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THE IMPACT OF WIRELESS FIDELITY ON STUDENTS' ACADEMIC PERFORMANCE IN A DEVELOPING ECONOMY

Abstract:

A wireless technology recently has become our life saver in the communication process and also in sharing of information. Private and public institutions, individuals, businesses, non-profit organisations, government agencies and other corporate have already invested heavily and grown the wireless technology operations. Wireless Fidelity (Wi-Fi), is the common term in the process of connection local area network (LAN) with high frequency wireless. Wi-Fi allows electronic devices to connect to LAN and enables Internet access to devices such as the laptops, smartphone and tablets. Institutions in developing countries already make it possible to connect the LAN and also enable the Wi-Fi to allow the individual to connect their personal devices. However, the better Wi-Fi speed of upload and download provided by the institution, also increase opportunities to achieve their teaching and learning objectives, while the poor infrastructure of Wi-Fi limits the opportunities of achieving learning objectives. This study was conducted from the North-West University (NWU) Mafikeng Campus, with the aim to determine the impact of Wi-Fi (as new connectivity designation) in the academic performance of the students in a developing country. The study also determines how many students' use this technology for school related matter and how many use it more for personal reasons than academic. For the purpose of this study, data was collected using quantitative research method through questionnaire. The sample size for this research involved 370 participants. The findings indicate that majority of students find Wi-Fi beneficially to their studies, since it enables them to access Internet in different spot around campus and allow them to submits academic work on time and also enable communication with classmates and lecturers.

Keywords:

Wi-Fi, Wireless technology, Internet, Academic performance, Students

Introduction

Over the past two decades there has been a very interesting transformation in the area of communication and how people are sharing different forms of information and ideas. Previously access to Internet in sharing of data information and communication were done by the use of wired technologies, but recently things have changed with the involvement of wireless communication technology (WCT) (Negus & Petrick, 2008). O'Leary and O'Leary (2011), maintained that Wi-Fi is a technology that allows electronic devices to connect to local area network and be able to access Internet and share connections. According to Dubendorf (2003), the word wireless means the ability of transmitting any type of data (text, video, image or audio) through the radio waves, infrared or microwaves instead of using wires (cables). Studies have shown that wired technology had its own disadvantages and one of significant is that communication is limited (Kim, Mims & Holmes, 2006).

Wireless fidelity technology (Wi-Fi) has evolved nearly two decades ago, nevertheless companies straggle to invest in the technology because of the dominance of wired technology. However, things changed in 1998 when wireless communication was finding its feet and trust in users (Negus & Petrick, 2008). Therefore, it is necessary for researchers to focus on the wireless technology. The purpose of this study is to investigate how this technologies (Wi-Fi) impact on the lives of students academically. Institutions in developing countries already make it possible to connect the LAN and also enable the Wi-Fi to allow the students to connect their personal devices. However, the better use of Wi-Fi by the institution provides more opportunities for students to achieve their leaning objectives, while the poor infrastructure limits the opportunities of higher education institutions and students at large.

Research problem statement and objectives

Many studies have been conducted on wireless technologies and their impact in the lives of the people. However, the researchers were not focusing on the impact of Wi-Fi in the education industry. Over the past two decade there has been a very interesting transformation in terms of communication and how people share different forms of information (Dubendorf, 2003). Also, previously sharing of information and communication depend on wired and wireless technology evolved. Although, wired technology can be disadvantaged as a result of it limited access courage (Kim, Mims & Holmes, 2006).

Recently many organizations and institutions are investing on wireless technology to provide effective workplace and improved end-user productivity. In 2010 the North-West University (NWU) launched a project of upgrading its network infrastructure by installing wireless technologies in its three campuses (Mafikeng, Potchefstroom and Vaal triangle campuses). The project aim was to provide at least 70-80% coverage of wireless connection in all the campuses (North-West University (NWU) (2010). Singson and Rajesh (2012), they believe that such an investment in this technology improves productivity in education sector from both the staff members and the students.

Example, Pondicherry University (PU) is one of the universities that invested in wireless technology (Wi-Fi) by installing the Wi-Fi infrastructure around its campus (Singson & Rajesh, 2012). And many education institutions in Republic of South Africa (RSA) have invested heavily in

this technology to increase access to Internet which aimed to improve teaching and learning positively. From this section, there is an indication of interest and investment by higher institutions on Wi-Fi, but there is no prove whether this technology is improving on the academic performance of users, especially students. The problem therefore is that there is not enough available information on how WIFI technology impacts on students' academic performance. Then, this study is investigating whether Wi-Fi is having a positive impact and whether it improves the productivity and performance of students at the NWU (Mafikeng campus).

Research method

According to Oates (2008), quantitative research is a type of research that involves the use of numerical expressions in terms of data generation. This research method is also related to positivism, realism and interpretivism research design. In addition, Oates (2008), believes that questionnaire is a commonly used technique of collecting quantitative data for academic research. A questionnaire is a prearranged set of questions that can be answered without an interviewer or researcher. Types of research includes inductive, deductive and descriptive research that are related to the methodology that is quantitative research (Bhattacherjee, 2012). For the purpose of this research the deductive type was applied since it is relevant to a quantitative research. Also to add on that, the inductive research rest on reasoning and knowledge and this study collected data and analysis them based on respondent's sense of ideas and knowledge on the impact of Wi-Fi on their academic performance.

This study was constructed at the NWU (Mafikeng campus) with the total numbers of 11,657 students and 370 students participated in the study as the sample size. The sample size was determined using Krejcie and Morgan (1970) sampling size determinant scale. From the entire questionnaires distributed, 84% were returned and analysed after a number of follow-up were made. According to Chukwuere, Mavetera and Mavetera (2015) and Ntseme, Nametsagang and Chukwuere (2016), a study can be analysed after follow-up made without further success. The study involved four research questions: (1) In what ways are students' academic performance improving because of Wi-Fi? (2) How is the student's usage of Wi-Fi in NWU (Mafikeng)? (3) Are students using Wi-Fi more for academic related issues than personal issue? (4) What are the advantages and disadvantages of using Wi-Fi as a student?

Literature review

This section focus on the previous studies that were done regarding Wi-Fi and other theories that are related to Wi-Fi. The most important part of the literature in this study is to look at studies that have been conducted before on the Wi-Fi, usage of Wi-Fi in universities and purpose of Wi-Fi in institutions (education) to understand the topic better. The literature also seeks to understand how student's benefits from it, it disadvantages and the changes it brought to universities in general.

Usage of Wi-Fi in universities

As earlier noted that education institutions in RSA have adopted Wi-Fi technology. In 2012 and 2013 the University of Free State (UFS) started a project of installing Wi-Fi infrastructure in all of their three campuses. This project was aimed to provide wireless communication all over the three campuses to both the students and staff members. The university managed to install 150 access points around the campuses, and six mobility controllers for about 30000 users connected

to the network (Arubanetworks, 2014). Many people around the campuses now use laptop and other handhold devices like smartphones and tablets to connect and share information with one another (Arubanetworks, 2014).

The University of Pretoria (UP) also invested in the Wi-Fi as they believed in its ability to improve productivity on both staff and students, but at first the plan did not work as they planned until they had to reinstall the infrastructure again (Arubanetworks, 2014). Both the UFS and the UP agreed that the installation of Wi-Fi in their universities was the best decision they have taken and they can now see the benefits of it. As a result of the installations, there was no need for the two institutions to build lots of computer labs that can cost millions of rands just to provide Internet services to students and lecturers (Arubanetworks, 2014). However, Lauricella and Kay (2010) argue that the use of handhold devices can become a distraction to students during lectures, where by students use these devices to access Internet and do other academic unrelated activities.

Although, in the University of Kebangsaan Malaysia, students started using Wi-Fi to neglect their studies by being busy on the Internet during class time doing their personal activities (Thang, Mahmud & Abd Razak, 2012). They also argue that the transmission of data through wireless connection can lead to data being unsecured, and also students might hack into the network and get files transmitted by a lecturer's IP address. At the same hand, NWU in 2010 rolled out Wi-Fi technology across the three campuses to increase quality access to Internet and giving student and lecturers alike to work at anyplace around the campus. This examples and many more is an indication on the adoption of Wi-Fi technology by education institutions in South Africa and elsewhere. These adoptions prove its impact on quick access to Internet for both students and lecturers.

Purpose of Wi-Fi in institutions (education)

According to Awais, Bilal, Usman, Waqas and Sehrish (2001), access to information is very significant for studying purposes. Currently there is a lot of information that is released every day and most of it is available on the Internet. Also, it is not easy that an institution can have all the recent books and the old ones in the library (Awais et al., 2001). With that being said, the Internet becomes a better way that anyone can get information that is both old and current.

According to Ehrman (1995) as cited by Ogedebe (2012), the impact of Wi-Fi and Internet on academic performance of the student has shown a positive reaction because now students are able to access more information in short period of time. Also, students are able do their assignments and even submit on time because there is s no longer a need for them to print and submit their work. They just use their smartphone to connect and submit on time online, however as they get used to the technology others start to use it for non-academic purposes (Ogedebe, 2012). In addition, it also has a positive impact as students can have a group discussion using video conferencing. Busari (2001), says that it is important as it improves the interaction or communication between students and their lecturers during schooling hours when they are busy doing their work.

With that being said, some authors differ by arguing that not all of this only produce positive impact on the academic performance of students, but there are also negative impacts that Wi-Fi and all the wireless devices bring to the table (Lauricella & Kay, 2010). In addition, Mehmood and Taswir (2013), also argue that the use of Internet and social network can impact negatively on the

academic performance of student, this was discovered in the survey that was conducted in colleges (Mehmood & Taswir, 2013).

Advantages and disadvantage of Wi-Fi technology

According to Sandhu et al. (2013), the use of wireless and Wi-Fi technology goes with advantages and disadvantages which impact on university student's academic performance.

Advantages

- Emergency situations can be alerted through wireless communication. The affected regions can be provided support with the help of these alerts through wireless communication.
- Wireless technology is cheap and easy to install and to maintain.
- Wi-Fi it saves students money to buy mobile data.
- Wi-Fi enables students to access information and shares it in real time.
- Wi-Fi doesn't require physical connections.

Disadvantages.

- The speed is not as fast as wired.
- Wireless infrastructure is complicated to install.
- Wireless transmission uses radio signal which can easily experience interference.
- Wireless connection makes it easy for hackers to access people's information on the air and misuse it.

Data analysis

This section focus on answering the research questions in the following structure: Firstly, in what ways are students' academic performance improving because of Wi-Fi? Secondly, how is the student's usage of Wi-Fi in NWU (Mafikeng)? Thirdly, are students using Wi-Fi more for academic related issues than personal issue? Lastly, what are the advantages and disadvantages of using Wi-Fi as a student?

In what ways are students' academic performance improving because of Wi-Fi?

The aim of this research question is to find out the ways in which the use of Wi-Fi in NWU (Mafikeng campus) improves the academic performance of students. The question began with Table 1.

Table 1: Productiveness

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly agree	41	13.2	13.2	13.5
Agree	159	51.1	51.1	64.6
Not sure	90	28.9	28.9	93.6

Disagree	18	5.8	5.8	99.4
Strongly Disagree	2	.6	.6	100.0
Total	**311**	**100.0**	**100.0**	

The question was to determine if participants are productive on their school work using Wi-Fi. The options in response to the question are; strongly agree, agree, not sure, disagree, and strongly disagree. Out 311 participants that approached the question, 13.2% of them strongly agree, 51.1% agree, 28.9% not sure, 5.8% disagree, 0.6% strongly disagree. The above Table 1 shows that the majority of the participants (51.1%) agree that Wi-Fi helps them to be productive during schooling hours. Students believes that Wi-Fi helps them to be productive during schooling hours when they are submitting assignments online, downloading online study material and engaging in other academic related work.

Table 2: Wi-Fi improves communication

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly agree	42	13.5	13.5	13.8
Agree	167	53.7	53.7	67.5
Not sure	81	26.0	26.0	93.6
Disagree	18	5.8	5.8	99.4
Strongly Disagree	2	.6	.6	100.0
Total	**311**	**100.0**	**100.0**	

To understand whether Wi-Fi improves communication between students and lecturers, this question was asked (Do Wi-Fi improves your communication with classmates and lecturers?). Table 2 indicate that, 13.5% of participates strongly agree, 53.7% agree, 26% not sure, 5.8% disagree, and 0.6% strongly disagree. Busari (2001), mentioned that the use of Wi-Fi in academic institutions improves communication between students and they can interact better when they are doing their assignments. This study confirmed to the literature showing that majority of the participants agreed 53.7% and 13.5% strongly agreed that the use of Wi-Fi improves how students communicate and interact with each other and their lecturers.

Table 3: Information accessibility

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly agree	48	15.4	15.4	15.4
Agree	158	50.8	50.8	66.2
Not sure	86	27.7	27.7	93.9
Disagree	18	5.8	5.8	99.7
Strongly Disagree	1	.3	.3	100.0
Total	**311**	**100.0**	**100.0**	

This question seeks to understand if Wi-Fi technology improves information accessibility towards academic performance. The indication from Table 3 above shows that amongst 311 participants that respond to the question, 15.4% of them strongly agree, 50.8% agree, 27.7% not sure, 5.8% disagree and 0.3% strongly disagree. The finding proves that 50.8% of the participants agreed while 15.4% strongly agreed that Wi-Fi makes access to information online very easy and fast when their doing their school works. According to Awais et al. (2001), a lot of information is being released every day on the Internet and it is not easy for universities to keep up and to shelve all the recent information so many students use Internet to access information that is recent.

Table 4: Improve performance

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly agree	32	10.3	10.3	10.3
Agree	165	53.1	53.1	63.3
Not sure	97	31.2	31.2	94.5
Disagree	15	4.8	4.8	99.4
Strongly Disagree	2	.6	.6	100.0
Total	**311**	**100.0**	**100.0**	

This question tries to find out if participants can study well because of migration to Wi-Fi. Table 4.5 shows that 10.3% of the participants strongly agree, 53.1% agree, 31.2% not sure, 4.8% disagree, and 0.6% strongly disagree. Ogedebe (2012), argues that the use of Wi-Fi and Internet improves the academic performance of students as they are able to access information easily and not just any information but also the recent information. Then, Ogedebe (2012) states that since

students started using Wi-Fi their school work has improved. In contradiction, Mehmood and Taswir (2013) believed that the use of Internet and social network does more harm than good to students. Nonetheless, the findings from this study indicate that students are able to study well, do they school work on time and even their academic performance has enhanced.

How is the student's usage of WI-FI in NWU (Mafikeng)?

This second research question was aimed to find out how students in NWU (Mafikeng campus) use Wi-Fi, and paying attention at the awareness of Wi-Fi, locations that students access Wi-Fi, the frequency usage, preferred devices to access Wi-Fi and quality of the Wi-Fi provided.

Table 5: Awareness of WI-FI

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly agree	150	48.2	48.2	48.2
Agree	116	37.3	37.3	85.9
Not sure	35	11.3	11.3	97.1
Disagree	5	1.6	1.6	98.7
Strongly disagree	4	1.3	1.3	100.0
Total	**311**	**100.0**	**100.0**	

One might assume that most students are familiar with Wi-Fi based on the use rate, but it must not be ignored that some students are not familiar with Wi-Fi based on their background and other factors; hence it is important to understand if participants truly familiarize themselves with Wi-Fi. Then, Table 5 shows a question "Would you say that most students are familiar with Wi-Fi?" The findings show that 48.2% of the participants strongly agree that students are familiar with Wi-Fi, 37.3% agree, 11.3% not sure, 1.6% disagree, while 1.3% strongly disagree. Most undergraduate students at PU were aware of Wi-Fi from their computer literacy class and this included 60% of the post graduate students (Singson & Rajesh, 2012). Participants at the NWU (Mafikeng campus) also agree that they are aware of Wi-Fi, and 37.3% agreed that they are aware, and also with supporting of 48.2% strongly agreed.

Table 6: Wi-Fi access locations

	Frequency	Percent	Valid Percent	Cumulative Percent
Lecture hall	50	16.1	16.1	16.1
Computer labs	54	17.4	17.4	33.8
Student Cafeteria	141	45.3	45.3	79.4
Library	53	17.0	17.0	96.5
24hours	11	3.5	3.5	100.0
Total	**311**	**100.0**	**100.0**	

The desired location of accessing Wi-Fi is aimed at finding out the location that most students have access to Wi-Fi. The options given are based on locations that most students are always spend time, such as; lecture halls, computer labs, student cafeteria, library and 24 hours reading library. In above Table 6, the response indicate that 16.1% of the student prefer accessing Wi-Fi at lecture halls, 17.4% computer labs, 45.3% student cafeteria, 17.0% library and 3.5% 24 hours. Singson and Rajesh (2012) found that most student at an average of 60% prefer to access Wi-Fi from their residences while another large group of about 20% prefer the library to access Wi-Fi. But in the NWU (Mafikeng campus) most students said that they prefer the student cafeteria than other places.

Table 7: Frequency usage by students

	Frequency	Percent	Valid Percent	Cumulative Percent
Hourly	65	20.9	20.9	20.9
Daily	118	37.9	37.9	58.8
Weekly	103	33.1	33.1	92.0
Monthly	25	8.0	8.0	100.0
Total	**311**	**100.0**	**100.0**	

How often do you use Wi-Fi? This question aimed to find out how often students get connected to the Wi-Fi. The findings show that 20.9% of the participants are connect hourly to Wi-Fi, 37.9% connect daily, 33.1% connect weekly (once or two twice) and 8% connect monthly (see Table 7 above). Therefore, this study out that more students are connect to Wi-Fi daily. Also, the findings indicate that students are using Wi-Fi in daily basics in their learning process.

Table 8: Preferred devices to access Wi-Fi

	Frequency	Percent	Valid Percent	Cumulative Percent
Smartphone	135	43.4	43.4	43.4
Tablet	42	13.5	13.5	56.9
Laptop	98	31.5	31.5	88.4
Other devices	36	11.6	11.6	100.0
Total	**311**	**100.0**	**100.0**	

There are different kinds of device that can be used to connect users to Wi-Fi. This question aimed to ascertains the most preferred device participants use when accessing Wireless Internet in the campus. The findings on Table 8 above shows that 43.4% of the participants' access Wi-Fi with smartphones, 13.5% uses tablets, 31.5% uses laptops and 11.6% uses other devices not mentioned in this study. Students from PU were given different gadgets during data collection and most students 71% said that they prefer to access Wi-Fi with their laptops while 14% prefer their phones (Singson & Rajesh, 2012). NWU (Mafikeng campus) students however, have a different view because as most of them prefer smartphone more than other devices like laptop.

Table 9: Quality of Wi-Fi

	Frequency	Percent	Valid Percent	Cumulative Percent
Very high	73	23.5	23.5	23.5
High	75	24.1	24.1	47.6
Fair	144	46.3	46.3	93.9
Low	19	6.1	6.1	100.0
Total	**311**	**100.0**	**100.0**	

The quality of Wi-Fi service provided to students also needs to be tested. By quality, the study regards factors like accessibility, speed, security and reliability. Students were asked "How would you rank the quality levels of Wi-Fi in NWU (Mafikeng campus)?", and in response according to Table 9 above, 23.5% ranked Wi-Fi very high, 24.1% ranked high, 46.3% says it is just fair, while 6.1% say it is low. The finding shows that the Wi-Fi service level provided to students at NWU (Mafikeng campus) is just fair to the users.

Are students using Wi-Fi more for academic related issues than personal issue?

This research question is aimed at investigating if the students in NWU (Mafikeng Campus) use Wi-Fi more for personal thing or for academic related issues.

Table 10: Use of WI-FI for academic related issues

	Frequency	Percent	Valid Percent	Cumulative Percent
Mostly	48	15.4	15.4	16.1
Sometimes	230	74.0	74.0	90.0
not sure	26	8.4	8.4	98.4
Hardly	5	1.6	1.6	100.0
Total	**311**	**100.0**	**100.0**	

"When I am connected to Wi-Fi during schooling hours I only use it for academic related issues (doing assignment, research, online learning, downloading slides and writing online quiz)" this question is aimed at finding out if students use WI-FI for academic related issues. In response to this question, 15.4% students said mostly, 74.0% said sometimes, 8.4% are not sure, 1.6% hardly do that while 0% never use it for academic related issues. According to Table 10, most of the participants only use Wi-Fi sometimes for their academic related work.

Table 11: Use of WI-FI for entertainment

	Frequency	Percent	Valid Percent	Cumulative Percent
Mostly	42	13.5	13.5	14.1
Sometimes	212	68.2	68.2	82.3
not sure	38	12.2	12.2	94.5
Hardly	12	3.9	3.9	98.4
Never	5	1.6	1.6	100.0
Total	**311**	**100.0**	**100.0**	

"I spend most of my time when I am not doing my school work watching movies on the Internet and series to refresh my mind." This question is aimed at finding out if participants use Wi-Fi for entertainment. The findings show that 13.5% of the students spend time mostly in entertainment, 68.2% said sometimes, 12.2% are not sure, 3.9% hardly do that while 1.6% said they never use it

for entertainment (See Table 11 above). Findings show that most students are using Wi-Fi for entertainment purposes than academic issues.

Table 12: Using for social networks

	Frequency	Percent	Valid Percent	Cumulative Percent
Mostly	68	21.9	21.9	22.8
Sometimes	191	61.4	61.4	84.2
Not sure	37	11.9	11.9	96.1
Hardly	12	3.9	3.9	100.0
Total	**311**	**100.0**	**100.0**	

Students mostly use social networks to communicate, hence this question aimed to find out if they use Wi-Fi for social networks or not (WhatsApp, Facebook and Twitter). According to above Table 12, 21.9% of the students selected mostly, 61.4% sometimes, 11.9% are not sure, while 3.9% hardly do use Wi-Fi for social networks. According to Mehmood and Taswir (2013), students mostly spend their time on Internet and social networks during lectures. The argument can be true because the majority 61.4% of the students sometimes use Wi-Fi for social networking purposes.

Table 13: Use of WI-FI for personal things

	Frequency	Percent	Valid Percent	Cumulative Percent
Mostly	36	11.6	11.6	12.2
Sometimes	194	62.4	62.4	74.6
Not sure	53	17.0	17.0	92.0
Hardly	13	4.2	4.2	96.1
Never	12	3.9	3.9	100.0
Total	**311**	**100.0**	**100.0**	

This question "I use Wi-Fi more for my personal stuff (online banking, sending emails and online trading)?" The question aimed to understand if respondents use Wi-Fi more for personal stuff. According to Table 13 above, 11.6% students said mostly, 62.4% said sometimes, 17% are not sure, 4.2% hardly do that while 3.9% said they never use it for personal stuff. The findings indicate that most 62.4% of the participants sometimes use Wi-Fi for their personal stuff and in

some instances they use it for academic related issues. In addition, Mehmood and Taswir (2013), in their study they observed that most students use Wi-Fi and Internet to go to social networks.

What are the advantages and disadvantages of using Wi-Fi as a student?

This question required the participants to select all the advantages and disadvantage that they have experienced while using Wi-Fi and in response participants were given a list of answers to select from.

Table 14: Advantages of WI-FI

The structure of the immediate table below is as follows: (A) Access to internet with different and portable devices. (B) Downloading documents on smart phones. (C) Better internet surfing in terms of speed. (D) Access to internet from different locations. (E) Helps me save my data bundles when I am in campus. (F) Helps me to study online.

	Frequency	Percent	Valid Percent	Cumulative Percent
A,B,C and D	9	2.9	2.9	2.9
A,B,C,D and E	8	2.6	2.6	5.5
A,B,C,D,E and F	294	94.5	94.5	100.0
Total	**311**	**100.0**	**100.0**	

The aim of this question is to find out all the positive benefits that the students get from using Wi-Fi and will help to measure how beneficial it is to the students and how positively it affects their studies. More participants chose options between A and F (94.5% according to Table 14 above) as the advantages they have experienced using Wi-Fi. The finding implies that students using Wi-Fi is helping them out in so many ways including connecting with classmates and sending email to lecturers and students.

Table 15: Disadvantages of WI-FI

The structure of the immediate Table below is as follows: (A) Security of information is not up to standard as I was hacked before. (B) Difficult to trace lost data on the line. (C) The speed of Wi-Fi slows down when many people are connected. (D) Wi-Fi sometime disconnect when I am busy downloading. (E) Many devices from different manufacturers are not fully compatible. (F) Use of Wi-Fi affects my battery life time.

	Frequency	Percent	Valid Percent	Cumulative Percent
C	1	.3	.3	.3
D and C	2	.6	.6	1.0
D, C, E and F	1	.3	.3	1.3

E and F	296	95.2	95.2	96.5
E, F and C	4	1.3	1.3	97.7
E, F, C and D	1	.3	.3	98.1
E, F and D	2	.6	.6	98.7
E, F, D and C	4	1.3	1.3	100.0
Total	**311**	**100.0**	**100.0**	

The aim of this question is to find out all the negative factors that the students experience while using Wi-Fi and will help to measure how unbeneficial it is to the students and how it negatively affects their studies. Most participants chose option E and F at a percentage of about 95.2% according to above Table 15. The findings mean that they all have a problem with the fact that Wi-Fi minimizes their battery life of their devices and some device are not Wi-Fi compatible.

Discussion of the findings

The discussion of this study were done according to the analysis of the tables above. The findings indicate that Wi-Fi helps students to be more productive to their studies, since it allowed students to access study materials online, submit their school work online and receive the announcements online. According to Aruba networks (2014), after Wi-Fi was installed in the UFS and UP, both students and lecturers were exited and everyone started accessing Internet with their laptops and smartphones. Refer to Table 1, students indicate that Wi-Fi is academic life saver. Again, Busari (2001) suggested that the use of Wi-Fi in academic institutions improves communication between students and they can interact better when they are doing their assignments. Table 2 show that majority of students agreed that Wi-Fi enable all angles of communication among the students, lectures and other people around the global. The findings indicate that Wi-Fi bridge communication and digital divide among students.

Table 3 show that majority of students find Wi-Fi easy to access and retrieves information toward their academic performance. To Awais et al. (2001), they suggest that a lot of information is being released every day on the Internet and it is not easy for universities to keep up and to shelve all the recent information. Therefore, more students use Wi-Fi to access recent academic information. Students agreed that Wi-Fi help them to study well and it improves their academic performance (See Table 4). Ogedebe (2012), argues that the use of Wi-Fi and Internet improves the academic performance of student as they are able to access information easily and not just any information but also the recent information. Although this information can improve academic performance when it is well managed.

One might assume that most students are familiar with Wi-Fi based on the use rate Table 7, but it must not be ignored that some students may not familiar with Wi-Fi based on their background and other factors hence it is important to ask that. However, the findings from Table 5 indicate that students are familiar and aware with Wi-Fi. According to the literature provided by Singson and Rajesh (2012), it was found that most students at PU were aware of Wi-Fi due to their

computer literacy class. The literature study further stated that an average of 60% prefer to access Wi-Fi from their residences while another large group 20% prefer the library to access Wi-Fi. But in the NWU (Mafikeng Campus) most students said that they access the Wi-Fi service at the student cafeteria (See Table 6). The access location of Wi-Fi by students discover the significant of using Wi-Fi, this is supported by Table 7, that indicate that majority of students at NWU (Mafikeng Campus) connect to Wi-Fi services daily. This is also influence by the fact that that Wi-Fi allows students to connect using smart phone Negus and Petrick (2008). Table 8 shows that majority of students use smart phones to connect Wi-Fi.

Table 9 determines the quality of Wi-Fi connection provided to students. The findings indicate that the Wi-Fi connection quality is just fair. With available signal of Wi-Fi around the campus, students indicate that they connect to Wi-Fi during schooling hours and using it for academic related issues (doing assignment, research, online learning, downloading slides and writing online quiz) as indicated in Table 10. However, Table 11 also indicates that students also use Wi-Fi for entertainment to refresh from the school work. In the meanwhile, Table 12 indicates that majority of students use Wi-Fi to connect to social networks to communicate. Mehmood and Taswir (2013), say that students mostly spend their time on Internet and social networks during lectures. The argument can be true because the majority of the students in this study said that sometimes use it for social networks (See Table 12). Again, Table 13 indicate that majority of students use Wi-Fi to support their personal interest, and this was observed by study that was done by Mehmood and Taswir (2013) that indicate that most of students use Wi-Fi for social networks, online banking, sending emails, online trading and many more.

Table 14 indicate the benefits of using it, the results shows that more students enjoy the benefits from Wi-Fi in the following manner: access to Internet with different portable devices, downloading documents on smartphones, better Internet surfing in terms of speed, access to Internet from different locations, helps students to save data bundles cost when they are in campus and help students to study online.

The finding regarding the downside of Wi-Fi shows that most participants chose option E and F (See Table 15). The finding results pointed out that most of the participants all have a problem with the fact that continuous usage of Wi-Fi minimizes their battery life of their devices and some device are not Wi-Fi compatible. In sum, majority of students indicate that many devices from some manufacturers are not fully compatible and it facilitate short battery life of their devices. Then, education institutions should upgrade their Wi-Fi connectivity so it can be compatible to all device no matter the make.

Recommendations for future research

As noted earlier that education institutions within and outside RSA are investing in Wi-Fi service heavily. Table 5 indicates that only about 48% of the participants are aware of Wi-Fi, so it is advisable that the university must educate students on the services offered by the technology.

Most of the participants indicated that the quality of Wi-Fi in NWU (Mafikeng campus) is just fair (see Table 9). Base on this quality level, it is important for the university to investigate and upgrade the quality level of Wi-Fi that they provide the students in order to improve and impact positively on the performance of the students.

Based on the findings, most participants said that Wi-Fi helps them find information for their academic work and therefore their performance has improved. So it is advisable that the NWU campus should investigate more about the benefits of Wi-Fi towards academic performance.

Conclusion

The literature survey shows a debating argument where some authors said that the use of Wi-Fi has a positive impact in academic institutions Ogedebe (2012), while the other group of authors did not agree based on their observations and findings. Some argue by bringing the impact of social media as a distraction Mehmood and Taswir (2013), however as much as it is considered to be a distraction it also improves communication between students and lectures (Busari 2001).The findings based on collected data from students also showed a high number of participants saying that Wi-Fi improves their performances based on the fact that it helps them submit their work on time and even to access information for assignment, they feather added that it also improves communication with classmates and lecturers. Participants also indicated it is simple to connect, since it allows smartphones to connect at the student cafeteria.

Overall, Wi-Fi come with range of advantages (benefits) and disadvantages (Table 14 and 15 respectively). Then, Wi-Fi technology in the higher education institutions should be encourage among the universities, colleges and students because it can affect positively on going green initiatives.

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