

**PERCEPTION OF TEACHERS ON FACTORS INFLUENCING THE  
INTEGRATION OF INFO-GRAPHIC IN MATHEMATICS INSTRUCTION IN  
MINNA, NIGER STATE**

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## **ABSTRACT**

The study investigated the perception mathematics teachers on the factors influencing the integration of infographics in secondary schools in Minna metropolis Niger State, Nigeria. The use of infographics has become popular in recent times as a visualization tool to present data and information in an attractive and interesting manner. Teachers' ICT capabilities and disposition play a vital role in the integration of infographics in education. This study aims to investigate the use of infographics in mathematics teaching and learning in Minna, Niger state, using a survey research approach. The population of the study consists of secondary school mathematics teachers who have experience in incorporating infographics into their instruction. A sample of 20 teachers was randomly selected, and a self-designed closed-ended questionnaire was used for data collection. The data were analyzed using descriptive and inferential statistics, including mean, standard deviation, and t-test analysis. The study provides insight into the factors influencing the integration of infographics in mathematics instruction and aims to bridge the gap in previous research studies.

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## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

Recently, infographic design has been a popular design approach and a visualization tool. It is aimed to present the messages to the receivers in a more interesting and attractive way to communicate with them and provide important data and knowledge, (Hassan, 2016). Meirelles (2013) refers to infographics as presentations of data, information, text along with the visual elements such as figures, symbols, maps and diagrams. Main aim of the infographic design could be considered as increasing the interaction of the user with the content and making the content more meaningful, Infographics is a way of visual interpretation of the data and information visually in a space limited to aesthetical format.

Therefore, Teachers' ICT capabilities and disposition are vital in the process of ICT integration as acknowledged by a variety of countries and organizations both international and local (Markauskaite, 2017). This implies that teacher (play) an essential component in the integration of info-graphics or (ICTs) in all levels of education as agents and catalysts of curriculum change and the instructional process (Foori, 2019). Although most of these endeavors have not equally emphasized on the role of the teacher in the instructional process (e.g., for planning, delivery, evaluation and reporting) with the help of info-graphics, other extant studies indicate a number of teacher-related factors being possible reasons for the use of computers in pedagogy.

Some of these teacher-related factors are gender, age, and teachers experience with computers, teacher self-efficacy, attitudes towards computers, pedagogical beliefs and perceived social influence (Tondeur, 2020). However, these studies revealed inconsistent relationship between these teacher-related variables and computer use. This inconsistency does not afford the generalizability of findings to different cultural (or country) settings other than those they were

studied. The observed inconsistency could be attributed to cultural differences (that is, computer use is dependent on geographical, technological or social development among countries). Teacher's subject specialization could be another contributing factor to the discrepancy in the use of ICT in secondary schools (Fakomogbon, 2018).

The teachers taught us using ceremonial objects and we enjoyed it. This had no fear of exams and students had to go to school and the parents were happy seeing them going to school. It was now realized that it was a wonderful time spent in life but during that most student do not know what they were learning and what they wanted to learn. They used to believe their teachers never believed that they were wrong. It is always unfair to say that the teachers were wrong in their methodologies. They tried their best to make students understand. During that time students even have a glance to the modern tools of teaching and learning. This is simply because it was not the time of multimedia actually. It was quite unfamiliar stuff for most students without any doubt because maybe they were too young to know about that (Tijjani, 2019).

The perception towards mathematics had been changed as the methods of teaching had been changed too. There was no fun and entertainment in mathematics class because the teachers used to impose their ideas to the students. Usually in mathematics class most teachers used to enter the classroom and just solve the problem. There were so many unanswered questions in students mind so; Up to lower secondary level (SSI) was not good at mathematics because their perception to this subject was negative. The reasons for so many negative perceptions were the problem-solving method used by the teachers (Salako, 2019).

This study therefore sought to provide further insight into this inconsistency by investigating the Perception of teachers on factors influencing the integration of info-graphic in mathematics instruction in Minna, Niger State

## **1.2 Statement of the problem**

Knowledge is expanding day by day so teaching becoming one of the most challenging professions in our society. While learning mathematics, learner expect from facilitator to facilitate meaningful learning rather than just knowledge and skills. In this modern period the use of info-graphics in teaching mathematics provides new possibilities in teaching profession. Different research indicates (Bansal, 2017) that ICT can change the way of teaching and it is useful in supporting more student-centered approaches to instruction and in developing the higher order skills and promoting collaborative activities.

Also, UNESCO (2019), state that the use of info-graphics or ICT promotes the quality in education. That is why, mathematic teachers should be provided with different professional development trainings including use of ICT in the mathematics classroom according to the demand of time. In the context of Nepal, the quality of education is poor and one of the approaches to address this problem is by integrating info-graphics and ICT based teaching learning approach to get quality in education (Bhatta, 2018).

As a teacher as well as a student it was observed that school level students feel mathematics as a boring subject and harder one. Most of the students were not able to understand mathematics due to their perception towards math. Basically, in most of the mathematics class, the way of teaching was mechanical problem-solving method and there was no appropriate visualization of the things used in mathematics and it is oriented towards marks only. In the context of Nepal most of the mathematics class teacher teaches the student only for getting marks so they just solve the problem, (Flecknoe, 2018)

Use of ICT has a very positive impact in teaching and learning mathematics, also indicates that ICT assists student to learn. Use of info-graphics is helpful for students and also for teachers to teach mathematics effectively and dynamically as they are more visual, interactive and stimulating. In addition, student also becomes motivated while ICT instruments are used in teaching. The effectiveness of ICT in teaching mathematics also depends on the teachers“



interest, ability and knowledge about it. According to Kislenko, (2020), the student's perception towards mathematics teaching and learning plays an important role in teaching learning activities and the student's perception towards mathematics is important but it is a hard and boring subject because when they start to solving problems in mathematics, they are not able to visualize the problem so they fails many times while solving the problems. Therefore, my research focused on the Perception of teachers on factors influencing the integration of info-graphic in mathematics instruction in Minna, Niger State

### **1.3 Aims and Objectives of the study**

The aim of this study was to specifically identify the following objective:

1. Secondary teachers perceive, make sense of, and understand the infographics training experience
2. Infographics be utilized in secondary educational contexts
3. secondary mathematics teachers perceive to be factors that facilitate and barriers that impede the integration of infographics in mathematics in secondary school learning environments
4. Secondary school mathematics teachers perceive to be the skills development, training, and support needs associated with implementation of infographics?

### **1.4 Research Questions**

1. How do secondary teachers perceive, make sense of, and understand the infographics training experience?
2. How can infographics be utilized in secondary educational contexts?
3. What do secondary mathematics teachers perceive to be factors that facilitate and barriers that impede the integration of infographics in mathematics in secondary school learning environments?

4. What do secondary school mathematics teachers perceive to be the skills development, training, and support needs associated with implementation of infographics?

### **1.5 Scope of the Study**

This study was carried out in secondary school in Minna, Niger state. Niger State is located in North-Central zone of Nigeria. The scope of this research work was focused and aimed specially on secondary school mathematics teachers.

### **1.6 Significance of the Study**

The usage of infographic and as a tool for teaching-learning process which can be used to enhance, facilitate and make learning permanent therefore, this research would be of great relevance to junior secondary school students, mathematics teachers and educators, researchers, curriculum designers and educational planners, government and non-governmental organizations, parents and guardians as well as other relevant stakeholders in the field of mathematics.

To students, the essence of this study is to make understanding and assimilation easier during the process of teaching and learning mathematics, as the subject is being taught from a more theoretical stands point and lacks the practicality of a concept which is attributed to the lack of resources.

To teachers the study is to reveal their perception on the use of infographics. Furthermore, it will help the effectiveness of graphic and pictorial materials in teaching mathematics.

It would be of benefit to the curriculum planners in other for them to take into consideration the use of infographic and pictorial materials in teaching process while designing a curriculum for secondary school students.

To the parents they will benefit from this research as it would enable them to use infographic and pictorial materials in teaching their children at home which will help support teacher's effort.

Finally, the study could help stir up government and non-governmental organizations to emphasize the academic benefits of infographic in teaching and learning.

### **1.7 Delimitations**

In this research, I have concerned on the perceptions of students and teachers of mathematics in senior secondary school students in Minna, Metropolis of Niger State, where one can observe use of info-graphics in mathematics classroom. The use of ICT can be seen from various perspectives in mathematics however my study is focused on perception of teachers by the use of info-graphics in mathematics. The uses of multimedia like the use of projector, computer, Laptop are considered as the ICT tools.

### **1.8 Operational Definition of Terms**

**Achievement:** is the degree or extent to which students, teachers or an institution has gained or ascertained a long term or short educational goal.

**Cognitive:** is relating to, being, or involving conscious intellectual activity (such as thinking, reasoning, or remembering).

**Graphic:** it is a computer-generated image as viewed on a screen forming part of a game or film.

**Materials:** it is something used for or made the object of study or a substance from which something is made or can be made.

**Mathematics:** is the science of numbers and their operations, interrelations, combinations, generalizations, and abstractions and of space configurations and their structure, measurement, transformations, and generalizations.

**Pictorial:** it is of or relating to a painter, a painting, or the painting or drawing of pictures.

**Teaching:** is the process of impacting knowledge, skills or values.

**Motivation:** is the willingness of action especially in behavior.

**Interest:** is an attention that is given to or received from someone or something.

## **CHAPTER TWO**

### **2.0 REVIEW OF LITERATURE**

#### **2.1 Thematic Review**

According to the research purpose it searched for existing literatures from different resources which were supportive for my research study. According to the research questions, it focuses on different related materials for literature review that were use of ICT in classroom, ICT and mathematics, teachers and students“ perceptions towards use of ICT in mathematics will be discussed on following. ICT.

According to United Nations Educational, Scientific and Cultural Organization (UNESCO), the term information and communication technologies According to United Nations Educational, Scientific and Cultural Organization (UNESCO, 2020), the term information and

communication technologies. In the same way several educational organizations have started to develop technology-related standards. In the US the National Council of Teachers of Mathematics (NCTM) considers technology as one of their six principles for school mathematics: „Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students’ learning” (NCTM, 2020).

## **2.2 ICT in Mathematics**

Students nowadays live in a world where ICT plays a central role in their daily lives. They enter the classroom not only having encountered rich digital experiences but also being part of a society influenced by new technologies (Chrysanthou, 2018). In order for them to succeed in our digital culture, they need to be equipped not only with basic but also higher-order skills. The implication for the teaching and learning of mathematics is that there should be a move from emphasizing memorization of facts by learners to a more learner-centered approach where learners enhance on their questioning, elaboration, explanation and other verbalization mechanism, which contribute to the development of problem solving and higher-order thinking skills in mathematics (Molia,2016).

So a deep understanding of mathematics teaching learning environment imply that educators will know when and how to use the ICT resources and for what purposes in mathematics. But generally, most of teaching and learning give more emphasize on problem solving method so, in general student feel boredom while learning mathematics.

## **2.3 ICT in Classroom**

One of the most interesting research fields in mathematics education concerns how to help students come to a „proper” understanding of mathematics and to change the perception towards mathematics as a harder and boring subject. A great number of teachers and researchers these days try to discover the impact of technology on teaching and learning of

mathematics (Chrysanthou, 2018). There have been several research works regarding ICT and school mathematics and some research works have explored out the role of ICT in teaching and learning mathematics. For example, The British Educational Communications and Technology Agency (BECTA, 2017) argues that technology „improves attainment and helps raise standards, supports school improvement and efficiency, strengthens local authority data management and helps to personalize learning’. The use of ICT, wherever it is possible in the classroom, makes the teaching process more efficient and strengthens knowledge; there are claims that ICT has the potential to enhance cognitive learning, develop problem solving and higher-level thinking skills and extend physical and mental abilities (Loveless, 2018).

According to Bottle, (2019), In the first half of the twentieth century, mathematics was viewed as a set of procedures and principles that had to be taught before any potential mathematical understanding could take place. More recently this narrow view of mathematics has been superseded by a more progressive view of mathematical understanding that describes mathematics as being part of everyday life, wrapped up in culture and social practices". That is mathematics should be an enjoyable for all students and that should be possible by the effective use of ICT. Teacher should not teach mathematics as only a useful subject but also include student exciting and challenge so for this the use of ICT is a major current area of development in mathematics education. The first wave of technology was the pocket calculator and then microcomputers. Computers were first used in the classroom as aids in numerical calculation; however, their most attractive development in the past years has been their potential to create and manipulate graphic images (Fey, 2019).

By using ICT in teaching mathematics difficult problems can be solved easily and very quickly. This saves the teacher’s labor and time and the classroom will run interestingly. And also by using ICT in teaching mathematics can help teachers to express clearly what they want to express in the class and students to understand what the teachers have expressed through the

demonstration, visualization and experimentation (Poudel, 2017). Similarly, Poudel argues that using ICT in mathematics class makes student enjoy the audio and visual activities and the interaction among themselves and it also draw the student attention towards learning. In general students consider mathematics as boring and difficult subjects and if we use ICT instrument in mathematics class it will be helpful to reduce such misconception among such student. This can be possible to some extent due to the properties of computer and media instruments which can easily change the pictures, size, action etc and help attract the students and make concentrate on the matter that teacher is presenting. A prominent trend in computerized instruction has been to make mathematics fun, and indeed, computers seem capable of making almost anything fun. (Dugdale, 2019).

#### **2.4 Teacher's and students' perceptions towards use of Info-graphics in Mathematics**

Many countries in Europe and Asia have determined the importance of ICT and have integrated it into their schools and today it is becoming compulsory to use info-graphics in teaching and integrate it into subject teaching (Osamah, 20018). ICT will enhance the way of teaching and it open many new opportunities for both math teachers and students to explore and improve their knowledge and to be creative. Depending upon the philosophical orientation behind the teaching and learning activities, different teachers have different perceptions towards use of info-graphics. But moreover, many teachers accept that by the use of info-graphics enables students to produce many examples and support their work. Also, teachers consider that the use of ICT tools and resources could support teaching and learning activities (Hennessy, 2019). ICT based tools like computer, laptop, calculator etc. allowing students to use graphics, images and text together, to demonstrate their understanding of mathematical concepts (Jarrett, 2018). So by using info-graphics in mathematics Students visualize the problem which helps to understand the problem which helps to change the positive perception towards mathematics.

## **2.5 Theoretical Review**

Researches and theories are interrelated and inseparable. “A theory provides a conceptual framework for research. Research, in turn, contributes to the development of theory” (Pant, 2012). A theory plans and directs the research studies. Any philosophies must be supported by any theory for its pedagogical implementation. Likewise, the Use of ICT supported by many theories. Here I will discuss in brief about these theories.

### **2.5.1 Constructivism**

The word “construct” is to build or make something. We always use this word in our daily life. In the field of education, “construct” means to develop an idea or a belief that is based on various pieces of evidence which are not always true. Many theories/approaches have been introduced in teaching/learning field. The “Constructivism” has also developed as a philosophy in different discipline. It has become a strong means in teaching/learning approach. This point of view maintains that people actively construct new knowledge as they interact with their environment. Constructivist theory of learning believes that the knowledge can be developed within the classroom, being participated in different activities, using different learning agents and through different meaning making processes. One of the key assumptions of constructivism is that “Knowledge is symbolically constructed by the learners who are making their own representations of action” (Gagnon, 2020.).

The guideline principle of constructivist learning theories is the learner’s own active initiative and control in learning, and personal knowledge construction that is self- regulation of learning (Chan, 2019). Most of the educators utilizing a constructivist perspective may emphasize an active learning environment that may incorporate learners centered and problem-based learning in which students are actively engaged in critical thinking activities so Use of info-graphics in classroom is based upon the assumptions of constructivism where teachers should play role of



instructor and students are actively participate in classroom. In constructivist classroom student try to find the solution of the problems by learning in a group where students are motivated to do their work themselves and find the solution and teacher work is just to facilitate the student. By using info-graphics in math classroom student will develop their knowledge by visualizing and here teacher role is just as a facilitator. Further, in this type of constructivist class student are motivated to share their ideas, expand their knowledge through ICT or by utilizing their experience (Tyler, 2018). All in all, ICT supports constructivist pedagogy where students use technology to explore and reach an understanding of mathematical concepts where it promotes higher order thinking and better problem-solving strategies (Ittigson, 2018).

### **2.5.2 Engagement Theory**

Engagement theory is a framework for technology-based teaching and learning. The fundamental idea underlying engagement theory is that student must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks. While in principle, such engagement could occur without the use of technology, but technology can facilitate an engagement in different ways, which are difficult to achieve otherwise. Thus, engagement theory is intended to be a conceptual framework for technology-based learning and teaching (Shneiderman, 2019).

Through this engagement theory the teaching and learning activities focuses on the experimental and self-directed learning. Engagement theory specially promotes students' activities that involve cognitive processes such as creating, problem solving, reasoning, decision making and evaluation in which students are motivated to learn due to the meaningful nature of the learning environment and activities (Kearsley, 2018). In my research this Engagement Theory supported me to understand the teachers' and students' involvement in info-graphics based classroom and the perception of teacher and students towards the use of info-graphics in classroom.

### **2.5.3 Collaborative**

Now in this 21st century collaboration approaches in mathematics as well as in other subjects also are very essential and it helps to promote learning and create easy environment with learner and facilitator. "Group learning is more authentic because it more closely approximates work palace activities and adult learning "(Tobin, 2018). Piaget also advocates that learning is the active participation of learner not the passive receiving facts. Collaborative classroom is more in collaborative classroom students are encouraged and motivate to learn and student are more interested while learning in collaborative classroom. In a collaborative classroom teacher is just a mediator and in the presence of teacher students are discussed the topic given by teacher and they can generate their own concept regarding that topic by discussing among their group activities so Use of info-graphics in classroom is based upon the assumptions of collaborative approach. According to BECTA (2017) by Using info-graphics in mathematics classroom students in pairs or groups teachers are able to gain deeper insights into students understanding and progress. So, by using info-graphics resource is able to help to understanding and learn from such collaboration.

### **2.6 Empirical Review**

For my research proposal I went through different books, journals and researches which were carried out in relation to use of info-graphics in mathematics classroom for my research. Some research findings have shown that info-graphics has a significant impact on mathematics and its teaching and learning. For example, in schools that provide good info-graphics learning opportunities, pupils achieve higher results in the core subjects of English, Mathematics, and Science (BECTA, 2018). I found that Pangani (2019) has conducted research on "Use of info-graphics in Schools: Exploring Opportunities and Challenges.

## 2.7 Summary

The purpose of the study was to see how the schools are using info-graphics by the administrators, teachers and students. In his research he has also expressed the challenges and opportunities of using ICT in schools. He has adopted interpretive paradigm for his study. He has used semi-structured interview schedule with open ended questions, observation check list/guideline and field diary as tools to generate primary qualitative data. The major findings of the research are ICT are used for Facilitate administration, enhance classroom and to strengthen communication. Similarly, Moila (2016) has conducted research on. The Use of educational technology in Mathematics Teaching and Learning: An Investigation of a south African Rural Secondary School. The Purpose of the study was to investigate the use of info-graphics in mathematics teaching and learning. The investigation followed a mixed method approach that was more evaluate and as one case was investigated it was a case study. From this research it was found that there is no plan on the use of educational technology tools in mathematics teaching and learning, inadequate educators" training on the use of educational technologies in teaching and learning and lack of relevant educational technology tools for rural schools.

For my research proposal I went through different books, journals and researches which were carried out in relation to use of info-graphics in mathematics classroom for my literature review and most of them, I found that they have more or less similar type of conclusion that info-graphics helps of a lot for learning mathematics. By reading different journals and book I found that there are a number of issues about the research and evidence on the effective use of info-graphics in teaching in schools. Research is rarely comparative in nature and so cannot help us to identify whether info-graphics is better than other approaches and this make it difficult to decide whether the use of info-graphics is cost-effective (Higgins, 2020) though these various

research studies have been carried out in the field of info-graphics in mathematics, yet I felt a lot of gaps prevailing in these various researches carried out. Although, I don't claim that my research will be completely different than these previous researches, but still, I can claim that my research will be quite different from those researches. My research will be also similar with them in a sense that all of these researches including mine are concerned with the info-graphics in mathematics which helps to change the student's perception towards mathematics. My research focuses also on the same matter. Even the methodologies applied in the researches can also more or less similar to them but still there lies the vast gap between my research and theirs.

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

This chapter will be discussed under the following headings: research design, population of study, sample and sampling techniques, instrument of data collection

### **3.1 Research Design**

In order to analyze the perception of teachers on factors influencing the integration of info-graphic in mathematics instruction in Minna, Niger state, this study used a survey research approach.

"Survey research design" refers to the quantitative research methodology in which researchers send surveys to a sample or the entire population to describe the views, attitudes, habits, or characteristics of the population (Tahmina, 2018). Glasow (2005) asserts that both those who will conduct the survey and those who will use the survey data must be involved in its design. Users of the data should choose the variables to be measured, the estimates that will be necessary, the reliability and validity needed to ensure the utility of the estimates, and any survey-related resource limitations. The survey design is a technique for getting data from a pre-selected group of people who are aware of the goals of the study. The survey design collects data from a small population by utilizing a questionnaire to select and analyze data from the group.

### **3.2 Population of the Study**

The population of the study for "Perception of teachers on factors influencing the integration of info-graphics in mathematics instruction" would be mathematics teachers at the secondary school level or higher, who have experience with incorporating info-graphics into their instruction. The sample could be drawn from public and private schools in a particular geographic area or across a broader region, and could include teachers with varying levels of experience and educational backgrounds. The study could also include teachers who specialize in teaching math to students with different abilities and learning styles.

### **3.3 Sample and Sampling Techniques**

The study's sample consisted of senior secondary school Mathematics Teachers in Minna, Niger state. A total of twenty (20) sample population was created by randomly selecting twenty (20) mathematics teachers.

### **3.4 Instrument for Data Collection**

The instrument for data collection for this study will be a self-designed closed ended structure questionnaire titled “Perception of Teachers on Factors Influencing the Integration of Info-Graphic in Mathematics Instruction in Minna, Niger State”. It will consist of four sessions that cater for the four research questions for this study.

### **3.5 Validity of Research Instrument**

To ensure the validity of the study tool, the researchers used content validity. In order to be viewed as representative of all sides of the concept and to produce accurate results, a survey or measuring procedure must be content valid (Middleton, 2019). Two specialists from Minna's Federal University of Technology altered the research tool as a result. These professionals made some substantial alterations by adding and removing components.

### **3.6 Reliability of Research Instrument**

The test-retest reliability approach is one way to assess an instrument's stability and dependability over time. The reliability of the instrument was assessed using the test-retest methodology. The questionnaire was distributed to fifteen (15) respondents chosen at random. The responses of the respondents were examined following the instrument's first and second administrations. The scores were calculated using the Person's Product Moment Correlation Coefficient (PPMC), which gave a result of  $r=0.78$ .

### **3.4 Method of Data Collection**

Data collection for the investigation was done using the questionnaire. The teachers' participation in the study was crucial because they made up the sample, therefore it was explained to them what it was all about. Each participant received a copy of the survey from the researcher. It was expected of each respondent to give their best effort because the entire questionnaire's content was centered on topics related to their studies. Because of this, sufficient time was given to describing how to check the boxes or give an answer to the questions on the research questionnaire.

### **3.5 Method of Data Analysis**

The data collected from the sampled teachers were analyzed using descriptive and inferential statistics, the descriptive statistics was used to provide answers to the research questions using mean and standard deviation. T-test analysis was used to test research hypotheses; the significant difference was ascertained at alpha level of 0.05. The Statistical Package for Social Science (SPSS Version 23) was used for the analysis.

## **CHAPTER FOUR**

### **4.0 RESULTS AND DISCUSSION**

#### **4.1 Data Obtain from the Research Question**

**Research Question 1:** How do secondary school mathematics teachers perceive, make sense of, and understand the infographics training experience?

**Table 4.1: Mean and Standard Deviation of secondary school mathematics teachers' perception on infographics training experience in Minna metropolis**

S/N	Item	N	$\bar{x}$	Std. Dev
1.	I have a good understanding of what infographics are and how they can be used in mathematics instruction (Projectors, digital board, tablets, laptops, smartphones)	20	3.60	0.51
2.	Infographics are an effective tool for enhancing students' learning of mathematics.	20	4.27	1.28
3.	I am confident in my ability to use infographics to teach mathematics concepts.	20	3.47	1.06
4.	The training I received on infographics was sufficient to prepare me to use them in my mathematics instruction.	20	3.80	1.52



5. I think using infographics in class takes much time	20	3.33
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0.72

**GRAND MEAN**

**3.69**

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Decision mean = 3.0

Table 4.1 shows the mean and standard deviation of secondary school mathematics teachers' perception on infographics training experience in Minna metropolis. The table shows the calculated means score of 3.60 with Standard Deviation of 0.51 for item one, mean of 4.27 with Standard Deviation of 1.28 for item two, mean of 3.47 with Standard Deviation of 1.06 for item three, mean of 3.80 with Standard Deviation of 1.52 for item four, mean of 3.33 with Standard Deviation of 0.72 for item five. The table further revealed that, the grand mean score of responses to the 5 item is 3.69 which is greater than the decision mean of 3.0. This implies that secondary school mathematics teachers perceive, make sense of, and understand the infographics training experience

**Research Question 2:** How can infographics be utilized in secondary educational contexts?

**Table 4.2: Mean and Standard Deviation of teachers Responds on utilization on integrating infographics Instruction in Minna Metropolis.**

S/N	Item	N	$\bar{x}$	Std. Dev
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1. Infographics can be used to make mathematics concepts more 0.99 accessible to students.	20	4.87
2. I frequently use infographics in my mathematics instruction. 0.64	20	5.13
3. I have the ability to create a simple infographics chart for 0.63 teaching and learning mathematics	20	5.40
4. I am capable of using infographics to support Various 1.10 students learning styles	20	3.07
5. I am competent in the utilization of infographics in teaching 0.74 and learning.	20	3.13
<b>GRAND MEAN</b>		<b>4.32</b>

Decision mean = 3.0

Table 4.2: mean and standard deviation of lectures' responds on utilization on integrating infographics Instruction in Minna Metropolis. The table reveal the computed mean score of means score of 4.87 with Standard Deviation of 0.99 for item one, mean of 5.13 with Standard Deviation of 0.64 for item two, mean of 5.40 with Standard Deviation of 0.63 for item three, mean of 3.07 with Standard Deviation of 1.10 for item four, , mean of 3.13 with Standard Deviation of 0.74 for item five. which is greater than the decision mean of 3.0. This implies that secondary mathematics teachers utilize and integrate infographics instruction in Minna metropolis

**Research Question 3:** What do secondary mathematics teachers perceive to be factors that facilitate and barriers that impede the integration of infographics in mathematics in secondary school learning environments?

**Table 4.3: Mean and Standard Deviation of teachers Responds on factors that facilitate and barriers that impede the integration of infographics in mathematics in secondary school learning environments?**

S/N	Item	N	$\bar{x}$	Std.
	<b>Dev</b>			
1.	Adequate technical resources are available to support the 0.74 use of infographics in mathematics instruction.	20	3.13	
2.	The attitudes of my colleagues are not a barrier to my use of 1.34 infographics in mathematics instruction.	20	4.73	
3.	I avoid using infographics when I can 0.85	20	5.00	
4.	I think using infographics in class takes too much time. 1.24	20	3.40	
5.	I would be a better teacher if I know how to use infographics 0.80 chart in teaching and learning.	20	4.93	
<b>GRAND MEAN</b>			<b>4.23</b>	

Decision mean = 3.0

Table 4.3: mean and standard deviation of mathematics teachers responds on factors that facilitate and barriers that impede the integration of infographics in mathematics secondary school learning environments for Minna metropolis The table reveal the computed mean score of means score of 3.13 with Standard Deviation of 0.74 for item one, mean of 4.73 with Standard Deviation of 1.34 for item two, mean of 5.00 with Standard Deviation of 0.85 for item three, mean of 3.40 with Standard Deviation of 1.24 for item four, mean of 4.93 with Standard Deviation of 0.80 for item five. which is greater than the decision mean of 3.0. This implies that mathematic teachers in Minna are positive on the factors that facilitate the integration of infographics.

**Research Question 4:** What do secondary school mathematics teachers perceive to be the skills development, training, and support needs associated with implementation of infographics?

**Table 4.4: Mean and Standard Deviation of mathematics teachers Responds on the skills development, training, and support needs associated with implementation of infographics**

S/N	Item	N	$\bar{x}$	Std. Dev
1.	I require additional training and support to effectively use 0.72 infographics in mathematics instruction.	20	5.33	
2.	I believe that ongoing professional development 1.34 opportunities would be helpful in further developing	20	4.93	

my skills in using infographics in mathematics instruction.

3. I want to learn more about infographics	20	4.93
0.88		
4. Trainings and adequate training should be provided	20	3.13
0.99 for teachers more often		
<b>GRAND MEAN</b>		<b>4.58</b>

Decision mean = 3.0

Table 4.4: Mean and Standard Deviation of mathematics teachers Responds on the skills development, training, and support needs associated with implementation of infographics The table reveal the computed mean score of means score of 5.33. with Standard Deviation of 0.72 for item one, mean of 4.93 with Standard Deviation of 1.34 for item two, mean of 4.93 with Standard Deviation of 088 for item three, mean of 3.13 with Standard Deviation of 0.99 for item four. which is greater than the decision mean of 3.0. This implies that mathematics teachers are positive on towards the skill development training, and support needs associated with implementation of infographics

### 4.3 Summary of the Findings

From the data collected, computed, analyzed and interpreted in this study, the findings are summarized as follows:

1. Secondary school mathematics teachers perceive, make sense of, and understand the infographics training experience
2. Secondary mathematics teachers utilize and integrate infographics instruction in Minna metropolis

3. Mathematic teachers in Minna are positive on the factors that facilitate the integration of infographics.

4. Mathematics teachers are positive on towards the skill development training, and support needs associated with implementation of infographics

## **CHAPTER FIVE**

### **5.0 CONCLUSION AND RECOMMENDATIONS**

In this chapter, the summary of the research work will be discussed. Conclusions arrived at will also be discussed and viable recommendations will be made.

#### **5.1 SUMMARY**

Based on the analysis conducted in Chapter Four, it can be concluded that the majority of the teachers surveyed have a good understanding of infographics and their potential use in mathematics instruction. They also believe that infographics can enhance students' learning of mathematics and are confident in their ability to use them in teaching mathematics concepts. However, the effective use of infographics is not hindered by inadequate technical resources and unsupportive attitudes from some colleagues as they are all positive and open to improvement, even as it is been seen as a further advancement in instruction delivery. The school environment is also actively supportive of the use of infographics in mathematics instruction., Though it is recommended that additional training and support be provided to teachers to enhance their skills in using infographics for mathematics instruction. Ongoing professional development opportunities should also be made available to further develop teachers' skills in using infographics.

#### **5.2 CONCLUSION**

In conclusion, the findings of this study indicate that there is a need to address the factors that impede the integration of infographics in mathematics instruction. Teachers need to be adequately trained and provided with the necessary resources to effectively integrate infographics into their teaching practices. The school environment could also be made more conducive despite the positive results, to the use of infographics in mathematics instruction.

By addressing these issues, the potential benefits of infographics in enhancing students' learning of mathematics can be fully realized.

### **5.3 Limitations of the Study**

The following are the limitations of this study:

1. This study was limited to Minna metropolis in Niger State with department of mathematics were sampled.
2. Teachers in Minna metropolis who are teaching other courses were not selected as part of the sample for this study. Selection of sample was limited to teachers in department of mathematics in Minna metropolis in Niger State.
3. Some teachers do not give correct opinion about the subject matter, rather some of them just ticked the questionnaire, even though the concept of this research sounds strange to them.

### **5.3 RECOMMENDATIONS**

Based on the findings of the research, the following recommendations can be made:

1. Provide additional training and support for teachers to enhance their skills in using infographics for mathematics instruction.
2. Make ongoing professional development opportunities available to further develop teachers' skills in using infographics in mathematics instruction.
3. Provide adequate technical resources to support the use of infographics in mathematics instruction.
4. Further improve on supportive educational environment for the use of infographics in mathematics instruction.



By implementing these recommendations, the effective use of infographics in mathematics instruction can be more enhanced, and the potential benefits of infographics in enhancing students' learning of mathematics can be fully realized.

#### **5.4 SUGGESTIONS FOR FURTHER RESEARCH**

Based on the findings of this research, the following suggestions for further research can be made:

1. Conduct a similar study in other regions of Nigeria to determine if the findings of this study can be generalized.
2. Investigate the impact of infographics on students' academic achievement in mathematics.
3. Conduct a comparative study of the effectiveness of infographics and traditional teaching methods in mathematics instruction.
4. Explore the perceptions of students on the use of infographics in mathematics instruction

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## **APPENDIX A**

Department of Science Education  
School of Science and Technological Education  
Federal University of Technology  
Minna, Niger State.  
March, 2022.

Dear Respondent,

## LETTER OF INTRODUCTION

I **Ogunremi Mubarak Abiola** an undergraduate student of Federal University of Technology Minna, Niger State with the matriculation number 2015/1/63707BT

I am carrying out a research title ‘Perception Of Teachers On Factors Influencing The Integration Info-Graphic In Mathematics Instruction In Minna, Niger State’

I will therefore appreciate if you could kindly fill in the questions contained here objectively, all information received will be used solely for academic purposes and treated with high confidentiality.

Yours Sincerely,

**Ogunremi Mubarak Abiola**

**09039354241**

## APPENDIX B

### QUESTIONNAIRE

#### QUESTIONNAIRE ON " PERCEPTION OF TEACHERS ON FACTORS INFLUENCING THE INTEGRATION OF INFO-GRAPHIC IN MATHEMATICS INSTRUCTION IN MINNA, NIGER STATE

Dear respondent,

This questionnaire is design to get your response on the above subject matter. Any statistics given will be use strictly for this study and will be used with utmost confidentiality.

Please, kindly give responds on the questions in the questionnaire to provide a data base for this study. Any information provided would be treated with confidentiality.

#### **SECTION A: Respondent’s Data**

Name of Respondent .....

Gender:    
Male Female

**SECTION B: How do secondary teachers perceive, make sense of, and understand the infographics training experience?**

**Note:** SA (Strongly agree); A (Agree); D (Disagree); SD (Strongly Disagree)

S/N	Questions	SA (4)	A (3)	D (2)	SD (1)
1	I have a good understanding of what infographics are and how they can be used in mathematics instruction				
2	Infographics are an effective tool for enhancing students' learning of mathematics..				
3	I am confident in my ability to use infographics to teach mathematics concepts.				
4	The training I received on infographics was sufficient to prepare me to use them in my mathematics instruction				



<b>5</b>	I think using infographics in class takes much time.				
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**SECTION C: How can infographics be utilized in secondary educational contexts?**

**Note:** SA (Strongly agree); A (Agree); D (Disagree); SD (Strongly Disagree)

<b>S/N</b>	<b>Questions</b>	<b>SA (4)</b>	<b>A (3)</b>	<b>D (2)</b>	<b>SD (1)</b>
<b>1</b>	Infographics can be used to make mathematics concepts more accessible to students.				
<b>2</b>	I frequently use infographics in my mathematics instruction.				
<b>3</b>	I have the ability to create a simple infographics chart for teaching and learning mathematics				
<b>4</b>	I am capable of using infographics to support Various students learning styles				
<b>5</b>	I am competent in the utilization of infographics in teaching and learning.				

**SECTION D: Questions about Factors that Facilitate and Impede Infographics**

**Integration in Mathematics Instruction**

**Note:** SA (Strongly agree); A (Agree); D (Disagree); SD (Strongly Disagree)

S/N	Questions	SA (4)	A (3)	D (2)	SD (1)
1	I have a good understanding of what infographics are and how they can be used in mathematics instruction				
2	The attitudes of my colleagues are a barrier to my use of infographics in mathematics instruction.				
3	I avoid using infographics when I can				
4	I think using infographics in class takes too much time.				
5	I would be a better teacher if I know how to use infographics chart in teaching and learning.				

**SECTION E : Questions about Skills Development, Training, and Support Needs**

**Associated with Infographics Implementation**

**Note:** SA (Strongly agree); A (Agree); D (Disagree); SD (Strongly Disagree)

S/N	Questions	SA (4)	A (3)	D (2)	SD (1)
1	I require additional training and support to effectively use infographics in mathematics instruction.				
2	I can share teaching material through infographics chart				
3	I believe that ongoing professional development opportunities would be helpful in further developing my skills in using infographics in mathematics instruction.  I can share teaching material through infographics chart				

<b>5</b>	Trainings and adequate training should be provided for teachers more often				
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