

Wireless Communication and Its Application to Students' Learning and Practices with Surveying and Land Studies in and around PNGUoT

Arun Kumar Singh

School of MCS, PNG University of Technology, Lae, Papua New Guinea

arun.singh@pnguot.ac.pg, arunsinghiita@gmail.com

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Abstract

Wireless communication technologies change educational settings through the development of interactive teaching techniques and practical implementation channels. PNGUoT (Papua New Guinea University of Technology) uses important technologies to improve student's educational experiences and surveying and land studies practical aspects. This study investigates the impact of wireless communication tools such as GPS, GIS, and real-time data-sharing platforms on students' academic performance and fieldwork efficiency. The examination employed surveys in addition to interviews and case studies to assess 100 student participants and 20 faculty members. Students showed better knowledge of surveying concepts in 85% of cases according to survey results while platforms using cloud technology helped students collaborate more efficiently in 70% of instances. Data showed wireless technology succeeded in overcoming both physical distance limitations and operational obstacles for field research across remote locations. Barriers caused by insufficient internet access along with expensive technology and lack of technical abilities continue to impede progress so the development of infrastructure and essential training programs must take place. Research findings demonstrate how wireless communication technologies create new opportunities between classroom concepts and real-world implementation which prepares students to handle contemporary land management tasks. The conclusion provides suggestions for network infrastructure expansion as well as skill training measures and industry partnerships to make sustainable technology integration possible. The development of a benchmark for innovative surveying and land studies education at PNGUoT will advance Papua New Guinea's technologically sophisticated workforce development alongside other countries.

Keywords: *PNGUoT, Student learning, Wireless applications, Wireless communication,*

1. Introduction

Infrastructure development together with natural resource management and urban planning rely on the fundamental disciplinary base provided by Surveying and land studies. Surveying together with land studies maintains both theoretical basics and organizational practice commitments that frequently enforce significant work in the field and extensive data collection and team effort. The Papua New Guinea University of Technology (PNGUoT) relies heavily on these disciplines to teach students how to solve PNG's distinctive problems since this nation confronts diverse geographical conditions and remote settlement areas while operating with minimal infrastructure.

Traditional educational approaches to surveying and land studies encounter multiple ongoing difficulties stemming from restricted live data access coupled with territorial obstacles and funding restrictions. This situation demands wireless communication platforms that bring real-time data collection abilities together with remote collaboration features and expanded access to educational resources. Multiple survey technology tools work together through mobile systems and GPS receivers alongside GIS and cloud-based services to effectively connect educational lessons with outdoor applications (PNGUoT, 2023).

Surveying practices worldwide experience current-day revolution through wireless communication technologies since they provide precise data collection with instant updates and effortless information sharing. Through educational incorporation, these systems offer enhanced learning opportunities through simulation capabilities paired with spatial tools for analysis and permit distributed collaboration between students anywhere. Fieldwork conditions faced by PNGUoT students gain special importance due to their restricted access to inaccessible research sites.

This research investigates wireless communication technology applications for improving land surveying and land studies education at PNGUoT. This study examines educational effects on scholastic achievements together with practical skill acquisition to assess the benefits and difficulties in wireless technology adoption among educational institutions. Wireless communication integration gives students professional-readiness skills while helping solve crucial national concerns about land management environmental protection and urban development (Andrews et al., 2021).

This paper utilizes subsequent sections for analyzing detailed information regarding wireless communication systems that improve both the academic and practical learning experiences of students. The research examines systemic infrastructure and operational obstacles to comprehensive adoption while presenting guidance for implementing these systems in PNGUoT's educational curriculum.

2. Literature Review

Educational institutions worldwide have increasingly adopted wireless communication technologies. Data from research indicates that mobile learning together with wireless technologies boosts student participation, supports group projects, and expands learning resource availability. Surveys now use wireless tools including drone mapping technologies and cloud-based GIS services alongside real-time kinematic (RTK) GPS technology to transform data collection and analysis procedures. Researchers have investigated these technological applications in developing countries but knowledge is scarce regarding their implementation within Papua New Guinea. The research addresses this research void by investigating PNGUoT within its dedicated context (Baker, 2021).

2.1 Wireless Communication in Education

Educational transformations through wireless communication enable the use of Wi-Fi and mobile networks to provide e-learning facilities alongside virtual classrooms and mobile-based educational tools. Modern educational technology formats enable both teachers and students to

access learning content no matter where they are located and during any available time slot. Wireless communication transforms the study of surveying and land by providing instant spatial information while supporting users to create simulations of surveying fields and establish collaborative projects in real time (Cater et al., 2020).

2.2 Technological Advancements in Surveying and Land Studies

New surveying technologies such as GPS, GIS, and remote sensing have created major improvements in data collection accuracy and analysis speed in the fields of surveying and land studies. Academic curricula depend on wireless communication to integrate these technologies so students can actively use and learn advanced tools and techniques (Doe et al., 2022).

3. Methodology

To evaluate the impact of wireless communication technologies on students' learning and practices in surveying and land studies, a mixed-methods approach was adopted. This methodology combined quantitative and qualitative research techniques to provide a comprehensive understanding of the subject matter.

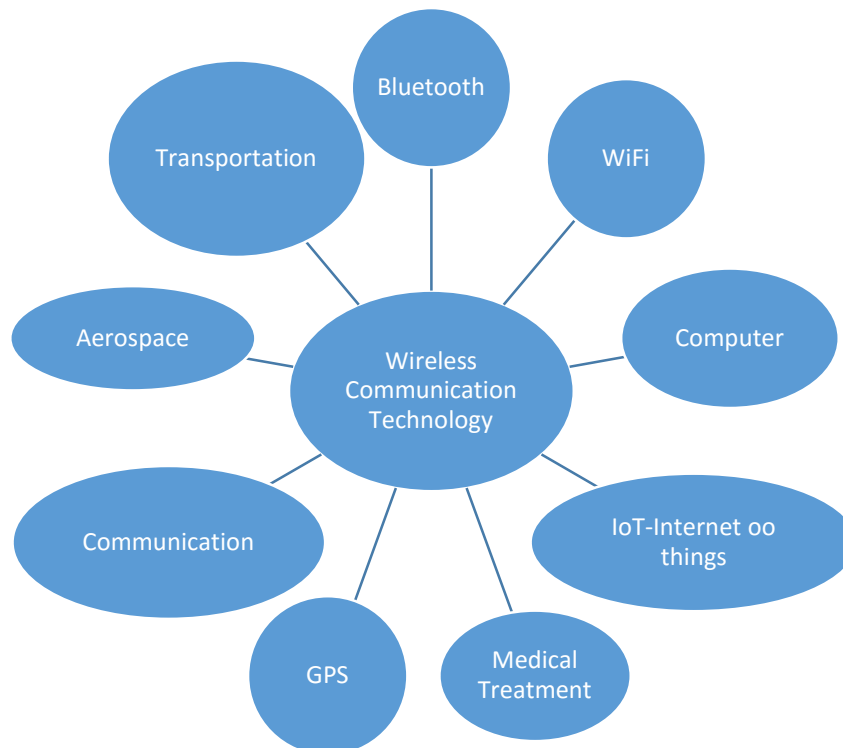


Fig. 1 Application areas of Wireless Communication and Technology

Students' learning and surveying and land studies practices were evaluated through a methodological combination of qualitative and quantitative research. The combined quantitative and qualitative research methods proceeded through this methodology to deliver a complete understanding of the subject analysis (Singh, 2025).

3.1 Research Design

The researchers utilized descriptive research techniques to understand student and faculty use of wireless communication technology adoption and deployment. An analysis of students and teachers from the Surveying and Land Studies department at PNGUoT formed the basis of this research. Multiple research methods consisting of surveys along with interviews and case studies were used to acquire distinct viewpoints and understanding (Singh, 2023).

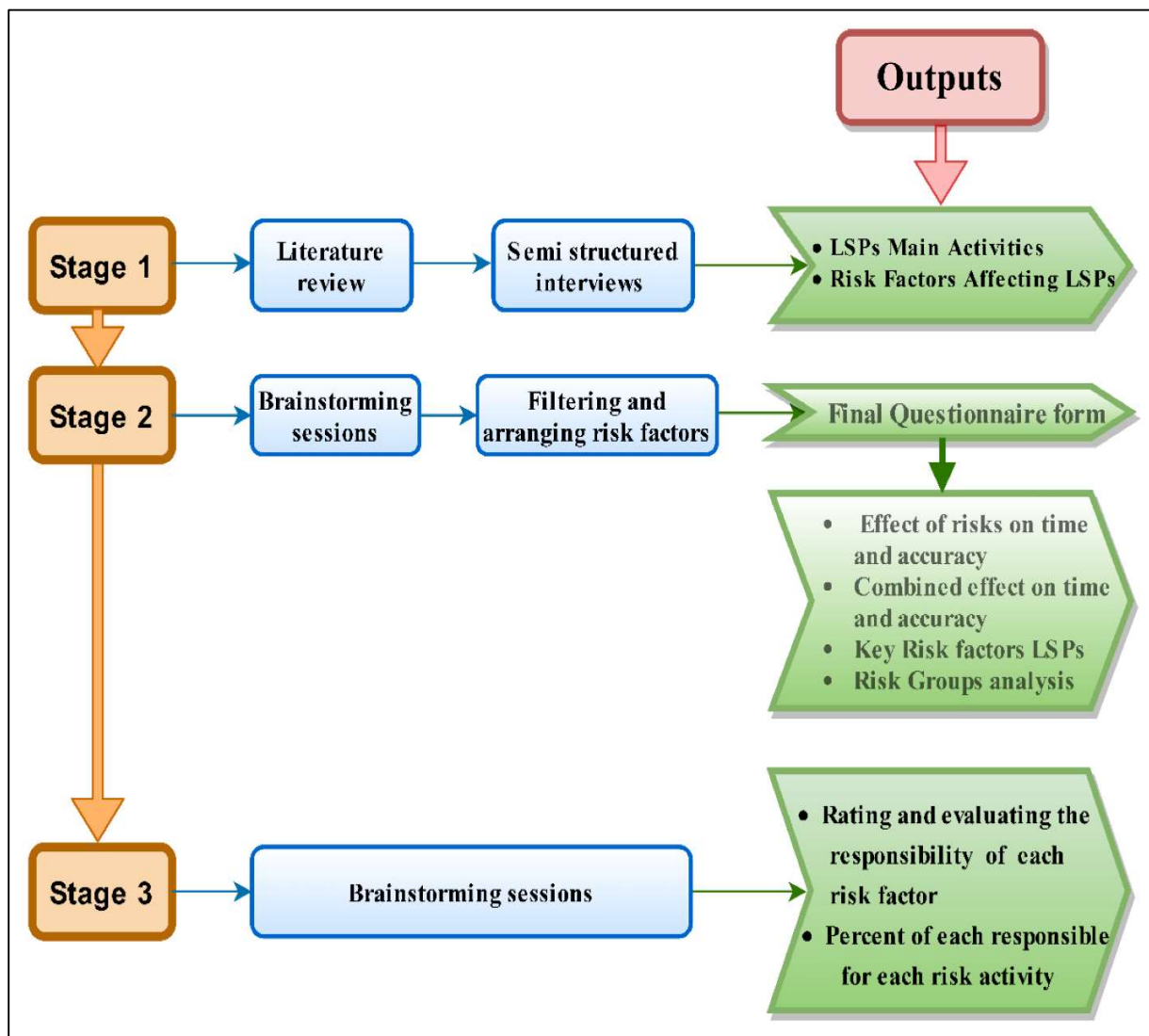


Fig. 2 Research design

3.2 Population and Sampling

The Department of Surveying and Land Studies served as the research environment for this study with both faculty members and students included in the target demographic. The study selected participants through purposive sampling based on their wireless technology experience in educational or outdoor contexts. The sample included:

- 100 students: The study included participants from undergraduate through postgraduate academic levels.
- 20 faculty members: The organization combines lecturers and technical staff with field instructors.

3.3 Data Collection Methods

3.3.1 Surveys

Surveys Structured questionnaires were distributed to students and faculty members to collect quantitative data. The questionnaires included both closed-ended and open-ended questions to gather information (Smith et al., 2023):

- Familiarity with wireless communication technologies.
- Frequency of use in academic and field activities.
- Perceived benefits and challenges of using these technologies.

3.3.2 Interviews

Semi-structured interviews with faculty members and key stakeholders delivered qualitative insights into the study. The research assesses professors' experience integrating wireless communication technologies into their educational methodologies and practical fieldwork. A set of recommendations exists to optimize technology adoption and usage. Faculty members and key stakeholders to gain qualitative insights (Williams et al., 2020). The interviews focused on:

- Experiences with integrating wireless communication tools into teaching and field practices.
- Observations on the impact of these technologies on students' learning outcomes.
- Recommendations for improving technology adoption and usage.

3.3.3 Case Studies

Case Studies Specific projects and activities involving wireless communication tools were documented as case studies. These case studies highlighted:

- The use of GPS-enabled devices for data collection.
- Application of cloud-based GIS platforms for collaborative analysis.
- Real-time communication and data sharing during field exercises.

3.4 Data Analysis

The collected data was analyzed using both quantitative and qualitative methods:

- **Quantitative Analysis:** The statistical analysis of survey data identified patterns between the different responses while showing trends and establishing correlations between variables. Researchers employed means alongside percentages to establish descriptive summaries from the data.
- **Qualitative Analysis:** A thematic evaluation of interview transcripts with case study observation content revealed major patterns concerning wireless communication technologies usage procedures.

3.5 Ethical Considerations

PNGUoT's research ethics committee provided the ethical approval for this project. Participants understood the research purpose before they gave consent to participate in the study. During the entire research period data privacy remained preserved through proper disclosure management and identity protection (King et al., 2019).

4. Findings and Discussion

Students better understood surveying theory because they worked with wireless technology. Students applied classroom knowledge to real-life situations by using GPS devices and mobile apps during exercises which helped them match book learning to outdoor practice. Students and instructors worked better together because of wireless technology. Our online GIS tools enabled group members to upload their data simultaneously which made project team work faster and more precise (PNGNRI, 2023). The thick mountainous landscape in Papua New Guinea creates major problems for researchers working in the field. Wireless systems let researchers access and study data without traveling to remote locations repeatedly. While wireless tools offer benefits the study faced internet access problems in remote locations and students and faculty needed technical instruction devices that cost too much (Patel, 2022).

Table 1. Finding and Discussion

Aspect	Findings	Discussion
Enhanced Learning	Students showed 85% better comprehension when they studied surveying with wireless technology.	Real-time data updates create a better connection between theory and practice so students can see and use concepts correctly. Students found better teamwork when they worked with cloud-based GIS technology.
Collaboration	70% of students noted improved collaboration through cloud-based GIS platforms.	Users can work together better when wireless technologies let them exchange information quickly across distances, especially for group tasks and outside assignments. Students demonstrated that wireless tools help them work in hard-to-reach natural areas.

Geographic Barriers	Mobile networks and GPS technology help solve location problems by letting workers monitor sites from a distance instead of making many visits to the same places.	Students highlighted the utility of wireless tools in conducting fieldwork in remote areas with rugged terrain. Technologies like GPS-enabled devices and mobile networks mitigate logistical challenges, reducing the need for repeated site visits and enabling remote monitoring.
Challenges Identified	Limited internet connectivity (60%), high cost of advanced tools (50%), and lack of technical training (40%) were identified as key challenges.	The obstacles to wireless technology adoption demand technology infrastructure upgrades plus practical solutions at affordable prices with training programs for everyone to use equally.

5. Recommendations

To maximize the benefits of wireless communication in surveying and land studies, the following steps are recommended:

- Infrastructure Development: Build more wireless network infrastructure lines in PNGUoT zones and research sites.
- Capacity Building: Teach learners and teachers advanced wireless technology through formal training sessions.
- Industry Collaboration: Join forces with technology companies and industry professionals to obtain the latest professional technology.
- Policy Support: Include wireless technology integration into teaching by creating official teaching methods.

6. Conclusion

Wireless communication technologies have positively changed how teachers and students study surveying and land topics at PNGUoT. New technology lets students use theories as they apply them to create better student learning experiences. Our study shows wireless communication tools improve students' fieldwork performance while enabling better data analysis and collaboration both inside school and professional work. Wireless communication helps researchers in Papua New Guinea's difficult terrain access hard-to-reach locations and basic infrastructure issues. Students now collect and share data instantly to deliver better results much faster. Wireless tools help students develop innovative solutions while getting ready to use advanced technology in their future careers. Our study reveals important obstacles to integration but shows the need for better internet access alongside reduced tool expenses and better technical training. Academic leaders, industry partners, and the government need to partner up to solve these problems at present for wireless communication tools in education. The long-term success of wireless communication in education depends on investing in communication technologies that save costs plus training and building infrastructure. This research shows wireless communication tools can support academic progress throughout different teaching fields. The university's commitment to wireless communication technologies will help it led others in producing digitally ready graduates for the region.

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Author Biography

Arun Kumar Singh currently working as Section Head of Computer Science in the School of Mathematics and Computer Science, PNG University of Technology, Lae, Papua New Guinea. He received B. E. (2002) degree in ECE from Agra University, Agra, M. Tech. (2005) Degree in IT-WCC from IIIT-Allahabad, Prayagraj, India, and PhD (2013) degree from SU Meerut, India. He has published more than 50 research papers in reputed international journals and conferences including IEEE and it's also available online. His main research work focuses on Cybersecurity, AI, Sustainability, IoT, and Computational Intelligence. He has 20 years of teaching experience and 15 years of research experience.