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Smartphone Application Usage Amongst Students at a South African University

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Abstract: This study assesses the usage of smartphone applications and specifically social networking applications (SNS) amongst smartphone users, due to the perceived high-level of usage amongst University Students. Questionnaires were derived from the literature, and used to assess the frequency and intensity of application usage. The data was analysed looking at key applications and frequency/intensity of usage. It was found that the students that were questioned at this university, spend an average of five hours per day on their smartphones interacting with others via SNS, and remain online for about 16 hours per day. The students that were sampled preferred to communicate using SNS. These students appear to use sms for close friends only, and phonecalls for loved ones and family; possibly due to the high cost of sms' and phonecalls in South Africa compared to the low cost of SNS. Students use SNS predominantly for Facebook, Facebook chat and Blackberry Messenger (BB users) in order to update their profiles, chat with friends, and look at their friends' profiles and statuses. Future studies should investigate what motivates students to spend such an inordinate amount of time with SNS apps, and which Apps are long term favourites in the race for market leading SNS App.

Keywords: Smartphones, Applications, Mobile Social Networking, M-Education, Smartphone Usage.

1. Introduction

The capability and performance of mobile phones have improved considerably since their first introduction, and are no longer simple voice centric devices. They now provide mobile computing power equivalent to that of personal computers of a few years ago and can be used for several purposes.

Advanced mobile phones now have the capabilities of a telephone, camera (still and video), music player and voice recorder, personal digital assistant [19]. They are approaching the level of complexity of computers for mobile applications with applications such as mobile word processing, spreadsheets email and internet. These mobile phones have become so interactive that they are referred to as Smartphones [16].

A number of studies have been done on the use of mobile and smartphones. These studies typically looked at usage patterns on mobile devices [21,22], data traffic, battery life, interactions on servers [22] and interactions with mobile applications [33,34].

Reasons given in the literature for examining smartphone usage are; that little is known about how people use these devices; such as how often a user interacts with the phone, how

long such interactions last, how users interact with such applications, and how their attention is spread amongst them [22].

Other studies claim the need for understanding smartphone usage to guide strategic research and product development around issues why users adopt applications, why they use them, HCI factors, user satisfaction and change to competing offerings [34].

Social and Psychological factors such as the blurred distinction between work and private time with mobile devices, intrusion of mobile devices in social life [27], even claiming smartphone addiction [37], dependency [24] and dysfunctional behaviour [29] have all been examined.

Little is however understood about which applications end-users use when they are spending time on their smartphones. This study aims to provide a snapshot from a student's life perspective.

2. Objectives

This preliminary study examines the usage of smartphones and applications amongst students at a South African University. This research attempts to understand the perceived high-level of usage of mobile social networking applications amongst university students by looking at the intensity of usage, and which smartphones and applications they use.

Of specific interest is the level of interaction with social networking applications (SNS), comparing the intensity of interactions between voice, sms, SNS, Face to Face (F2F) interactions, and its correlations with application usage.

The results will be compared to two other similar studies done in Australia [37] and Europe [35]. Based on the perceived level of interactions of students with their smartphones, it is hypothesized that there should be no difference to the intensity of usage as benchmarked by these prior studies.

3. Methodology

In order to better understand what students are using their smartphones for, a questionnaire was developed to assess their demographics, smartphone details, relative ranking of apps, and intensity of usage.

3.1 Data Collected

Demographics, including information such as year of study, age, course major, language and marital status was collected. Questions were formulated to determine the make and model of smartphone as well as the network providers. Operating systems were established from the make and model of the phone. Users were asked to rank the level of usage of SNS applications on a scale of 1 to 11, as well as which other apps they use on a regular basis, ranked from 1 to 10. These rankings were then inverted to establish intensity.

To determine the general usage of the phone, the number of incoming/outgoing calls were queried, as well as the number of incoming/outgoing sms'. The average time spent on a phonecall was also asked for. To determine the intensity of SNS usage, the number of SNS interactions per day were requested, the average time spent on SNS interactions, as well as how many people were interacted with together with the number of SNS friends/contacts. As a comparison, the users were also asked how many Face to Face (F2F) interactions they have on a daily basis, and the average time spent on these interactions.

In order to determine the average monthly cellphone expenditure, the average monthly income as well as monthly cellphone costs was requested, as well as the source of income to pay these bills.

3.2 Questionnaire Administration

The questionnaire was piloted in a class situation by all the students of a 3rd year course on research methods, where one student was the interviewer, and another the interviewee. The questionnaire was then expanded based on the class feedback to include other Apps and questions that were identified in the class.

For the final study, students who use or own a smartphones on campus were randomly surveyed. A prize was offered for their participation, and this was found to be a useful incentive to encourage participation.

Sixty questionnaires were administered, and three were discarded due to incomplete information. Results were captured, additional data re-requested, prizes drawn and handed over, data analysed, and further research performed by the listed authors, who voluntarily participated in the process.

3.3 Study Limitations

The sample population for this study was specifically students on campus using smartphones. Only a small number of students were surveyed (60 out of a possible 7000 on campus), therefore the following limitations should be considered.

Due to the low number of responses (n=60 with 57 valid responses), non-parametric statistics was used to analyse the results. Also, a number of the variables are based on self-reported figures, and may be skewed due to the users not being clear on the question, on their actual usage, or may be in denial about their level of usage or wish to conceal what they perceive to be sensitive or personal information such as income or cell expenditure.

Although the sample is not statistically representative of the student population, a good representation of students from different departments, as well as gender, race and language were targeted in the study.

Users were asked to provide a self-report on their usage and ranking of Apps, which may not be as accurate as using metric software, but should provide sufficient causal data for examination.

As only smartphones were surveyed, the operating systems identified in this survey are only indicative of smartphones used on this campus, and should not be considered representative of all phone operating systems.

It should also be noted that smartphone apps are under continuous development, and a number of new apps such as Viber etc. have entered the market since this study was done.

3.4 Limitations i.t.o. Examples

For illustrative purposes and in order to compare the findings to usage norms, this study is compared with that of Verkasalo [35] and Walsh, White & Young [37].

The population for the Verkasalo study [35] were users from North-America, Europe and selected Asian countries and was conducted between 2008-2009. Fifty-six percent (56%) of the users were under the age of 30 and 86% paid their own phone bills.

The Australian study [37] sampled 946 participants aged between 15 to 24 years from private and public schools, university campuses, youth organisations, and snowballing methods between 2005-2006.

These populations are significantly different to this study to readily make comparisons, however it is hoped to illustrate some of the differences on usage from a Southern African students perspective.

Because of the disparities amongst measures for usage and differences in samples, it is difficult to compare the frequency and intensity of usage of apps with those of [35,37], however attempts were made to standardise the times for illustrative purposes only.

4. Smartphone Applications

Smartphones run Operating Systems (OS) that allow the installation of third party and vendor applications or "Apps". Most Smartphone OS' have their own dedicated Apps that are normally available from a portal for downloading, frequently referred to as an "App Store" [26].

Smartphone Apps range from Games, e-Book Readers, Navigation Software, Services providing news and weather feeds, to Apps allowing users to access internet services such as email, Wikipedia, Youtube, Facebook and other Social Networking Apps.

Mobile Social Networking Apps can be seen as Apps that allow users to connect to other users through server-based or Cloud systems [23] and enable mobile collaboration [15] such as Facebook, Twitter and Linked-in. These can be broadly grouped as social networking sites (SNS), chat or instant messaging (IM) applications, and email providers. SNS included in this survey were Facebook [2], MySpace, Twitter and Linked-in. Chat or IM Apps included are Facebook Chat, Google Talk [11], Skype chat, Yahoo chat, Mxit [5], Nimbuzz and MIG33. Email providers included in this survey were Yahoo Mail, Gmail [12], Hotmail [4], and the University email.

Some apps act as chat integrators that can connect to a number of chat services. Those included in this study were eBuddy [13], 2Go [6, 14] and Palringo. There are also platform specific systems that were included such as Blackberry Messenger that is specific to the Blackberry operating system.

5. Results

Following is an overview of the results of the study, ordered by demographics, smartphones, network providers, usage patterns, costs and funding, application usage, SNS usage and frequency of interactions.

5.1 Demographics

Table1: Demographics

Var	Description	n	% Tot	Std. Dev
Resp	Respondent	57	98%	
Age	Min	18		1.962
	Maximum	29		
	Average	21		
Year	1st	5	9%	0.953
	2nd	10	17%	
	3rd	27	47%	
	4th/Honours	13	23%	
	Masters	2	4%	
Gender	Male	21	37%	0.487
	Female	36	63%	
Marital	Unknown	5	9%	
	Single	30	37%	
	Relationship	21	52%	
	Married	1	2%	
	Divorced	0	0%	

Students in this survey were predominantly English speaking (60%), 15 % Xhosa, and the rest were Zulu (7%), Afrikaans (7%), Venda (5%), French (5%), Tshona and Sotho (2% each).

The majority of the students (63%) were from the Economics and Management Sciences Faculty, 18% Natural Sciences, and the rest from Law, Arts, Community & Health Sciences as well as Dentistry.

From the EMS Faculty, the largest numbers of students were from Finance (21%), Accounting (10%), Industrial Psychology (10%), Information Systems (5%) and Economics (4%).

From the sample 36,8% were males and 63,2% were females.

The most frequent language spoken is English but there were also different variations in the language, showing that a language barrier should not be an issue when regarding smartphone usage.

Different living backgrounds were taken into account to help explain how people's backgrounds affect their usage and types of smartphones. 60% of the respondents reside in cities, 33% reside in towns and the remaining 7% live in rural villages.

5.2 Smartphones

The predominant make of smartphone is Blackberry (60%) with the 8520 Curve the most prolific model. The next most popular brand was Nokia (28%) made up of models such as the E73, E72, E63, N79 and 5800 Xpress Music.

Due to the high count of Blackberry smartphones, Blackberry OS (60%) is the predominant operating system, with Symbian OS next at 28% and Android OS 7%. This contrasts with a recent Gartner survey for 2010 of 16% Blackberry OS, Symbian (37.6%), Android (22.7%), and iOS of 15.7% [1].

The phones were on average two years old, with the oldest being 5 years old.

5.3 Cellular Networks

MTN had 49% of the market share of the students, Vodacom 46%, Cell-C 23% and 8-TA 2%. The majority of the subscribers had contracts (60%), 32% were Pay-as-you go, and the other 23% top-up.

An interesting phenomena that was raised during this study was that a few students indicated that they would switch their simcards depending on the best price for a service, or use a dual sim phone such as the Nokia E73.

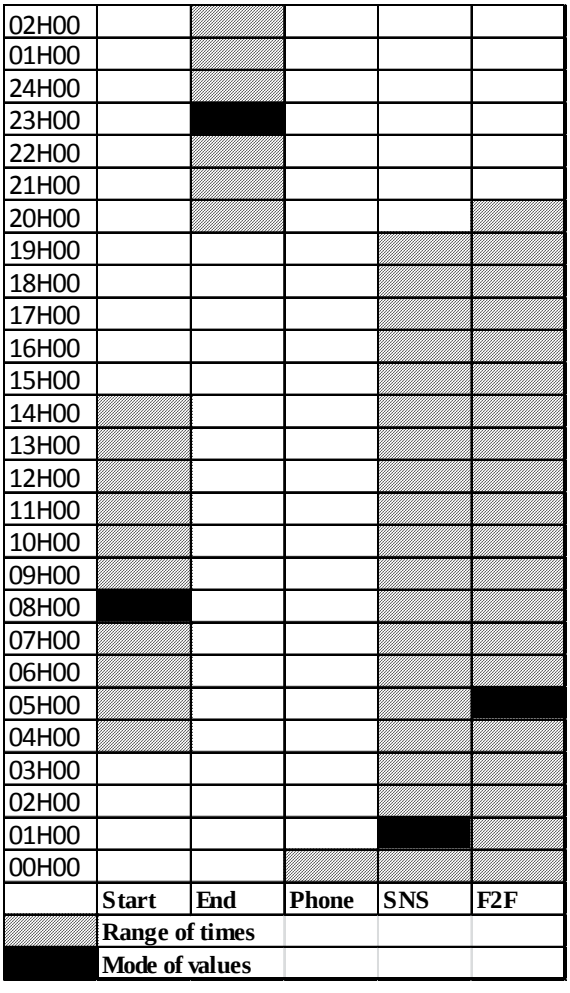
Table2: Start and End, Phone, SNS and F2F Times

5.4 Online Time

Most of the students would start their day with Social Networking when they wake up, or between 07H00 and 08H00 in the morning, and continue with Social networking till about 24H00 at night or when they go to sleep. Some students start at 06H00, and finish at 02H00 the next day. This translates to an average of 16 hours with a maximum of 22 hours of Social Networking access per day. It is understood that this is not an exclusive activity, as shall be seen from the analysis of usage of smartphones.

5.5 Phonecalls

The survey showed that the students made about 6.25 phonecalls per day, and received about 7.94. The average time spent per phonecall was about 4 minutes. A few students subscribe to Vodacom Nightshift, MTN Zone or Cell C's Woza Weekend, where you can talk for up to one hour for free between 24H00 and 05H00. These students would make on average one, 1 hour phonecall per night.



5.6 SMS

Students sent on average about 8.85 sms' and received on average 9.96 sms' per day.

5.7 Mobile SNS

On average, students had about 45 mobile social interactions, per day. A few students indicated 1200 interactions per day, and it is not understood why they responded this way. These responses were excluded in order not to skew the results.

The survey also showed that students spent an average of five (5) hours per day with social networking apps, with about 4 hours on messaging Apps such as Facebook, Facebook chat, BBM, MXIT, WhatsApp and Hotmail.

Students indicated that they communicated mostly in groups (51%), one-on-one conversations (42%) and both 5%. On average students will interact with about 16 people on a daily basis, with the maximum being 65, and the minimum being one interaction for a married lady communicating only with her husband.

The average number of social networking friends respondents indicated were 381, with the most being 1560, and the minimum 5 friends.

5.8 F2F Networking

Students indicated that they spent between 10 minutes and 6 hours per day interacting face to face with friends and family. These interactions would last approximately 17 minutes at a time and would involve about 17 family members and/or friends.

5.9 Smartphone Applications

Smartphone application usage was assessed by asking students their perceived frequency of usage, as well as to rank the apps and SNS Apps that they use in order of perceived usage on a scale of 1-10.

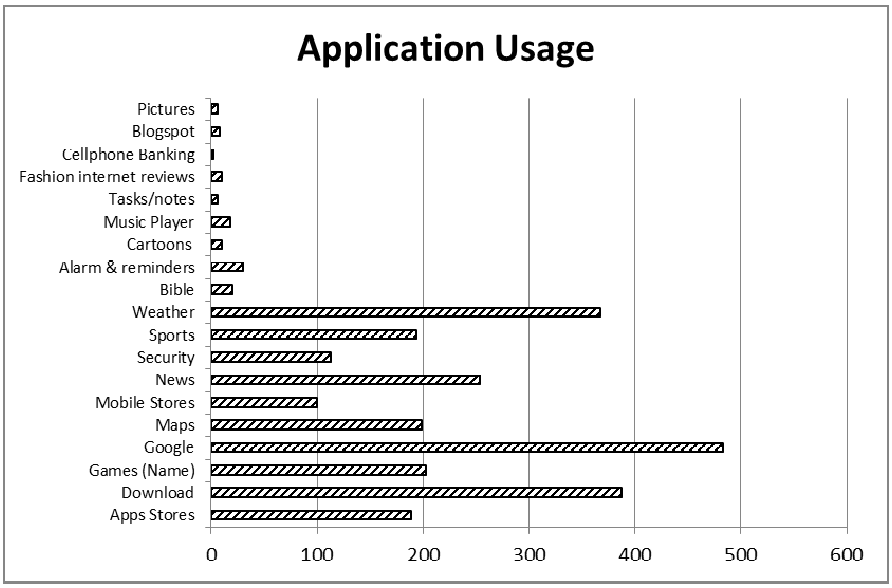


Figure 1: Smartphone Apps Usage Ranking

5.10 Smartphone App Usage

The previous chart represents the students ranking of the applications that they use on their smartphones. Students were asked to rank the applications in order of usage from 1-10, and the scale was inverted to determine the usage ranking (10 most and 1 least used).

The highest used application was Google, then Downloads and Weather, with App Stores, Games, Maps and Weather the next highest used. The types of Games that are

played by the students are FIFA, Brick Breaker, Hangman, Rollercoaster, Sudoko and Texas Hold-em.

5.11 Social Networking Apps

The following chart outlines the trend in terms of ranking that students offered as to the level of usage of the following Social Networking applications.

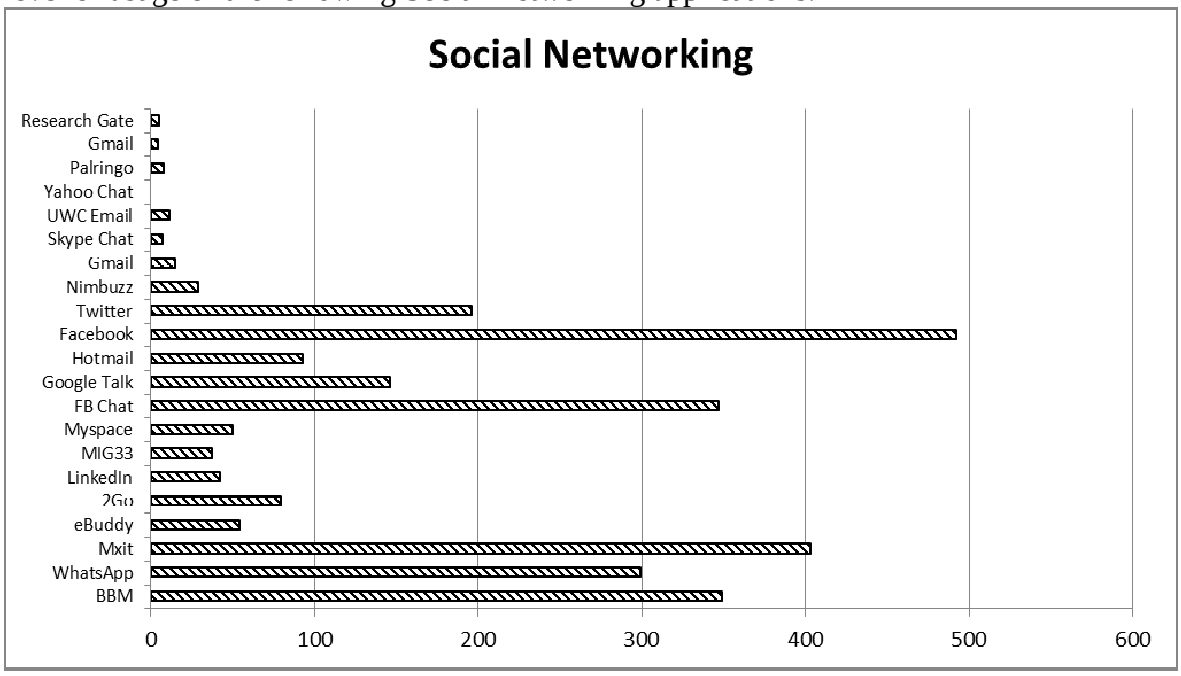


Figure 2: SNS Apps Ranking

The highest ranked email provider was Hotmail, with the highest ranked chat applications being Mxit, Blackberry Messenger, Facebook Chat and WhatsApp in descending order of usage. The highest ranked social networking site was Facebook. The highest ranked chat integrator was 2Go with eBuddy next.

5.12 Costs and Funding

More than half of the students (60%) indicated that they paid for their own cellphone expense, with their parents paying 32% of the bills and siblings paying 4% of the bills. However, when asked where the money for paying phone expenses comes from, 46% said from their Parents, 28% from their own work (part-time, weekends or as interns) and 14% from their own income and parents.

The Average monthly cellphone expenditure was R260 (€26), a minimum of about R90 (€9) p/m and the largest spender of R1600 (€160) per month. This can be contrasted with an average expendable income of R1000 (€100) per month, although one respondent stated an income of R9000 (€900) which would skew the averages and was excluded as it is not a student norm.

On average, students spent about 25% of their monthly income on their cellphone bills. What was not differentiated was the percentage contributing towards phone calls, and that of data.

Based on students estimated usage, an average expenditure for calls are approximately R200 (€20) per month. Blackberry offer an unlimited data package called Blackberry Internet Service (BIS) for R60 (€6) per month, which would comprise the balance of the average monthly cellphone expenditure. It is not clear from this study how much non BIS users spend on data per month.

6. Discussion

In this study, students made about 6 phone calls, and received about 8 per day as compared to Australian youth of about 2.5 and 3 respectively. SMS's are also higher at 9 outgoing, and 8 incoming versus 7 out and in. The Australian study unfortunately did not measure time spent and number of interactions with SNS, mobile email and chat which makes it difficult to positively confirm SNS usage baselines when lacking metrics on how much time youth are spending with SNS interactions.

In the Verkasalo [35] study, which targeted a much larger survey across North-America, Europe and Asia, voice represented 34% of total usage, 21% on messaging of which 82% being sms, 14% email and IM only approximately 2%. The other 14% comprised the use of mobile apps and browsing, and multimedia usage 15% being mainly music and videos. In that study, smartphone users spent approximately 410 minutes per month with mobile email, approximately 350 minutes with Social Networking Apps, 440 minutes for voice *(1225 mins)*, and 560 with sms (399 mins). Other apps with high intensity of interactions are music (+- 650 mins), and Calendar, with Instant Messaging of about 40 minutes per month, and web browsing and games of approximately 120 minutes per month.

In order to establish a baseline, the SNS, mobile Email and IM usage from this prior study was added together to get a figure of 410+350+40 = 800 mins/month or 38 mins/day. When adding the times from this study for web browsing (120 mins/month) and other mobile apps (MMS = 30, Games=120 & Video=25 for a total of 175 mins) one gets a total time spent with mobile apps (excluding calendar) of 295 mins/month or 14 minutes per day.

By using a 21 day month to cater for possible discrepancies over weekend usage, differences can be noted with the Verkasalo study *(comparative figures from [35] are indicated in brackets*). In stark contrast with this study, students at this university spend approximately 60 *(20)* minutes per day in phone calls, 20 *(26)* minutes on sms, five hours *(14 mins)* with SNS (email, Chat, Facebook, Twitter), and about 4h45 mins on F2F interactions with friends, fellow students and family.

Of the total time measured, phone calls only comprise about 15 %, sms 5% with the remainder 80 % of time spent on SNS Apps. The time spent with specific Apps such as Google, News, Sports, and Games was however not measured, and this may be better measured with app tracking or mobile phone telemetry software. It is also important to note that the time spent on SNS matches closely the amount of time students spend with face to face interactions, possibly because they spend a considerable time on campus with their friends.

In some cases the amount of time spent on SNS's has negatively affected students studies, with one student acknowledging that she failed her first year due to excessive SNS interactions. More than half of the students are also not shy to acknowledge that they use their mobile phones for responding to messages in class, with 60% of the students being of the opinion that they use their phones "all the time", more than 70% acknowledging that they check their messages frequently and more than 85% using their phones mainly for SNS.

Also of interest for m-teaching applications is that less than 10% of the students would use their smartphones to consult with their lecturers, although 60% of the students indicated that they use their smartphones for their studies.

Students appear to have no loyalty to a specific application, and are prepared to use whatever App is required to connect to their friends. The most preferred IM App is Mxit, possibly because it is accessible on most OS and Smartphone platforms, and can be installed on the cheaper handsets for which there are more users. The cost of the handset, data package or application, seems to be a factor in adoption of a particular IM or chat application amongst these students.

The other applications which are compatible with lower end mobile handsets are Gmail, eBuddy, Mig33, Google Chat, Facebook, Nimbuzz, Skype Chat and Yahoo! Messenger. A key trend for Smartphone users appear to be the use of IM Integrator Apps such as eBuddy or 2Go, which allow users to connect to multiple IM platforms in the background.

Because BBM is only available on Blackberry devices, it appears to be driving a trend amongst the students to acquire a Blackberry in order to connect with their friends. Cost is however still a factor and not all the students appear to be able to afford or want to use a Blackberry. The R60 per month free internet from Blackberry (BIS) does make it very attractive for those that can afford this package. It also becomes essential for some students to have free internet access, since when they run out of airtime, they can still communicate with their friends and family with BBM and/or WhatsApp, Mxit or Facebook Chat.

Monthly cellphone expenditure is a big concern for students, considering that they are spending on average 25% of their disposable income of about 100 euros per month on their cellphone bill. The preference for communications medium (chat over calls and sms) can possibly be explained because of the high costs of phone calls in South Africa (+-20 € cents per minute), and sms (2 €c) as opposed to R1 (10 €c) per Mb for data with which a number of messages and email can be sent. Students use these means of communication only for worthy purposes such as contacting ones they love, or close friends respectively.

For all other communication and social messaging, students appear to choose mobile IM, email and SNS and SNS sites such as Facebook and Twitter to keep in contact with others or keeping them updated. Linked-in also becomes important for students when considering their further career and keeping track of others in their network of friends.

7. Conclusions

Even after considering the higher accuracy of using an application to track mobile usage such as the Verkasalo [35] study versus measuring students self-reporting and the disparity in samples, spending 5 hours daily using SNS and mobile communication apps cannot be ignored.

Differences between these studies may be ascribed to dissimilarity in sample populations (students vs adults), geographical differences, costs for voice, sms and data in South Africa as opposed to North-America, Europe, Asia and Australia, as well as other possible factors motivating students to excessive usage of Social Networking Applications.

In the Verkasalo study, voice was the predominant means of communication (34%), with SNS apps, browsing and IM second (20%)%, and sms third (16%) with the balance from multimedia, music and games, with less than 40% of the users using mobile email and instant messaging. Amongst the students surveyed, the predominant means of communication was SNS (85%), with voice second (15%) and sms last (5%).

Preliminary findings indicate that the students spend the majority of their time with mobile SNS on Facebook, Facebook Chat, MXIT and WhatsApp by chatting, updating their profiles and statuses as well as monitoring their friends' profiles and statuses. Those students with Blackberry's spend their SNS time with BBM by chatting, updating their statuses, and checking on their friends statuses.

Whether this excessive usage of SNS is driven by addictive behaviour, or other possible social or psychological needs begs to be investigated further, and concepts from PC-based social networking and communication [20,25,30,32] as well as other prior studies on Mobile SNS applications [18,36,38] should be examined and tested.

Further investigations should also attempt to explain the plethora of mobile IM applications and the role of integration applications such as IM+, eBuddy and 2Go. Favourite mobile IM apps should also be further investigated, as this may indicate the dominant IM platform for the future.

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