Towela Kalikeka
0960728471
2018169092@student.unza.zm

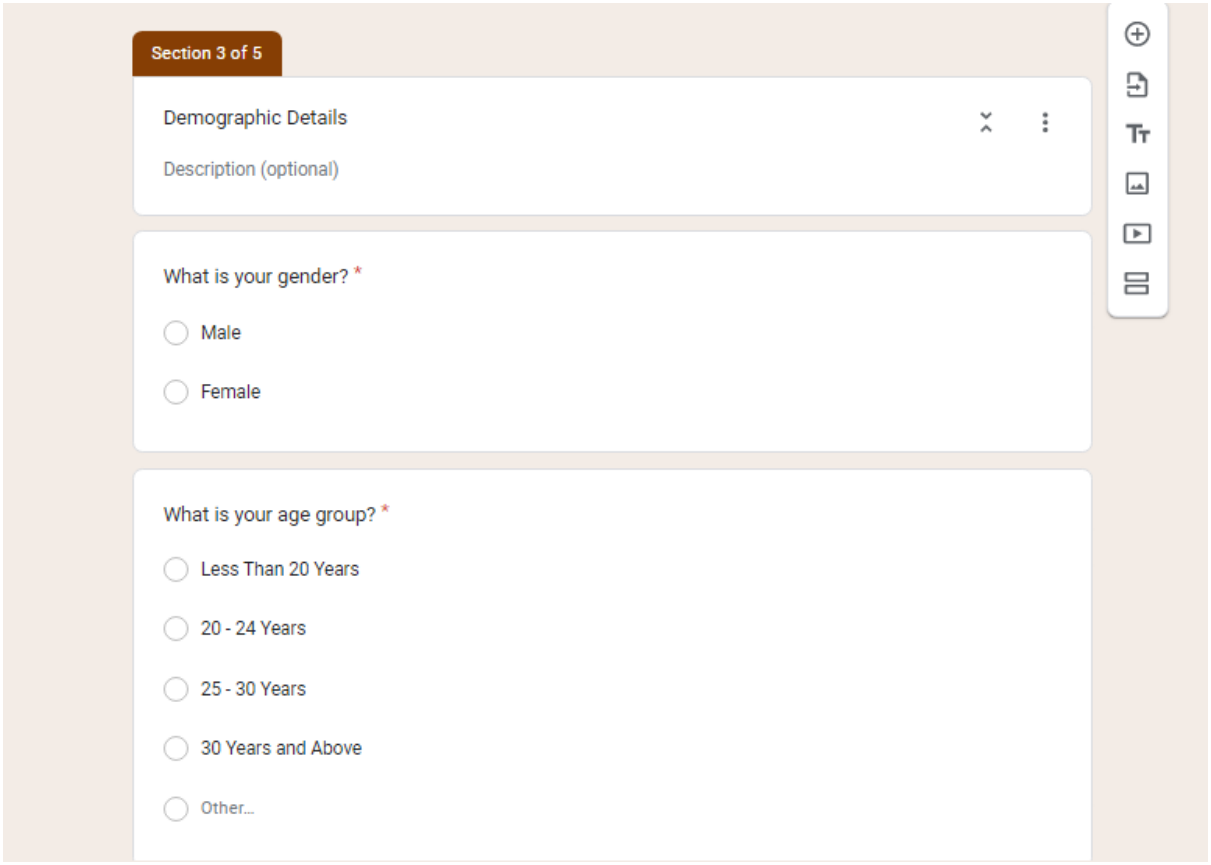
Prudence Mwendaluta
0974049213
2018211226@student.unza.zm

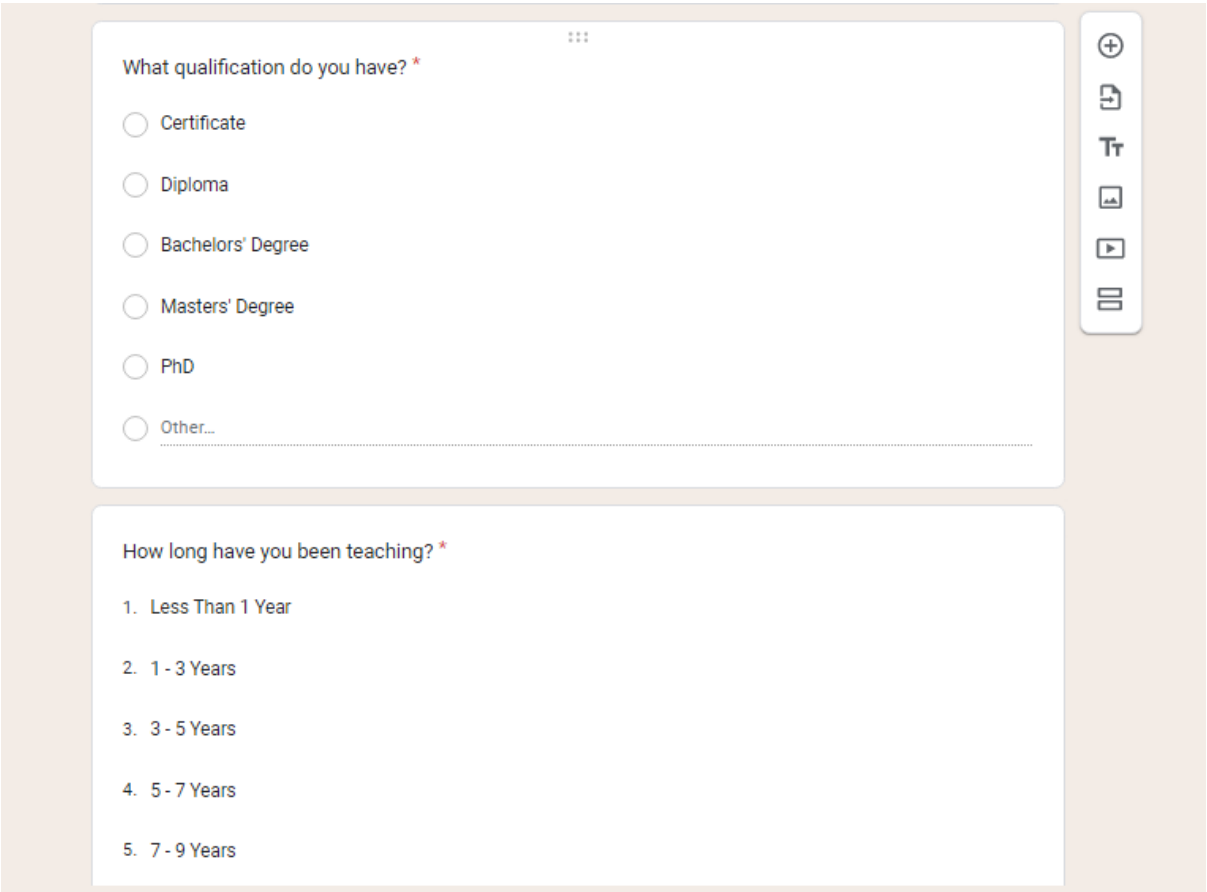
Rector Njobvu
0968433582
2018217216@student.unza.zm

Seite 1 von 5

Weiter

Bearbeitungszugriff anfordern


Section 3 of 5
Demographic Details
Description (optional)
What is your gender? *
Male
Female
What is your age group? *
Less Than 20 Years
20 - 24 Years
25 - 30 Years
30 Years and Above
Other...

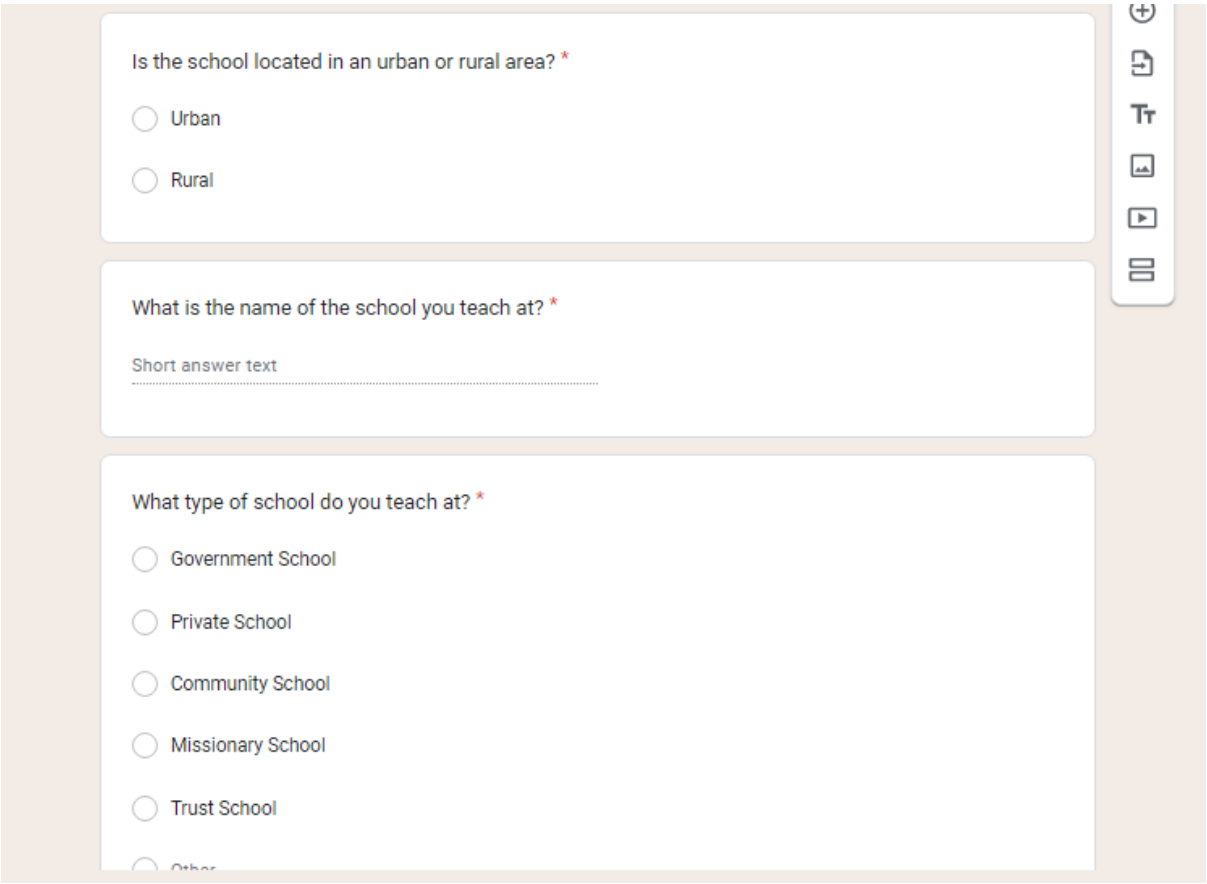

What qualification do you have? *
Certificate
Diploma
Bachelors' Degree
Masters' Degree
PhD
Other...
How long have you been teaching? *
1. Less Than 1 Year
2. 1 - 3 Years
3. 3 - 5 Years
4. 5 - 7 Years
5. 7 - 9 Years

6. 10 Years and Above

In which province are you working from? *

1. Central
2. Copperbelt
3. Eastern
4. Luapula
5. Lusaka
6. Muchinga
7. Northern
8. North Western
9. Southern
10. Western

Is the school located in an urban or rural area? *


Is the school located in an urban or rural area? *
Urban
Rural
What is the name of the school you teach at? *
Short answer text
What type of school do you teach at? *
Government School
Private School
Community School
Missionary School
Trust School

What Grade do you Teach *

1. Grade 1
2. Grade 2
3. Grade 3
4. Grade 4
5. Grade 5
6. Grade 6
7. Grade 7

Pupils' age group *

1. 4 - 7 Years
2. 8 - 10 Years
3. 11 - 12 Years
4. 13 Years and Older

How many pupils are in the classroom *

1. Less Than 20 Pupils
2. 20 - 30 Pupils
3. 31 - 40 Pupils
4. 41 - 50 Pupils
5. Above 50 Pupils

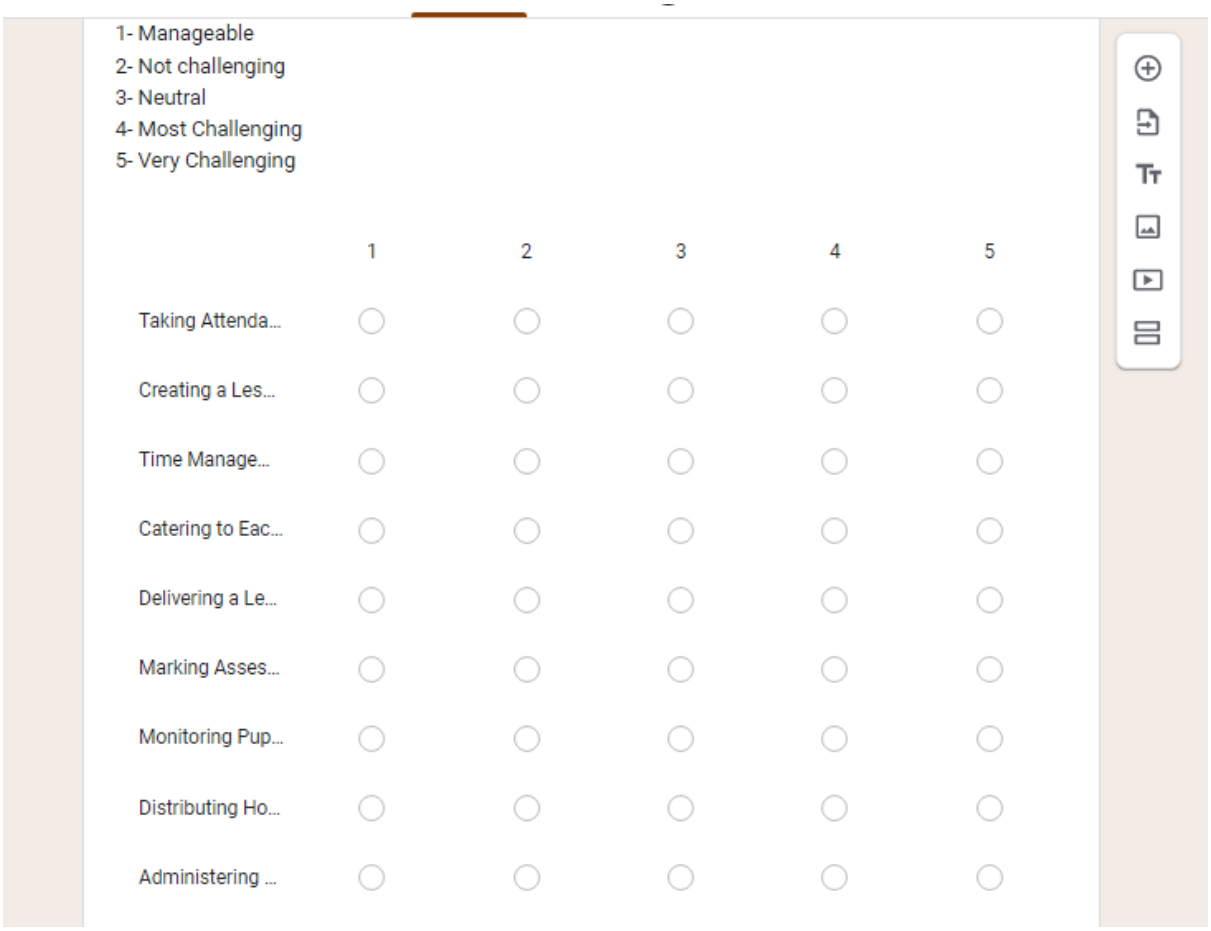
After section 3 Continue to next section

Section 4 of 5

Classrooom Activities and Technology

Description (optional)

To what extent are these classroom activities challenging to you? (using a Likert scale of 1-5) *
1- Manageable
2- Not challenging
3- Neutral
4- Most Challenging



Appendix 2: Consent Form

THE UNIVERSITY OF ZAMBIA

DIRECTORATE OF RESEARCH ND GRADUATE STUDIES

HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

Telephone: +260-211-290258/293937
Fax: +260-211-290258/293937
E-mail drgs@unza.zm

P. O. Box 32379
Lusaka, Zambia

HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

CONSENT FORM

(Translated into vernacular if necessary)

TITLE OF RESEARCH:

REFERENCE TO PARTICIPANT INFORMATION SHEET:

1. Make sure that you read the Information Sheet carefully, or that it has been explained to you to your satisfaction.
2. Your permission is required if tape or audio recording is being used.
3. Your participation in this research is entirely voluntary, i.e. you do not have to participate if you do not wish to.
4. Refusal to take part will involve no penalty or loss of services to which you are otherwise entitled.
5. If you decide to take part, you are still free to withdraw at any time without penalty or loss of services and without giving a reason for your withdrawal.
6. You may choose not to answer particular questions that are asked in the study. If there is anything that you would prefer not to discuss, please feel free to say so.
7. The information collected in this interview will be kept strictly confidential.
8. If you choose to participate in this research study, your signed consent is required below before I proceed with the interview with you.

VOLUNTARY CONSENT

I have read (or have had explained to me) the information about this research as contained in the Participant Information Sheet. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction.

I now consent voluntarily to be a participant in this project and understand that I have the right to end the interview at any time, and to choose not to answer particular questions that are asked in the study.

My signature below says that I am willing to participate in this research:

Participant's name (Printed): ……

Participant's signature: …… Consent Date: ……

Researcher Conducting Informed Consent (Printed) ……

Signature of Researcher: …….. Date: ……

Signature of parent/guardian: …….. Date: ……

Appendix 3: Questionnaire For Classroom Attendance

Demographic Details

Gender:

☐ Female

☐ Male

Program of Study:……

Year of Study:……..

Do you have any experience with interactive tablets

☐ Yes

☐ No

Study Questionnaire

Answer this questionnaire using Likert scale, where 1 strongly disagree, 2 moderately disagree, 3 somewhat disagree, 4 neutral (neither disagree nor agree), 5 somewhat agree, 6 moderately agree, and 7 strongly agree.

Likert Scale	1	2	3	4	5	6	7
Intention to use							
Assuming I have access to the tablet, I intend to use it.							
Given that I have access to the tablet, I predict that I would use it.							
Perceived Usefulness							
Using the tablet improves my performance in my job.							
Using the tablet in my job increases my productivity.							
Using the tablet enhances my effectiveness in my job.							
I find the tablet to be useful in my job.							
Perceived Ease of Use							
My interaction with the tablet is clear and understandable.							
Interacting with the tablet does not require a lot of my mental effort.							
I find the tablet to be easy to use.							
I find it easy to get the tablet to do what I want it to do.							
Subjective Norm							
People who influenced my behaviour think that I should use the tablet.							
People who are important to me think that I should use the tablet.							
Voluntariness							
Use of the tablet is voluntary.							
My use of the tablet is voluntary.							
My supervisor does not require me to use the tablet.							
Although it might be helpful, using the tablet is certainly not compulsory in my job.							
Image							
People in my organization who use the tablet have a more prestige than who do not.							
People in my organization who use the tablet have a high profile.							
Having the tablet is a status symbol in my organization.							
Job Relevance							
In my job, usage of the tablet is important.							
In my job, usage of the tablet is relevant.							
Output Quality							
The quality of the output I get from the tablet is high.							
I have no problem with the quality of the tablet's output.							
Result Demonstrability							
I have no difficulties telling others about the results of using the tablet							
I believe I could communicate to others the consequences of using the tablet.							
The results of using the tablet are apparent to me.							
I would have difficulty explaining why using the tablet may or may not be beneficial.							