M-LEARNING IN HIGHER EDUCATION: TECHNOLOGY OWNERSHIP AND COMMON ATTRIBUTES AMONG MILLENNIALS IN SOUTH AFRICA

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ABSTRACT

This research investigates the mobile technology ownership concerning M-learning and identifies Tapscott's (2009) common traits of Millennials in a South African context. Technology growth and adoption is impacting the education sector by changing teaching and learning through an innovative form of learning commonly known as M-learning. Along with the growth in adoption of technology, students learning profiles have also changed over time, evolving toward another generation of learners referred to as Millennials. A total of 103 Millennial student respondents in a higher education institution in South Africa were surveyed to collect primary data and descriptive statistics were used to summarize the results according to which the entire sample population owned at least one type of mobile devices. The findings also indicated that technology acquaintance and innovation are the most relatable attributes shared among Millennials.

1. INTRODUCTION

Mobile technologies, principally smartphones, have spread rapidly in both developed and developing countries. According to the International Telecommunication Union (ITU), global mobile cellular subscriptions increased from 2205 million in 2005 to 8152 million in 2020, of which 6441 million relates to developing countries (Statistics, 2021). ITU's latest figures also show that around 50-59% of the South African population owns a mobile phone (Measuring digital development: Facts and figures 2020, 2020). This phenomenon has brought new opportunities which enabled more people to have access to education through M-learning. (Kaliisa et al., 2019).

In the education sector, the introduction of mobile technology such as personal computers, provides learners and teachers with a flexible platform to engage in learning and use of technological tools dynamically and asymmetrically. Mobile devices have gained immense prominence since its launch in the 1980s (Mwapwele & Roodt, 2016). In 2014, approximately 86% of undergraduates were reported to be smartphone owners (Chen, Seilhamer, Bennett & Bauer, 2018). Consequently, the increasing application of M-learning and the rapid development in the mobile landscape have given rise to incredible opportunities in higher education (Alhassan, 2016).

Higher education is constantly evolving with the advent of new technologies (Serrano et al., 2019). Current university or college students who are part of the Net Generation, also known as Millennials, have grown up with technology. Consequently, it is perceived that conventional learning practices are inadequate or irrelevant for the Millennials (Barnes, Marateo & Ferris, 2018). Hence, there is an increasing need for higher education organizations to modify their teaching practices to accommodate the evolving demand of the Millennial student. However, to address Millennials needs for the improvement of current learning practices, it is necessary to investigate their mobile technology ownership pattern first (Talan, 2020).

The aim of this research is to investigate mobile technology ownership in higher education and to identify which of the common traits of Millennials outlined by Tapscott (2009) are relevant in a South African context. By doing so, this study sets a tone for further research in understanding the perception of M-learning

by Millennials as well as the implementation and adoption of M-learning in higher education. This research study might contribute to the educational sector by providing the legislators and other stakeholders, insights into the need of students regarding the provision of M-learning. This study might also prove to be of significant value to the academic sector by providing bodies of knowledge a better understanding around the adoption of M-learning in a developing economy.

Before diving into the findings, the following section discusses the fundamental concept of the research topic, namely mobile learning and trait of Millennials.

1.1 Mobile-Learning (M-Learning)

Different researchers have attempted to define Mobile learning. According to Mcconatha, Praul and Lynch (2018), M-learning consists of learning using small computing portable devices including smartphones. Talan (2020) defines mobile learning as "the ability of learners to access information independently of time and space through mobile devices" while customizing their learning processes depending on their preferences and needs. M-learning is a subject that has evolved from distance learning and is now a subset of e-learning which incorporates the adoption of mobile technology (Alzaza and Yaakub 2012). Before studying this phenomenon or designing M-learning solution, it is recommended to know the benefit and constraints involved in other for the study result to be more efficient and useful for learners (Talan, 2020).

As its name suggests, one of the main features of mobile learning is mobility. Mobility in the context of M-learning can be analysed from three different angles namely: learners, learning and technology (Sinen, 2015). M-learning improves the mobility of learners because it eliminates physical barriers such that the learning process can occur anywhere. Portable devices enable learners to gain access to information and engage in forum discussions at their comfort irrespective of location (Latchem, 2018). With M-learning, "a student can learn whatever, wherever and any- time" through teaching applications installed on a portable device, such as a smartphone, iPods, tablet, notebook and so on (Khan et al., 2019). These devices are equipped with advanced attributes such as Wireless Fidelity (Wi-Fi) and Wireless Application Protocol (Hao et al., 2017). Hence, technology allows learners to be "always-on" through improved connectivity and internet access.

As a result, information is readily available at a click or a touch away, at arguably lower costs and the portability of devices offers the opportunity for a customized learning process (Talan, 2020). Students can tailor their learning tools and the environment as per their preferences. In a mobile learning environment, authenticity can be improved through contextualized learning exercises. Collaboration between learners is facilitated through the sharing of resources and improved networking connections. According to Al-Emran & Shaalan (2015), M-learning assists the interaction and sharing of knowledge between stakeholders.

M-learning comprises of certain limitations including "hardware and software problems caused by technologies, internet and infrastructure problems, screen, keyboard, battery problems of mobile devices" (Talan, 2020, p81). Since the elementary resources required for M-learning systems to work include electricity and good network connectivity (Ameen et al., 2019), "internet bandwidth and power failures" appear to be the most challenging issue of mobile learning (Khan et al., 2019). Moreover, a suitable mobile device is necessary to fully optimize the use of M-learning. These mobile devices are usually very expensive and might not fit a student's budget (Sabah, 2016). Additionally, Ryu (2009) highlights that the size of mobile devices also gives rise to input type challenges, followed by the issue of battery life of mobile devices used for M-learning. The size of the screens of mobile devices is relatively small and is inconvenient for learning purposes (Sabah, 2016). If used excessively, students might even face vision problems in the long run. Furthermore, mobile devices are limited in storage and hence hindering the sharing of information and resources (Sabah, 2016). Besides, Churchill & Hedberg (2008) think that bringing learning to mobile devices creates some form of dependence on the use of the battery life of devices.

Another major constraint to M-Learning is that of inconsistency in mobile devices platforms. Huang, Kuo, Lin, & Cheng, S. C. (2008) states that variability in devices very often led developers in designing mobile learning apps that are cross-platform, however lacking in certain functionalities due to the need to accomplish cross-platform operability. Looking at the constraint of M-learning from the perspective of learners' attention, it was found that M-learning seems to bring into factor multi-tasking which is not always a productive way to learn. Dolittle, Lusk, Byrd & Marianob (2009) in a study investigating the level of attention among groups of students who were sitting and working at a desktop as compared to those using mobile learning. It was found that the group of those students who happen to work on desktop computers scored higher test score as compared to those receiving content through m-leaning platforms. Subsequently, M-learning entails a form of considerable exposure to distraction through the use of mobile devices.

1.2 Traits of Millennials

Conventionally, the education system constituted of mass production and standard dissemination of knowledge (Rossing, Miller, Cecil & Stamper, 2012). However, in the current scenario, traditional learning and teaching approaches have become obsolete because students have changed drastically over the last years (Barnes, C Marateo & Ferris, 2018). Presently, a large proportion of students pertain to a group commonly referred to as Millennials. Millennials or the Net Generation is defined as a group of people who got exposed to technology since childhood and who have differing expectations from bodies of knowledge as compared to the preceding generations (Monaco & Martin, 2018). As described in Table 1 below, Millennials have distinctive traits that differentiate them from their predecessor generations.

Table 1. Traits of Millennials

Trait	Description
Freedom	Millennials feel entitled to freedom of choice in all aspects of life. They demand variety in consumption, and they do not compromise on their preferences.
Customization	Homogeneous goods and services do not appeal to Millennials. The Net Generation values personalization of various activities to gain maximum satisfaction.
Scrutiny	Net Geners have gained exposure to various media platforms and hence, information overload. Consequently, they analyze the validity and accuracy of data before acknowledging or accepting a statement, product or service.
Integrity	Millennials value Integrity such that they expect openness and honesty from businesses. They are very understanding of genuine mistakes.
Collaboration	Millennials can adapt easily to group work such that they are very efficient when working in teams. They are open to collaboration and sharing of ideas.
Entertainment	The Net Generation gives significant importance to their hobbies and relaxation time. They expect a good quality of entertainment in their routine to exploit their productivity
Speed	Millennials are confident users of technology. Activities are expected to be speedy and efficient. They expect good internet access so that they can acquire information promptly. Net Geners demand quick decision-making.
Innovation	Millennials adjust easily to changes and they constantly anticipate novelty, improvement and creativity. Goods must be innovative to match the demand of Net Genres.

Due to their incessant exposure to technology since birth, it is perceived that Millennials demands from academic institutions differ from that of their predecessors because of their distinct preferences and social interaction patterns (Prensky, 2001). Studies have inferred that the brain of a Millennial has developed differently as compared to other generations such that Millennials have a more acute vision and increased spatial awareness (Mthembu & Roodt, 2017). Tapscott (2009) identified 8 unique traits of the Millennials described in Table 1 above. This study is taking into consideration the above-mentioned traits to determine the attributes of Millennials in the research.

2. MATERIALS AND METHODS

This section explains the research methodology that is being followed throughout this empirical research. The following segment elaborates on various aspects of research such as approach, purpose and time frame, population, sampling method, data collection method, data collection instrument, method of analysis, and ethical considerations.

2.1 Research Approach and Time Frame

This research was conducted using an inductive approach. After data collection, a summary of the results was produced to describe the data. The description then brought knowledge of the technological ownership patterns as well as the most common traits of Millennials in higher education with regards to M-learning in South Africa.

A quantitative research approach was used by collecting data from online questionnaires which Millennials had to complete to describe their technological ownership about M-learning. A quantitative research method is best suited to assist the positivist research paradigm because it comprises the use of scientific methods to conclude.

A cross-sectional research study evaluates a sample at a point in time (Maree, 2016). The study was cross-sectional because the research investigated data collected from a population at a specific time. In other words, the study analysed the technology ownership and common trait of Millennials specifically during less than one year whereby the time spent on data collection did not affect changes in the data gathered.

2.2 Data Collection and Analysis

The research population involved students who are considered as Millennials studying at universities in South Africa. The accessible population consisted mainly of students at the University of Cape Town. The purposive sampling method was used because the study had to analyse data from a population. Homogenous purposive sampling also known as judgmental sampling is a non-probability sampling technique (Maree, 2016). In other words, a sample was chosen by taking into consideration the common traits of Millennials, year of birth and the country of study. The sample comprised mostly of students studying at the University of Cape Town who have been categorized as Millennials based on common traits and year of birth as specified by the sampling method. The common traits were established by a series of questions. The study received a total number of 120 responses. However, an initial clean-up of data was carried out to discard invalid responses. Eventually, the sample size consisted of 103 respondents.

Since new data had to be generated, for this research, a primary source of data was required. Hence, the data collection method consisted of a survey and the data collection instrument involved online questionnaires. The questionnaire had two sections: the demographics profile of the sample population section (which includes mobile ownership) and the Millennials classification section. The questions in the demographics profile section were related to age, year of study, place of study and mobile technology ownership. The questions in the Millennials classification section were set to determine if the sample population fit some of the characteristics identified by Tapscott (2009), as outlined in Table 1. The questions are related to the Year of Birth and the following traits: Technology Acquaintance, Innovation, Collaboration and Customization. This is to fit the sample population into a Millennial profile based on some of the common traits of Millennials as discussed by Tapscott (2009) and the year of birth.

The data analysis method selected for the study is descriptive statistics. The reason for this choice is simply to align with the nature of the study which is descriptive and not correlational. This study aims to summaries trends rather than compare relationship among variables. The descriptive analysis helped to describe patterns of technology ownerships as well as common traits of Millennials regarding M-learning in high school, mainly by using the percentage. Graphical representations of data helped to better visualize some of the findings.

2.3 Ethical Considerations

The study did not necessitate any confidential information and the respondent remained anonymous. A cover letter was attached to the questionnaire stating that participation in the survey was entirely voluntary and no personal details were published. Furthermore, the cover letter included a clear explanation of the purpose of the research and the contact details of the researcher were stated. Additionally, participants were given the option to withdraw from the survey at any point in time. Information collected was used for academic purposes only. Questioners were sent only after the approval from the Research Ethics committee of the University of Cape Town.

3. RESULTS AND DISCUSSION

This section consists of the analysis and representation of data collected for the study. The data analysis was carried out based on 103 participants as stated previously. Eventually, the section will proceed by describing the demographic profile of the sample and then the analysis of common attributes of Millennials based on data collected to show how the sample fits the desired profile. Eventually, an analysis will be given on the perceptions of Millennials in South Africa towards M-learning in higher education. The section will also include the statistical representation of data accompanied by narratives and interpretations. The findings of this study will be discussed thoroughly to answer the research questions.

3.1 Demographic Profile

This section will give an overview of the demographics of the sample population. The different elements that will be looked at consist of Age, Place of study/Location, and Year of study/level of education.
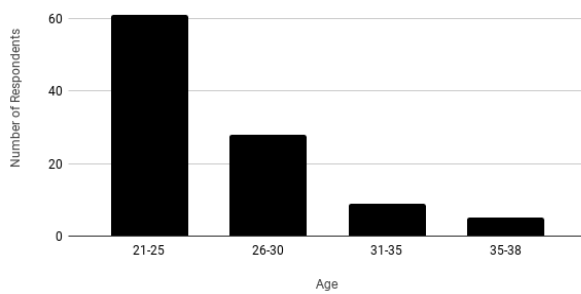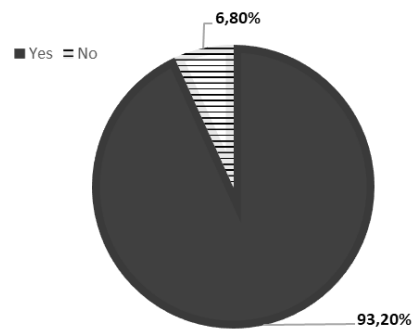
Figure 1. Age group of respondents

Figure 2. Respondents studying at a tertiary institution in a developing country

Figure 1 above gives a visual representation of the different age groups from which respondents were asked to choose. The age of the entire sample population lies between the range of 21 and 38 years old. As per the data collected, most of the respondents (approximately 60%) were in the age group of 21-25 years old. This is explained by the fact that the survey was carried out among university students. University students consist of mostly young people who enter tertiary education institutions immediately after secondary school. Having a high percentage of young respondents is significant and relevant in this study because it is believed that the younger generation is the most active users of mobile technology (Srivastava, 2005).

In the online survey carried out, participants were asked whether they study at a university or a tertiary institution in a developing country. As shown by Figure 2 above, a large proportion (93.2%) of the sample population replied "Yes" to the question asked while only around 6.8% of the respondents are not registered at a university in a developing country. For this study, the data gathered is relevant because this research is specifically investigating Millennials in the context of a developing country, in this case, South Africa.
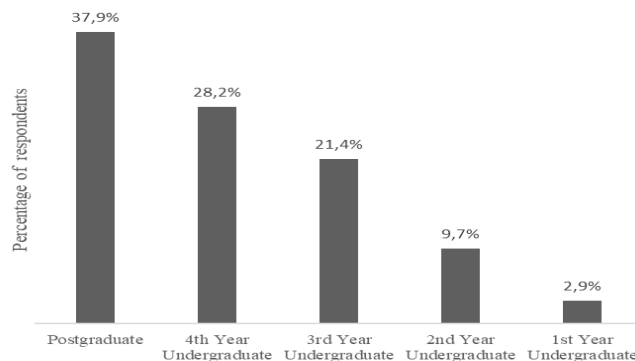
Figure 3. Year of study of respondents

To get an insight into the level of qualification of the sample population, the respondents were asked to choose their year of study. As shown by Figure 3 above, most of the respondents (37.9%) are doing their postgraduate studies while 28% of the sample population is in the fourth year of study at university. These percentages correspond to the age groups of the respondents.

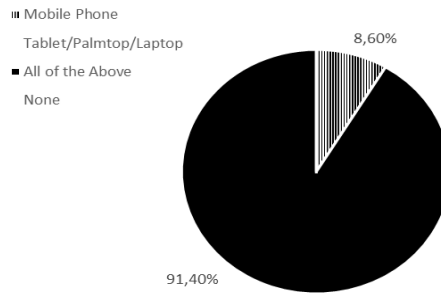## 3.2 Mobile Technology Ownership Pattern

Figure 4. Mobile technology ownership pattern

Mobile phones, tablets, palmtops and laptops are popular examples of mobile technology devices. As per data collected, all the respondents owned a mobile phone. Figure 4 above shows that around 91.4% of the respondents owned either a tablet or a palmtop or a laptop in addition to a mobile phone. Since the sample data was collected in South Africa, it can be deduced that Graph 4 represents the mobile technology ownership pattern in a developing country. Furthermore, this attribute is vital and acts as a prerequisite given the subject of this study which is M-learning.

3.3 Millennials Classification – Common Traits

The key attributes driving the survey's questions includes Year of Birth, Technology Acquaintance, Innovation, Collaboration and Customization. For every attribute, respondents were asked to answer a question by "Yes" or "No", and the findings are summarized in Table 2 below. For the attributes, the results of the survey confirm the literature review such that it can be visually seen that Millennials, in general, do share some of the common traits which were identified by Tapscott (2009). It can also be observed that Technology Acquaintance and Innovation are the most relatable attributes of Millennials according to the sample population. Respondents were also asked if they consider themselves to be Millennials. 94.2% of the participants replied positively while 5.8% replied otherwise. The results discussed in this section confirms that overall, the sample population does consist of Millennials hence, validating the relevance of the research.

Table 2. Millennials classification

Response	Were you born between 1981 and 1996?	Have you been acquainted with technology since at least 10 years?	Do you get used to new technology relatively fast?	Do you adapt easily to group work?	Do you like customizing your belongings?
Attribute	Year of Birth	Technology Acquaintance	Innovation	Collaboration	Customization
Yes	99%	95.1%	85.4%	79.6%	78.6%
No	1%	4.9%	14.6%	20.4	21.4%

3.3.1 Year of Birth

For analytical purposes, the Millennial generation is born between 1981 and 1996 inclusive (Dimock, 2018). Participants of the survey were asked if their year of birth lies in the desired range. As shown in Table 2, a large majority of respondents positively responded to this question. 99% of the sample population stated that they were born between 1981 and 1996. Hence, based on year of birth, it can be deduced that the sample population consists of Millennials.

3.3.2 Technology Acquaintance

According to Tapscott (2009), Millennials have been familiar with technology since birth or at a very early stage of their life. The sample population has been asked if they are familiar with technology for at least 10 years. The results indicate in Table 2 that, out of the 103 respondents, 98 (95.1%) participants responded positively. Consequently, it can be deduced that the sample population is well acquainted with technology and hence, is relevant to the nature of the study while also meeting another key criterion of Millennials.

3.3.3 Innovation

As mentioned in the introduction section, innovation is a key attribute of Millennials. Millennials adjust to new technology relatively faster than the preceding generations and they are in a constant quest for innovation (Tapscott, 2009). Participants of the survey were asked if they adapt quickly to new technology. The descriptive statistics of the results are shown in Table 2. A large majority (85.4%) of the sample population meet this particular trait of Millennials.

3.3.4 Collaboration

Another trait of Millennials consists of collaboration. Millennials are very efficient and comfortable when working in a team (Tapscott, 2009). In this survey, as shown by Table 2, around 82 respondents gave a positive reply when asked if they can adapt easily to group work. Given the significant proportion of 79.6%, it can be inferred that the sample population meets the collaboration trait of Millennials.

3.3.5 Customization

The survey has also explored the customization trait of Millennials. According to Tapscott (2009), Millennials prefer customizing their assets. In Table 2, the frequency of people who admitted to preferring customization is high with 81 respondents. Subsequently, it can be established that the sample population tends to fit this characteristic of Millennials.

4. CONCLUSION

4.1 Summary of Findings

This study was primarily investigating technology ownership among Millennials in South Africa with regards to M-learning in higher education. The study has given an insight into the mobile technology ownership pattern amongst the participants of the survey. It has been found that the entire sample population owned at least one type of mobile devices, notably a mobile phone. Taking into account Sabah's claim of mobile devices being possibly very expensive for students (Sabah, 2016), it could be inferred that students surveyed have the financial means to purchase such a device given that they can afford the tuition fees of a university. Furthermore, it was found that Millennials, in general, do share some of the common traits which were identified by Tapscott (2009). It was also observed that Technology Acquaintance and Innovation are the most relatable attributes of Millennials according to the sample population. Conclusively, the data collected, and the data analysis method were relevant in reaching the research aim of this study.

4.2 Research Limitations

This section will briefly outline the limitations of this research. Firstly, time constraint proved to be a major issue. The Ethics application process and the approval from the Student Affairs had exceeded the time expected and as a result, there have been delays in the data collection process. Furthermore, the researcher had a lack of experience with regards to conducting research and analyzing data. However, a lot of support and guidance was received from the supervisor and the UCT Department of Information Systems which led to the successful completion of this study.

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