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Teachers' Attitude towards the Use of Excel Software, to Teach and Learn Statistics on Learner's Performance in Rwanda's Kicukiro Public Upper Secondary Schools

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Abstract: *The development of technology, especially ICT, influences education. There was the initiation of smart classrooms and the distribution of laptops to science teachers, in 2016 in Rwanda. But for now, a few pupils do poorly on questions involving probability and statistics but do well in other areas of the math exam, when they use calculators. This study examined the attitude of teachers towards the use of Excel software to teach and learn statistics. The target population was upper public schools in the Kicukiro district having smart classrooms, teachers who have computers, and having combinations studying core mathematics. Sixteen (16) who had the required prerequisites were interviewed. Case study research design and thematic analysis were used. Results indicated a positive attitude of teachers to integrate Excel software in teaching and learning statistics. According to this study, more computer labs should be established, teachers should be trained in computer use and software like Excel, and all teachers should be given computers, to allow students to use Excel software in statistics, and to use Excel software in all secondary schools in teaching and learning statistics in other Rwandan districts, as well as in academic institutions.*

Keywords: *The use of Excel software, Teacher's attitude towards the use of Excel software, Teach and learn statistics, Learners' performance, Rwanda*

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1. Introduction

These days, utilizing technology in our everyday lives is more required than optional. This illustrates the necessity for people to use technology in their daily lives. Furthermore, the education system is another domain where technology is used (Yilmaz, 2021). The goal of education is to prepare pupils for society and real-world circumstances. The educational system also benefits greatly from several technologies' direct and indirect advantages. Online learning, virtual laboratories, simulation environments, rapid access to technological advancements, and scientific knowledge are all important components of the educational system, according to Yilmaz (2021). Furthermore, with so many new skills being taught, scientific and technological breakthroughs must be included in the education process.

Despite their cautious approach, math teachers needed to integrate ICT into their lessons and maintain an optimistic outlook. The more the parents participated, the better the students' performance was. Parent's ongoing participation in their child's academic endeavors has been crucial to the student's success. Students benefit most from the use of Excel software in data analysis since it improves their performance (Cobcobo & Capua, 2022).

The way content is delivered is altered by instructors' positive views toward using computers in the classroom. This suggests that instructors' attitudes toward ICT use to teach and learn statistics have a significant impact on the integration of computers in schools (Mukarugira, Mbanzabugabo, & Mbonimana, 2018). Accordingly, this study contended that a positive attitude implies a high degree of computer use to teach and learn statistics; in contrast, a pessimistic viewpoint suggests a low degree of computer integration (Arkorful, Kwaku, & Aboagye, 2021).

Since the year 2000, there has been a notable drive in Rwanda to include ICT in the curriculum and bring computers into classrooms. To raise the standard and delivery of education, the Rwandan government has introduced several ICT tools in the classroom, such as One Laptop Per Child, ICT, and teacher training. The Rwandan government launched a nationwide initiative known as SMART CLASSROOM in 2016(Mukarugira et al., 2018).

The goal of this project was to provide Rwandan schools with an IT infrastructure that would enable the digitization of the teaching and learning process across all subject areas and at all educational levels, including primary, secondary, and postsecondary education as well as vocational training facilities. Additionally, 52% of schools had access to this smart classroom, and 35% of schools had an Internet connection (Digital Africa, 2021).

Nonetheless, the Rwamagana District research by Nsekandizi et al. (2020) demonstrates that the computers provided to schools are not being utilized efficiently for instructional purposes. Pupils suffer academically because more than 70% of teachers do not use computers to research material, inspire pupils, or further their professional growth. Conversely, educators often assert that they have not received enough training about the usage of computers in the classroom. Moreover, it has been demonstrated that efficient ICT use modifications can increase instructors' performance in the secondary school teaching and learning process.

This suggests that educators should regularly use ICT in their everyday activities if they wish to enhance their teaching methods (Nsekandizi; Karangwa & Adala, 2020).

Some learners performed better in other areas of mathematics but struggled in probability and statistics, and vice versa despite the introduction of smart classrooms and the provision of laptops to science teachers (Dushimimana & Uworwabayeho, 2021).

When ICT was integrated into secondary schools in Rwanda, students' performance in statistics was low when they were taught using traditional methods or scientific calculators. As that, the purpose of this study is to investigate teachers' attitudes towards the use of Excel software to teach and learn statistics.

2. Literature Review

The usage of mathematical functions related to everyday life, such as financial, statistical, engineering, information, and Web functions, is one of Microsoft Excel's benefits. In addition, the software features a wide variety of sizes and types of photos. However, if the Microsoft Excel Visual Basic application is not used, the relationship between mathematical functions and graphics cannot operate appropriately (Fitriani, Suryadi, & Darhim, 2018).

Excel software is a flexible program with a variety of applications, including data management and statistical analysis (Serhat, 2016). Teacher education programs and educational technology courses help to change teachers' attitudes and views about using technology in the classroom as well as their knowledge and skills in technology (Chandrani, Soo, Loran, & Kari, 2019).

Moreover, the teachers expressed their opinions and ideas about technology use in the classroom: the majority expressed a desire to learn more about technology, while others claimed to have completely given up using some of it, because of scheduling restrictions and a lack of resources, as well as some skepticism regarding its advantages. Even within their administrative procedures, all instructors used a variety of technologies, but teachers more frequently used technology to spread knowledge. Finally, pre-service teachers can teach most of the concepts in a basic statistics course using Excel software(Isha & Tasha, 2018). Once more, math teachers have a positive understanding of how to use Excel software to teach and learn about school statistics.

Teachers of mathematics found the usage of Excel software to be engaging and have listed various ways in which they believe students might benefit from it, including the capacity to solve real-world problems with the program and enhance their response abilities (Tshepho, 2019).

Another study by Bindu (2017) on Malaysian teachers' knowledge of and attitudes toward using ICT revealed that most teachers are knowledgeable in using Microsoft Office, except for Microsoft Excel, and that teachers generally have a positive attitude toward using Microsoft Excel in the classroom. Once more, the study showed that

teachers' attitudes regarding ICT had an impact on how aware they are of its use in the classroom. The usage of ICT by teachers in the classroom is negatively connected with their age, gender, and attitude. However, a survey of Turkish educators reveals that male educators are more capable than their female counterparts. The study on how ICT training and experience affect teachers' fundamental ICT abilities, ICT knowledge, and ICT attitudes also revealed that instructors have a positive attitude toward ICT integration and that their ICT awareness is restricted to Microsoft Office (Bindu, 2017).

Tshepho (2019) stated that teachers demonstrated a good attitude regarding the use of Microsoft Excel to teach statistics, saying that students' use of Excel may improve their performance in statistics and enable them to address difficulties in real life. Teachers were enthusiastic about utilizing Excel, but they felt unqualified to do so because they had not received any introductory training in its use.

Teachers may not use Excel because of their incompetence. According to Tshepho (2019), there are some ways to increase the knowledge of teaching in teaching statistics such as,

- ✓ To include, excel software (and other software) in teacher training programs of the school which will help teachers to meet ICT demands.
- ✓ To intensify training that allows teachers to upgrade their ICT integration including the use of Excel software.

However, teachers' attitude about teaching and learning with ICT is a concern as it was indicated that when educators encounter novel technologies that can provide challenges in terms of usage, they feel vulnerable, disempowered, and frustrated. These include resource mismatches that cause students to fail as they didn't study how to use computers due to insufficient knowledge of the intended technology to be taught and lack of collaboration between educators and tech support staff. The two most common barriers are a shortage of time to understand how to incorporate computers into the curriculum and a shortage of computers in the classroom causing students to perform poorly in statistics (Dushimimana & Hesbon, 2020).

Moreover, some teachers when they use ICT as a tool to teach and learn statistics, feel comfortable. Other teachers said that the use of computers does stress them, and if something goes wrong, they have no idea how to fix it.

Learning will change as a result of students using computers in the classroom; computers help students to understand concepts more effectively, but others said that as they cause technical issues, computers are not conducive to good teaching and learning (Termit , 2014).

3. Methodology

3.1 Design

Research designs are forms of inquiry that belong to the mixed methodologies, qualitative, and quantitative approaches and offer particular instructions for how to conduct a study. Case studies are a type of inquiry when the researcher thoroughly examines a program, occasion, activity, procedure, or one or more people. Researchers use a range of data collecting strategies to gather precise information over an extended period of time, with cases limited by time and activity. A case study research design was used in this study (John W., 2009).

3.2 Population and sampling procedure

A population is defined as the entire set of people who share the traits being studied (Njiku, 2021) and a sample is the specific group from which data will be collected. The sample size is always less than the population size. This study was conducted in public schools of Kicukiro District in Kigali City. The target population was public upper schools of Kicukiro district which have smart classrooms, teachers who have got computers given by Rwanda Education Board (REB), and a combination of studying core mathematics (Ufitiwabo, 2021).

As there were four upper public secondary schools in Kicukiro district with the required criteria,sixteen (16) mathematics teachers, four teachers per school, from all those schools participated in the study. The teacher sampled was the teacher teaching core mathematics in upper secondary school and having computers given by Rwanda Education Board (REB). The schools were given names as A, B, C, and D.

16 teachers from 4 schools were interviewed in order to get qualitative data because they all met the requirement of having computers, to examine their attitudes towards the use of Excel software in teaching and learning statistics.

3.3 Validity and Reliability

Each study subject was given the same care and exposure to the same research tools as other study participants. Because of this, the study's explanation showed how the results apply to many situations and scenarios involving mathematics learning. Consequently, additional experts from the literature review provided further information regarding the collection and examination of the study's data.

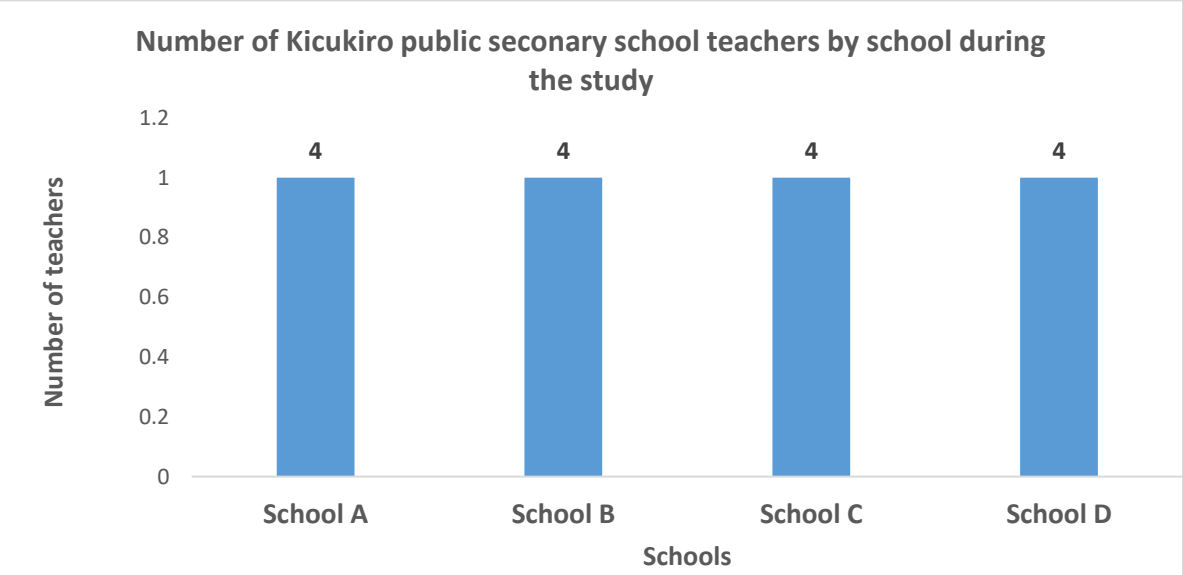
3.4 Data analysis

After data collection, the next step was data analysis. Different answers of participants were analyzed by doing a summary of them, for each question. Opinions of responds were also compared to what was said in literature review. This type of analysis used is thematic analysis which is an approach to qualitative research that researchers use to carefully arrange and examine big, complicated data sets. It's an investigation of potential themes that could sum up the narratives contained in the descriptions of the data sets (Dawadi, 2020).

4. Results and Discussion

This study aimed to investigate teachers' attitude towards Excel software integration in teaching and learning statistics in Kicukiro public upper secondary schools.
The Kicukiro district's upper public schools, A, B, C, and D, were the sites of data collection. Four teachers of core mathematics at each school were interviewed. The findings of this study were based on teachers' attitudes toward the use of Excel software to teach and learn statistics. The following are findings with the discussion made concerning the authors.

Teachers' distribution by school



With a broad range of uses, including data management and statistical analysis, Excel software is a useful tool for data analysis Serhat (2016). He added that it is software used to explore the content from the computer which is not true according to him (Serhat, 2016).

Concerning Excel software importance, respondents argue that using Excel software in statistics teaching and learning helps to gain time, motivates learners and feel happy, encourages learners to use computers, helps to manage time, and is very attractive. Other respondents said that Excel software helps to analyze statistical data. Others said that it is used to track attendance, average quarterly grades, develop a lesson plan template, and create a schedule.

Tshepho (2019) made a similar argument, stating that the responses provided are largely consistent with his assertion that mathematics teachers have a good perception of Excel software to teach and learn statistics. Again, teachers of mathematics found using Excel to be intriguing. They have listed many ways in which they believe using Excel can help students; including using it to address problems from real life and helping them become better at answering questions. Excel software reduces the work. When it is used, learners are motivated and well-understood. Therefore, Teachers stated that using Excel may assist students learn mathematics more enjoyable, which will increase their capacity to answer some practical problems. It may also have a favorable impact on the affective domain of math students (Tshepho, 2019).

Since this program can simply rerun an operation if a value is added or altered, it can add, subtract, multiply, and divide hundreds of numbers, which made all of the study's participating teachers very happy. The teachers showed their good attitude toward using Excel software (Isha&Tasha, 2018).

The majority of teachers indicated that they would like to learn more about technology; however, some stated that they had given up on using specific technologies entirely

because of a lack of resources, time constraints, and skepticism regarding the advantages of using technology.

All of the teachers who were interviewed agreed that Excel software is useful since people prefer globalization to tradition and nobody should ever cling to the past. This opinion is the same as what Bindu (2017) said in his study conducted in Malaysia on teachers' knowledge and attitudes toward using ICT, it was discovered that the majority of teachers are knowledgeable in using Microsoft Office, except Microsoft Excel, and have a positive attitude toward using it in the classroom.

The survey's findings also revealed that instructors who don't use Excel do so because they lack proficiency. They went on to say that a key factor in how exposed teachers feel about using ICT for teaching and learning is their mindset. Once more, teachers experience a sense of powerlessness and frustration when faced with novel technologies that may prove challenging to operate. Insufficient coordination between teachers and technology support people, as well as teachers' lack of expertise in the technology they are supposed to teach, are two examples of mismatches in resources that hinder pupils from learning how to use computers (Dushimimana & Hesbon, 2020).

Some teachers still prefer to use traditional methods in teaching and learning statistics because they don't know how to use Excel software, and they don't have ICT tools and infrastructure. These findings support what Dushimimana and Hesbon (2020) observes there is teachers' insufficient knowledge of the intended technology to be taught. This will lead to the use of traditional methods, which is true compared with what teachers answered.

Teachers will feel happy when they are asked to do exercises regarding the use of Excel software. As Excel software is part of ICT, according to Termit (2014), teachers feel comfortable when they utilize ICT to teach and learn statistics. The use of computers stresses them out, and teachers have no idea how to fix it if something goes wrong. We can conclude that when teachers are asked to do an exercise regarding the use of Excel software, some will feel happy, others not.

Teachers' knowledge of teaching statistics can be increased when Excel software is used to verify answers using the traditional method (that is using calculators); when they use Excel software and if the computer lab is increased.

When Excel software is used to validate answers produced using traditional method (that is, using calculators), as well as if the computer lab is expanded, teachers' understanding of teaching statistics can be strengthened. Tshepho's (2019) study, said that teachers showed to be incompetent to use Excel for statistics teaching and learning. Considering that, to increase the knowledge of teachers to teach statistics:

- firstly, excel software (and other software) should be included in teacher training programs of the school which will help teachers to meet ICT demands.

-The secondary is to intensify training that allows teachers to upgrade their ICT integration including the use of Excel software.

Answers of teachers and what Tshepho (2019) study said, have in common the use of Excel software to teach and learn statistics. When a teacher training program of the school uses Excel software, it will help teachers meet ICT demands, meaning that they will use it, and may use it to verify answers using traditional methods.

According to different perceptions of teachers about Excel software used to teach and learn statistics, this shows that all interviewed teachers have positive attitudes about the use of Excel software in teaching and learning statistics in general, and we agree with them as the findings testimony that attitude.

5. Conclusion and Recommendations

5.1 Conclusion

During this research, teachers showed a positive attitude towards Excel software integration in their daily work of teaching statistics. Teachers who lack ICT skills are unable to contribute to Excel software used to teach and learn statistics. Learners will perform poorly in statistics due to a lack of proper training provided to teachers to improve their use of Excel software as a pedagogical tool. Teachers indicated the need of training suitable for their daily teaching practices using excel software. Teachers also said that working together with educators throughout the globe will provide them with ideas for cutting-edge instructional strategies and web-based learning approaches to successfully incorporate ICT into their teaching. Additionally, they illustrated the need of their schools, in using Excel software as a tool to help students understand the theory being taught, which will improve their performance in statistics.

5.2 Recommendation

Statistics is one of the most crucial subjects taught in upper secondary mathematics classes that include fundamental mathematics and effectively use Excel software integration. Students can comprehend what is taught when technology is integrated into teaching and learning (Mishra & Koehler, 2006). Similarly, using Excel software has an impact on pupils' performance. In light of these details, the following suggestions could be put into practice by

Rwanda Education Board (REB) and the Ministry of Education in Rwanda:

1. To provide computers to all educators, with a focus on those teaching fundamental mathematics
2. To instruct educators in the usage of statistics applications such as Excel software
3. To expand secondary school computer labs
4. To implement the use Excel software in statistical exercises, by putting practical statistical exercises in the curriculum.
5. Lastly, we advise that Excel software be used in universities for upcoming research projects as well as in all secondary schools for teaching and studying statistics in other Rwandan districts.

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