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The Readiness of Teachers to the Application of GIS and ICT in Teaching Geography at the Secondary Level in Limpopo province, South Africa

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ABSTRACT

The use of information and communication technology (ICT) and geographic information systems (GIS) in the teaching of Geography in higher secondary schools is a modern technique in Geography pedagogy. The goal of this study was to look into the readiness of Geography teachers in Limpopo's secondary schools to include ICT and GIS in routine teaching-learning processes. The study employed a mixed research approach, including the descriptive survey research design, which was implemented in this research. The participants of the study schools consisted of 15 teachers from 5 schools in Limpopo. The schools were chosen using simple random sampling, with the teachers being selected purposively. Questionnaires and interviews were scheduled at every selected school for a certain period, which gave participants enough time to reflect on the questions. The data collection procedure was followed by data analysis. Quantitative data (questionnaires) were processed and analysed with the Statistical Package for Social Science (SPSS), version 24.0. The study findings outlined that regardless of the age or experience in the teaching field of Geography teachers, many schools in Limpopo, especially those found in deep rural have teachers who are not prepared to integrate ICT and GIS when teaching due to a lack of adequate access to good internet, electricity and limited equipment such as laptops. The study recommended that the school administration and Government stakeholders should make decisions on the sort of ICT infrastructure to purchase as well as the technical assistance required. The study contributes to academic scholarship by exploring teacher preparedness, thereby identifying gaps in skills and resources that require attention.

Keywords: *Teachers' readiness, GIS, ICT, Geography, Interviews, Questionnaire, Mixed approach.*

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INTRODUCTION

ICT is described as the use of electronic media such as Laptops, communications devices, mobile phones, and so on to acquire, process, store, retrieve, and disseminate information.[1] It is made up of software and hardware solutions that facilitate the deliberate transmission of information. GIS is one of the disciplines of ICT, hence it is necessary to assess teachers' readiness to utilise both ICT and GIS. GIS is a comprehensive mapping system that captures, stores, analyses, synthesises, queries, retrieves,

[1] Alessandro Félix Pascoin and José Wilson P Carvalho, "Representações Quantitativas Em Laboratórios Virtuais Para o Ensino de Química," *Revista de Ensino, Educação e Ciências Humanas* 22, no. 2 (2021): 152–59.

manipulates and displays spatial data obtained from the earth's surface in the form of tables, charts, 3D images, and maps according to the richness of the information entered into the database.[2]

GIS and ICT, in particular, have enormous potential to impact learning and teaching, as well as research, in the educational sector at all levels, beginning with the Higher Secondary stage. It aids in the acceleration, enrichment, motivation, and engagement of students during the teaching and learning processes, consequently boosting students' conceptual comprehension.[3] It will also create a conducive learning area, whereby there will be an interaction between the learners and their teacher rather than an environment where only the teacher dominates the lesson.

The use of GIS and ICT in Geography teaching at secondary schools is a current Geography pedagogical strategy.[4] It entails employing cutting-edge technology to educate Geography learners' digital literacy and arming them with the skills required for the fourth industrial revolution.

Most upper secondary schools in Limpopo, particularly those in remote areas, have inadequate internet access to facilitate the teaching-learning process. According to studies, it has made it difficult for Geography instructors and administrators to develop instructional techniques for the essential integration of GIS and ICT at the Secondary educational level, which has the ability to increase students' knowledge and abilities in the subject.[5] In line with popular belief, additional research has discovered that younger Geography instructors are more willing to integrate ICT and GIS when teaching.[6] Hence, the need to find out what challenges old teachers are facing that hinder or make them less ready to apply ICT and GIS in Geography.

The goal of this research is to investigate the readiness of Limpopo high school Geography teachers to use ICT and GIS in ordinary learning and teaching processes. This research is chosen on the basis that it will help discover topics within Geography where GIS and ICT can be effectively applied, unravelling the impacts and hindrances towards applying ICT and GIS when teaching Geography in secondary schools and then proposing potential solutions to the challenges.

The specific objectives of this study are:

- To assess the infrastructural capacity of GIS and ICT for learning and teaching Geography at the Secondary level in Limpopo.
- To identify the perspectives of Geography teachers towards the integration of Geography teaching and learning using ICT and GIS
- To identify the reasons that may prevent Geography instructors from using GIS and ICT.
- To propose future recommendations to improve the utilization of ICT and GIS, and for learning and teaching in Secondary Schools in Limpopo.

LITERATURE REVIEW

Importance of ICT in teaching and learning Geography

According to Rahman et al., ICT is an essential instrument that may be used in teaching Geography since it can improve geographical and educational quality by exposing learners to real-world circumstances.[7] It will give students an opportunity to discover knowledge on their own, and adopting ICT will be an essential necessity for these students in acquiring geographical abilities. Learners will also have the opportunity to witness processes like volcanoes and earthquakes on projectors rather than simply reading about them in textbooks. This will keep students focused, encouraging learner-centred learning. Zhang, Liu, and Hong also maintain that ICT use in teaching leads to positive effects that are attributed to improvement in the lesson quality and preparation by the teacher.[8]

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[2] Fortunate Takawira Gunzo, "Teachers' Perceptions, Experiences and Challenges Related to Using ICTs in Teaching Social Sciences in Marginalised Classrooms in the Eastern Cape Province, South Africa," *Grahamstown: Rhodes University*, 2020.

[3] Pascoin and Carvalho, "Representações Quantitativas Em Laboratórios Virtuais Para o Ensino de Química."

[4] Md. Mizanur Rahman et al., "Psychological Status of Private Commercial Bank Employees in Bangladesh during COVID-19," *Journal of Business Strategy Finance and Management* 3, no. 1–2 (December 28, 2021): 66–73, https://doi.org/10.12944/JBSFM.03.01-02.07.

[5] Pascoin and Carvalho, "Representações Quantitativas Em Laboratórios Virtuais Para o Ensino de Química."

[6] Rahman et al., "Psychological Status of Private Commercial Bank Employees in Bangladesh during COVID-19."

[7] Rahman et al., "Psychological Status of Private Commercial Bank Employees in Bangladesh during COVID-19."

[8] Junjie Hong, Wanlin Liu, and Qing Zhang, "Closing the Digital Divide: The Impact of Teachers' ICT Use on Student Achievement in China," *Journal of Comparative Economics* 52, no. 3 (2024): 697–713.

What are teachers' perceptions of using computers in teaching?

Good attitudes, according to Felix, will lead to good decisions to utilise ICT in the classroom.[9] Felix discovered that teachers' personalities, beliefs, experience, and environmental concerns determined their perceptions of technology usage in research on Taiwanese teachers' perspectives on the elements that influenced technology integration in their teaching.[10] For example, Gunzo discovered that instructors in Turkish schools with limited hardware and software had favourable views towards GIS, resulting in the successful integration of GIS into Geography curricula.[11] Gunzo discovered that ICT awareness, positive attitudes, and perceptions influenced the decision to adopt ICT in the classroom. A teacher who feels that computers play an important part in students' learning.

Challenges to ICT and GIS use in the learning area.

Lack of infrastructure was identified as the primary reason why certain South African instructors were found to be unprepared to use ICT and GIS.[12] For example, research has indicated that in schools where there was limited equipment, such as computers and laptops, teachers were found to be not prepared for ICT and GIS.

Desktop computers rely on a functional fundamental infrastructure, such as a reliable power supply and a solid internet connection. Low levels of physical access to computers in South Africa are owing, in part, to the fact that certain secondary schools do not have continuous electrical supply, including power outages known as load shedding, or that they do not have quality, secure premises. As a result, it is difficult for teachers to use computers or projectors while teaching. Because the power might go out at any time and there is no backup, teaching and learning will be disrupted.

THEORETICAL FRAMEWORK

This study was guided by the Connectivism Learning Theory. Connectivism theory holds that learning is a process of linking specialized nodes or information sources. Furthermore, the ability to see connections between fields, ideas, and concepts is essential. The researcher chose this theory because it is crucial to investigate if teachers are ready for the technological world that is fast evolving. The use of technology in the classrooms supports connectivism; hence, this theory was chosen. According to Demirci, the use of ICT tools necessitates the learners' engagement and active participation.[13] Connectivism allows students and teachers to make decisions about education. Connectivism can thus be implemented in a Geography classroom using ICT and GIS tools. A projector saves teachers time because it can be used to display notes without the teacher having to write notes using chalk.

This research was carried out in the Limpopo Province (Figure 1).

[9] Felix Dube, "Separation of Powers and the Institutional Supremacy of the Constitutional Court over Parliament and the Executive," *South African Journal on Human Rights* 36, no. 4 (October 1, 2020): 293–318, https://doi.org/10.1080/02587203.2021.1925954.

[10] Dube, "Separation of Powers and the Institutional Supremacy of the Constitutional Court over Parliament and the Executive."

[11] Gunzo, "Teachers' Perceptions, Experiences and Challenges Related to Using ICTs in Teaching Social Sciences in Marginalised Classrooms in the Eastern Cape Province, South Africa."

[12] Gunzo, "Teachers' Perceptions, Experiences and Challenges Related to Using ICTs in Teaching Social Sciences in Marginalised Classrooms in the Eastern Cape Province, South Africa."

[13] Ali Demirci, "How Do Teachers Approach New Technologies: Geography Teachers' Attitudes towards Geographic Information Systems (GIS)," *European Journal of Educational Studies* 1, no. 1 (2009): 43–53.

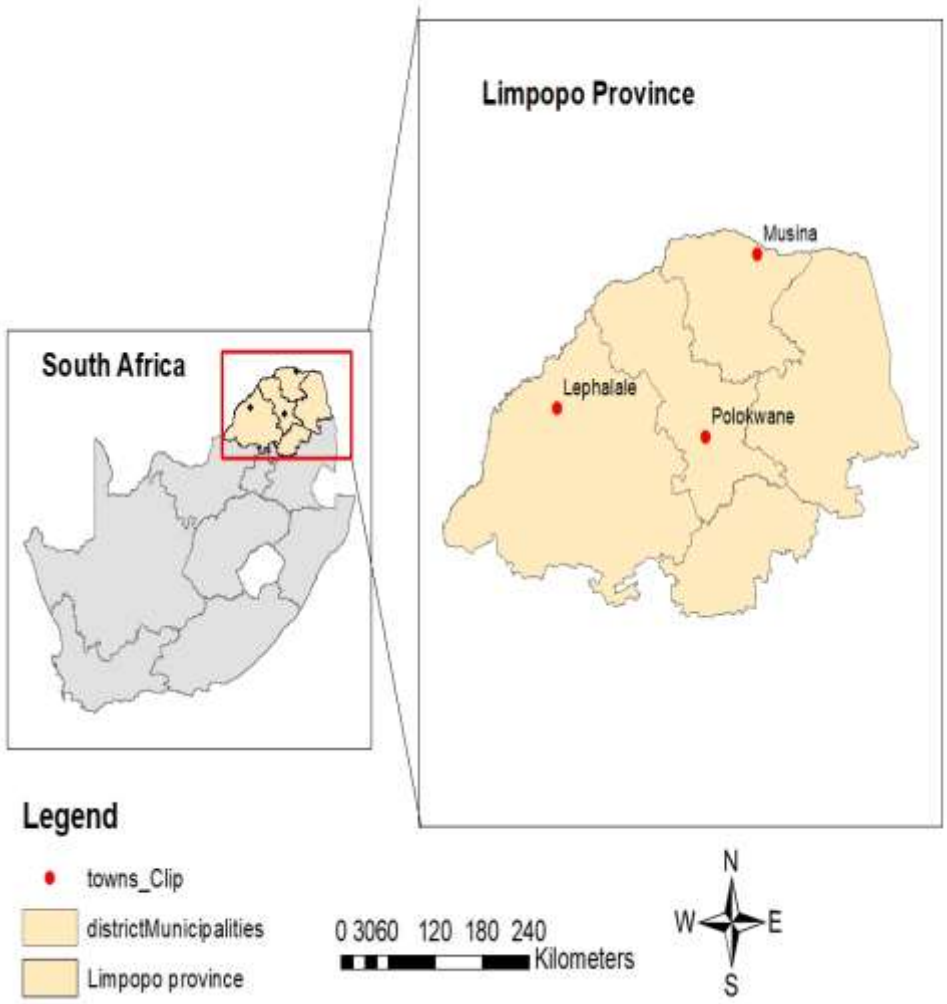

Figure 1. Map of South Africa showing the Limpopo Province as an area of interest.

METHODOLOGY

Sampling

The participants of the study consisted of 15 teachers from 5 schools in Limpopo. The schools were chosen using simple random sampling, with the teachers being selected purposively. The simple random sampling was suitable for the study to give all the secondary schools in Limpopo an equal opportunity to be chosen. Purposive sampling gave the researcher a chance to directly communicate with the participants. 15 Geography teachers were then chosen, three from each of the schools chosen.

Research Design

The study employed a mixed research approach, which comprised interviewing study participants and delivering questionnaires to them. This method was suitable for this study because it obtains a detailed description of phenomena and can be used to generalize the obtained views.[14] Using data from both qualitative and quantitative approaches helps the researcher to deeply understand their title. For example, the study which looked into the readiness of teachers to the application of GIS and ICT in teaching Geography at the secondary schools in Limpopo province used questionnaires to measure quantitative data on teachers' readiness to integrate ICT and GIS in Geography classrooms. At the same time, interviews provided qualitative data on teachers' experiences and opinions.

Research Paradigm

[14] R Koross and P Kosgei Kipkenda, "The Short Message Service (SMS) Texting Style of Communication and Its Impact on Kenyan University Students' Written Communication Skills," *International Journal of Scientific Research and Innovative Technology* 3, no. 6 (2016): 151–62.

The study was based on the critical theory paradigm, which is relevant for this study since it focuses on involving people with the goal of improving their circumstances. This enabled the researcher to come up with recommendations that could be used to improve teachers' readiness in case the study findings revealed that they were not ready. In the event that there are some elements of unreadiness, the government or any sponsors could use this paper as a referral to help schools that lack infrastructure to improve their situation.

Data Collection

Data for this study was gathered through questionnaires and interviews. The researcher distributed questionnaires, which were accompanied by a letter of authorisation from the institution.[15] Participants were asked to fill out the forms and have them available for collection within two weeks. The two-week interval was intended to allow participants adequate time to complete the questionnaires. The interviews thereafter took place over a one-week period, according to the timetable provided by school officials. These methods were used to collect data in order to answer the research questions and achieve the objectives of this research.

Table 1 below is a teacher interview transcript example that displays one of the verbatim excerpts from the interviews:

Table 1: Teacher's interview transcript example

INTERVIEW QUESTIONS
1. Specifying your answer in a Geographic classroom context, what do you think and feel about the world moving towards the fourth industrial revolution? "I honestly do not think the world moving towards a technological world will impact on Geography classrooms, I mean, all we teach is in the textbook and outside the classroom. Adding that I am comfortable teaching from the textbook, I just feel normal."
2. If Geography teachers were to be asked to implement the use of ICT and GIS by tomorrow, would you be able to? 2.1 If yes: What makes you think so? What skills do you have that can enable you? 2.2 If No: What do you think would be the challenges? "Yes, but the GIS part, I am unsure." "The reason I am saying yes is because I am computer literate, but have never been introduced to integrating ICT and GIS simultaneously. For instance, I have never been taken to training for that and I never learnt about them during my college era. But we teach Map-work part manually."
3. Do you feel like the utilization of ICT and GIS will improve learning Geography? "Yes, according to how you explain it, I think it will improve teaching and learning, but it will take time for some of us to adapt, hence, somehow implementing it might be difficult."
4. Have you ever attended any programme about ICT and GIS? It can be training or during your years of studying towards your degree "ICT, yes, but no for GIS."
5. How long have you been a Geography teacher? "15 Years."
6. Is there access to infrastructures such as projectors, enough laptops, a computer Laboratory, and good internet in your school? "No."

Data Presentation and Analysis

[15] Felicia O Akinyemi, "An Assessment of GIS Use for Teaching in Rwandan Secondary Schools," *The Geography Teacher* 12, no. 1 (2015): 27–40.

The data collection procedure was followed by data analysis, in which qualitative data (interviews) were examined using descriptive statistics, and raw data were translated into legible gathered data in the form of tables and frequencies. Quantitative data (questionnaires) were processed and analyzed with the Statistical Package for the Social Sciences, version 24.0, to draw graphs. Descriptive statistical analysis was used to present the results of the study and the general trends, which involve tabulating, graphing and describing data. The questionnaires also included comments on a three-point scale of 3 (strongly agree), 2 (undecided), and 1 (strongly disagree). Data collected through interviews was written down in a notebook by the researcher to ensure that it was safe and not lost. For the questionnaire transcripts, the researcher held the hard copy and also scanned the transcripts to ensure safety as well. The researcher used both methods to try and quantify the questions asked in the interview and questionnaire.

Ethical Considerations

It is fundamentally important that human research ethics approval has been acquired and that approval has been granted before data collection commences from human participants, because human research ethics committees cannot grant approval for research after the data collection has begun.[16] Hence, the following ethical issues were addressed:

- Permission was obtained from the Turfloop Research Ethics Committee, school authorities, and participants to conduct the study, ensuring clarity on the study's purpose and voluntary nature of participation.[17]
- Informed consent was emphasized as a key ethical consideration, where participants were fully briefed on the study details, allowing them to make an informed decision on their participation and requiring signed consent to indicate understanding.[18]
- Anonymity was maintained through the use of anonymous questionnaires and coding, ensuring that participants' identities remained unknown to the researcher, thus promoting accurate data collection.[19]
- Confidentiality was assured when the researcher was aware of participants' identities but committed to keeping their information private. Participants were labelled as "Participant 1" and so on in data collection instruments.[20]
- Participants were informed of potential harms, including physical, resource loss, emotional, and reputational risks, with assurance that the researcher would take responsibility for any such occurrences.
- Participation in this research was set to be non-coercive, allowing teachers the freedom to withdraw at any time.
- The study was conducted with objectivity and integrity, avoiding bias and manipulation of results.

[16] N. V. Ralushai et al., "Report of the Commission of Inquiry into Witchcraft and Ritual Murders in the Northern Province of South Africa, To: His Excellency the Honourable Member of the Executive Council for Safety and Security," *Northern Province, South Africa*, 1996.

[17] Koross and Kipkenda, "The Short Message Service (SMS) Texting Style of Communication and Its Impact on Kenyan University Students' Written Communication Skills."

[18] K A Salaudeen, A M Gbolagade, and S O Sangoniyi, "Indiscipline: A Destructive Tool on the Academic Performance of Secondary School Students in Mathematics," *International Journal of Pure and Applied Science* 21, no. 9 (2021): 45–53; Koross and Kipkenda, "The Short Message Service (SMS) Texting Style of Communication and Its Impact on Kenyan University Students' Written Communication Skills."

[19] Aminat Adeola Odebode, "Causes of Indiscipline among Students as Viewed by Primary School Teachers in Nigeria.," in *Elementary School Forum (Mimbar Sekolah Dasar)*, vol. 6 (ERIC, 2019), 126–40.

[20] Koross and Kipkenda, "The Short Message Service (SMS) Texting Style of Communication and Its Impact on Kenyan University Students' Written Communication Skills."

PRESENTATION OF RESULTS AND DISCUSSION

Themes emerging from the data.

Theme 1: Teachers' experience period in the teaching field

Table 2: Teachers' Experience Period

Interview Question: How long have you been a Geography teacher?	Answers
Participant 1	15 Years
Participant 2	7 Years
Participant 3	3 Years
Participant 4	2 months
Participant 5	2 years
Participant 6	8 Years
Participant 7	4 Years
Participant 8	5 Years
Participant 9	20 Years
Participant 10	23 Years
Participant 11	3 years
Participant 12	34 years
Participant 13	6 years
Participant 14	10 years
Participant 15	6 months

From the participants' responses (Table 1) extracted from the interview question, it can be seen that Teachers below 10 years of teaching Geography are more ready than those who have 10 years or above. This view aligns with Gunzo's view of discovering that ICT awareness, positive attitudes, and perceptions influenced the decision to adopt ICT in the classroom.[21] This is because some of the teachers who have 10 years or below of experience, mostly attended Universities to acquire their degrees and have once applied ICT and GIS during their years of studying within certain modules. This assertion agrees with Felix's view that good attitudes lead to good decisions to use ICT in the classroom.[22] Therefore, the study showed that young teachers are more prepared to use ICT and GIS as a result of their good attitudes.

Theme 2: Location of the school

Table 3: Location of schools

QUESTION: Does the location of your school contribute to your readiness?	Strong agree	Undecided	Strongly disagree
Teacher 1	✓		
Teacher 2	✓		
Teacher 3		✓	
Teacher 4			✓
Teacher 5	✓		
Teacher 6		✓	
Teacher 7	✓		
Teacher 8	✓		✓
Teacher 9			
Teacher 10	✓		

[21] Gunzo, "Teachers' Perceptions, Experiences and Challenges Related to Using ICTs in Teaching Social Sciences in Marginalised Classrooms in the Eastern Cape Province, South Africa."

[22] Dube, "Separation of Powers and the Institutional Supremacy of the Constitutional Court over Parliament and the Executive."

Teacher 11	✓		
Teacher 12	✓		
Teacher 13		✓	
Teacher 14	✓		
Teacher 15			✓

From Table 2 above, many teachers felt like the location of their school had an impact on their readiness. 70% of the teachers strongly agreed that the location of their school affects the quality of their network, hence will make it difficult for them to use things like online assessments or even use their phones to download study materials.

Theme 3: Availability of infrastructure to support the use of ICT and GIS

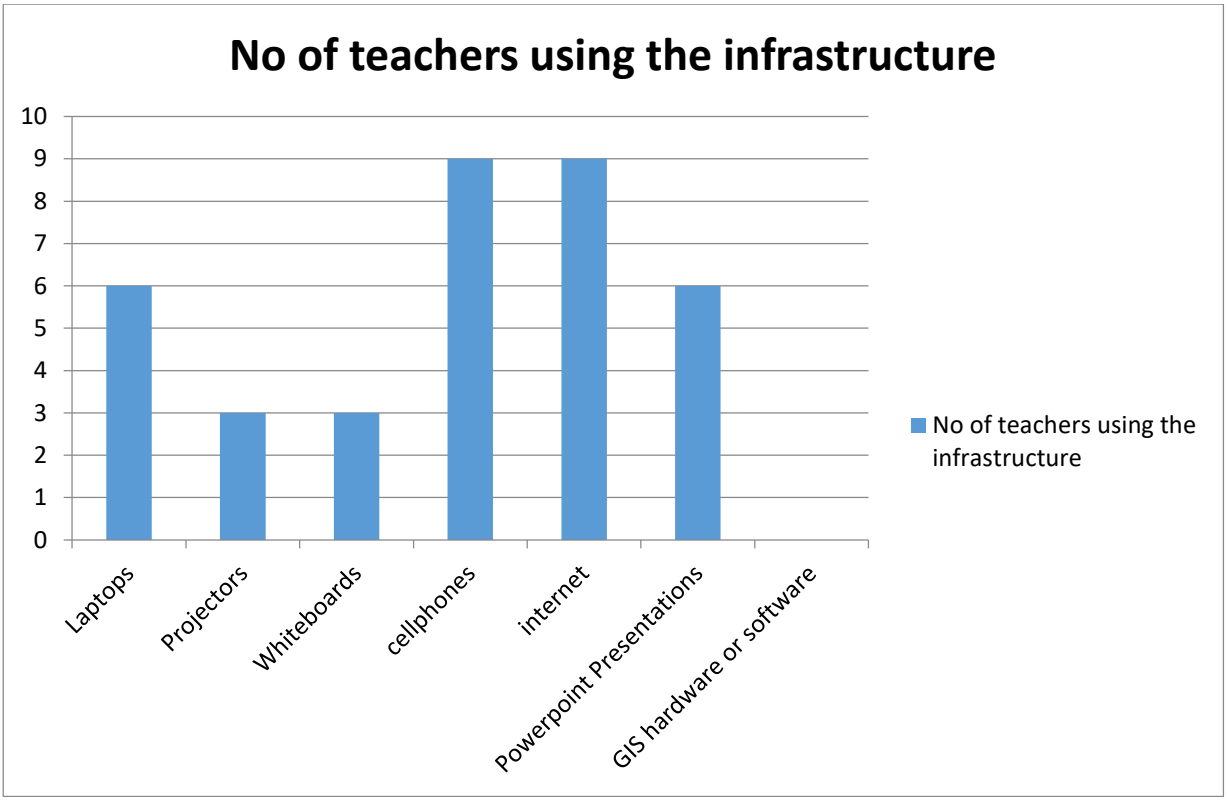

Figure 2. Availability of infrastructure to support the use of ICT and GIS

From the analysis of the data collected, many schools have laptops, but not enough to support the use of GIS and ICT. In many schools, laptops are only used to print out learning materials and store the data of the school, such as the number of learners at the school and school timetables. So teachers did not have laptops of their own that they could take to class and project notes on projectors. There were also only 3 teachers out of the 15 participants that used projectors or whiteboards reason being that they were not available in the schools. This indicates that if those teachers have the appropriate equipment, they will experience what Zhang, Liu and Hong (2024) say ICT leads to positive effects as it improves the teacher's lesson planning and preparation.

Another reason that made teachers not fully ready for the integration of ICT and GIS is the availability of GIS software and hardware. Many teachers agreed to have hardware GIS tools, such as textbooks and Maps, but did not have GIS software tools, such as ArcGIS, on the school laptops. Participants also highlighted that the reason for not having GIS software is that they do not have allocated time for it at the secondary school level in their school curriculum. Hence, they do not see the need to install them.

Theme 4: Attitude of Teachers

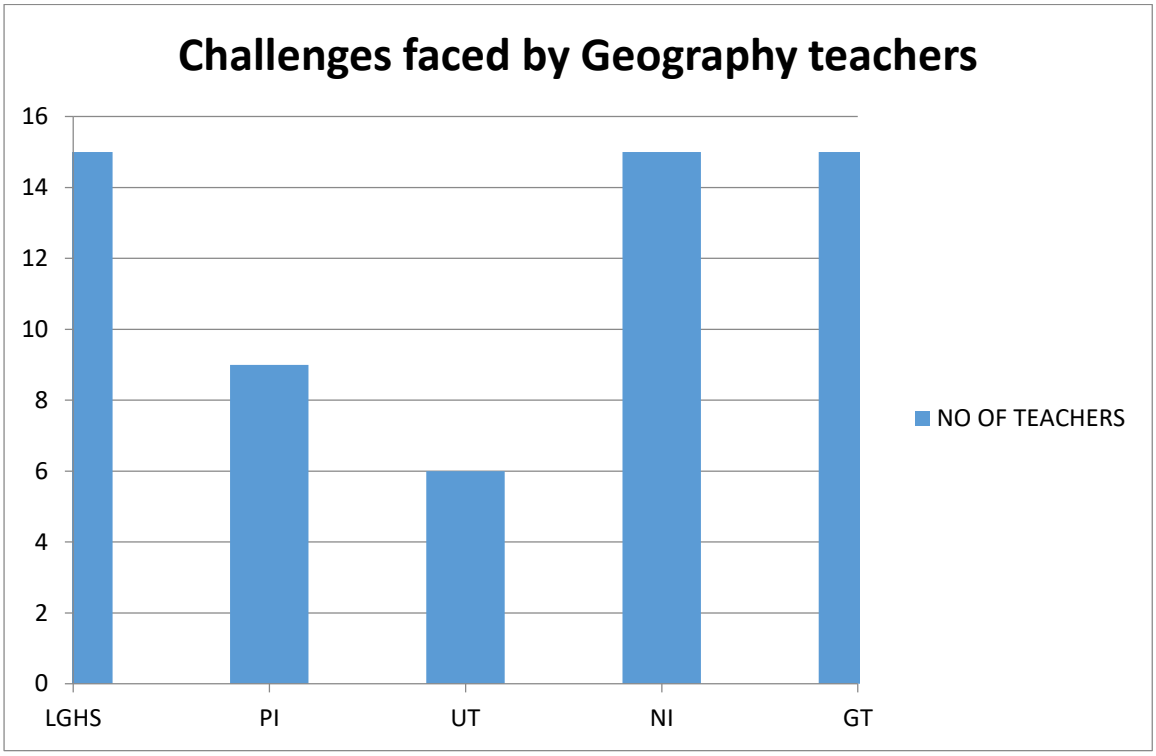

Figure 3: Challenges faced by Geography teachers

HINT
LGHS=Lack of GIS hardware and software
PI=Poor internet
NI=No inclusion of GIS in the curriculum
UT= inexperienced teachers to use ICT and GIS
GT= No GIS training

Table 4: Teachers' feelings about using ICT and GIS

Question: Do you feel like the use of GIS and ICT will improve learning and teaching Geography?	**Answers**
Teacher 1	Yes
Teacher 2	Yes
Teacher 3	Yes
Teacher 4	Yes
Teacher 5	No
Teacher 6	Yes
Teacher 7	No
Teacher 8	No
Teacher 9	Yes
Teacher 10	Yes
Teacher 11	no
Teacher 12	Yes
Teacher 13	Yes
Teacher 14	Yes
Teacher 15	Yes

Table 3 shows that almost 90% of the teachers showed a positive attitude towards the use of GIS and ICT to teach Geography, but there are many challenges that hinder them. Figure 3 shows the challenges that teachers are faced with, and the lack of GIS software, insufficient internet, and lack of GIS training for teachers seem to have contributed more towards the readiness of teachers. This agrees with Gunzo, who posits that infrastructure shortage is the primary reason why certain South African instructors were found to be unprepared to use ICT and GIS.[23] The teachers' attitude towards the use of ICT also contributes to their readiness, the reason being that if a person does not feel like doing something or does not show willingness towards the implementation of something, they would not put much effort into trying to implement it effectively.

The study has revealed the readiness of teachers to use GIS and ICT in Geography classrooms:

- Young teachers are more ready to use ICT and GIS in Geography classrooms than older teachers.
- Teachers' readiness is mostly influenced by the challenges that they face at their schools, such as the lack of infrastructure to support the effective use of GIS and ICT while teaching Geography.
- Teachers who were found in remote areas stated that they lack access to a good network connection, which sometimes limits their access to online learning materials.
- All the schools visited did not have Computer laboratories where learners could be successfully taught GIS.
- Teachers highlighted that the exclusion of GIS in the secondary-level curriculum also contributes to their readiness.

The more teachers are ready to use ICT and GIS in Geography classrooms, the more time-saving, advanced, and effective teaching and learning will be. For instance, when teaching topics such as climate and continents. For better understanding, teachers can use GIS software that will give learners a clear picture of how and where continents are located in relation to one another. Using the same software, they could see how climate conditions vary from one place to another.

In addition, the use of ICT saves time, and it catches learners' attention fast. For example, when a teacher projects notes on the projector, it saves his/her time writing notes on the board. Learners will be focusing on the projector as well because they do not want to miss anything.

RECOMMENDATIONS

The study recommends that education stakeholders should use the variables to influence the usage of ICT and GIS in the school system and make appropriate decisions. Furthermore, the study can be used to inform the Department of Education's in-service teacher training programmes in making improvements. The school administration can also use the findings of the study to solve the technological needs that are required to support the Use of GIS and ICT. Teachers might as well get knowledge on how important and effective the use of ICT and GIS is, and make better decisions for the future. The results will be critical for the teacher training institution in establishing educator courses to improve pre-service ICT training for the better implementation of ICT and GIS in classrooms.

CONCLUSION

The study has revealed that while young teachers in Limpopo province show higher readiness to integrate GIS and ICT into Geography classrooms, several systemic challenges hinder effective implementation. Key obstacles include inadequate infrastructure, lack of access to stable internet in remote areas, and the absence of computer laboratories in schools. Additionally, the exclusion of GIS from the secondary-level curriculum limits teachers' preparedness and motivation to adopt these tools in their teaching. Despite these challenges, the potential benefits of incorporating GIS and ICT into Geography education are significant. These technologies offer time-saving solutions, enhance student

[23] Gunzo, "Teachers' Perceptions, Experiences and Challenges Related to Using ICTs in Teaching Social Sciences in Marginalised Classrooms in the Eastern Cape Province, South Africa."

engagement, and provide advanced teaching methods that improve understanding, particularly in complex topics. If properly supported, GIS and ICT integration can revolutionize Geography education, fostering interactive and data-driven learning experiences. To improve teacher readiness, policymakers and educational stakeholders must prioritize investment in digital infrastructure, provide targeted professional development programs, and advocate for curriculum revisions to include GIS as a core component of secondary-level Geography instruction. Without these essential reforms, the gap between teacher willingness and practical implementation will persist, limiting the benefits of ICT and GIS in Geography education.

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Ms Phomelelo Maroga was born in Burgersfort township. She holds a Bachelor of Science degree in Environmental and Resource Studies and a Postgraduate Certificate in Education (PGCE) specialising in Social Sciences. With a strong foundation in both environmental and educational disciplines, her career path is broad and dynamic.Driven by passion for knowledge, she aspires to become a lifelong academic and researcher, focusing on intriguing topics within social sciences and environmental studies. Phomelelo's dedication to learning is a reflection of her love for reading and researching, which

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Dr Tebogo Malahlela holds a Phd from the University of Kwazulu Natal and Master of Art in Geography from Chicago State University. He supervised doctoral and masters students, alike.He worked as a School Teacher, College of Education Lecturer, Chief Planner in Government and GIS Specialist in Corporate Sector. He currently works as a Senior Lecturer of Geography Education at the University of Limpopo. He has presented papers in both national and international conferences and published articles in the Department of Higher Education accredited Journals. His research interest is Environmental Magagement, Geography Education and Geographic Information Systems.