

Use of Wireless Communication Technology by Postgraduate Students and Research Scholars of the University of Agricultural Sciences, Raichur: A Study

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ABSTRACT

This study investigates the use of wireless communication technologies by postgraduate students and research scholars at the University of Agricultural Sciences, Raichur, examining its effect on academic activities. Wireless technologies like Wi-Fi, mobile hotspots and 4G/5G mobile data are vital for accessing digital resources, online teaching and learning, research, and academic collaboration. Information gathered from 118 respondents via structured questionnaires indicated that many users access academic resources daily using wireless technologies, with laptops and smartphones being the devices of choice. The study finds that wireless technologies act positively on academic productivity, but impediments, such as difficulty in connectivity, limited coverage area, and security, are still a matter of concern. Of the total respondents, 72% mentioned that they faced connectivity issues, while 56% raised their concerns about the security of online resources. The study concludes with the recommendation to upgrade the wireless infrastructure, tighten security, and provide off-campus access ensuring smooth and uninterrupted application of wireless communication technologies in academic pursuits.

KEYWORDS: Wireless Communication, Academic Productivity, Wi-Fi & Mobile Data, Digital Resources, Connectivity Issues, Security Concerns, Educational Technology.

1. INTRODUCTION

Over the last few years, the application of wireless communication technologies in classrooms as well as among graduate and research students has become increasingly important. The study looks at the University of Agricultural Science, Raichur and how these devices aid in academic as well as research activities. Wireless communication is a collection of many technologies such as Wi-Fi, Bluetooth, and mobile networks make it possible to use devices for obtaining online materials, communicating with fellow students, and submitting assignments. According to Dr. V. T. Kamble and Nijaguna (2024) the students from the postgraduate programs at Gulbarga University indicated that

wireless communication technologies greatly aid them in various academic works, such as efficiently reading online journals and actively engaging in group work. As such, the increase in wireless-enabled devices over the years has enabled students to learn and conduct research more effectively.

The same trend pointed out concerning wireless technologies enhancing library services and community participation has also been noted by Graham (2002). However, some drawbacks exist for the proper availing of these technologies. Poor internet connectivity, low bandwidth, and difficulty in accessing certain online resources affect the performance (Kamble & Nijaguna, 2024). There is a definite need for infrastructure and connectivity to be put in place so that the advantages of wireless communications in an educational setup can be properly tapped.

This study investigates the primary modes of access to wireless communication technology among postgraduate students at the University of Agricultural Sciences in Raichur, assessing the academic activities mediated by these technologies and the constraints faced by the users. With these in mind, it attempts to make recommendations for improving Internet connectivity and technical support for scholars within the university.

2. LITERATURE REVIEW

The literature describes the use of wireless communication technology as a transforming tool to improve the academic world for postgraduate students and research scholars. Wireless technologies of Wi-Fi or mobile networks provide enhancement to research and learning environments. For example, Kamble and Nijaguna (2024) show that postgraduate students at Gulbarga University greatly utilize wireless communication to access online resources, collaborate with peers, and submit assignments, in this regard, stakeholder activities on technology. Access to information and educational resources is further improved by wireless communication technology. Graham (2002) illustrates how libraries have incorporated wireless networks into their function, enabling greater engagement of users with resources⁵; as shown in studies, furthermore, the implementation of wireless technologies creates a conducive environment for collaborative learning whereby students have effectively engaged in online courses and webinars (Kamble & Nijaguna, 2024). But still, there are challenges to effective technology use. Internet connection unreliability and limited bandwidth could thus negatively affect the user experience (Sen et al., 2024). Moreover, ERIC (2021) mentions that there is an urgent need to build up infrastructures catering to growing demands for wireless connectivity in educational institutions. In the dynamic evolution of wireless communications, uninterrupted technological advances from the first Wi-Fi systems to current solutions like Li-Fi and fifth-generation (5G) systems characterize developments² (Sen et al., 2024). These advances will aim at rectifying existing discrepancies while meeting the rising demands from users.

3. OBJECTIVES OF THE STUDY

- ✓ To assess the extent to which students and research scholars use wireless communication technology in accessing information and resources from the library.
- ✓ To identify the types of wireless communication technology that are commonly used by students and research scholars in agricultural universities.

- ✓ To examine the impact of wireless communication technology on the research process and academic performance of students and research scholars.
- ✓ To explore the challenges faced by students and research scholars in accessing and using wireless communication technology in agricultural university libraries.

4. METHODOLOGY

The study employed a descriptive survey method. A structured questionnaire was distributed to 140 postgraduate students and research scholars, out of which 118 valid responses were received, yielding a response rate of 84.3%. Data were analyzed using frequency and percentage distribution, and findings were tabulated for clarity.

5. RESULTS AND DISCUSSION

5.1 Demographic information

Variable	Category	Frequency	Percentage
Gender	Male	86	72.9%
	Female	32	21.1%
	Total	118	100%
Area	Rural	76	64.4%
	Urban	42	35.6%
	Total	118	100%
Designation	PG Students	66	55.9%
	Research Scholars	52	44.1%
	Total	118	100%
Age	20 to 25	72	61%
	26 to 30	38	32.2%
	30 above	08	6.8%
	Total	118	100%

Table 5.1 shows Demographic information The study at the University of Agricultural Sciences, Raichur, examined wireless technology usage among postgraduate students and research scholars. As shown in Table 1, the majority of respondents were male (72.9%), while females accounted for 27.1%. Most participants (64.4%) came from rural areas, emphasizing the need for improved digital access. In terms of academic level, PG students (55.9%) slightly outnumbered research scholars (44.1%). Age-wise, 61.0% were between 20–25 years, 32.2% were aged 26–30, and 6.8% were above 30. These findings highlight the significance of wireless technology in enhancing academic accessibility, particularly for rural students.

5.2 Frequency of Wireless Technology Usage for Library Access

Frequency	Respondant	Percentage
1. Daily	60	50.85%
2. Weekly	34	28.81%

Use of Wireless Communication Technology by Postgraduate Students and Research Scholars of the University of Agricultural Sciences, Raichur: A Study

3. Monthly	08	6.78%
4. Rarely	12	10.70%
5. Never	04	3.39%
Total	118	100%

The table 5.2 shows the frequency of wireless technology usage for library access among 118 respondents. The majority, 50.85%, use it **daily**, indicating frequent reliance. About 28.81% use it **weekly**, suggesting regular but less frequent access. Only 6.78% use it **monthly**, and 10.70% use it **rarely**, reflecting occasional usage. A small group, 3.39%, **never** use wireless technology for library access. Overall, 100% of respondents are accounted for, with most relying on wireless technology either daily or weekly, while a smaller portion accesses it less often or not at all

5.3 Devices Used for Wireless Library Access

Device Used	Respondant	Percentage
a. Smartphone	54	30.68%
b. Tablet	10	5.68%
c. Laptop	74	42.05%
d. Desktop Computer	40	22.73%
Total	176	100%

The table 5.3 displays the devices used for wireless library access, based on 118 respondents who provided a total of 176 responses (since multiple devices could be selected). **Smartphones** were selected by 54 respondents (30.68%), while **tablets** were selected by 10 respondents (5.68%). The most popular device was the **laptop**, used by 74 respondents (42.05%). **Desktop computers** were used by 40 respondents (22.73%). The total of 176 responses represents the combined selection of all respondents. These percentages highlight the distribution of device preferences, with laptops and smartphones being the most frequently used devices for library access.

5.4 Types of Library Resources Accessed via Wireless Technology

Type of Library Resource	Respondant	Percentage
a. E-books	56	13.86%
b. Online journals	70	17.32%
c. Databases	20	4.95%
d. Library catalog	12	2.97%
e. Research papers	80	19.80%
f. Audio/video lectures	60	14.85%
g. Conference proceedings	28	6.93%
h. Theses and dissertations	58	14.36%
i. Digital archives	06	1.49%
j. Open educational resources (OER)	14	3.47%
Total	404	100%

Table 5.4 presents the types of library resources accessed via wireless technology, based on 404 responses from 118 respondents who could select multiple options. **Research papers** (19.80%) and **online journals** (17.32%) are the most accessed resources, followed by **e-books** (13.86%) and **audio/video lectures** (14.85%). **Theses and dissertations** account for 14.36% of responses, while **conference proceedings** (6.93%) and **databases** (4.95%) are accessed less frequently. **Library catalogs** (2.97%) and **digital archives** (1.49%) are the least accessed, and **Open Educational Resources (OER)** make up 3.47%.

5.5 Frequency of Wireless Access to Library Resources Off-Campus

Frequency of Access	Respondant	Percentage
a. Frequently	52	44.07%
b. Sometimes	28	23.73%
c. Rarely	32	27.12%
d. Never	06	5.08%
Total	118	100%

The table 5.5 shows the frequency of wireless access to library resources off-campus among 118 respondents. Most respondents (44.07%) access resources **frequently**, followed by **rarely** (27.12%). **Sometimes** was selected by 23.73%, and **never** by 5.08%. Overall, most users access library resources remotely at least occasionally.

5.6 Primary Wireless Networks for Accessing Library Resources

Type of Wireless Network	Respondants	Percentage
a. University Wi-Fi	68	57.63%
b. Personal mobile data	36	30.51%
c. Public Wi-Fi	00	00%
d. Hotspot from another device	02	1.69%
e. Institutional network (e.g., hostel network)	12	10.17%
f. Shared internet connection	00	00%
Total	118	100%

The table 5.6 shows the primary wireless networks used by 118 respondents for accessing library resources. The most common is **University Wi-Fi** (57.63%), followed by **Personal mobile data** (30.51%). **Institutional networks**, like hostel networks, account for 10.17%. **Hotspot from another device** is used by 1.69%. **Public Wi-Fi** and **Shared internet connections** were not used by any respondents, indicating a preference for more secure or private networks.

5.7 Wireless Technologies Used for Academic Purposes

Wireless Communication Technology	Respondants	Percentages
a. Wi-Fi	102	39.3%
b. Mobile hotspots	56	21.6%
c. Bluetooth	18	6.9%

Use of Wireless Communication Technology by Postgraduate Students and Research Scholars of the University of Agricultural Sciences, Raichur: A Study

d. NFC (Near Field Communication)	02	0.8%
e. 4G/5G mobile data	70	27.0%
f. Infrared	04	1.5%
g. Satellite internet	01	0.4%
h. Zigbee	02	0.8%
i. Li-Fi (Light Fidelity)	00	00%
j. VPN (Virtual Private Network) over wireless networks	04	1.5%
Total	259	100%

Table 5.7 shows that in the survey, **118 respondents** provided a total of **259 responses**, indicating that each respondent could select multiple wireless technologies, leading to more responses than the number of individuals surveyed. The percentages for each wireless technology are calculated based on the **259 total responses**, not the number of respondents. Wi-Fi was the most frequently selected technology, with **102 responses**, accounting for **39.3%** of the total. Mobile hotspots followed with **56 responses**, or **21.6%**, while **70 responses** for 4G/5G mobile data made up **27.0%**. Bluetooth received **18 responses (6.9%)**, and **VPN over wireless networks** had **4 responses (1.5%)**. NFC and Zigbee each had **2 responses**, corresponding to **0.8%**, while **Infrared** received **4 responses (1.5%)**. Satellite internet had only **1 response (0.4%)**, and **Li-Fi** received no responses (**0.0%**). These findings highlight the varying levels of wireless technology usage in academic settings, with some technologies being significantly more popular than others

5.8 Frequently Used Device Brands for Wireless Services

Device Brand	Respondants	Percentages
a. Apple	08	3.6%
b. Samsung	22	9.8%
c. Hp	66	29.3%
d. Dell	30	13.3%
e. Lenovo	18	8.0%
f. Microsoft	24	10.7%
g. Asus	02	0.9%
h. Acer	04	1.8%
i. Huwaei	02	0.9%
j. Xiaomi	32	14.12%
k. Motrola	05	2.2%
l. Realme	04	1.8%
m. vivo	06	2.7%
n. infinix	01	0.4%
o. iqoo	01	0.4%
Total	225	100%

Table 5.8 shows that **118 respondents** provided a total of **225 responses**, indicating that respondents could select more than one device brand for wireless services. The percentages are calculated based on the **225 total responses**. **HP** was the most frequently selected brand, with **66 responses**, accounting for **29.3%**. **Xiaomi** had **32 responses**, representing **14.2%**, and **Dell** received **30 responses**, making up **13.3%**. **Samsung** received **22 responses** (**9.8%**), while **Microsoft** had **24 responses** (**10.7%**). **Lenovo** was selected **18 times** (**8.0%**), and **Apple** had **8 responses**, or **3.6%**. Brands like **Asus** (2 responses, **0.9%**), **Huawei** (2 responses, **0.9%**), **Motorola** (5 responses, **2.2%**), **Realme** (4 responses, **1.8%**), **Vivo** (6 responses, **2.7%**), **Infinix** (1 response, **0.4%**), and **IQOO** (1 response, **0.4%**) received fewer responses. These percentages reflect the usage of each brand in wireless services.

5.9 Impact of Wireless Technology on Research Ability

Impact on Research Ability	Respondents	Percentage
a. Significantly improved	51	43.2%
b. Improved	60	50.8%
c. No change	06	5.1%
d. Decreased	01	0.8%
e. Significantly decreased	00	00%
Total	118	100%

Table 5.9 shows that **118 respondents** were asked about the impact of wireless technology on their research ability. Among them, **51 respondents** (43.2%) reported that wireless technology had **significantly improved** their research ability. **60 respondents** (50.8%) stated that it had **improved** their research ability. **6 respondents** (5.1%) indicated that there was **no change** in their research ability due to wireless technology. Only **1 respondent** (0.8%) felt that it had **decreased** their research ability, while no respondents (0.0%) reported that wireless technology had **significantly decreased** their research ability. These figures reflect the overall positive impact wireless technology has had on research, according to the respondents.

5.10 Importance of Wireless Access for Completing Assignments and Projects

Importance for Assignments and Projects	Respondents	Percentage
a. Extremely important	56	47.5%
b. Very important	50	42.4%
c. Moderately important	08	6.8%
d. Slightly important	04	3.4%
e. Not important	00	00%
Total	118	100

Table 5.10 shows that **118 respondents** were asked about the importance of wireless access for completing assignments and projects. Among them, **56 respondents** (47.5%) rated it as **extremely important**, while **50 respondents** (42.4%) considered it **very important**. **8 respondents** (6.8%) found it to be **moderately important**, and **4 respondents** (3.4%) thought it was **slightly important**. No respondents (0.0%) considered wireless access to be **not important**. These figures reflect how critical wireless access is for completing assignments and projects, with most respondents viewing it as highly important.

5.11 Challenges in Accessing Wireless Communication in the Library

Challenges	Respondents	Percentage
a. Poor connectivity	57	32.0%
b. Limited coverage area	51	28.7%
c. Device compatibility issues	23	12.9%
d. Security concerns	29	16.3%
e. Technical support availability	18	10.1%
Total	178	100

Table 5.11 shows that **118 respondents** provided a total of **178 responses** regarding challenges in accessing wireless communication in the library, with respondents allowed to select multiple challenges. Among the responses, **57 responses** (32.0%) identified **poor connectivity** as a challenge, while **51 responses** (28.7%) mentioned **limited coverage area**. **29 responses** (16.3%) were related to **security concerns**, and **23 responses** (12.9%) indicated **device compatibility issues**. Lastly, **18 responses** (10.1%) pointed to **technical support availability** as a challenge. These figures provide insight into the primary issues faced by respondents when using wireless communication in the library.

5.12 Impact of Security Concerns on Wireless Use in the Library

Impact of Security Concerns	Respondents	Percentage
a. Significantly affect	26	22.0%
b. Somewhat affect	34	28.8%
c. Neutral	20	16.9%
d. Rarely affect	26	22.0%
e. Do not affect	12	10.2%
Total	118	

Table 5.12 shows that **118 respondents** were asked about the impact of security concerns on their wireless use in the library. Among the respondents, **26 respondents** (22.0%) stated that security concerns **significantly affect** their wireless use, while **34 respondents** (28.8%) indicated that security concerns **somewhat affect** them. **20 respondents** (16.9%) felt **neutral** about the impact of security concerns. Another **26 respondents** (22.0%) reported that security concerns **rarely affect** their wireless use, and **12 respondents** (10.2%) mentioned that security concerns **do not affect** their wireless use in the library. These figures highlight varying degrees of concern regarding security among the respondents.

FINDINGS

1. Most respondents (50.85%) used wireless technology for library access daily, indicating a high dependency on digital resources.
2. Laptops (42.05%) were the most commonly used devices for library access, followed by smartphones (30.68%)
3. The most accessed library resources were research papers (19.80%) and online journals (17.32%), with a notable interest in academic literature.

4. A significant number of respondents (44.07%) accessed library resources frequently off-campus, demonstrating the growing trend of remote learning and research.
5. University Wi-Fi was the most popular network used for library access (57.63%), reflecting a preference for institutional networks.
6. Wi-Fi (39.3%) was the most commonly used wireless technology for academic purposes, followed by 4G/5G mobile data (27.0%).
7. HP (29.3%) was the most popular brand for wireless services, followed by Xiaomi (14.2%) and Dell (13.3%).
8. Wireless technology significantly improved research ability for 43.2% of respondents and improved it by 50.8%, reflecting the positive impact on academic work.
9. The majority (47.5%) of respondents considered wireless access **extremely important** for completing assignments and projects.
10. Poor connectivity (32.0%) and limited coverage area (28.7%) were the most common challenges in accessing wireless communication in the library.
11. Technologies such as NFC, Zigbee, Satellite internet and Li-Fi were rarely or not used for academic purposes.

SUGGESTIONS

1. Improve wireless connectivity and coverage in libraries.
2. Ensure broader device compatibility for library resources.
3. Expand off-campus access to library materials.
4. Strengthen security measures for wireless communication.
5. Enhance technical support for wireless network issues.
6. Focus on the most frequently used device brands for better compatibility.

CONCLUSION

The study on wireless communication technology used by postgraduate students and research scholars at the University of Agricultural Sciences, Raichur, shows that wireless technologies like Wi-Fi and mobile data are integral to academic work. These technologies enhance access to resources, facilitate research, and aid in completing assignments. The widespread use of smartphones and laptops highlights their importance in academic life. However, the study also highlights significant challenges, including poor connectivity, limited coverage areas, and security concerns, which affect the effectiveness of wireless communication. These issues are more prominent for students in rural areas, pointing to the need for better infrastructure and technical support. Despite these hurdles, the majority of respondents reported positive impacts on their research capabilities. To improve the situation, it is recommended that the university focus on enhancing wireless network quality, expanding access, improving device compatibility, and addressing security issues. Providing better technical support will also help students and scholars make more efficient use of wireless technologies. By addressing these challenges, the University of Agricultural Sciences, Raichur, can maximize the benefits of wireless communication for its academic community, fostering improved productivity and research outcomes.

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