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Faculty of Health Sciences
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**EVALUATING THE UTILISATION OF GAMIFICATION AS A LEARNING METHOD
AMONG NURSING STUDENTS IN SELECTED NURSING EDUCATION
INSTITUTIONS IN GAUTENG**

Submitted in fulfilment of the requirements for the degree

Magister Curationis

Nursing Science Education

by

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DECLARATION

I, Fatima Isa Abdullahi,
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declare that:

**EVALUATING THE UTILISATION OF GAMIFICATION AS A LEARNING METHOD
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IN GAUTENG**

is my original work and that it has not been submitted before for any degree at the University of Pretoria or at any other institution. All sources that have been used or quoted have been acknowledged by means of complete references in the text and in the list of sources.

Signed

Date

DEDICATION

I dedicated this study in memory of my beloved late mother Usaibatu (Nusaiba) Husaini who departed on 29th August 2006. For your inspirations, sacrifices, attentiveness, trustworthiness, non-judgemental behaviour, and determination. Your love and words of encouragements keeps me moving. I will continue to make you proud mother. May you continue to rest in peace, ameen.

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ABSTRACT

Introduction: Gamification is a technique employed by utilising game-based mechanic to motivate, promote engagement, and develop skills in learning. This involves adapting an educational activity presented in electronic devices, such as smartphones or tablets to improve experiences and engagement. There is an increasing interest in the application of gamification recently especially with the development of technological innovations. The acceptance of technology is becoming more prevalent in South African Universities. Gamification has been utilised to enhance students' learning process. The importance of gamification in educational sector such as nursing colleges indicates its crucial role in increasing and changing the learning experiences, teaching complex subjects, and systems thinking. However, many nursing education institutions does not acknowledge the utilisation of gamification as an additional method of teaching and learning.

Purpose: The aim of the study is to evaluate the utilisation of gamification as a learning method among nursing students in selected Nursing Education Institutions (NEIs) in Gauteng Province, South Africa.

Method: In this study, a quantitative, non-experimental descriptive survey design was followed. Data was collected using structured questionnaire and an online survey. The total population of nursing students were 1220 from the two selected NEIs (C1 and C2) of all levels of study (1-4). The C1 has 609 nursing students and 611 in C2 NEI. A stratified proportional sampling method was used, and the sample size (n) was 301 nursing students' (respondents). This enabled the respondents to have equal probability of being selected and chance in participation. The data collected was analysed using statistical software SAS and reported upon. Ethical principles of beneficence, non-maleficence, justice, and autonomy was ensured throughout the study.

Result and conclusion: The result revealed a positive findings on utilisation of gamification and confirmed to be relevant, contributes towards learning, helps with understanding, motivation and considered to be an important additional learning tool.

Keywords: Gamification, Evaluation, nursing students, Learning, Learning method, Education, Online nursing games.

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
NEI	Nursing Education Institution
APPS	Mobile Applications
GRS	Game Reward Systems
SANC	South African Nursing Council
Wi-Fi	Wireless Fidelity

CHAPTER 1

OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Gamification is a concept that draws the attention of field like education and other profession (Cechella, Abbad, & Wagner, 2021:1). According to Deterding, Dixon, Khaled & Nacke (2011:9), gamification refers to the use of electronic or digital elements to entertain and educate individuals. Gamification, also known as online games, are designed to improve personal experiences and engage the user in a variety of activities to stimulate their critical thinking (Vleeshouwer, 2015:2). On the other hand, Kapp (2012:10) further explained that online games are used to engage, motivate, promote learning and in solving problems. In some cases, online games have been used to acquire various skills such as cognitive, psychomotor, and affective skills (Kapp, 2012:105). It involves adapting an educational activity that is presented electronically on a device such as smartphones, tablet, or computers (Hamari, Koivisto, & Sarsa, 2014:3028). Recently, mobile applications (Apps) like video games have become more popular teaching tools (Ling, Harnish & Shebab, 2014:532). The current development of technology globally provides opportunities in nursing education to migrate to a digital learning environment to enhance nursing students' learning and develop skills such as problem solving, collaboration and critical thinking.

Over the past decades, low fidelity simulators have been used to practice clinical skills rather than real patients to avoid any harm or associated risks (Stokowki, 2013). However, emerging technology and social media platforms are currently part of human life and have changed educational paradigms or approaches (Kayımbaşıoğlu, Oktekin & Hacı, 2016:669). Gachago, Bozalek & Ng'ambi (2013:422) argued that, technology provide positive impact on teaching and learning practices, such as personalised learning and teaching experiences in a diverse learning environment. In this regard, technology support teaching and learning, engage and motivate students, build their skills, and increase learning. This study therefore aimed to evaluate the utilisation of gamification by nursing students for learning purposes.

1.2 BACKGROUND

The innovative use of emerging technologies to reshape curricula in teaching and learning is not completely or widely recognised in South African higher education Institutions (Gachago et al., 2013:421). Rambe (2015:89) argued that, various suggestions should be made to re-evaluate the curricula and to improve it by purchasing available low-cost technology in South African Universities to make curricular transformation a reality. Gamification can also come in handy as part of a hybrid learning tool in the South African context especially with recent students' unrest (e.g., Fees must fall protests) which often results in disruption of face-to-face classroom attendance or the current COVID-19 pandemic that saw the suspension of traditional face-to-face learning methods. Educators are to employ various teaching methods for students to actively participate in their learning (Furdu, Tomozei & Kose, 2017:56). Gamification has been shown to develop skills and improve confidence (Shawaqfeh, 2015:1), and recent interest in employing gamification showed to make a difference in teaching and learning.

According to Alhammad & Moreno (2018:131), proved that applications of gamification in software engineering education improve student engagement and knowledge acquisition. Stansbury & Earnest (2016:43) conducted a study in the United State of America among students in which the experimental group found gamification in learning more enjoyable, motivating, engaging, and fun than in the control group. Basten (2017:79) argued that gamification is crucial for future generations who are found to be liking video games than traditional means of play or learning. Most of the millennial students have electronic devices, which they use to play games online or through mobile apps (Furdu et al., 2017:56).

Digital natives, as they are commonly known, have entered nursing programs, and are engaging in an advancing technological environment and are able to compete as well as connect with others on social media platforms (White & Shellenbarger; 2018:78). Mobile devices are recognised as emerging technology that has potential in facilitating teaching and learning methods to engage students to experiential and situated learning with no restriction to place, time, and devices (Sampson, 2013:4). The millennial nursing students become bored when educators use routine traditional teaching methods such as lecture, visual projection, and discussions (White & Shellenbarger; 2018:78). It is

important to understand the needs of nursing students' in learning, this will help educational designers and lecturers to accommodate the digital natives so that they acquire the skills required for modern nursing practices.

The use of gamification in education has increased over the past few years (Martí-Parreño, Méndez-Ibáñez & Alonso-Arroyo, 2016:674). Gamification is increasingly being adopted in various professions including health care sciences (Dicheva, Dichev, Agre and Angelova, 2015:7). In South Africa, a study on gamification was conducted by O'Donovan, Gain & Marais (2013:250) and the results indicate that gamification has a positive impact on active learning. The importance of gamification in the educational sector indicates its importance in increasing and changing the learning experiences, teaching complex subjects, and systems thinking (Kapp, 2012:13). A study by Brull & Finlayo (2016:374) has shown that gamification increases motivation and interest in learning process. It also provides suitable solutions for the pedagogical needs of the new generation that can be regarded as an innovation and community-based design or level of engagement in learning (Bíró, 2014:151). Gamification is a valuable tool that aids content understanding, real life application and communicating the knowledge learnt (Shawaqfeh, 2015:4).

Therefore, the reasons provided above indicate that gamification can be employed in the classroom with various learning styles and preferences to meet the needs of nursing students. Fan, Xiao & Su, (2015:1226) emphasised that, every student is unique and has different learning styles, and the exclusivity of students in each class differs from another class. An empirical study conducted by Hamari et al., (2014:3028) demonstrated that great gamification has a positive impact on students' learning. White & Stellenbarger (2018:78), argued that the current nursing students prefer active learning, experiential activities, and instant feedback. From the existing studies, it has been discovered that human beings learn from experiences. Human brains can store every experience that is passing through and that is what informs their learning process (Goon, Kundu & Roy, 2016:540). As a result, certain experiences can only be understood and interpreted by an individual. Addressing nursing students learning styles, preferences and needs is very important especially the current net generation as they can easily lose interest in their learning.

According to Araújo, (2017:140), various resources are available on the internet, but teachers find it difficult to keep up with the developments and new innovations of digital tools and apps. The application of gamification as an additional teaching method continues to be limited and the reluctance to use it remains a great challenge (El-Masri & Tarhini, 2015:1). There are other issues related to gamification that needs to be addressed (Martí-Parreño, et al., 2016:674). Based on the researcher observation, both lecturers and nursing students have access to technology with limited resources, such as computers and inadequate or limited internet connectivity. The nurse educators in a selected nursing education institutions (NEIs) encourages nursing students to use smartphones and download nursing education apps to enhance learning. Furthermore, there is no statistical evidence indicating the utilisation of mobile apps nor on their benefits for nursing students. Nurse educators usually use traditional method of teaching such as integrating PowerPoints and group discussions. It is necessary to evaluate the utilisation of gamification as a learning method among nursing students in selected nursing education institutions (NEIs) in Gauteng.

1.3 PROBLEM STATEMENT

Gamification in education is growing at a fast pace globally and has been associated with increased retention of knowledge and student engagement (White et al., 2018:79). However, traditional classroom teaching, discussion and voice over PowerPoint presentations, which tend to be less engaging for the younger generation, are still the leading methods adopted by most educators to facilitate learning (Brull & Finlayson, 2016:372; (White et al., 2018:72). Students find it boring or demotivating when only traditional classroom teaching methods are adopted (Alhammad, 2018:132). This may lead to lack of interests and less engagement in nursing students' learning. As indicated by Erenli (2013:1), the current generation of learners acquire knowledge and skills through utilisation of online games in their everyday life. As such, mobile applications influence students' learning positively (Ling et al., 2014:532). Hence, gamification is increasingly being used by many students, which may directly or indirectly contribute or enhance their learning process. Additionally, students are the centre of the educational process, commonly known as student-centred teaching (Balliu & Belshi, 2017).

However, there seems to be some reluctance among the nurse educators to integrate online or digital games in their classrooms for various reasons especially with the current development of more advanced technology. This is despite the NEIs providing free Wi-Fi (Wireless Fidelity), computer laboratory with internet cables, and some NEIs provides tablets for students to use in their learning. In the selected participating NEIs, educators commonly use formal lectures, PowerPoint presentation, flipped learning, and group discussions, as methods of teaching and learning. The digital technology use in this NEI is limited and sometimes even if the resources are available. Despite this, nursing students still use online nursing games and mobile apps to enhance their learning. However, the use of online and mobile apps is not formally integrated as an additional innovative teaching and learning method and there is no evidence of its utilisation or documented. However, it seems most nurse educators do not even know that such a program exists within the library database of the NEIs.

The researcher observed that there is paucity of information within the South African context, particularly on the utilisation of gamification among the nursing students, the benefits nursing students may gain in learning process and there seem to be a lack of support or knowledge for using gamification. It was strongly stated that there are many areas related to the effective utilisation of gamification in education that needs to be explored (Vleeshouwer, 2015:4). The needs of nursing students in learning process must be acknowledged holistically in line with the student-centred approach. Meanwhile, the benefits and opportunities of using gamification among nursing students must not be ignored. This study will focus on evaluating the utilisation of gamification as a learning method in selected NEIs in Gauteng. This will assist in understanding the needs of the nursing students and to provide suitable recommendation to successfully improve teaching and learning in to nursing education.

1.4 AIM, OBJECTIVES AND RESEARCH QUESTIONS OF THE STUDY

1.4.1 Aim of the study

This study aims to evaluate the utilisation of gamification as a learning method among nursing students in selected nursing education institutions.

1.4.2 Objectives

- To describe the demographic data on utilisation of gamification among nursing students.
- To evaluate the utilisation of gamification among nursing students as a learning method.
- To determine the relationship between the demographic data and utilisation of gamification.

1.4.3 Research question

- How can the utilisation of gamification as a learning method among nursing students in selected NEIs be evaluated?

1.4.4 Hypotheses

- The demographic characteristic of the nursing students is significant in utilisation of gamification among nursing students.
- Nursing students utilise gamification for learning.
- There is a relationship between the demographic data and utilising gamification by nursing students.

1.5 RATIONALE OF THE STUDY

This study evaluates the utilisation of gamification by nursing students as a learning method in selected NEIs to understand the benefits students gain using gamification for educational purposes. It is also necessary to adopt current development and innovative technologies in teaching nursing and to identify the support nursing students needs in utilising gamification in their learning. The findings from this study provides recommendations that will effectively help nurse educators in integrating gamification into teaching and learning under normal circumstances or unforeseen ones such as students' unrest and pandemics like the coronavirus that resulted in closure of all NEIs and movement restrictions.

1.6 DELIMITATION OF THE RESEARCH STUDY

The study was conducted at selected NEIs in Gauteng Province, South Africa. The study was limited to all students enrolled for the R425 programme in the participating NEIs. The R425 programme allows the nursing student to be a qualified professional nurse (general, psychiatric, community nurse) and midwife after completion of the course.

1.7 DEFINITION OF KEY TERMS

1.7.1 Nursing student

In terms of Act 33 Of 2005 section 32, a nursing student is any person registered with South African Nursing Council (SANC) and undergoing education or training in nursing at an accredited NEI (SANC, 2005:27). The term nursing student in this study refers to person enrolled for a four-year diploma programme at the participating NEIs.

1.7.2 Regulation R425

This refers to “a regulation relating to the approval of and the minimum requirements for the education and training of a Nurse (General, Psychiatric and Community) and Midwife leading to registration” (SANC, 1988). In this study, the regulation R425 applies to all enrolled nursing students who met the requirement for the four-year diploma course in participating NEIs.

1.7.3 Nursing Education Institution (NEI)

According to SANC in terms of Act 33 of 2005 section 1, a NEI means “*any nursing education institution accredited by the Council*”. It is an accredited establishment or organisation that has a building or complex of buildings and its relevant resources for the specific purpose of offering formal nursing education and training programmes. In this study, a NEI is an institution that trains student nurses for the four-year diploma course in nursing.

1.7.4. Learning

Refers “to the acquisition of knowledge, understanding, values, skill, competence and/or experience” (SANC, 2013:3). In this study, is the knowledge and experiences obtained by nursing students through using gamification.

1.7.5 Evaluation

This refers to a process of forming an opinion about something (Oxford dictionary, 2018). In this study, the nature and the information provided on gamification utilisation among nursing students was evaluated based on data collected.

1.7.6 Utilisation

This is an act of making use of something practically (Oxford dictionary, 2018). Utilisation in this study refers to the usage of gamification by nursing students for learning. It refers to adoption and application of gamification in learning a particular content or skill.

1.7.7 Gamification

Kapp (2012:10), defines gamification as the use of game-based mechanics, aesthetics, and game thinking to engage, motivate, promote learning, and use in solving problem. In this study, gamification refers to an approach in education to enhance nursing students’ learning using digital platforms such as smartphones, computer, and tablets to ensure motivation and engagement in learning.

1.7 RESEARCH PARADIGM

Paradigm is composed of set of philosophical assumptions on social world and a guide to the approach of inquiry. It provides a way of looking at natural phenomena a worldview (Polit & Beck, 2012:739). In this regard, positivist paradigm is selected in this study, which is believed to provide scientific valid and reliable findings.

- **Positivism**

Positivism emphasis reality exist out there that can be studied and known (Polit & Beck, 2017:9). Positivism is appropriate to evaluate the utilisation of gamification as a learning

method among nursing students in learning process as it is indicated and believed that gamification engage, motivate, and improve learning process. The selected paradigm for the study is based on the following major philosophical assumptions which are interrelated.

1.7.1 Physiological assumption

It is a basic principle which considered to be truth logically without evidence (Polit & Beck, 2017:720), that requires verification and clarification to provide understanding (Crewell, 2014: 20).

- **Ontology**

According to Polit & Beck (2017:10), this refers to the nature of reality and its existence. Regarding this study, the researcher observed that nursing students utilise mobile apps and online educational nursing games to enhance learning. Gamification is not formally use as an additional teaching method, but the nurse educators encourage the nursing students to utilise online resource in the participating NEIs. Therefore, the researcher seeks to evaluate the utilisation of gamification as a learning method among nursing students in selected NEIs.

- **Epistemology**

This refers to the knowledge of how the reality is being known (Botma, Greeff, Mulaudzi & Wright, 2010:287). There is an emergence development of technology and its acceptance. Various online gamification for smartphones is available for nursing education and learning. The advancement in technologies encouraged to utilise new methods of teaching and learning. This assist to focus more on students-centred rather than teacher-centred education. Previous research proved that gamification play a role in enhancing students' learning. The researcher observed and sought to acquire information regarding the adopted teaching methods and gamification for nursing education in the selected NEIs. The study focused on evaluating the utilisation of gamification as a learning method among nursing students in the participating NEIs, and to provide findings to help in making recommendations.

- **Methodology**

Methodological assumptions are procedures and rules that guide the researcher during an investigation or study (Botma, et al., 2010:287). Quantitative approach is selected to

evaluate the utilisation of gamification as a learning method in participating NEIs. A structured questionnaire and online survey were used as a tool to collect data (Chapter 3). Descriptive survey was selected to provide information of findings.

1.8 SUMMARY OF THE RESEARCH DESIGN AND METHODOLOGY

The design selected for this study was quantitative, non-experimental descriptive survey design. Therefore, sample size was $n=301$ of nursing student participants from the two selected NEIs. The quantitative research method was directed using questionnaire. The questionnaire was constructed by the researcher based on literature and hypotheses of the study with the assistance of statistician. The questionnaire focused on evaluating the utilisation of gamification among nursing students as a learning method from selected NEIs in Gauteng. A link was sent to the potential respondents through email, short message service (SMS), and survey questionnaire based on request made by participants who wish to participate only using hard printed copies to fill in at their conveniences. Respondent's information and consent forms were also attached. Numerical data was generated and analysed from nursing students in the selected NEIs in Gauteng for addressing the research question as well as testing the hypotheses set out in this study. A descriptive survey was used to provide detail on the data collected for justification. An in-depth discussion regarding the research methodology is provided in Chapter 3.

1.9 ETHICAL CONSIDERATIONS

In this study, permission was obtained from the Faculty's Ethics Committee (cf. Annexure G), Ethics Committee University of Pretoria (cf. Annexure H), National Health Research database (cf. Annexure I), and from the selected NEIs (cf. Annexure D & E). All relevant and adequate information provided for voluntary informed consent without exploitation, force, and deceit. The following ethical aspects were considered in this research study.

- **Beneficence and Non-maleficence:** The respondents must be protected from harm, discomfort, and intentional refraining from harm (Pera & Van Tonder, 2011:55). A link was sent to individual nursing students and survey structured questionnaires were distributed, to fill in voluntarily by the respondents at their selected date, time, and venue to avoid any inconveniences and discomfort. The

researcher ensured that the findings obtained were communicated to the institution involved to benefit from the new knowledge. The researcher ensured no harm or discomfort is inflicted during the period of study.

- **Justice:** This demands that fairness in distribution and treatment (Pera & Van Tonde, 2011:57-58). All the respondents have equal right to fair treatment as well as right to privacy. Meanwhile, there was no discrimination of any nursing student to ensure equitable distribution of benefit from the study.
- **Respect for human dignity:** This involves the principle of autonomy, the right to self-determination which stipulates that the individuals are autonomous agents capable of being informed to make an informed and independent decision (Pera & Van Tonder, 2011:332). In this study, the nursing students participating were provided with the information regarding the study. The respondents voluntarily decided to or not to participate in this study and their decision and rights were respected by the researcher. The researcher ensured the dignity of the respondents was protected.
- **Privacy and confidentiality:** The principles demand the individual to be free from interference by other individuals (Pera & Van Tonder, 2011:61 & 335). The respondents' personal information and data are carefully protected. Privacy and confidentiality are very crucial in this study, this was carefully maintained as well as anonymity. The information of the nursing student respondents will not be revealed, and it is considered as confidential except for the purpose of this research study. The researcher used codes to represent a participating nursing student for privacy and confidentiality.

The respondents were not subjected to any risk, stress, or discomfort. The researcher ensured the study was conducted within ethical requirements.

1.10 ORGANISATION OF THE STUDY

This dissertation comprises of five chapters as indicated below.

Chapter 1: Overview of the study

This chapter focus on introduction of the research topic, explored the background of the study, problem statement, aim, objectives, research questions, hypotheses, rationale of the study, delimitation of the research study, definition of key terms, research paradigm,

summary of research methodology, ethical consideration, organisation of the study and conclusion of the chapter.

Chapter 2: Literature review

This chapter explains the concept of literature review, the history of gamification and literature that has already been written related to gamification application in nursing education and other fields and professions. The chapter also provides an insight regarding some challenges facing the employment of gamification.

Chapter 3: Research design and method

This chapter entails the methodology adopted in this study. The chapter provide details on the research design, strategy, the procedure, the instrument of data collection and method of analysing the data collected from the respondents.

Chapter 4: Presentation, and discussion of the result

This chapter provide findings of the analysis. The nature, required materials, the result of the data analysis and puts it in the context of relevant literature, research questions and hypotheses.

Chapter 5: Discussion of findings, conclusion, limitation, and recommendations.

The chapter presents the interpretation of findings. Conclusion from the research findings limitations and recommendations.

1.11 CONCLUSION

In this chapter, the introduction and background presented to provide information and understanding on emergence of technology which transformed teaching and learning environment positively. As such, many nursing students use the available resources from online at their conveniences to enhance their learning, such as gamification. Hence, nurse educators are expected to provide a positive learning environment that will accommodate the nursing students' needs in their learning process. The problem statement stated which indicated the area of the existing gap that needs further understanding and investigation. Also, the chapter briefly explained the research methodology that was used in the study,

ethical consideration, and organisation of the study. The reviewed literature will be presented in chapter 2.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The previous chapter discussed the overview of the study. This chapter explored gamification through literature reviews. The reviews of literature assisted the researcher to acquire latest knowledge on gamification, gaps, and current development in utilising gamification for learning in the current era of emerging technology. The researcher consulted various sources from University of Pretoria library resources and scholarly articles from Science Direct, Scopus, Google Scholar, electronic books, and books. The literature used in this study explained the views of various researchers related to the study carried out from nursing education field and other fields and professions within South Africa and beyond.

2.2 LITERATURE REVIEW

Literature review is a building block of theses in form of written argument obtained from reliable sources of previous research (Machi, & McEvoy 2016:5). According to Efron & Ravid (2018:2), literature review refers to a systematic examination of academic literature which involves critical analyses, evaluation and synthesis of findings from a selected area of research study (Hart, 2018:5). Literature review leads to the development of new knowledge through reviewing existing body of knowledge (Aveyard, 2014:6). Machi & McEvoy (2018:5) further explained that, literature review is a written document logically argued and providing a comprehensive understanding of existing research on a specific topic. Interestingly, reviewing the literature presents the entire picture of hidden or partially hidden information in research that is often positioned in isolation (Aveyard, 2014:8). Several authors indicate that literature review is a summary carried out critically and systematically from the published scholarly articles to understand the existing state of knowledge related to a specific field of study. Furthermore, it plays a vital role in academic writing which provide a broad understanding of a topic or field and forms a base of research study or further analysis.

2.2.1 Search method

The search of the scientific evidence and reference lists of the articles was carried out electronically by using Scopus database, EBSCOHost, ScienceDirect, Google scholar, the Cumulative Index to Nursing and Allied Health Library (CINAHL) and University of Pretoria library resources which includes articles, review, books, electronic books, and book chapters related to gamification. The sources provide a comprehensive data output from different professions, such as nursing, nursing education, engineering, social science, among others. The literature search was conducted aiming to extract the available knowledge on gamification utilisation and in nursing education as well as understanding the relationship in its application among nursing students. The search of literature remained merely within the scope of this study and the databases provided the most relevant information as well as suggestions. The required information for the study obtained through abstracts, reports, analysis, results of the reports, discussions, and recommendations of the literature (Squires & Amico, 20015:3). These assisted not to miss out on any vital and important information.

2.2.2 Search terms

The search terms use for literature were constructed within the scope of the study that is related to gamification and carried out electronically using databases. The key terms used for scientific and scholarly information were: Gamification, gamified nursing education, gamification in education, gamification in nursing education, challenges of gamification, emerging technology, technology and education and benefits of gamification.

2.2.3 Sources year

The information was sought for the related information published between 2014 and 2018 to obtain more recent literature initially. As the year goes by, search for latest literature continued for between 2016 and 2020. The books and electronic books used were dated between 2012 and 2018. The search was done using the English language. All published literature that was not documented in English language and unrelated to gamification were excluded.

2.3 THE HISTORY OF GAMIFICATION

The concept of gamification has been in existence for almost one hundred years (Simões, 2014:1), in human history which involves playing games that has been adopted to improve ways of life (Nacke and Deterding, 2017:450). Kapp (2012:13) strongly argued that, it is believed by the historians that the first possible game applied was conceived in the 7th century known as Chaturanga and developed based on an imaginary battlefield using pieces to represent military figures. Gamification was also used in early 20th to mid-20th centuries in form of competition to motivate workers in order to promote production level than capitalist system in Lenin's Soviet Union (Nelson, 2012:23).

Alok (2017:13) explained the history of gamification from 1961 towards the year 2011 and states that, a French sociologist named Roger Caillois described many social structures and pointed out several behaviours designed as play in his book called the influential *Man, Play and Games* in 1961. A multiplayer video game 'the first shooter' was introduced by Lieutenant Colonel Casey Wardynsk in 1999 to entice recruits as well as part of the United States Armed Forces awareness program. In 2005 a company named Rajat Paharia, Bunchball created game mechanics in form of a service by using software (SaaS) gamification to improve loyalty and online engagement of its customers. This development led to a summit held in San Francisco where more than 400 professionals discussed about gamification. A book known as "*Reality is broken: Why Games Make Us Better and How They Can Change the World*" was published in 2011 by Jane McGonigal. The book has been greatly in use providing a plan towards achieving real goals in using games. The meaning of gamification based on the present day was introduced by Sebastian Deterding, Dan Dixon, Rilla Khaled, and Lennart Nacke in their first publication of academic research in 2011.

According to Deterding, *et al*, (2011:9), gamification first appeared in 2008 and increasingly became significantly well-known after 2010. The development of gamification in human lives has impact in addressing the new desire of intrinsic motivation which are consciously and unconsciously applied at workplace (Morschheuser & Hamari, 2019:145). Accordingly, gamification originated from game design to encourage gameful experiences through various contexts, and recently a positive trending topic in the industry as well as academia (Koivisto, 2017:15). Koivisto, (2017:15), added that, the growth of gamification is due to the

vital role of current development of technology, advanced understanding of human psychology, motivation, and behaviour to achieve goals.

The current transformation of using new technologies, promotes development of numerous learning models and processes (Paine, 2014:158).as well as, new gamified activities which are being launched (Koivisto, 2017:18), with no indication of declining (Kapp, 2012:18). Consequently, educational institutions need to redesign their curricular to encourage positive learning experiences (Isaías, 2018:402). As forecasted that learning and education will develop more rapidly by 2020 due to technology adoption, and it will transform education more than the previous experiences. Gamification contain design elements from games, such as badges and rankings applied in non-game contexts (Deterding et al, 2011:10). Base on the above arguments, the concept of gamification has been in use effectively for a long period of time before the existence of emerging technology and devices. Thus, it was clearly indicated that the application of gamification was a success, and it will continue to improve positively.

2.3.1 Elements of gamification

The application of game element has long been in use for centuries by the military in war games simulations and goal driven experiences for training their personnel (Kapp, 2012:13). Gamification provides the learner with incentives such as winning badges, building leader boards or challenges (Paine, 2014:15), with the attempt to encourage the user to achieve desired behaviours (Kapp, 2012:10), as demonstrated in Kaizen software which provides online questions in a game format, and create competition among participants. Additionally, it provides immediate feedback, as well as details on the right answers, encourage individual and teamwork (Roche, Wingo, & Willig, 2017:124), motivate and assist in keeping the students active (Furdu, et al., 2017:57). Additionally, the game elements are designed to accommodate various learning programmes to provide incentives, sharing items of interest or comments, and questions, this enables the player to move to the next level by winning a point (Paine, 2014:158). The designers of instruction, teachers, and professors incorporated many game elements of gamification which were derived from educational psychology (Kapp, 2012:12), and these elements such as points, levels, and leaderboard, display progress, provide feedback, promote intrinsic motivation and competence of the user (Nacke & Deterding, 2017:451).

Table 2.1 below adopted from Garrett and Young, (2019:350) based on the literature searches carried out on gamification provides a list of mechanics of gamification that are commonly used within the health care including ranking, and definition of each mechanic accordingly.

Table 2.1: The most popular game mechanics

Ranking	Game mechanic	Definition
1	Points (70%)	The study reward participants with points or virtual currency for completing certain tasks
2	Social interaction (55%)	Users interact with each other (collaboration, completion/tournament, comments)
3	Leaderboard (40%)	The study use leaderboards to display how each participant is doing (a table listing leaders in a competition)
3	Progress status (40%)	The study allows participants to check their progress
4	Levels (35%)	The study allows participants to level up
5	Immediate feedback (30%)	The study provides immediate feedback after completing certain tasks
6	Narrative (20%)	The study has a storyline or a theme
6	Badges/medals (20%)	The study reward participants with badges or medals
6	Reward system (20%)	The study allows participants to exchange points/virtual currency with online or offline perks, such as new accessories for avatars

The gamified elements can assist students in tracking their progress, individual and group feedback, and credentialing opportunities when applied in nursing education (White & Sallenbarger 2818:79). The game elements are not intended to replace user tests rather as an additional tool for evaluation (Tondello, Kappen, Mekler, Ganaba & Nacke, 2016:316). Elements of gamification play a vital role in game territory for creating a meaningful experiences. This can be applied based on the target outcome and context of its application.

2.3.2 Stages of designing gamification for educational purposes

Gamifying education requires some activities that developer needs to follow to successfully achieve the objectives. Based on the study carried out on gamification design by reviewing forty-one (41) publications and twenty-five (25) experts from sixteen (16) different countries participated in the study. The result revealed that the experts apply similar stages when designing gamification for learning (Morschheuser, Werder, Hamari & Abe, (2017:1299).

- **Project preparation**-This is the initial stage for designing gamification and the foundation of the entire project. The aim of this stage is to clarify the gamification project's objectives. The required activities in this stage are identifying the objectives, ranking of project objectives, justification of objectives, assessment of gamification whether it is applicable and identification of requirements such as legal, ethical, deadline, budget, required actions, institutional culture, human resources, constraints, and the criterion for success.
- **Analysis**-The focus of this stage is to examine the players (characteristics) and the context of gamification. This stage involves identification of the potential users, their needs, motivation, personas, and the context analysis. The context analysis includes, identifying context, understanding the context, and identification of success metrics.
- **Ideation**-This stage deals with the development of gamification and mainly focus on the user needs. It involves the selection of elements based on identified user needs, and desired behaviour of the user. It is a creative process with extensive lists of ideas on gamification design and attention must be paid during this stage.
- **Design of prototypes**-At this stage, an accurate development of gamification designs can be established. This includes design concept, creation of prototype, evaluation of the prototype and planning of development.

- **Implementation of a design**-The prototype is put in to continue play testing and evaluation must be carried out. Recommendation and improvement of the designed mechanics is made based on the evaluation results.
- **Evaluation**- At this stage, the developed gamification solution is investigated whether the defined objectives is met by applying something like the playtesting.
- **Monitoring-A** This can be achieved through collected data to evaluate the employed game mechanics. This helps to identify any deviation and whether the expected behaviour of the user is achieved. Balance and tweak of the mechanics, rules, and content to ensure system engagement and adapting the changing objectives.

Figure 2.1 presents a summary of stages for designing gamification (Morschheuser et al., 2017:1299).

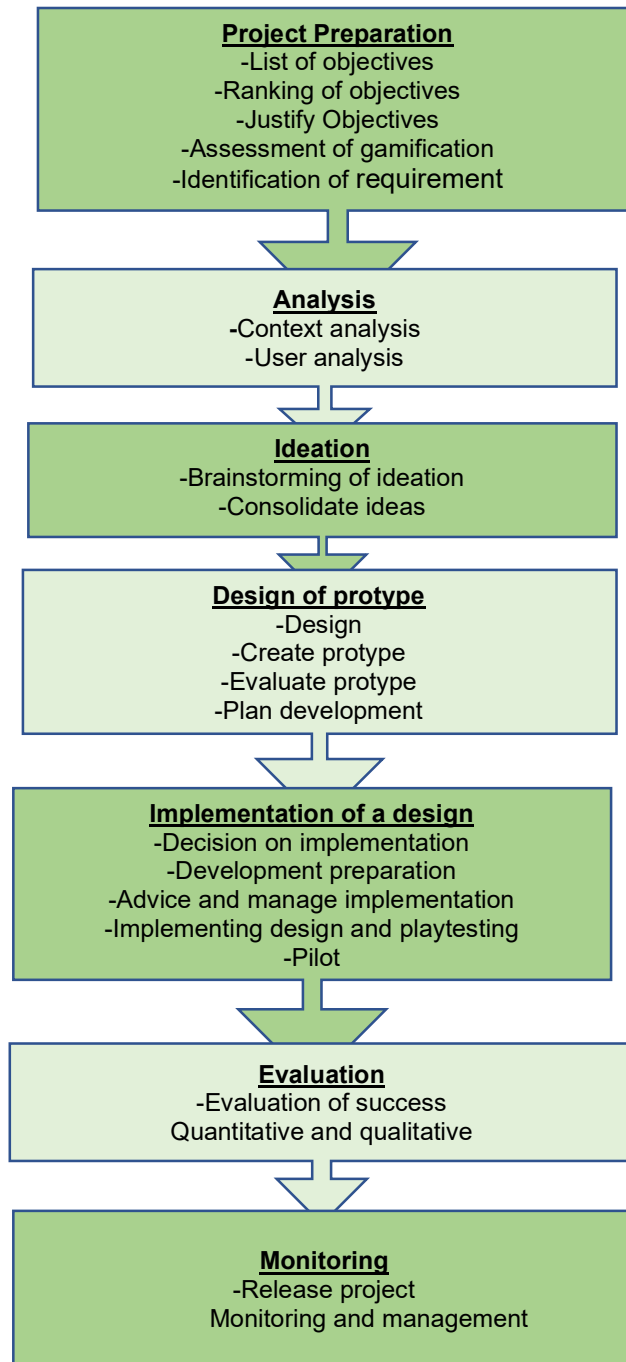


Figure 2.1: The stages of designing gamification (Morschheuser et al., 2017:1299).

2.3.3 Gamification in digital age

The rapid development of technologies is noticeably impacting our daily activities. In the current era, there is a massive increase and changes in the way we communicate and learn due to emerging technologies (Bates, 2015:13). The availability of various technologies in higher education, has positive influence on learning (Isaias, 2018:405). The increase of technology acceptance in education led to a change of policies (Pektaş & Kepceoğlu, 2019:65). Interestingly, the modern classrooms are provided with technologies for students to easily access and share information (Robson, 2019:154), these resources and information can be obtained directly through the internet (Kuhlthau, Maniotes & Caspari, 2015:5), this provides an innovative way of learning through various platforms like online and mobile applications. These handheld tools have become part of every day's live with positive benefits worldwide and provides prompt communication regardless of place and time (Kuhlthau, *et al*, 2015:6).

The transition of digital age brought about changes in nursing education. However, students often question and challenge the existing state of innovation (Mackavey and Cron, 2019:86), and investing in learning (Paine, 2014:163), searching for innovation and quality in education that generated to the implementation of modern technological tools and practices, such as the trending term in educational sector called gamification. Gamification generally allow students to play the most important role in their learning process while the lecturers are responsible for providing diverse learning paths (Bíró, 2014:150). In addition,, gamification allows students to confront the fear of failing, re-do the activity and improve from previous mistakes (Isaías, 2018:409), through the application of engaging elements such as, feedback, achievable goals, progress, and encouragement create an environment to support user and enjoy the learning experiences (Koivisto and Hamari, 2014:180), with rewards developed to promote motivation and increase the level of engagement in students' learning process (Kapp, 2012:21). Learning experience required to be more efficient and effective based on current and more understanding of human brain and clearer view of the science of learning (Paine, 2014:165). Thus, these needs to be carefully designed based on the potential users' characteristics and learning objectives accordingly.

According to Kovisto & Hamari (2014:183:183) carried out a survey, that age does not affect the direct significant benefits gained by the gamification users and further suggested that,

the more usage of gamification the greater chance of exposure and recognition. However, the learner-centred approach actively encourage constant improvement of knowledge (Isaías, 2018:408), maintain student active learning (Furdu, et al., 2017:56). Meanwhile, educators can adopt an alternative teaching method without compromising the quality of nursing education. Gamification is needed in nursing education since the younger generations have access to computer, tablet or smartphones and have grown up with it (Brull & Finlayson, 2016:374), and majority of nursing students play video games of various context.

2.3.4 Application of gamification and behavioural changes in learning experiences

About 80% of people recollect what they see and do, 20% of what they read, while only 10% recollect what they hear (Wyzowl, 2017:1). Gamification is aimed to target a specific behaviour or attitude (Landers, Bauer, Callan, Armstrong, 2015:167). Previous study proved that gamification can positively influence attitude towards better behaviours (Kapp, 2012:106). As indicated that between 80% to 95% of the student nurses were able to recognise the activities of decision making, clinical skills, ward management, practical nursing knowledge, critical thinking, medication knowledge and leadership (Stanley & Latimer, 2010:24). Gamification is a strategy that can enhance and improve student's retention of knowledge and subsequently improve their abilities and skills. A research study carried out on attitudes of healthy nutrition by Ezezika, Oh, Edeagu & Boyo, (2018:135) the result showed that playing gamification known as nutrigo improved students' behaviour towards eating healthy and willingness to buy healthy food that they have not tolerated previously to replace junk food. Gamification has been utilised to encourage healthy lifestyles, greener consumption, and helps in making right decision on finances (Koivisto & Hamari, 2014:189).

There are various mobile apps and online nursing games for nursing education and learning which provides immediate feedback. The apps and online games are readily available in various subjects in nursing education such as, anatomy and physiology, cardiology, drug classifications, dosage calculations, assessment, and diagnosis. The examples of educational nursing games use for educational purposes are Learning Nurse Resources Network that offers 156 free interesting educational nursing games with 6000 questions to facilitate learning and engage students which includes anatomy and physiology,

pharmacology, disease conditions, assessment, diagnosis, among others. The Nursing and Allied Health Resources Section provides online nursing games and human anatomy activities. Prognosis: Your diagnosis is a mobile application that provide nursing students with the ability to diagnose and manage cases. The application offers over 600 cases and scenarios (Wilson: 2018 & Western Governors University: 2017).

2.3.5 Benefits in utilising gamification

Gamification provides interactive, engaging experiences and avenue of experimentation (Brull & Finlayson, 2016:372). Equips the player with higher retention/achievement of knowledge (Goon et al., 2016:541), decrease distraction and increase students' level of engagement (Choi, Lindquist & Song (2014:54). From the experimental study, students shown significant improvement in performance and knowledge acquisition from a gamified group compared to classroom-based teaching (Kayımbaşoğlu & Oktekin, 2016:675), increases spatial visualisation skills, attention, faster eye-hand coordination and reacts faster (Kapp, 2012:107). This indicates that an individual must be directly involved and actively engaged in an activity for them to understand better and get meaningful experiences. Gamification as a teaching strategy encourages problem solving, and inspire creative thinking and can be integrated easily in to nursing education (White et al., 2018), when constructed within the curriculum to meet all learning objectives of knowledge, skills, and competences for practice. It was pointed out that mobile apps can serve as an additional instrument in education to enhance students' learning and further recommend more research to obtain deeper understanding to ensure the greatest benefits of gamification apps (Ling, Harnish & Shebaba, 2913:542-543).

The effectiveness of gamification applications is significantly based on the context in which it is being utilised and in the individual user (Hamari, et al., 2014:3014). Goon et al., (2016:540) states that, the best of learning is obtained through a well-designed experience. Hence, it is important to acknowledge the nursing students learning styles and preferences. This will enable the nursing students to actively take charge of their role in learning to achieve a desirable outcome.

2.3.6 Utilisation of gamification in Nursing Education Institutions (NEIs)

Gamification started developing in business and marketing sectors, and recently adopted in the academic domain by some educators. As the concept of gamification began to develop with an increase participation in research study especially on its effectiveness, this strengthens the application of gamification within educational domain around 2010 (Van Roy & Zaman, 2018:284), with the aim to create or modify experiences and to provide similar feelings and engagement of playing games (Alhammad, 2018:131). The activities involve playing game, rules, and winning or losing game activity (White & Shallenbrger, 2018:78). As such, it was proved to have helped the first-year nursing students with knowledge acquisition, team competition and brought more closure with their team members during their tests preparation on cranial nerves (Roche, Wingo, & Willig, 2017:124), and strongly believed gamification was motivative, enjoyable, helpful in learning content and help for examinations (Gómez-Urquiza, Gómez-Salgado, Albendín-García, Correa-Rodríguez, González-Jiménez, & Cañadas-De la Fuente (2019:73), as well as contributions towards development of competences in nursing education (Castro & Gonçalves, 2018:1103).

Moreover, there are numerous nursing programs designed for physical assessment course (White & Shallenbrger, 2018:80), confirmed to improve health professionals' knowledge through implementation compared to traditional method (Gentry, Gauthier, L'estrade Ehrstrom, Wortley, Lilienthal, Tudor Car, Shoko, Charoula, Nabil, James, & Josip, 2019:16). The literature on gamification in the field of nursing education is still developing and the current knowledge indicated its benefits gained by the nursing students in their learning process. Gamification in nursing education has great potential in making education more engaging (Castro & Gonçalves, 2018:1044), promote satisfaction, creative thinking, and control (García-Viola, Garrido-Molina, Márquez-Hernández, Granados-Gámez, Aguilera-Manrique, Gutiérrez-Puertas, 2019:718). The successful adoption of interactive nursing education through mobile app considered to be an effective method of teaching and learning in practical nursing skills (Hyunsun Kim & Suh, 2018:17), and related content can be effectively adopted across the unique nursing students. As confirmed, that current nursing education contents conformed with the students' needs, digital application, and innovative method (Hyunsun Kim & Suh, 2018:17).

2.3.7 Challenges of gamification

Gamification is going through a tremendous development, yet there are some challenges in its application. These challenges involves limited empirical, theoretical, set of elements, and potential side effects (Rapp, Hopfgartner, Hamari, Linehan and Cena, 2019:1), as well as game design principles in various educational experiences (Dichev & Dichev, 2017:25). A study conducted by Nacke et al., (2017:541) proved that, there is no information provided on ethical consideration to halt exploitation of the user (Thorpe & Roper 2019:594), report on reliability and validity has not been established yet (Nasiri, et al., 2019:88), excessive or wrong ways of utilising and lack of consistency of using gamification (Furdu, et al., 2017:58). In addition, other related challenges such as assigning monetary rewards or other concrete rewards can completely alter the main aim in promoting intrinsic motivation (Basten, 2017:78), economic challenge for the development of educational games, training of the current generation educators for incorporating meaningful educational games into curricular activities, negative perceptions, and hostility towards games by some educators (information Resources Management 2018:3).

More importantly, there are some issues found related to defining the target audience, target behaviour or expected outcome, designing various gamification strategies for specific organisational role, choosing the appropriate approach to implement gamification, lack of empirical data, managing the introduced additional tool (Alhammad & Moreno, 2018:10), which must be carefully observed in designing gamification relevant to the users to achieve the learning objectives. Gamification demands creating new challenges for skills improvement (Basten, 2017:81), hence, a specialist on educational gamification must be consulted to ensure content accuracy. Gamification experts described each design principle and indicated a successful method of implementation as well as the evaluation of the developed tool prior to formalising gamification for learning (Morschheuser and Hamari, 2019:231).

The above arguments show that gamification application has some challenges in its employment which needs to be addressed accordingly. This will contribute positively towards the current nursing students learning experiences and achieve the required objectives, skills, and competences for professional practice. This can only be achieved with the NEIs support, setting of the content, costs, lecturers and learner readiness, training,

internet connection, required technological innovation, such as apps and software and its relevant to the subject or topic.

2.4 CONCLUSION

The chapter reviewed related literature on gamification including literature review meaning, the search method, search terms and years within which the literature and book used was published. The history of gamification was explained using literature, stages of designing gamification for educational purposes based on the systematic review and expert's recommendations as well as the elements of gamification that are commonly used. The chapter further discussed the gamification in digital age, application of gamification and behavioural changes in learning experiences, benefits, and challenges of gamification. The methodology used in the study will be presented in detail in chapter 3.

CHAPTER 3

RESEARCH DESIGN AND METHOD

3.1 INTRODUCTION

The previous chapter presented the overview of the literature related to gamification. Chapter three explored the selected research design and methodology applied in the study. This chapter describes how data and all the necessary information were collected, presented, and analysed on assessing utilisation of gamification as a learning method by nursing students in selected NEIs in Gauteng Province. A quantitative descriptive survey design was used to describe data collected by using online survey and survey-structured questionnaire.

3.2 RESEARCH DESIGN

Study design refers to a selected approach of inquiry in research study that provides a direction for procedure or a blueprint for research study (Creswell, 2014:247), that exert control over conditions that are likely to affect the validity of the study findings (Grove, Burns & Gray, 2013:43). This assists the researcher to achieve the aim and objectives of the study and ensure the validity of the study results. In this study, a non-experimental descriptive survey design was followed to collect data from respondents to evaluate the utilisation of gamification as a learning method among nursing students in selected NEIs. In this study, quantitative, non-experimental, and descriptive survey design was employed.

3.2.1 Quantitative design

Quantitative research deals with the process of data collection, analysing the data using statistical procedures, interpreting, and writing the result of a study (Creswell; 2014:19). Quantitative research investigates phenomenon that lend themselves to make specification of measurement and quantification and involves a rigorous and controlled design (Polit & Beck, 2017:741). It is an essential tool for generating knowledge in education (Botma, et al., 2010:82). Quantitative study was chosen in this study for evaluating utilisation of gamification as a learning method among nursing students in selected NEIs. Numerical data was generated and analysed from the participants in the selected NEIs in Gauteng.

3.2.2 Non-experimental design

This refers to the data collection process without intervention (Polit & Beck, 2017:736), or inhibit manipulation of independent variables, random assignment of respondents, conditions, or examining relationships (O'Dwyer & Bernauer, 2013:56). In that sense, the researcher cannot control the variables in this study. The variables were measured as they are, and conclusions were made accordingly.

3.2.3 Descriptive design

Descriptive design explained the result of data for variables in the study by using means, standard deviations, and range of score (Creswell, 2014:228). Therefore, the study described the utilisation of gamification among nursing students as a learning method from the collected data. Visual presentation using graphs, tables, and charts were used to make the findings easier to understand.

3.3 STUDY SETTING

Study setting refers to any selected physical location and conditions in which data will be collected for the study (Polit & Beck, 2017:744). There are five public nursing education institutions (Colleges) in Gauteng province. The entire five (5) NEIs had equal chance of being selected in the research study. The study setting of this research were conducted in two different public NEIs (C1 and C2) in Gauteng Province, respectively. The NEIs were selected using simple random sampling technique to represent the larger population. The two selected NEIs have large numbers of enrolled nursing students adequate for the sample size. The setting provided a sample of enrolled nursing students within a confined geographic area as well as facilitating data collection. The selected NEIs offer four-year training leading to registration as a Nurse (General, Community and Psychiatric) Midwifery. The nursing students have access to Wi-Fi, and they connect their devices to the Wi-Fi which provides an opportunity to utilise gamification as a learning method.

3.4 STUDY POPULATION AND SAMPLING

3.4.1 Study population

Study population refers to the characteristics or elements in a study that meet the required sample criteria and the approach to be used for the population size selection (Botma, et al., 2010:613). The study population are the entire set of individuals or objects that have some common characteristics in a study (Polit & Beck, 2017:746). The population in this study comprised of all students in levels one to four of enrolled nursing students for R425 in the selected NEIs (C1 and C2) as shown in Figure 3.1.

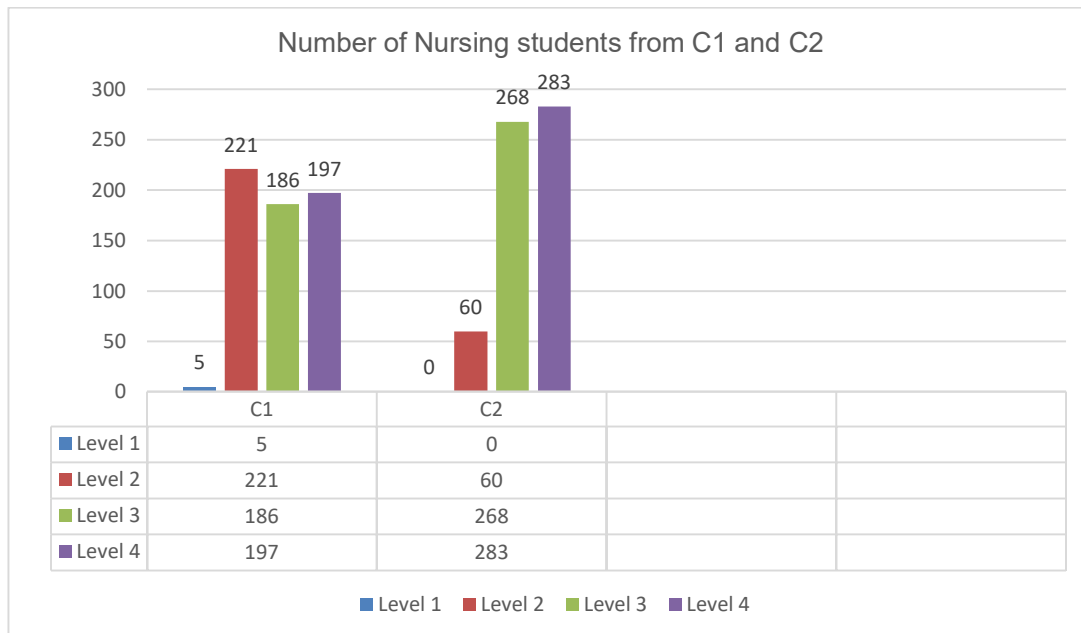


Figure 3.1: The numbers of students per level of participated NEIs.

3.4.2 Sample size

Sample size is the number of people who are participants from the accessible population in a research study (Polit & Beck, 2017:743). The total population of enrolled nursing students from C1 (609) from each academic year (Level 1 to 4). The C2 enrolled nursing students were 611 from level two to four (level 2 to 4). To calculate a representative sample size, Yamane (1967) in Sarmah & Hazarika (2012) formula was adopted. Assuming 95% confidence level and $P = 0.05$, the following formula was used for calculating sample size.

$$n = \frac{N}{1 + N(e)^2}$$

30

Where n is the sample size, N is the population size, and e is the level of precision. The sample size for this study were 301 participants from participating NEIs. The sample was lower (204) than expected (301) sample size due national lockdown because of Coronavirus pandemic. Some of the participants could not return their questionnaires and some of the participants were not having access to internet at home to participate in the online survey.

3.4.3 Sampling method

Sampling refers to a process in which the subgroup or a portion of the total population of the study is obtained during selection (Botma, et al., 2010:124), to represent the total population (Polit & Beck, 2017:743). A stratified proportional sampling method was used to determine proportional sample size within each study level. The Barreiro & Albandoz (2001:6) method which is based on the formula below was adopted for this study,

$$n_i = n \cdot \frac{N_i}{N}$$

n_i = sample size for each stratum, n = required sample size, N_i = population size for each stratum and N = size of the population.

Table 3.1: The proportional sample size for each stratum

Name of NEI	C1				C2				Total
	1	2	3	4	1	2	3	4	
Level of study	1	2	3	4	1	2	3	4	
N_i	5	221	186	197	0	60	268	283	1220
n_i	1	54	46	49	0	15	66	70	301

The last stage of sampling involves the application of a simple random sampling-without replacement method (SRSWOR). The SRSWOR method ensures that participants in the population have a known and equal probability to be selected and be part of the survey. The SRSWOR method was applied in each stratum. The computerised names of nursing students were randomly selected using random number generation format in Microsoft excel®.

- **Inclusion**

All the nursing students who enrolled for R425 in the selected NEIs in Gauteng province were eligible to participate in the study. The study enrolled nursing students from levels one to four (1-4), of any age groups, gender, and ethnicity within the selected NEIs institution in Gauteng.

- **Exclusion**

The study did not involve any NEIs outside the borders of Gauteng province. All nursing students were involved in the study except the level one R171 and who were not available in the selected NEIs.

3.5 DATA COLLECTION INSTRUMENT

Data collection is a process of gathering information to address a research problem (Polit & Beck, 2017:725). A survey structured questionnaire and an alternative online form of the questionnaire were used as the instrument to collect primary data from the respondents. The online survey was used because of emerging coronavirus pandemic which resulted in movement restrictions and closure of NEIs. The online survey was developed using Qualtrics ® software and set to prevent multiple responses from the responders using unique and dedicated links per respondent. The questionnaire was constructed by the researcher with the help of supervisors based on the literature and hypotheses of the proposed study and the assistance of a statistician was sought. The accuracy and credibility of the instrument were ensured throughout the study period. The survey questionnaire has two (2) sections for the nursing student participants to respond in the selected NEIs in Gauteng (cf. Annexure B).

Section A - Demographic data- The demographic profile was developed and statistical data on respondents' characteristics were collected based on the following variables: age, gender, level of education and computer literacy.

Section B –In this section, information was obtained using Likert scale and open-ended question to evaluate the utilisation of gamification as learning method among nursing students.

3.6 PROCEDURE FOLLOWED FOR THE RECRUITMENT OF PARTICIPANTS

Firstly, the researcher obtained approvals from the Faculty of Health Sciences University of Pretoria, and its ethics committee. Permission was also obtained from the selected NEIs' management to conduct the research study. The researcher obtained informed consent

and ensured ethical standards such as ensuring that no harm and discomfort were inflicted during participation in the study, confidentiality, and assurance of anonymity among other. The identification of eligible participants was done using the nursing students' record list. A stratified proportional sampling method was used to provide equal probability to be selected using sampling fraction for each stratum (Polit & Beck, 2017:746), and obtained the subgroup of nursing students participating in the study. Additionally, the inclusion and exclusion criteria were ensured. The researcher also ensured that the participants fully understand the procedure, provided all the necessary information based on the questions and clarified all aspects that need to the participants.

3.7 PILOT STUDY

Pilot study is a small group of total versions of a study carried out to test the instrument (Polit & Beck, 2017:739), and determine if it is adequate and appropriate for methodology, sampling, and analysis (Bless, Higson, & Kagee, 2006:184), as well as clearing any vague information. The pilot study exercise was carried out in one of the participating NEIs to test the instrument prior to the main research study. Permission and consent were obtained from the respondents. The process was conducted as would the main study in terms of recruitment, inclusion criteria, exclusion criteria, and ethical application. Ten 10 respondents were recruited voluntarily and responded to the questionnaire. The data collected during the pilot study were analysed by the researcher and submitted to the supervisor, and co-supervisor for review.

The findings were examined for the feasibility of the instrument for the full research study. The findings indicated that the study is feasible; instrument is appropriate, easy to understand and revealed the time window required to complete the questionnaire to be between 6-15 minutes. The result of the pilot study was not included in the main research study.

3.8 DATA COLLECTION

At the time of data collection, the first case of coronavirus pandemic was confirmed. This resulted in using online survey alternatively with informed consent form attached. The online survey link was sent to the potential participants (C1) through individual email addresses. However due to privacy concerns and protection of private information act the

second (C2) NEI did not provide individual email addresses but rather opted for the link to be sent to its ethics committee chairperson who distributed it to all the nursing students through SMS and sent follow up reminders when necessary. The survey was first commenced on 28th May 2020 in one of the participating NEI C1 with weekly reminders sent through emails and nursing student respondents' WhatsApp groups with the assistance of the students' representative council's president. The second participating NEI C2 only sent the online survey on 7th July 2020 to the nursing students. Data collection was stopped on the 30th of August 2020 for both NEIs.

During the time of data collection, the level four, three and two were called back to lectures at different dates in NEI C1. Some of the respondents prepared to participate using hard printed copies. The researcher was able to meet with some of the level four nursing students. This helped in establishing rapport with the participants and gain their cooperation. Through this, the researcher was provided with an opportunity to further clarify ambiguities and the procedure. The researcher handed in the survey structured questionnaire attached with informed consent form to ethics committee chairperson and assisted with the distribution in the classroom for the willing respondents. All necessary information regarding the study including the aim and objectives were provided adequately to ensure voluntary informed consent. Also, support was given to ensure that the participants understand the questions and the purpose for reliable and valid information. The data were collected at the selected date, time and venue or as requested by the respondents to prevent any inconveniences and discomfort.

3.8.1 Data analyses and management

Data analysis refers to a systematic organisation of obtained data from research study (Polit & Beck, 2017:725). The data from online survey and survey questionnaires of the study were collected from the participants by the researcher as a primary data. Additionally, the data collected from Qualtrics® software were exported into Microsoft Excel® for further processing. Cronbach's alpha coefficient was used to test the reliability and validity of the questionnaire (Tavacoli & Dennick, 2011:53). Chi-square test (χ^2) for equal proportions were used to describe the demographics and the utilisation of gamification among nursing student in the learning process. In addition, chi-square test (χ^2) for independence in a two-way contingency table was also used to determine the relationship between the

demographic data and utilisation of gamification (Polit & Beck, 2017:392). Furthermore, Cramer's V tests (correlation test) also performed as post-test to determine strengths of association between demographic data and utilisation of gamification after chi-square has determined significance. The findings are presented in charts and tables. All data were analysed using the statistical software SAS. The data will be stored in a secure environment for 10 years to ensure its proper accessibility using standard data management practices.

3.9 RIGOR

In this study, the concept of rigor indicates the accuracy and credibility of the research study discussed below as validity and reliability.

3.9.1 Validity

It is a concept that ensures the method measured what it purports to measure in quantitative research (Polit & Beck, 2017:161). Validity is the amount of systematic or built-in error in questionnaire. Face validity was used for this study. With face validity method, the supervisor reviewed the questionnaire and concluded that it measures the characteristic or trait of interest (Bölenius, Brulin, Grankvist, Lindkvist & Söderberg, 2012). In this study, the researcher ensured the survey structured questionnaire developed was relevant and adequately reflects the variables. The instrument was tested with a smaller accessible sample group of 10 respondents of nursing students from one of the selected NEI (C1). The findings of the pilot study were analysed to confirm the validity of the questionnaire. Criterion of validity was ensured through extensive search of literature and review. Furthermore, a statistician was consulted to ensure that contents of the questionnaire and face validity was sought. Content validity is the extent in which the content of an instrument has accurate sample of items to measure the construct and face validity to which the instrument looks it measures from (Polit & Beck, 2017:310).

3.9.2 Internal validity

This refers to the degree at which an inference can be made that independent variable truly cause an effect (Polit & Beck; 2017:224) and enable the researcher to make accurate conclusions on the cause-and-effect relationships (Cozby, 2009:86). The internal validity in this study was to ensure uniformity of data collection process throughout the study without

any compromise. This helped in establishing a causal relationship between the variables and made accurate inference.

3.9.3 Reliability

This refers to the accuracy and consistency of the instrument (Polit & Beck, 2017:161), throughout a series of measurements, (Goswami, 2011:2). The Cronbach alpha coefficient is largely applied for reliability testing to determine the level of positive correlation between the items (Sekaran & Bougie, 2010:162). It implies that a measure used, should produce similar or the same results consistently if it used more than once by different researchers. In this study, the Cronbach Coefficient Alpha was used to test the reliability of the data collection tool, (Sarmah & Hazarika, 2012:1508). The coefficient of Cronbach's alpha reliability ranges between 0 and 1. The coefficient that is 0.7 is deemed acceptable and reliable. While a coefficient closer to 1.0 indicates that the internal consistency is greater (Taber, 2018:1278). In this study, the items of the questionnaire had the coefficient greater than 0.6 while the overall coefficient of the Cronbach's alpha was 0.7. Thus, this implied that the reliability of the measuring tool falls with the acceptable range. The criterion was followed for quality to avoid measurement error. The instrument was consistently used throughout the study for data collection to ensure quality. This ensured the tool provide the same finding when the measurement is repeated.

3.10 CONCLUSION

The chapter described in detail the research methodology used in data collection, outlined, and discussed accordingly how the research questions were answered. A discussion was carried out on the research method, design, data collection, procedure and how the study was conducted. Chapter four discussed the finding of the result accordingly.

CHAPTER 4

PRESENTATION AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

The previous chapter discussed the research design method and how the data was collected. This chapter presents the handling of the data, its processing and the results obtained. The findings were subsequently used to answer the research questions and hypotheses earlier set out at the commencement of the study. From which conclusions were derived based on statistical inferences and hypothesis testing which allows the rejection or acceptance of the null hypotheses.

Research objectives

- To describe the demographic data of respondents.
- To evaluate utilisation of gamification among nursing students in the learning process.
- To determine the relationship between the demographic data and utilisation of gamification.

Research question

- How can the utilisation of gamification as a learning method among nursing students in selected NEIs be evaluated?

Hypotheses

- The demographic characteristic of the nursing students is significant in utilisation of gamification among nursing students.
- Nursing students utilise gamification for learning.
- There is a relationship between the demographic data and utilising gamification by nursing students.

4.2 DESCRIPTIVE STATISTICS

4.2.1 Brief description of data collection

The data were collected through online survey and survey structured questionnaire (hard printed copies) as discussed in chapter three (3). A total of 304 responses were received from both the online and paper-based survey questionnaires. Of this, 235 were online responses and 69 hard copies. From the total of three hundred and four (304) responses, only two hundred and three (203) met the inclusion criteria for the data collection and analysis. One hundred and one responses (101) were excluded during data cleaning as they were from level one students who were not R425. The collected data were coded for confidentiality and to allow consistency in capturing.

A descriptive statistical analysis using frequencies and percentages was performed followed by a Chi-Squared test to determine the proportion for the demography and utilisation of gamification as well as their relationships. Some of the participants did not answer all the questionnaire. Meanwhile, the percentage were presented based on the total number of participants who responded to each individual variable.

4.2.2 The Research Instrument

A survey structured questionnaire and online survey were both used in this study, and it involved of two sections as follows.

- **Section A: Demographic data**

This section A of the questionnaire consists of four (4) items which provides important information of the respondents' demographic data. The respondents were to choose only one option of the statement in the appropriate column of their choice.

- **Section B: The utilisation of gamification of gamification**

The second section consists of mixed response method with sixteen (16) items. The respondents were expected to choose only one option for a statement by marking in the appropriate column of their choice. The section has a Likert scale and open-ended question for the respondents to specify. All the responses of the questionnaire were analysed descriptively.

4.2.3 Validity and reliability of the instrument

The internal consistency of the questionnaire in this study was determined using Cronbach alpha test. All items of the questionnaire in this study had the coefficient of greater than 0.6 while the overall coefficient of the Cronbach's alpha was 0.7 as discussed in chapter three (3).

4.3 DEMOGRAPHIC DATA

Section one of the questionnaire contains important information related to the respondents. This information defined and determined the students' characteristics as a baseline prior to the implementation of gamification.

QUESTION 1: AGE DISTRIBUTION OF RESPONDENTS

Question one addresses the age distribution of the respondents. The age of respondents ranged from 18 to >55 (Table 4.1).

Table 4.1: Age class of the respondents and frequencies as represented in the sample

Age	Frequency (Percent)	Probability
18-24	87 (43.28%)	<.0001
25-34	65 (32.34%)	
35-44	45 (22.39%)	
45-54	3 (1.49%)	
>55	1 (0.50%)	

Table 4.1 shows the age category of the respondents who participated in the study result. The highest participants were between the age of 18-24 years 43.28% (n=87); followed by age between 25-34 years 32.34% (n=65), then age between 35-44 years were 22.39%

(n=45), the less respondents were between the age of 45-54 years 1.49% (n=3) and very less responded of >55 with 0.50% (n=1).

Based on the result, the age distribution of the respondents is within reported age distribution of enrolled nursing students <30 years old to >69 years old (SANC Statistics; 2019). The younger nursing students between the age of 18-24 and 25-34 participated highly in the study and are likely to utilise gamification more than the older nursing students. It was supported by Johnson, Adams, Cummins, Estrada, Freeman, & Ludgate (2013:20) that the common game players are between the age of 18-35 and the age category represent 31% of gamers.

QUESTION 2: GENDER OF THE RESPONDENTS

The information related to gender were obtained from the respondents in the selected NEIs in Gauteng. Figure 4.1 provides detail on gender distribution of the respondents who participated in the study.

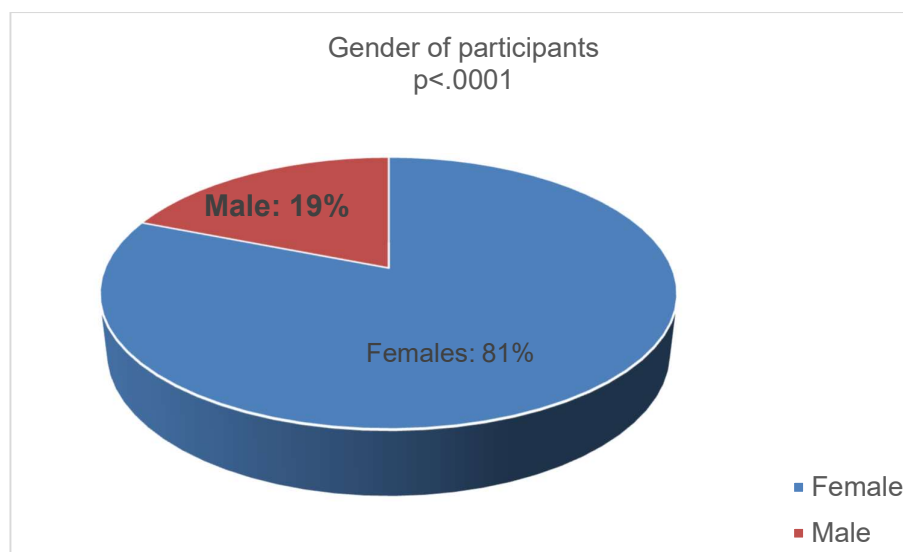


Figure 4.1: Gender of the respondents

Figure 4.1 Illustrating the gender distribution of respondents. The options for gender class were classified into three as in female, male and other. The result above indicates that the respondents are predominantly female n=81% (n=162) whereas male respondents were n=19% (n=38). There was no choice for option other (gender).

The proportion of female respondents was clearly higher than those of male respondents as shown by the results. The statistics of enrolled nursing students in Gauteng province shows that, of the 16454 enrolments recorded in 2018, 15120 are females and only 1334 are males (SANC, 2018). This indicates that there are still more female nursing students in nursing profession (Mooere & Jacqueline, 2014:90). Hence, male nurses remain the minority group.

QUESTION 3: STUDY LEVEL OF RESPONDENTS

The question aimed to obtain information with regards to the respondents' level of study, and their involvement in utilisation of gamification. The respondents' level of study ranged from level one to four (1-4). Although, the level one nursing students were quite very few for R425 due to newly established R171 which were excluded in the study. Meanwhile, only level one repeaters were included from one of the selected NEIs. Figure 4:2 provides more detailed information.

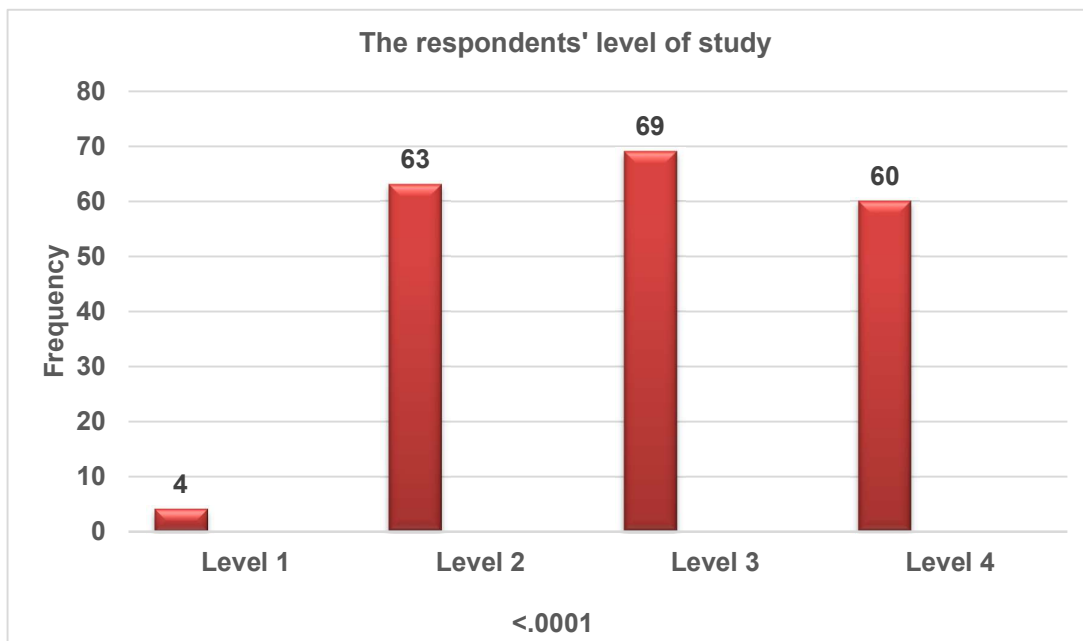


Figure 4.2: Study level of respondents

Figure 4.2 The shows the respondents' level of study in which 35% (n=69) were level three with highest percentage of respondents, followed by 32% (n=63) of the respondents were

level two nursing students, then slightly lower 30.61% (n=60) were level four nursing students' respondents, and finally the very less 2,04% (n=4) clearly indicated level one.

It is observed that the respondents from three levels (2,3, & 4) are almost equally distributed except level one was underrepresented. This indicates the likelihood that the nursing students from all levels of study utilise gamification to enhance their learning. However, there is no evidence to support the result on gamification acceptance by students of various levels of study within a specific professional field in higher education institutions and specifically in the field of nursing education (Márquez-Hernández, Garrido-Molina, Gutiérrez-Puertas, García-Viola, Aguilera-Manrique and Granados-Gámez, 2019:35).

QUESTION 4: COMPUTER LIETERACY LEVEL OF THE RESPONDENTS

The respondents were asked to indicate their levels of computer literacy in order to obtain information on the degree of skill acquired on computing. The results are indicated in Figure 4.3.

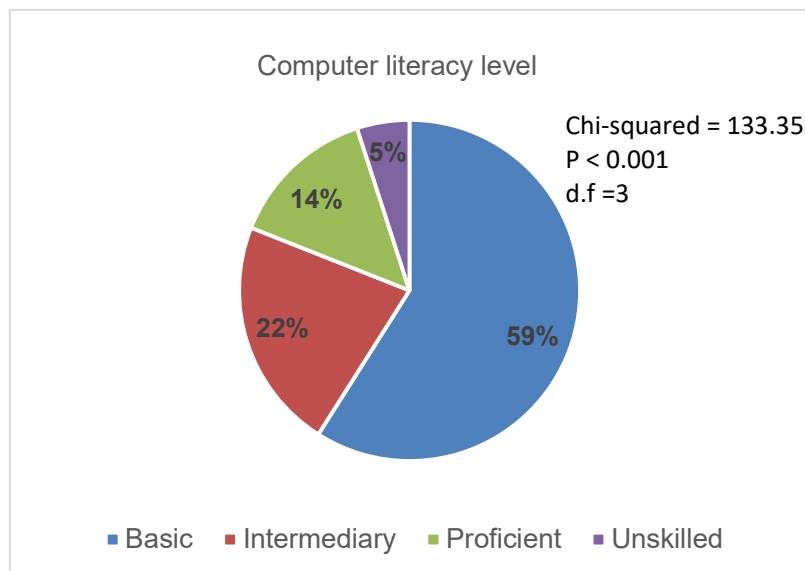


Figure 4.3: Computer literacy level

Figure 4.3 showed that, there is highly significant difference in respondents computer literacy level with 59% (n=118) indicating that they have basic computer literacy, followed

by 22% (n=44) with intermediate, 14% (n=29) had high proficiency in computing whilst 5% (n=10) of the respondents indicated that they possess no computer skills.

Overall, the result showed a very high prior knowledge of computer skills by the respondents. The development of technology provides new opportunities to enhance and widen the experiences of learning (Flynn & Vredevooged, 2010:7). Computer based information system should be considered as fundamental tool in students' learning experience not as an additional tool (Bouarab-Dahmania & Tahi, 2015:608).

4.4 SECTION B: THE UTILISATION OF GAMIFICATION BY NURSING STUDENTS

QUESTION 5: THE TYPE OF DEVICE

The question intended to understand the kind of devices use by the respondents and sought to determine its impact in their learning. The utilisation of mobile technologies does not exclude adult and older respondents. Below is more detail indicating the results accordingly.

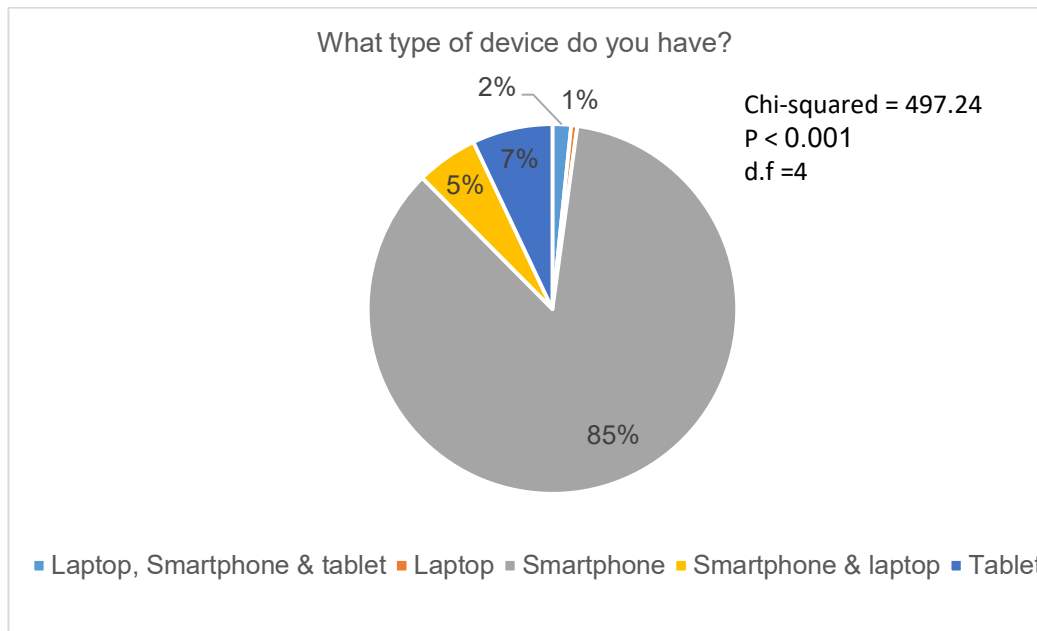


Figure 4.4: Summary of the types of devices owned by each respondents

Figure 4.4 shows that the main device type owned by respondents was a smartphone 85% (n=158), followed by tablet only 7% (n=13), then a combination of both a smartphone and

a laptop 5% (n=10). Respondents who own only a laptop, smartphone and tablet were n=2% (n=3) with only one having only a tablet n=1% (n=1).

According to the result, majority of the respondents commonly use smartphones. Indeed, a recent study by Alexander et al., (2019:21) indicated that, 95% of undergraduate students possessed smartphones as both smartphone and tablets have range of capabilities which serve as a primary medium to access learning materials. Thus, such devices provide the nursing students with greater opportunities to access gamification to enhance their online learning.

QUESTION 6: PLAYING ONLINE NURSING GAME

The question intends to know the level at which the respondent use any online nursing games for learning. The result is illustrated fully in Figure 4.5.

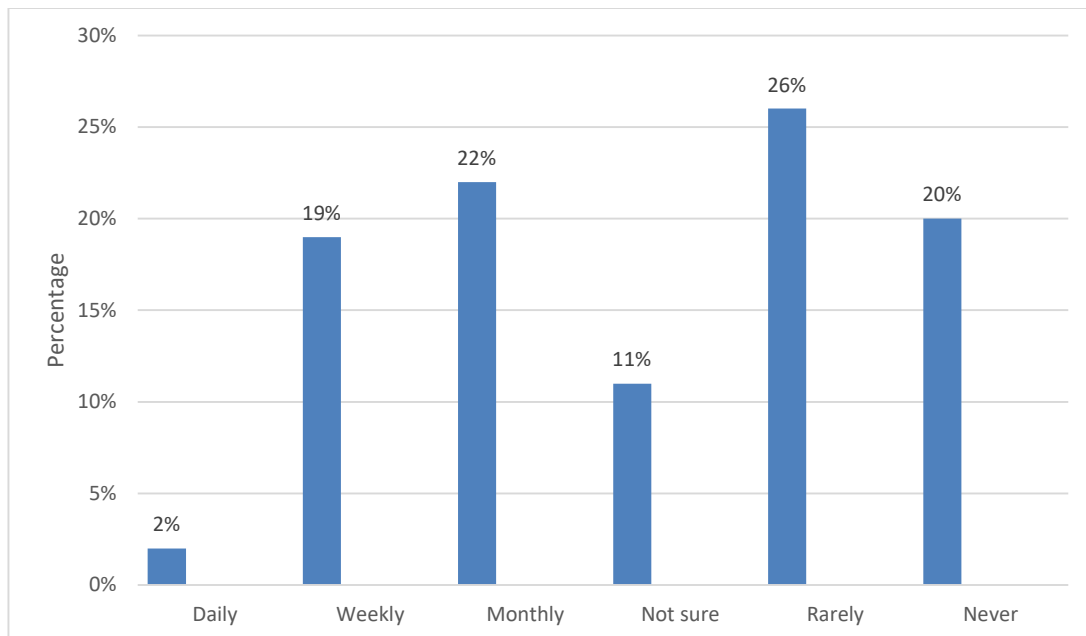


Figure 4.5 How often the respondents play online nursing game

Most respondents rarely play online nursing games 26% (n=47), while 22% (n=40) play online nursing games monthly, 20% (n=37) of the respondents never played any online nursing game (Figure 4.5). Respondents who play online games weekly were 19% (n=35), 11% (n=21) were not sure and only 2%, (n=4) of respondents play nursing game daily. The frequencies of playing online games did differ significantly ($X^2=39.70$, $df=5$, $p<0.001$).

The result showed that most of the respondents voluntarily utilise gamification for learning at various level of accessibility with only a few who have not used gamification. This is in

consistent with the findings, that majority of the current students learn through mediated experiences like online resources, video games, and social network (Hitchens & Tulloch, 2018:29).

QUESTION 7: THE CONTENT RELEVANT

The question aimed to determine whether the online nursing games content is pertinent to what the respondents learn in the classroom. Linkert scale was used with seven (6) points ranging from strongly agree, agree, don't know, not sure, disagree and strongly disagree for the participant to select based on their level of agreement to disagreement. The results are shown on Figure 4.6.

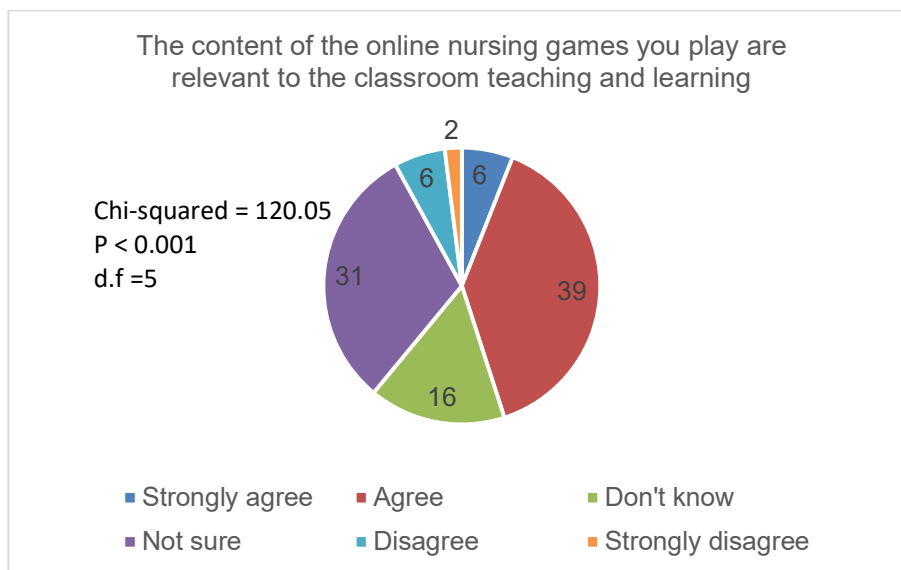


Figure 4.6: The content of the online games you play are relevant to the classroom teaching and learning

Majority of the respondents 39% (n=68) agreed that online nursing games are relevant to the classroom teaching and learning, followed by 31%(n=55) who were not sure, and 16% (n=28) who did not know if the online nursing games are relevant (Figure 4.6). A few respondents 6% (n=11) disagreed about the relevance of online nursing games. Similarly, 6% strongly agreed that online nursing games are relevant, while only n=3 (2%) strongly disagree that the online nursing games are relevant. The results from Chi-Squared test significantly indicated that the content of gamification is relevant to the classroom teaching and learning ($\chi^2=120.05$, $df=5$, $p<0.001$).

The result illustrated that majority of the respondents believed that gamification is relevant to the classroom teaching and learning. This is in line with findings by Pront, Muller, Koschade & Hutton (2017:5) on the study carried out through comprehensive and extensive review of available research in nursing education field, that four nursing games were found to meet the criteria which evidently show positive result in terms of usability and effectiveness in nursing education.

QUESTION 8: CONTRIBUTION TOWARDS LEARNING

The participants were asked to indicate the extent of contribution that online nursing provided towards their learning using a five (5) point Linkert scale such as very effective, effective, somewhat effective, ineffective, and not applicable. The result will assist to make recommendation in utilising gamification as an additional learning method among nursing students.

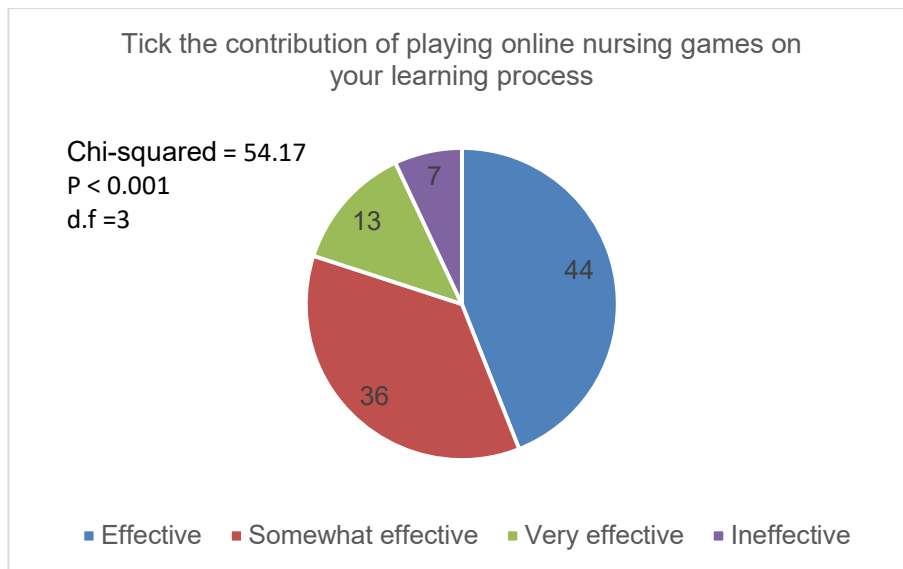


Figure 4.7: The contribution of playing online nursing games on learning process

The result in Figure 4.7 showed that mostly 44% (n=63) of the respondents found online nursing games effective, followed by 36%(n=52) of respondents who found online nursing games to be somewhat effective. And 13% (n=19) indicated that online nursing games are very effective, while 7% (n=10) found online nursing games as ineffective. The Chi-Squared

test indicated that the online nursing games significantly contribute towards nursing students' learning $X^2=54.17$, $df=3$, $p<0.001$.

Additionally, based on the study done by Nasiri et al., (2019:95) found that employment of educational games can effectively contribute towards students learning outcomes as well as skills, feelings, emotion, knowledge, performance, attitude, motivation, and interest. It is also regarded online nursing games as an effective and useful strategy in achieving positive outcomes on individual's experience and behaviour (Rapp et al., 2019:4). The previous findings supported the study results that majority of the respondents utilise gamification and proved its effectiveness in education.

QUESTION 9: UNDERSTANDING THE CONTENT

Nursing students are regarded as a centre for teaching and learning. The goal for this question was to evaluate if gamification content assists the respondents with understanding what have been taught in the classroom. Figure 4.8 provides more information on this finding.

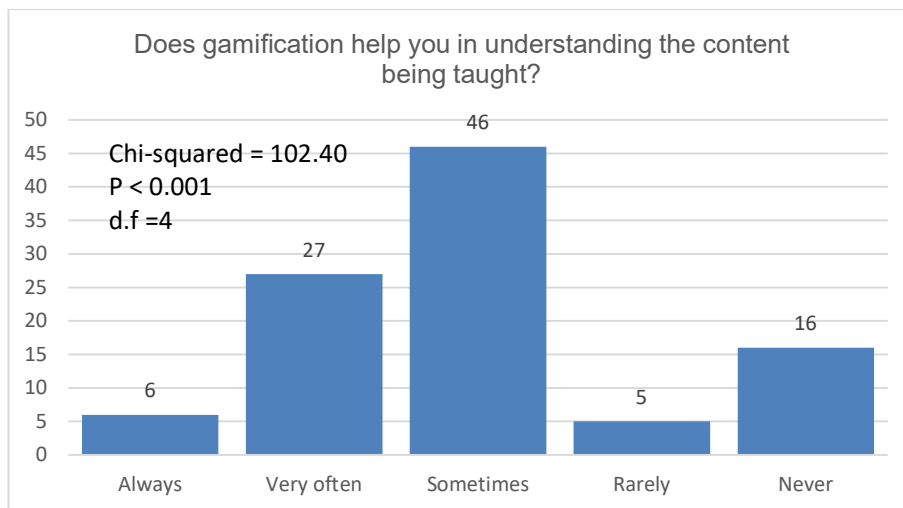


Figure 4.8: Gamification help in understanding the content being taught

Figure 4.8 indicates that 46% of respondents stated that, sometimes online nursing game help them with understanding the content being taught. Whilst 27% indicated that very often online nursing game helps, whereas 16% of the respondents showed that gamification

never helped them, and 6% indicated that the online nursing game always help in understanding the content being taught, while 5% indicated that it rarely helps. The Chi-Squared test showed there is strong significant evidence that gamification does assist the nursing students to understand the content ($X^2=102.40$, $df=4$, $p<0.001$).

Many students reported the usefulness of gamification with only a few (15%) disagreeing (Hitchens & Tulloch, 2018:28). Nursing games provides a crucial context that help in developing skills of nursing students (Pront et al., (2017:1). In this sense, nursing students are expected to understand what has been taught in the classroom in order to develop knowledge, skills and competencies for professional practices. However, the result indicated that gamification help with understanding of content as proved by the respondents as well as the previous studies.

QUESTION 10: MOTIVATIONS TO LEARN THE CONTENT

The question sought to find out whether playing online nursing games motivates the respondents to learn the content. A Likert scale was used to understand the extent at which online nursing games does so using the following as options; strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree. The results are indicated in Figure 4.9.

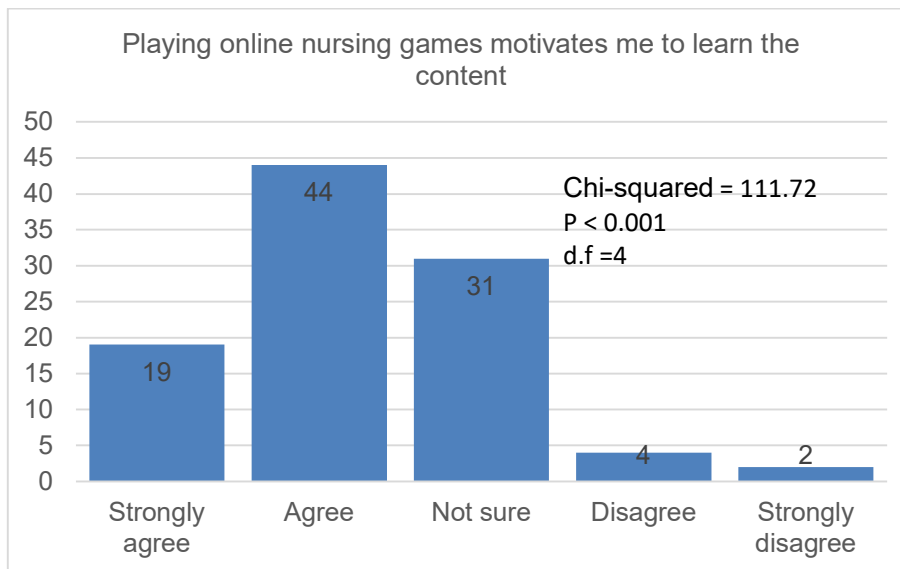


Figure 4.9: Playing online nursing games motivates me to learn the content

According to results in Figure 4.9, it clearly illustrated that majority (44%) of the respondents agreed that playing online games motivates the respondents to learn the content. Then 31% neither agree nor disagree, while 19% of the respondents strongly agree that online nursing game motivates them to learn the content, 4% disagree, whereas 2% strongly disagree. The results significantly indicated that nursing students were being motivated to learn through utilisation of gamification ($X^2=111.72$, $df=4$, $p<0.001$).

Within the nursing educational domain, motivation serves as a key driver which directly impacts nursing students' learning. Interestingly, majority of the respondents were motivated to learn using gamification. Gamification is a strategy that encourages learner motivation and engagement through game design within educational arena (Dichev & Dicheva, 2017:26), and serves as a solution to engage students individually and socially for continuous behaviours in education (Hamari, 2014:179). According to Pront et al., (2017:4) continues spatial movement and touch selections, multisensory stimuli through engagement, time limitations, feedback and scoring system assign rewards for efforts continue to motivate students to provide better and enjoyable experiences (Koivisto & Hamari, 2014:180).

QUESTION 11: ADDITIONAL LEARNING TOOL

The question was asked to gain an insight from the respondents based on their opinion whether they wish to have gamification as an important method of teaching and learning. This was determined through using a Likert Scale of five points (level of agreement to disagreement). The information was analysed as indicated below in Figure 4.10.

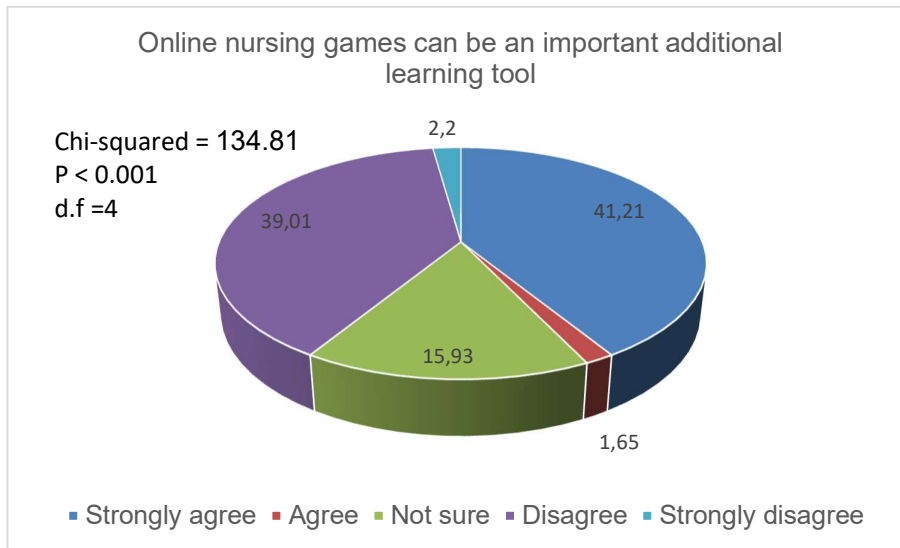


Figure 4.10: Online games can be an important additional learning tool.

Figure 4.10 indicated that 41.21% of respondents strongly agreed that online nursing games can be an important additional learning tool, followed by 39.01% of respondents who disagreed with the statement, 15.93% were not sure if online nursing games can be an important additional learning tool, while 2.2% strongly disagreed, and 1.65% agreed. The Chi-Squared test revealed that it is significant online nursing games can be an important additional learning tool ($X^2=134.81$, $df=4$, $p<0.001$).

Majority of the respondents significantly supported, that gamification can be an important additional method of learning. This could be as a result of the positive learning experiences linked to the opportunities provided by utilising gamification such as motivation, engagement, and knowledge acquisition in a fun and exciting way. Similarly, the incorporated visual presentations, user progress, user points, achievement, result and instant feedback as well as the ability to re-do the activities can potentially commit the learner to utilise gamification. The result confirmed that, the use of technology-enabled tools in the classroom are becoming more common and it is likely to be of benefit in education (Ling *et al.*, 2014:352). This positive indication of becoming a well acceptable additional tool in educational technology that work for personalised learning largely within educational practices had been aired by several authors (Brown, McCormack, Reeves, Brook, Grajek, Alexander, Bali, Bulger, Dark, Engelbert, Gannon, Gauthier, Gibson, Gibson, Lundin,

Veletsianos, & Weber, 2020:13). Although, nursing programs faces some difficulties in adopting innovative method of teaching to adjust with the needs of digital students (Day-Black, 2015:91), some universities considered and employed designed software along with best practice guidelines purposely for educators and students (Johnson, Adams, Cummins, Estrada, Freeman & Ludgate, 2013:4).

QUESTION 12: RESPONDENTS ACCESS TO INTERNET

Online games require access to effective internet connection. It is important to understand if the respondents can connect to the internet when playing online nursing games for educational purposes. Yes or no response were used in this regard and the results are present in Figure 4.11.

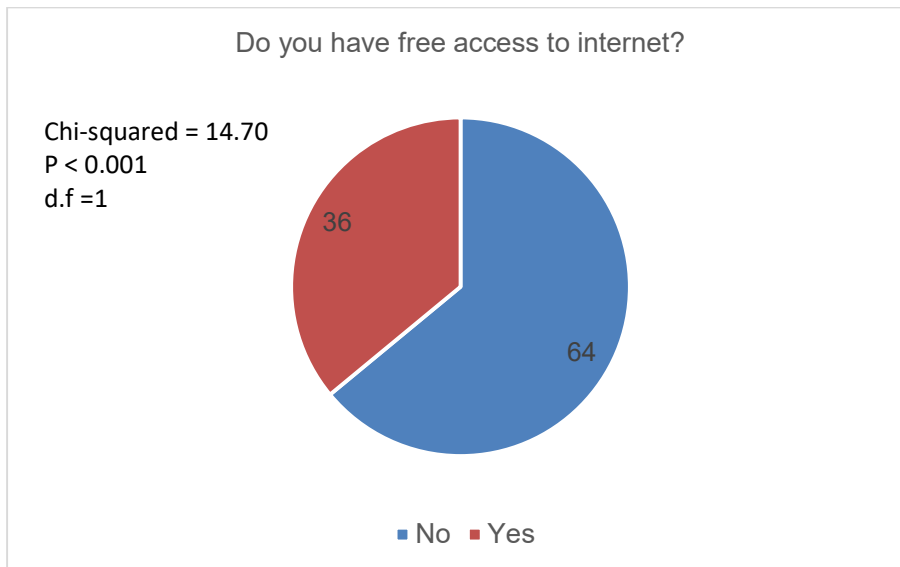


Figure 4.11: Do you have free access to internet.

Figure 4.11 illustrates the result of having access to internet connection with most respondents (64%) indicating that they do not have internet access. While 36% indicated that, they have access to internet.

The result revealed that majority of the respondents do not have access to internet, which can directly affect their utilising of gamification for learning especially when not on the NEIs campus. According to Adams Becker, Cummins, Davis, Freeman, Hall Giesinger, &

Ananthanarayanan, (2017:30), the United Nation declared that access to internet considered to be essential in education to meet the sustainable development goals. However, this implies that the NEIs management needs to re-examine the accessibility of internet and ensure all the nursing students can access internet widely to improve quality nursing education.

QUESTION 13: ACCES TO ONLINE NURSING GAMES

The question was asked to obtain information on internet access when playing online nursing games. The figure 4.12 below revealed the output from the data collected.

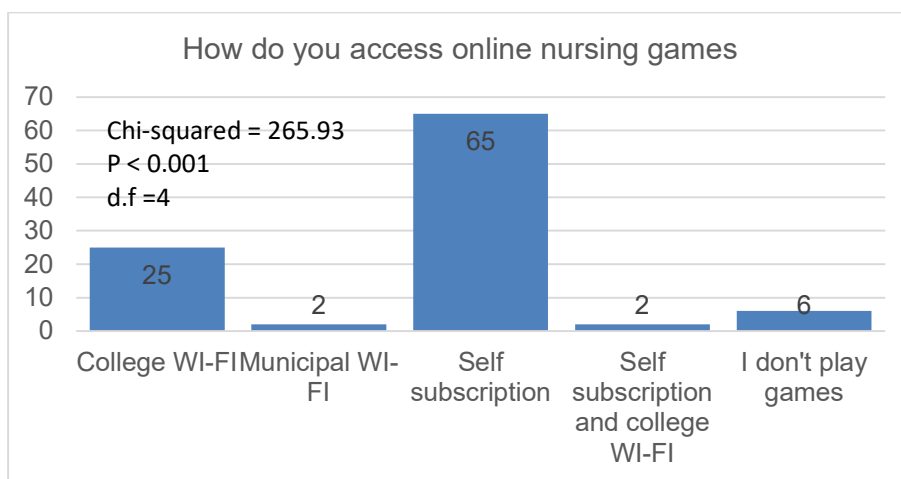


Figure 4.12: How the respondents access online nursing games

Figure 4.12 provided a clear information that the highest percentage of respondents 65% (n=118) indicated that they buy data themselves at own costs through self-subscription to access online nursing games. The respondents that access online nursing games through college WI-FI were 25% (n=46), while n=3 (2%) used municipal Wi-Fi, n=3 (2%) used both self-subscription and college Wi-Fi access an only n=11 (6%) indicated that they do not play online nursing games using any form of internet access.

Majority of the respondents purchase data to utilise gamification as seen from the result above. This may prevent the nursing students to fully access online resources such as gamification in their learning experience. It was strongly shown that, Internet access is

crucial in higher education, (Alexander et al., 2017:30). Hence, NEIs can assist and support the nursing students to explore their potentials of the modern learning environment.

QUESTION 14: PROBLEM WITH THE COLLEGE Wi-Fi

The question aimed to understand the respondents' experience with the college Wi-Fi when playing online nursing game. A two (2) points Linkert scale of "Yes" and "No" was used. Figure 4.13 provides the results in detail.

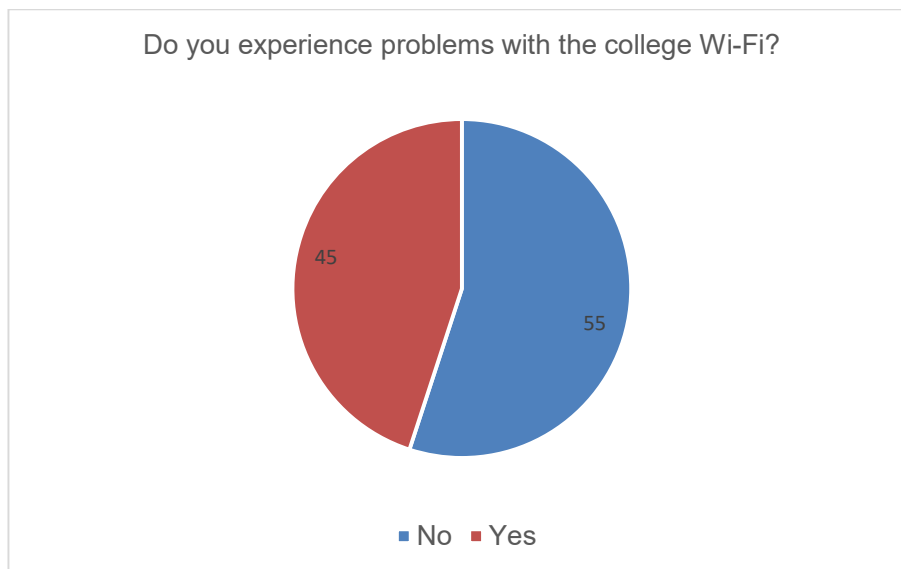


Figure 4.13: Experience problems with the college Wi-Fi by respondents

The given Figure 4.13 represent the result obtained from the respondents. The highest percentage of the respondents 55% indicated that they do not experience problems with college WIF, and the about half of the respondents indicated that they do experience problem with the college Wi-Fi.

More than half of the nursing students have access to college Wi-Fi, this provides a great opportunity to utilise online nursing games. About half of the respondents (45%) have problem with the college Wi-Fi which cannot go unnoticed, since it might deny them an opportunity to access online gaming using college resources. Access to good internet connection provides a valuable opportunity to obtain learning resources from any device (Isaías, 2018:409), with greater benefits for all nursing students. Additionally, Wi-Fi and

good cellular network connection especially with the abundance of mobile apps are powerful tool within and outside the classroom for learning (Johnson et al., 2013:4). This implies that a better provision of Wi-Fi and good internet connection for nursing students learning can have a great impact especially during critical times such as students riots or unforeseen circumstances like the present coronavirus pandemic.

QUESTION 15: THE TYPE OF PROBLEM WITH COLLEGE Wi-Fi

The question was asked to understand the kind of problem respondents experience while using college Wi-Fi for gamification. The information was obtained using open-ended question to allow the respondents indicate the problems freely without restriction. Problem specification provides the necessary knowledge of the problem and guide the way to address the problem accordingly. Table 4.2 showed the result below.

Table 4.2: Type of college Wi-Fi problems encountered by respondents

Which college Wi-Fi Problem did you experience	Frequency (%)	Probability
No connection at all	10 (6%)	<0.001
No content uploads	2 (1%)	
No problem with college Wi Fi	91 (52%)	
None	1 (1%)	
Only accessible from college	9 (5%)	
Poor Wi-Fi connection/WI-FI off	10 (6%)	
Sometimes unable to connect	39 (19%)	
slow due to over usage	17 (10%)	

Table 4.2 demonstrated the results of the problems and their nature as experienced by the respondents. Majority of the respondents 52% indicated that they have no problem with accessing their college Wi-Fi. While 19% indicated that at other times they were unable to connect, 10% indicated slow connection to be the problem they experience while connecting, 6% cited over usage whereas 5% indicated that they were only able to access Wi-Fi only while they are on college.

Various issues related to internet connection were found which need to be addressed. Such problems are usually common problems associated with Wi-Fi connections (Alexander et al., 2013:4). According to the results, it is beyond doubt nursing students do encounter Wi-Fi connectivity problems. However, poor internet or Wi-Fi connection can negatively interrupt learning of nursing students if the problems are not addressed.

QUESTION 16: RESTRICTION ON DATA ACCESS

The question was asked to obtain information and understand if there are restrictions on data access in the participating NEIs. A “Yes”, “no” and “not sure” response options were used to collect data. The results are shown in Figure 4.14.

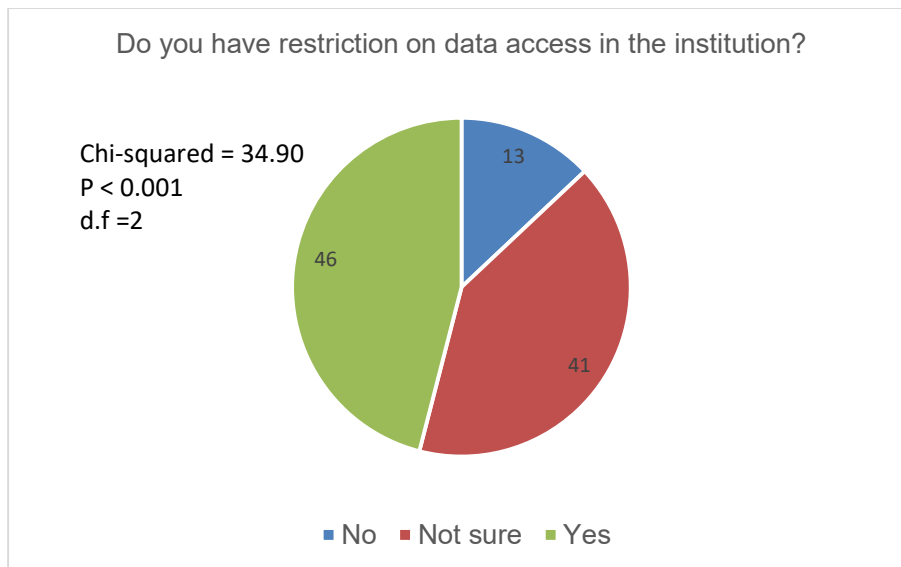


Figure 4.14: Restriction on data access in the institution

According to the results (Figure 4.14), 46% of the respondents indicated that there are data restrictions in the NEIs, 41% were not sure if there are such restrictions, while 13% indicated that to the best of their knowledge such restrictions on data access do not exist. It is observed from the results that, most of the respondents indicated that there are restrictions in the NEIs regarding the data access. This may limit the potential benefits that the nursing student might gain through internet in their learning process, as online activities are increasingly adopted and requires reliable internet by the user (Horrigan, 2006:23).

QUESTION 17: COSTS OF DATA SUNSCRIPTION OUTSIDE THE COLLEGE

Below are the results of data costs incurred outside the college for playing online nursing games as indicated in Figure 4.15.

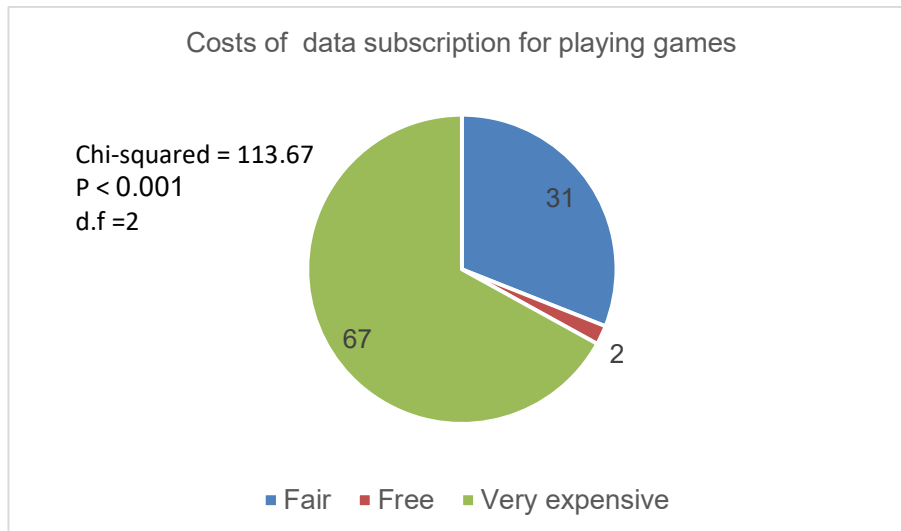


Figure 4.15: The costs of data subscription when playing online nursing games outside the college

The given results in Figure 4.15 significantly show 67% of the respondents indicated that the subscription for data cost is very expensive, 31% indicated that cost of data is fair whereas 2% access online nursing game at no cost.

Unfortunately, the result revealed that majority of the respondents buy data to utilise gamification that is very expensive. This can be a huge obstacle for many nursing students in the modern teaching and learning environment.

QUESTION 18: SUPPORT FOR ONLINE NURSING GAMES

The question aimed to understand the people involved in supporting the respondents for online nursing games in order to understand the impact of support in employing online nursing games in respondents learning experiences.

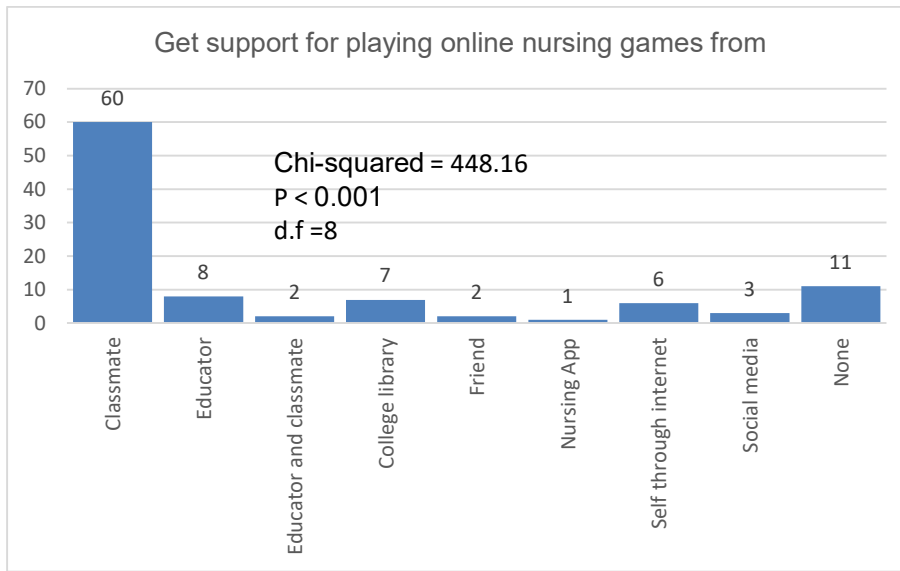


Figure 4.16: Getting support for online nursing games to respondents

According to figure 4.16, most respondents about 60% obtain support from their classmates in utilising gamification, followed by 11% which indicated that, they do not get any support. While 8% indicated that their support comes from their educators, 7% from the college library, 6% received self-support using the internet. Support from social media was 3%, through friends 2%, as well as through a combination of both educator and classmate (2%) while only 1% indicated support received through the nursing Apps.

From the result, more than half of the participants were encouraged by their classmate to utilise gamification to enhance their learning. This indicates that more support is required from nurse educators as they play a crucial role in the learning of the nursing students. Although, some studies indicated that there are limited number of educators that can effectively use technology and they have the responsibility as a role model to deal with technology related issues in teaching their students (Uerz, Volman, & Kral, 2018:13). This narrative is gradually changing as the profile of nursing students of new millennial differs from previous nursing students as well as their effective learning experiences to meet the nursing students' needs (Billings & Halstead, 2012:15).

QUESTION 19: LECTURERS ENCOURAGE TO USE ONLINE NURSING GAMES

The primary reason for the question is to have an overview regarding the educators' contribution towards utilisation of online nursing games for learning. Linkert scale of six (6) scales: strongly agree, agree, neither agree nor disagree, disagree. and strongly agree was used for the participants to express their level of agreement.

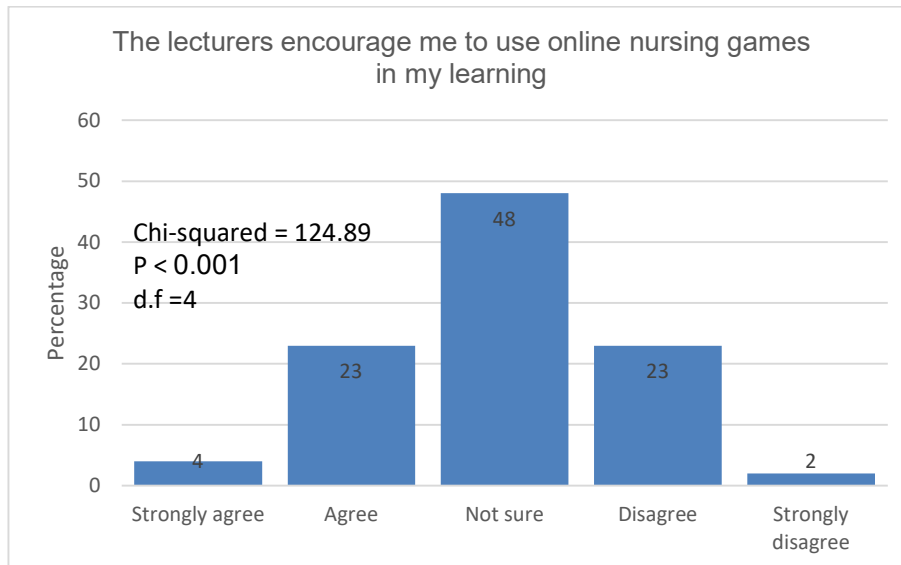


Figure 4.17: The lecturers encourage to use online nursing games learning process

According to the result in Figure 4.17, 48% of the respondents were not sure if the lecturers or nurse educators encouraged them to use online nursing games, 23% also agreed that they were encouraged by the nurse educators, 23% disagreed to the statement, 4% strongly agree that educators encouraged them to use online nursing games, whereas only 2% strongly disagreed.

As showed by the result, most of the respondents were not sure about lecturers' encouragement for utilising gamification. It was noted that the lecturers and professors restrict their students through their action of inability to assist them to develop and utilise necessary skills of digital media across the curriculum Johnson et al., (2013:9). However, nurse educators are encouraged to take more responsibilities to ensure all nursing students use the necessary, relevant, and available resources of emerging technology to boost their learning. This showed that nurse educators need to be fully involved and support the nursing students learning needs and ensure the needs are addressed accordingly.

QUESTION 20: GAMIFICATION NOT FORMALLY IMPLIMENTED IN THE CLASSROOM

Gamification is not implemented formally in the selected NEIs in Gauteng. Meanwhile, the researcher asked the participants to express their views using open-ended question as indicated in Figure 4.18.

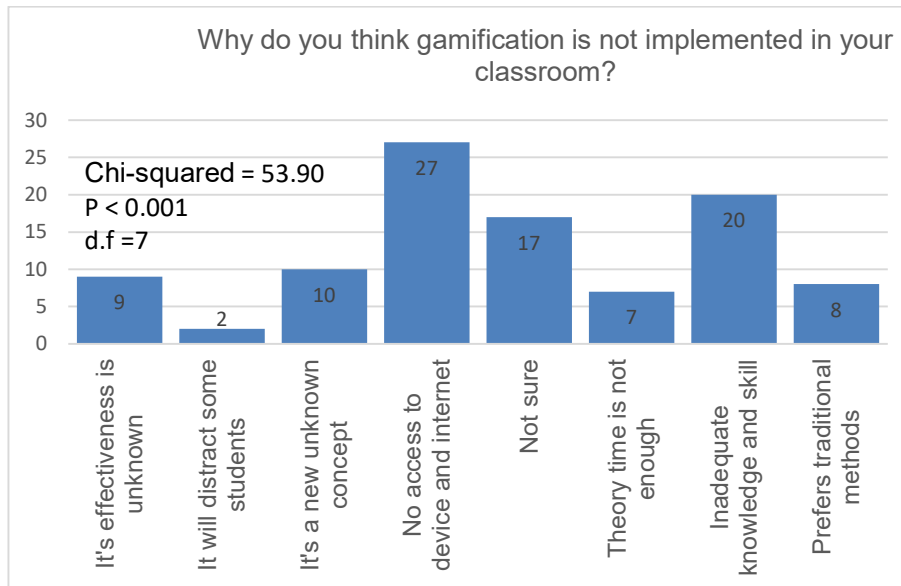


Figure 4.18: Gamification is not formally implemented in the classroom

Figure 4.18 above displays the result based on the respondents' views. It revealed that 27% indicated that it is may be due to lack of access to device and internet, 20% mentioned that may be the nurse educators does not have the adequate knowledge and skills on gamification application, 17% of the respondents clearly stated that they were not sure, 10% stated it is a new and not a well-known concept to them. While 9% stated that the effectiveness of gamification perhaps is unknown, 8% mentioned that they prepare traditional methods, 7% indicated that the theory time will not be enough to cover the required content, and only 2% believed it will distract some students.

Games related concepts are not considered to be a serious activity in formal education (Titus & Ng'ambi, 2014:8), also within higher education in South Africa (Amory, 2012:38). Although, nursing programs faces some difficulties in adopting innovative method of teaching to adjust with the needs of digital students (Day-Black, 2015:91). Majority of the respondents pointed out that gamification was not formally implemented due to lack of

appropriate devices. This is consistent with the prove that lack of relevant devices may impact playing high tech gaming (Capdarest-Arest, Opuda & Keiko Stark, 2019:567). Additionally, some of the respondents stated persistent internet problems, educators lack the knowledge and skills on gamification. In this regard, a study needs to be carried out on nurse educators' views to confirm the reason why gamification is not formally adopted in to teaching and learning. Hence, a professional development or informal learning is necessary Johnson et al., (2013:9), and improve digital literacy (Isaías, 2018:405), to help the nurse educators to effectively implement gamification relevant to the curriculum.

4.5 THE RELATIONSHIP BETWEEN DEMOGRAPHIC CHERACTERISTICS AND UTILISATION OF GAMIFICATION

This section sought to obtain information between the demographic data and utilisation of gamification. A Chi-Square test (X^2) for independence in two-way contingency table was applied to examine the relationship between the demographic variables (age, gender, study level, and computer literacy level) and six variables from utilisation of gamification (playing online nursing games, content relevant, contribution towards learning, understanding the content, motivates learning, and important additional tool). The application of Chi-Square test value of $p < 0.05$ considered to be significant while $p > 0.05$ level is not significant. A Cramer's V test was also applied as post-test for strength determination of the association between the variables (Cramer's V, 1946).

QUESTION 1 & 6: AGE OF RESPONDENTS AND PLAYING ONLINE NURSING GAMES

The age of nursing students varies within the same level of study. This aimed to understand whether age has effect on using online nursing games in their learning experiences. Table 4.3 showed the result accordingly.

Table 4.3: Age and play online nursing games

Age	Daily	Weekly	Monthly	Rarely	Not sure	Never	X^2 value	p-value
18-24	1	22	26	21	11	19	20,649	0,418
25-34	2	14	20	35	14	15		
35-44	5	21	14	23	9	28		
45-54	0	0	0	0	33	67		
>55	0	0	100	0	0	0		

Table 4.3 presents the results of relationship between the two variables. Even though the percentage in the age category 45 and beyond was too high, a significant relation was not detected ($X^2=20,649$, $p>0.05$, $V=0.1684$), this is because the differences between the other categories was not significant enough. The result revealed that 26% of the respondents within the age of 18-24 play online nursing games monthly, 22% play online nursing games weekly, slight decrease of 21% play online nursing occasionally, then 19% of the respondents in contrast indicated that they never play online nursing game, 11% play online nursing game but were not sure how often, while only 1% of the respondents play the games daily. The respondents between the ages of 25-34 showed that 35% play online nursing game but not rarely, followed by 20% who play monthly, 15% who never play online nursing game. Similarly, 14% of the respondents were not sure how often they play online nursing games, whereas only 2% play online nursing game daily.

Furthermore, the result illustrated that 28% of the respondents within the ages of 35-44 never play online nursing games, 23% rarely do, while a slightly lower percentage (21%) of the respondents play online nursing games weekly. While 14% indicated that they play online nursing games monthly, 9% were not sure of how often they play online nursing games and 5% does so daily. Majority (67%) of respondents in the older age group of 45-54 years indicated that they never play online nursing game 67%, and 33% indicated that do play online nursing games but were not sure how often. The age category of 55 and beyond all (100%) play online nursing games monthly. This could be as result of current technology innovations acceptance by many older individuals.

According to the findings, large number of respondents from different age groups utilise gamification for learning at variance level of accessibility. This showed that the benefit of gamification is not limited to any age group. However, the findings do not correspond with the prove that the effect of gamification varies in terms of age and gender (Koivisto & Hamari, 2014:180). The result of this study may be due to the observed current state of higher level of technology acceptance by the older people. However, in a recent study conducted by Koivisto & Malik, (2020:11) they affirmed that gamification has potential with regards to older users and they may benefit from gamification positively (Koivisto & Malik, 2020:10).

QUESTION 1 & 7: AGE OF RESPONDENTS AND ONLINE NURSING RELEVANT

This sought to understand if there is a relationship between the age of respondents and the content of online nursing games relevant to the classroom teaching and learning. Results are shown in Figure 4.19.

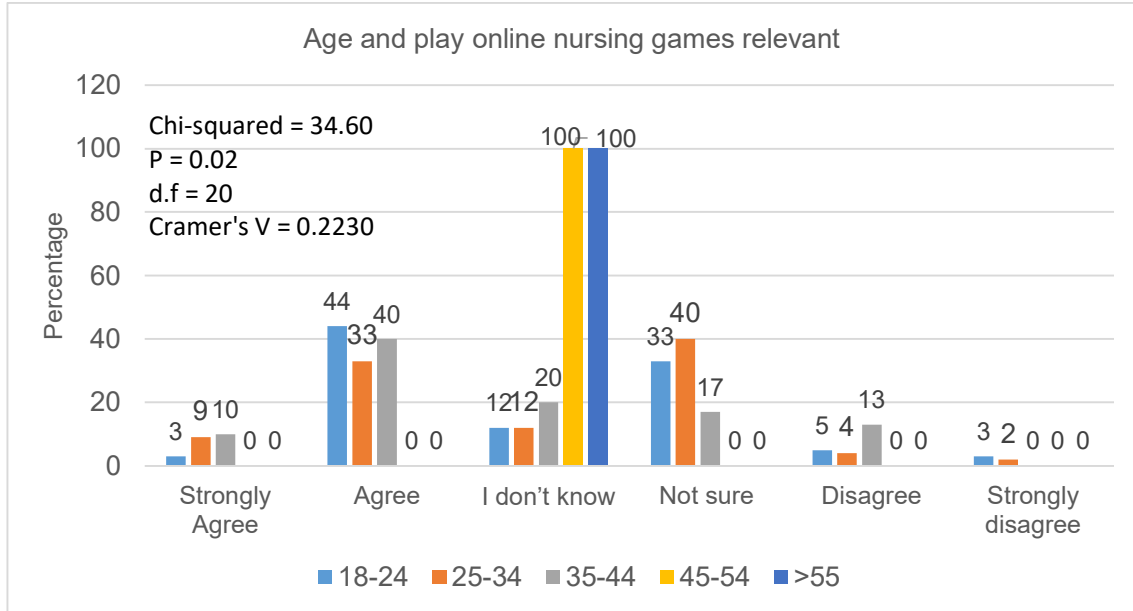


Figure 4.19: Age and online nursing game relevant to classroom teaching and learning

There is an association between the opinion on playing online nursing games relevant to classroom teaching and learning ($X^2 = 34.60$, $P=0.02$, $V=0.22$). The strength of the association is medium since $V=0.223$). The result above indicated in Figure 4.19 that the age range of the respondents between 18-24 years old, 44% agreed that the online nursing games are relevant to the classroom teaching and learning. Meanwhile, 33% were not sure if it is relevant, 12% does not know at all, 5% of the respondents disagreed that online nursing games are relevant to the classroom teaching and learning, 3% strongly disagreed while 3% strongly agreed that the online nursing games are relevant to the classroom teaching and learning. Majority (33%) of the respondents agreed that online nursing games are relevant to the classroom teaching and learning, 12% indicated that they do not know if it is relevant, 9% strongly agreed that online nursing games are relevant to the classroom teaching and learning, while 4% disagreed that it is not relevant to the classroom teaching and learning, whilst 2% strongly disagreed.

Within the 35-44 age group, 40% agreed that the online nursing games are relevant to the classroom teaching and learning, 20% of the respondent do not know if the online nursing games are relevant to the classroom teaching and learning, 17% were not sure, 13% disagreed that the online nursing game are relevant to the classroom teaching and learning while 10% strongly agreed. Furthermore, the result indicated that 100% of the respondent within the age category of 45-54 do not know if the online nursing games are relevant. Similarly, the age 55 and above indicated 100% that they do not know if the online nursing games are relevant to the classroom teaching and learning.

From the results, the percentage of agreement between age groups differ significantly. It is important to note that, the nursing games used by the respondents are available online and designed to generally assist nursing students with their learning. Hence, it is important as one of the requirements to study the nursing students' profile prior to implementing gamification for more effective learning outcome (Kiryakova, Angelova & Yordanova, 2014:2). This can be achieved by giving a valuable and beneficial attention to the older group (Koivisto & Malik, 2020:2), and ensuring that it is relevant to the curriculum and consistent with the future practices (Billing & Halstead, 2012:145).

QUESTION 1 & 8: AGE OF RESPONDENTS AND THE CONTRIBUTION OF ONLINE NURSING GAMES

The questions sought to understand if there is relationship between the respondents' age and the contribution of online nursing games contribute towards learning. The result was obtained and illustrated in Table 4.4.

Table 4.4: Age and contribution of online nursing games on learning process

Age	somewhat				X ² value	p-value
	Very effective	Effective	effective	Ineffective		
18-24	11	53	31	5	6,642	0,3552
25-34	14	35	45	6		
35-44	16	36	35	13		
45-54	0	0	0	0		
>55	0	0	0	0		

The result indicated that there is no relationship between the age of the respondents and contribution of online nursing game towards learning ($X^2=6.642$, $p>0.05$, $V=0.1529$). From

Table 4.4, the result indicated the within the age group of 18-24, 53% of the respondents believed that online nursing games are effective, 31% indicated that it is somewhat effective, 11% marked very effective and 5% of indicated that it is ineffective. Majority (45%) from the age category of 25-34 indicated that online nursing games are somewhat effective, 35% believed it is effective, 16% indicated very effective, while 6% indicated ineffective. Between the age of 35-44, 36% of the respondents think it is effective, 35% indicated it is somewhat effective, 16% declared it as very effective and 13% indicated online nursing games are ineffective.

Through the result, majority of the respondents from the younger age to older ones indicated that gamification is an effective tool for learning as mentioned by previous studies presented as part of the literature review in Chapter 2. It is important for nurse educators to seek further awareness and explore the effectiveness of gamification based on the nursing students' characteristics to ensure the content of gamified activity are relevant for effective learning. As such, it was indicated that application of gamification through a platform such as "kahoot" contributed towards students' knowledge acquisition by developing their skills and abilities (Campillo-Ferrer, Miralles-Martínez, & Sánchez-Ibáñez, 2020:9). Generally, videos games stimulate the secretions of dopamine an organic chemical of the catecholamine and phenylethylamine families said to induce learning by strengthen neuronal connections and communication (Johnson et al., 2013:21). Johnson et al. (2013:21) further alluded that video games can positively increase critical thinking, creative problem-solving, and teamwork in educational bases, when employed correctly.

QUESTION 1 & 9: AGE OF RESPONDENT AND UNDERSANDING THE CONTENT

The questions aimed to know if a relationship exist between the age of the respondents and understanding the content by using online nursing games. The result presented in Table 4.5 provides further details.

Table 4.5: Age and online nursing games helps with understanding the content being taught

Age	Always	Very often	Sometimes	Rarely	Never	X ² value	p-value
18-24	5	31	45	8	11	16,464	0,421
25-34	5	22	55	4	14	9	

35-44	9	26	35	4	26		
45-54	0	0	33	0	67		
>55	0	0	100	0	0		

There is no indication that age and online nursing games helps with understanding the content ($X^2=16.4649$, $p>0.05$, $V=0.1512$). According to the results presented in Table 4.5, 45% of the age category between 18-24 years old believed that online nursing games help them to understand the content being taught. While 31% of the respondents indicated that it very often does, whereas 11% are of the opinion that online nursing games never help in understanding the content. Among the respondents within the age of 25-34, 55% showed that the online nursing games sometimes help them to understand the content being taught, 22% demonstrate very often, 14% of the respondents never get help in understanding the content from using online nursing games, 5% indicated that it always helps, whereas 4% of the participants illustrated that online nursing games occasionally help them in understanding the content.

Additionally, 35% of the respondents between the age of 35-44 showed that online nursing games does help sometimes, 26% said it very often does, 26% indicated that online nursing games never help them in understanding the content, while 9% marked always, and 4% rarely. Within the age of 45-54, majority of the respondents (67%) indicated that online nursing games never help them understand the content being taught, 33% showed sometimes. The 55 years old and above were all of the opinion that online nursing games sometimes help them in understanding the content being taught.

Overall, the results showed that age group does not prevent the nursing students from understanding the gamification content. This is in line with forecast made by Raban & Brynin (2006:50) that individual who engaged in digital technology at younger age will reach the older age with technology skill and this diminish the idea so called digital divide. This provides new opportunities of technology solutions that could be benefit the user group, and their specific needs (Koivisto & Malik, 2020:2).

QUESTION 1 & 10: AGE OF RESPONDENTS AND ONLINE NURSING GAMES MOTIVATES TO LEARN

The two questions were analysed to determine the relationships related to utilisation of gamification. The result can be seen in figure 4.20 below.

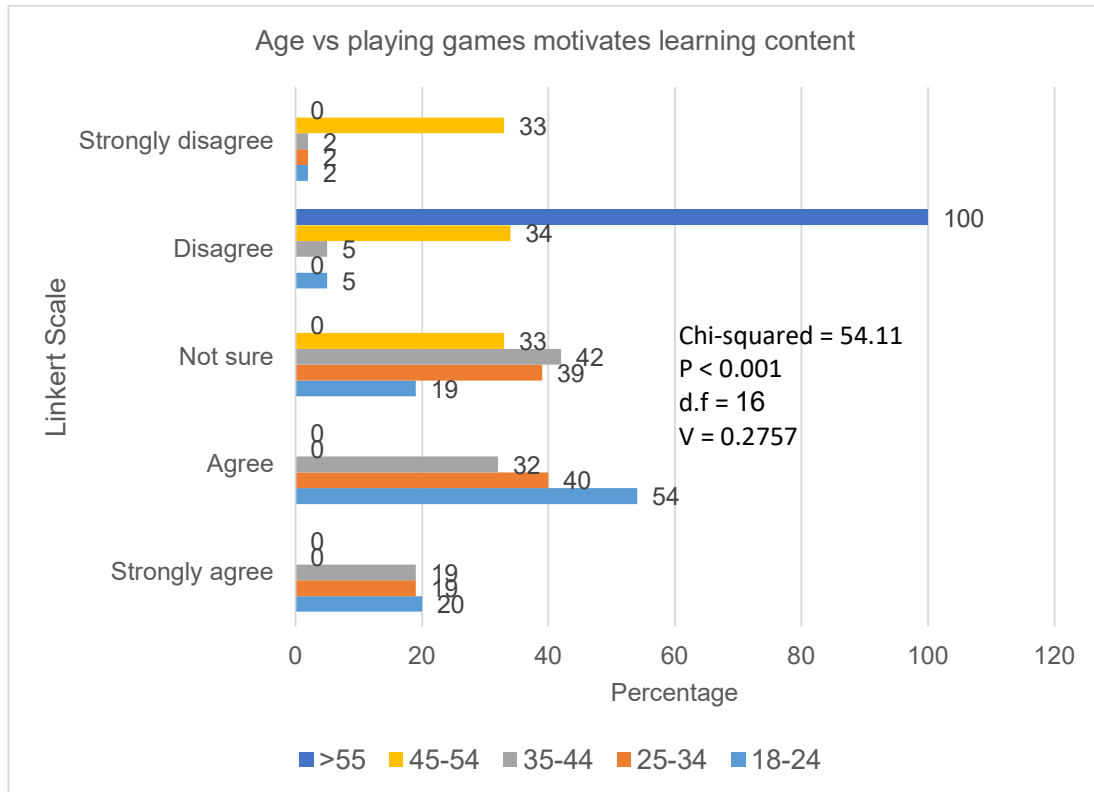


Figure 4.20: Age and online nursing games motivate me to learn the content.

The age group was associated with playing games being able to motivate in learning the content, ($X^2 = 54.11$, $p < 0.001$, $V = 0.2757$), the Cramer's V results indicated that age group and the fact that gaming being able to motivate in learning the content has a large association. From the result in Figure 4.20, 54% of the respondents between the age of 18-24 agreed that online nursing games motivates them to learn the content, 20% strongly agreed, 19% were not sure, 5% disagreed, and only 2% of the respondents strongly disagreed. The highest proportion (40%) of the respondents within the age group of 25-34 agreed that online nursing games motivates them to learn the content, slightly lower than those (39%) were not sure about motivation from online nursing games to learn the content, while 19% strongly agreed and only 2% strongly disagreed. Between age 35-44, the result illustrated that 42% were not sure if online nursing games motivates them to learn the

content, 32% agreed that online nursing games motivate them to learn the content, 19% strongly agreed, and 2% of the respondents strongly disagreed, respectively. Finally, all respondents from the age group 55 and above disagreed that online nursing games motivated them towards learning contents.

As seen in the result above, the motivational level of the respondent varies within age groups. As such, careful attention needs to be paid when designing or employing gamification in to teaching and learning. The gamified learning exercise aim to motivate students to be more aware (Robson, Crittenden, Peterson, 2019:158), increase productivity, vision, direction, and excitement towards learning (Billings & Halstead, (2012:45).

QUESTION 1 & 11: AGE OF RESPONDENTS AND ONLINE GAMES AS ADDITIONAL LEARNING TOOL

The two question were aimed to find out whether the age of respondent has effect on the choices made by the respondent on employing online nursing games as an important additional learning tool. The findings were presented in Figure 4.21.

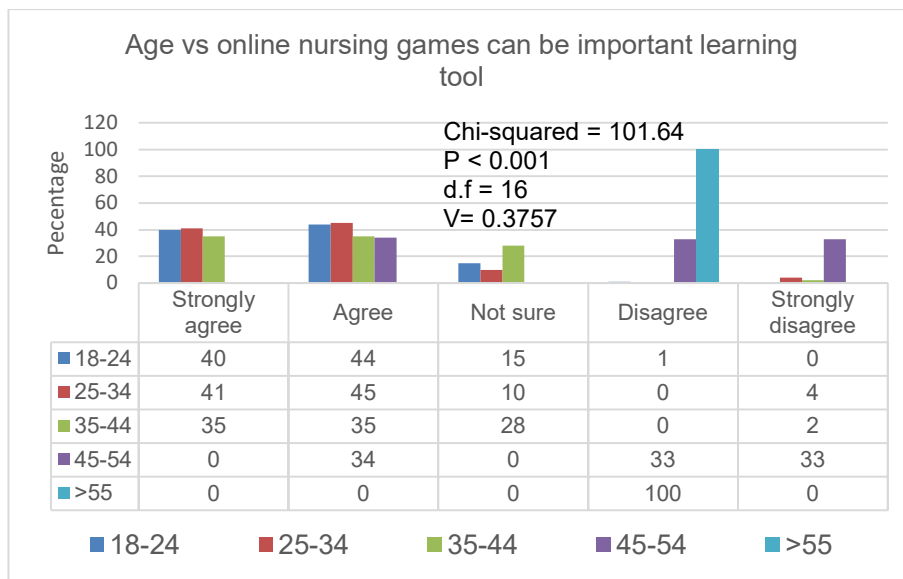


Figure 4.21: Age and online nursing games can be an additional learning tool

There was a direct association that is statistically significant between age and online games being an important learning tool, ($X^2 = 101.64$, $p < 0.001$, $V=0.3757$). Thus, age influences

how the respondents regard online games as an additional learning tool. Based on the result from Figure 4.21, more than 30% of the respondents between the age groups of 18-24, 24-34 and 35-44 agreed or strongly agree that online nursing games can be an important additional learning tool as compared to less than 5% who indicated that they disagree or strongly disagree that gaming is an important tool. In the category of respondents who strongly disagreed that online nursing games are important additional learning tool, age group 45-50 showed to be significantly different (33%) to other age group which had percentage of less than 5%. Finally, a percentage disagreement was significantly high (100%) in the age group of >55 as compared to other ages.

Through close observation of the result, there is a trend in age difference in relation to the idea of accepting gamification as an additional learning tool. This indicates majority of the respondents who agreed to gamification as an important additional learning tool were between the age of 18-24 and 25-34, followed by age between 35-44, then age between 45-54 years old, with total rejection from older above 55 years old. Yet, the percentage of respondents who agreed to the statement are significantly higher. This is consistent with the recommendation made by Campillo-Ferrer et al., (2020:1), that gamification can highly be incorporated in higher education context to promote students' motivation and enhance their learning experiences. This indicated that gamification can be employed formally as an additional learning tool for nursing students' learning.

QUESTION 2 & 6: GENDER OF RESPONDENTS AND PLAY ONLINE NURSING GAMES

This tends to understand the relationship between the respondents' gender group and playing online nursing games. The results are indicated in Table 4.6.

Table 4:6 Gender and playing online nursing games

Gender	Daily	weekly	Monthly	Rarely	Not sure	Never	X ² value	p-value
Female	3	18	18	28	10	19	7,156	0,209
Male	0	23	23	14	20	26		

The result showed no significant association ($X^2=7.1561$, $p>0.05$, $V=0.1988$) between gender and playing online nursing games in table 4.6. The result illustrated that only 28%

of female respondents rarely play online nursing games, followed by 22% who stated that they play nursing games monthly, and 19% who stated that they never play online nursing games, slightly lower 18% of the female respondents play nursing games weekly. However, 26% of male respondents never play online nursing games, 23% play online nursing games weekly, also 23% play monthly, 20% were not certain how often they play online nursing games, and 14% rarely play online nursing games.

The percentage of female playing games on a weekly basis, monthly basis and who never played games was almost the same. Similarly, the percentage of playing games by male respondents was almost the same (between 20-26) across all times except for the once that played games on a daily or rare occasion. Thus, respondents play games on monthly, weekly, daily, as well as on occasional basis irrespective of the gender. However, the result is contrary to the usual findings that gender difference exists (Koivisto & Hamari, 2014:18), and more women play video games than males (Folmer, 2015:2).

QUESTION 2 & 7: GENDER AND ONLINE NURSING GAME RELEVANT

Table 4.7 provides the information regarding the relationship between the gender and online nursing games relevant to the classroom teaching and learning.

Table 4.7: Gender and online nursing game relevant to the classroom teaching and learning

Gender	Strongly Agree	Agree	I don't know	Not sure	Disagree	Strongly disagree	X ² value	p-value
Female	7	36	15	33	7	2	5,3793	0,3714
Male	3	47	24	23	3	0		

The Chi-Squared test showed that there is no significant association between gender and the content of gamification relevancy ($X^2=5.3793$, $p>0.05$, $V=0.1763$). According to the result in Table 4.7 only 36% of female respondents agreed that online nursing games are relevant to classroom teaching and learning, 33% were not sure, 15% do not know if online nursing games are relevant to the classroom teaching and learning, 7% strongly agreed, 7% of the female respondents disagreed and only 2% strongly disagreed. The male respondents opined that 47% agreed that online nursing games are relevant to the classroom teaching and learning, 24% indicated that they do not know, 23% were not sure,

3% strongly agreed online nursing games are relevant to classroom teaching and learning, while 3% disagreed.

The result showed that the gender of the respondent does affect the content of online nursing games nor its relevancy. The study supported the findings of Welbers, Konijn, Burgers, De Vaate, Eden, & Brugman, (2019:105), who showed that by applying gamification to teach all the students a relevant information about the university operations (rules, regulations, social activities, and examination) and the result showed a positive performance.

QUESTION 2 & 8: GENDER OF RESPONDENTS AND THE CONTRIBUTION OF ONLINE NURSING GAMES

The two questions were combined to identify the relationship between the respondents' gender and the contribution of online nursing games in their learning process. Table 4.8 provides more information.

Table 4.8: Gender and the contribution of online games on learning process

Gender	Very effective	Effective	somewhat effective	Ineffective	X ² value	p-value
Female	13	42	36	9	2,4659	0,4815
Male	15	46	39	0		

The result showed no significant ($X^2=2.4559$, $p>=0.05$, $V=0.1322$) among gender. As seen in table 4.8, 42% of female respondents believed online nursing games effectively contribute towards their learning, 36% indicated somewhat effective, 13% illustrated very effective, and only 9% of the respondents indicated that online nursing games are ineffective towards their learning. Accordingly, 46% of the male respondents indicated that online nursing games are effectively contribute towards learning, 39% showed somewhat effective, while 15% marked that online nursing games are very effective towards learning.

It is evident that almost all the nursing students from both gender indicated that online nursing games are effective. Although, it should be noted that male nurses are fewer in comparison to the female nurses, yet most male nurses agreed to the effectiveness of gamification in their learning process. This shows that gamification can effectively impact

both female and male nursing students. A study conducted by Yogi Udjaja, (2018:11) stated that the ability of the students increased from 20% to 100% within a week of implementing gamification.

QUESTION 2 & 9: GENDER OF RESPONDENT AND CONTENT UNDERSANDING

This sought to find out if there is a relationship between the respondents' gender and if online nursing games helps with understanding the content being taught. The results are presented in Table 4.9.

Table 4.9: Gender and online nursing help in understanding the content being taught

Gender	Always	Very often	Sometimes	Rarely	Never	X ² value	p-value
Female	8	24	47	7	14	8,2061	0,0843
Male	0	31	43	0	26		

There is no significant relationship between gender and understanding of contents taught ($X^2=8,2061$, $p>0.05$, 0.2141). The result (Table 4.9) indicated that 47% of female respondents opted that online nursing games sometimes help them in understanding the content being taught, followed 24% who indicated that it very often does, 14% of the respondents indicated online nursing games never help in understanding the content, whereas 8% stated that it always does help, while 7% said it rarely does.

As observed from the result, 43% showed online nursing games does help sometime in understanding the content, very often 31%, and 26% of the respondents in contrast showed online nursing games never help them in understanding the content being taught. The result showed that majority of the respondents illustrated benefits of understanding the content of gamified learning activity irrespective of gender. This will help the students to reflect, strengthen their competence, and progress (Deterding, 2012:16).

QUESTION 2 & 10: GENDER OF RESPONDENTS AND ONLINE NURSING GAMES MOTIVATE

It is important to examine the relationship related to utilising gamification with gender of the respondent. The result determines the existence of the relationship as seen in Table 4.10.

Table 4.10: Gender and online game motivates me to learn the content

Gender	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	X ² value	p-value
Female	18	44	31	5	2	0,7274	0,9479
Male	23	40	31	3	3		

Table 4.10 showed that, there was no associated between gender and online nursing game in terms of motivation to learn the content, ($X^2 = 0.7274$, $p > 0.05$, $V = 0.0641$). The result illustrates that 40% of the male respondents agreed that online nursing games motivates them to learn the content, 31% were not sure, 23% strongly agreed, while 3% and 3% disagreed and strongly disagreed respectively. Accordingly, 44% of the female respondents agreed that online nursing games motivates them to learn the content, 31% were not sure, 18% strongly agreed, whereas 5% disagreed and only 2% strongly disagreed.

The result showed that gender does not have an influence on motivation towards learning the content of online nursing games. This is in line with the statement that majority of the research studies in nursing education reported the positive effects of gamification in terms of motivation and nursing students' active participation in their learning (Fijačko, Gosak, Debeljak, Skok, Štiglic, & Cilar, 2020:140).

QUESTION 2 & 11: GENDER OF RESPONDENTS AND ONLINE GAMES AS ADDITIONAL LEARNING TOOL

The questions examined the relationships accordingly, and the result are indicated in Table 4.11.

Table 4.11: Gender and online nursing games can be an important additional learning tool

Gender	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	X ² value	p-value
Female	39	40	17	2	2	1,1267	0,89
Male	37	46	14	0	3		

A significant association was not evident between gender and agreement that online games are important learning tools ($X^2 = 101.64$, $p < 0.001$, $V = 0.3757$). The result (Table 4.11) illustrated that 40% of female respondents agreed that online nursing games can be an important learning tool followed by 39% who strongly agreed, 17% were not sure, 2%

disagreed while 2% strongly disagreed. Similarly, 46% of the male respondents agreed that online nursing games can be an important additional learning tool, 37% strongly agreed, 14% were not sure and only a few (3%) strongly disagreed. Thus, the percentage agreement that online gaming can be an important learning tool was almost similar irrespective of the gender. It is observed that majority of respondents from both female and male groups highly agreed that online nursing game is an additional learning tool. This confirmed the findings the participants showed warm reception of online proposals (Campillo-Ferrer et al., 2020:8).

QUESTION 3 & 6: STUDY LEVEL OF RESPONDENTS AND PLAYING ONLINE NURSING GAMES

The relationship was sought to find out if the nursing students' level of study have an influence in utilising online nursing games. The result as show in Table 4.12 below.

Table 4.12: Study level versus play online nursing game

Study level	Daily	Weekly	Monthly	Rarely	Not sure	Never	X ² value	p-value
Level 1	0	0	0	100	0	0	18,3822	0,2431
Level 2	3	17	15	31	15	19		
Level 3	3	20	29	18	10	20		
Level 4	0	20	24	25	11	20		

A significance association was not evident level of study and playing online nursing games as shown in Table 4.12 ($X^2=18.3822$, $p>0.05$, $V=0.1855$). The result (Table 4.12) showed that 100% of the level one respondents play online nursing games rarely. The level two respondents result showed that 31% rarely play online nursing game, 19% never play online nursing games, 17% play online nursing games weekly, 15% monthly, equally 15% of the respondents were not sure, while 3% play at daily bases. With level three participants, 29% play online nursing games monthly, 20% weekly, also 20% never play online nursing games, 10% were not sure and 3% play online nursing game daily. The result also indicated that level four respondents play online nursing games rarely were 25%, slightly lower 24% monthly, 20% play online nursing games weekly, the same percentage of 20% never play online nursing games while 11% were not sure.

Based on the results, the percentage for playing online nursing games on different times was almost similar within all levels of study. Hence, there is that possibility that all nursing students irrespective of the level of study can equally benefit from gamification in their learning experience. However, there is a need to study this further by extending to multiple levels of study. As confirmed by Alsawaier, (2018:3) there is limited research available related to gamification on various levels and this indicated the need to explore its long-term effect to promote and sustain motivation as well as engagement of learners.

QUESTION 3 & 7: STUDY LEVEL OF THE RESPONDENTS AND RELEVANCE OF CONTENT

The two questions on study level of the respondents the content and relevance of online nursing games tend to understand if any relationship exist. The results are presented in Table 4.13.

Table 4.13: Study level of respondents and content of online nursing games relevant to classroom teaching and learning.

Study level	Strongly Agree	Agree	I don't know	Not sure	Disagree	Strongly disagree	X ² value	p-value
Level 1	25	0	25	50	0	0	18,4929	0,2376
Level 2	11	42	16	23	5	3		
Level 3	3	35	19	41	2	0		
Level 4	4	42	13	28	11	2		

The relationship between level of study of the respondents and the relevancy of online nursing games was not significant ($X^2=18.4929$, $p>0.05$, $V=0.1893$) (. Table 4.13). Half (50%) of level 1 students were not sure that the content online nursing games are relevant, 25% indicated that they do not know, while 25% strongly agreed that online nursing games are relevant to the classroom teaching and learning. Majority (42%) of the level two students indicated that they agreed that online nursing games content are relevant to the classroom teaching and learning, 23% were not sure, 16% do not know, 11 strongly agreed, whereas 5% disagreed and 3% strongly disagreed.

The level three students on the other hand were mostly (41%), not sure, 31% agreed online nursing games are relevant to the classroom teaching and learning, 19% of the respondents

do not know, 3% strongly agreed while 2% disagreed. The result also indicated that 42% of the level four respondents agreed that the online nursing games are relevant to classroom teaching and learning, 28% were not sure, 13% do not know, 11% disagreed, 4% strongly agreed, while only 2% strongly disagreed. The result demonstrates that the study levels of respondents does not have effect on content relevancy of online nursing games. This was in line with an experimental study conducted on first year undergraduate university students by applying relevant course and the result indicated a positive behavioural change in gamified group (Smiderle, José Rigo, Marques, Peçanha de Miranda Coelho & Jaques, 2020:10).

QUESTION 3 & 8: THE STUDY LEVEL OF RESPONDENTS AND THE CONTRIBUTION OF ONLINE NURSING GAMES

These were asked to know if there is a relationship between the study level of respondents and the contribution of online nursing games in their learning process. The summary of the results is provided on Table 4.14.

Table 4.14: Study level and the contribution of playing online nursing games on learning process

Study level	Very effective	Effective	somewhat effective	Ineffective	X ² value	p-value
Level 1	25	25	25	25	10,7116	0,296
Level 2	33	10	40	17		
Level 3	11	54	35	0		
Level 4	9	44	38	9		

There was no relationship between the study level and contribution of online nursing game ($X^2=10,7116$, $p>0.05$, $V=0.1591$). Results presented on Table 4.14 showed that 25% of level one respondents indicated that online nursing games are very effective towards learning process, equally 25% said it is effective, similarly 25% illustrate somewhat effective and 25% indicated that online nursing games are ineffective towards their learning process. Majority (40%) of the level two respondents stated that online nursing games are somewhat effective, followed by 33% that indicated very effective towards their learning process, 17% showed that online nursing games are ineffective, while 10% illustrated its effectiveness. With level three respondents, 54% indicated effectively, 35% indicated somewhat effective, while 11% said very effective. The level four respondents (44%) showed the effectiveness

of online nursing games towards their learning process, while 38% considered online nursing games are somewhat effective, whereas 9% indicated very effective, and 9% of the respondents marked ineffective.

In summary from the result, majority of the respondents especially from level two, three and four (2,3, & 4) indicated that online nursing games effectively contributes towards the respondents' learning from all level of study. It was posited that, gamification encourage collaboration, by engaging the users in a shared, relevant, and goal-oriented venture (Hyunsun Kim, Glassman, & Williams, 2015:333), and provides an opportunity of making amends in learning from the previous mistakes (Hanus & Fox, 2015:3).

QUESTION 3 & 9: STUDY LEVEL OF RESPONDENT AND UNDERSANDING THE CONTENT

This aimed to examine the relationship between the nursing students' level of study and the question online nursing games helps with understanding the content being taught. The result was indicated as explained in Table 4.15.

Table 4.15: Study level and online nursing games help in understanding the content being taught

Study level	Always	Very often	Sometimes	Rarely	Never	X ² value	p-value
Level 1	25	0	75	0	0	8,068	0,7798
Level 2	5	24	50	7	14		
Level 3	7	33	40	5	15		
Level 4	5	22	49	6	18		

This means that there is no relationship between the two variables ($X^2=8,0680$, $p>0.05$, $V=0.1233$). Table 4.15 present the results which showed that online nursing games only sometimes help in understanding the content of 75% of level 1 respondents, while only 25% of the same cohort indicated that it always does. In the case of level two respondents, 50% indicated that online nursing games sometimes help in understanding the content, 24% said it does very often do, 14% illustrated never help, while 5% of the respondents said it always help in understanding the content being taught. As clearly shown, 40% of level 3 respondents indicated that online nursing games sometimes help in understanding the

content being taught, 33% are of the opinion that it does help very often, 15% said it never help, 7% of the respondents showed that online nursing games always help them and 5% rarely. Similarly, 49% of the respondents within level four indicate that online nursing game help them to understand the content sometimes, 22% said very often, 18% never help, while 5% opted that online nursing games always help them to understand the content being taught.

Majority of the respondents opted that gamification effectively help to understand the content irrespective of the study level. This implies that the innovative method of teaching and learning can improve nursing students' learning and understanding to achieve the necessary knowledge, skills, and competences. The result was supported by the findings that gamification as teaching and learning method help students to understand the content of theory without difficulty (Hitchens & Tulloch, 2018:40), and all students within the university indicated positive performance towards learning the rules, regulations, social activities, and examination information by gamifying the content (Welbers et al., 2019:105).

QUESTION 3 & 10: LEVEL OF STUDY OF RESPONDENTS AND MOTIVATION BY ONLINE NURSING GAMES

The questions were analysed to determine the relationship between the respondents' level of study and if online nursing games motivates their learning the content. The findings were presented in Table 4.16.

Table 4.16: Level of study and online nursing games motivate me to learn the content

Study level	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	X ² value	p-value
Level 1	0	25	75	0	0	10,8395	0,5427
Level 2	16	41	34	7	2		
Level 3	28	46	22	2	2		
Level 4	16	44	31	5	4		

According to the result, there is no significant relation between study level and the fact that online gaming motivates learning ($X^2=10,8395$, $p>0.05$, $V=0,1437$). From Table 4.16, 75% of level one respondents indicated that they were not sure whether online nursing games motivates them to learn the content, and 25% agreed that online nursing games motivates

them to learn the content. Majority of level two respondents (41%) agreed that online nursing games motivates them to learn the content, 34% indicated that they were not sure, 16% strongly agreed online nursing games motivates them to learn the content, while 7% disagreed that online nursing games does not motivates them to learn the content, and 2% also strongly disagreed.

Furthermore, 46% of level three respondents agreed with the statement that online nursing games motivates them to learn the content, 28% strongly agreed, 22% were not sure, and 2% disagreed while 2% strongly disagreed. The final level four respondents showed that 44% of them agreed that online nursing games motivates them to learn the content, 31% of the were not sure, 16% strongly, 5% disagreed and 4% strongly disagreed.

The result indicates that study level does not affect the motivation towards learning the content of online nursing games. Generally, a previous study by Johnson et al., (2013:21) confirmed that gamification strengthen students' motivation to learn when implemented effectively.

QUESTION 3 & 11: STUDY LEVEL OF RESPONDENTS AND ONLINE NURSING GAMES AS ADDITIONAL LEARNING TOOL

This is aimed to determine the relationship between the respondents' level of study and online nursing games as an important learning tool. Table 4.17 presented the results.

Table 4.17: Study level and online nursing games can be an important additional learning tool.

Study level	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	X ² value	p-value
Level 1	0	50	50	0	0	10,411 7	0,5799
Level 2	44	35	17	2	2		
Level 3	44	40	12	2	2		
Level 4	27	51	16	2	4		

A Significant association ($X^2 = 10,4117$, $p > 0.05$) was not evident between the study level and online nursing games can be an important additional learning tool. This is shown in Table 4.17. Most of level one respondents (50%) agreed that online nursing games can be an important additional learning tool, and equally 50% were not sure. Among level two respondents, 44% strongly agreed that online nursing games can be an important additional

learning tool, 35% also agreed, 17% of the respondents were not sure, and 2% disagreed, similarly 2% strongly disagreed. Results for the level three respondents, that most of them (44%) strongly agreed that online nursing games can be an important additional learning tool, slightly lower of 40% of the respondents agreed, 12% were not sure, where 2% disagreed and some of the respondents strongly disagreed 2%. The last level of study (four) indicated that more than half (51%) agreed that online nursing games can be an important additional learning tool, 27% strongly agreed, 16% were not sure, while 4% strongly disagreed and 2% disagreed. The results revealed that the percentage agreement between the educational level is almost similar.

According to the result, it is indicated that majority of the respondents of all levels of study significantly agreed that gamification can be an important additional learning tool, respectively. This is consistent with the findings that students provided a positive feedback on the use of gamification as a useful technique for learning (Hitchens & Tulloch, 2018:40). And a recommendation by Fijačko, et al., (2020:140) to conduct more study on gamification integration, and acceptance by all nursing students.

QUESTION 4 & 6: COMPUTER LITERACY LEVEL AND PLAYING ONLINE NURSING GAMES

The current educational arena emphasis and encourages the use of ICT to support today's students learning. The result will help to understand the effect of computer skills in relation to playing online nursing games as shown in Table 4.18.

Table 4.18: Computer literacy level and playing online nursing game

Computer literacy level	Daily	Weekly	Monthly	Rarely	Not sure	Never	X ² value	p-value
Basic	2	19	20	29	11	19	10,4225	0,7924
Intermediary	5	18	28	18	10	21		
Proficient	0	20	24	24	16	16		
Unskilled	0	11	0	33	11	45		

Thus, Chi-Squared test result indicated no significant association ($X^2 = 10.4225$, $p > 0.05$, $V = 0.1382$) between the participants with computer literacy level and playing online nursing

games. Table 4.18 showed the respondents with basic level of computer literacy rarely play online games where equally 29% as compared to 20% of the respondents that play online nursing games monthly, and 19% that play online nursing games weekly or never play online nursing games. Only 11% of the respondents were not sure, while 2% of the respondent play online nursing games daily. Accordingly, the respondents with intermediary computer literacy level result illustrated that 28% play online nursing games monthly while 21% of the respondents never play online nursing games and 18% play online nursing games weekly, equally 18% rarely, 10% of the respondents who were not sure, and 5% who play daily.

The respondents with proficient computer literacy level, 24% were those who play online nursing games rarely, also 24% were the respondents who never play online nursing games monthly, 20% weekly, whereas 16% were not sure, 16% never play online nursing games. However, the respondents who does not have computer literacy showed 45% were that respondents never play online nursing games, 33% play online nursing games rarely, 11% were the respondents who play online nursing games weekly, and 11% were not sure. The percentages of agreement between the computer literacy level were almost similar.

The result showed encouraging result that computer literacy level does not have effect on playing online nursing games and possibly only the basic knowledge required. This is consistent with experimental study result that there were no special digital skills required to effectively utilise the platform for educational application (Campillo-Ferrer, et al., 2020:6). However, a study carried out by Koivisto & Malik, (2020:10) mentions that the participants' details such as information technology experience were not indicated in about half of the reviewed studies. Thus, the inclusion of such in a wider study is recommended to scrutinise the result.

QUESTION 4 & 7: COMPUTER LITERACY LEVEL OF RESPONDENTS AND RELEVANCE OF CONTENT OF ONLINE NURSING GAMES

These questions were asked to determine the relationship between the level of computer literacies of the participants and content of online nursing to see if it is relevant to the classroom teaching and learning. Results are presented on Table 4.19.

Table 4.19: Computer literacy level and content of online nursing games relevant to classroom teaching and learning.

Computer literacy level	Strongly Agree	Agree	I don't know	Not sure	Disagree	Strongly disagree	X ² value	p-value
Basic	7	40	15	30	7	1	14,1789	0,512
Intermediary	5	47	10	32	3	3		
Proficient	8	24	16	40	8	4		
Unskilled	0	25	50	12	13	0		

The relationship between the two variables of computer literacy level and if the online nursing games content is relevant were not significant ($X^2=14.1789$, $p>0.05$, $V=0.1648$). The result showed 40% of the respondents with basic computer literacy level agreed that online nursing games are relevant to the classroom teaching and learning, 30% were not sure, 15% indicated that they do not know if online nursing games are relevant to the classroom teaching and learning, 7% of the respondents strongly agreed, 7% also disagreed, whereas only 1% strongly agreed. The respondents with intermediary computer literacy level indicated that 47% agreed that online nursing games are relevant to the classroom teaching and learning, 32% were not sure, 10% indicated that they do not know, 5% strongly agreed, 3% disagreed, similarly 3% of the respondents disagreed that online nursing games are not relevant to the classroom teaching and learning.

On the other hand 40% of the respondents with proficient level of computer literacy indicated that they were not sure about online nursing games are relevant to the classroom teaching and learning, 24% agreed that online nursing games are relevant to the classroom teaching and learning, 16% of the respondents indicated that they do not know, 8% strongly agreed online nursing games are relevant to the classroom teaching and learning, 8% of the respondents disagreed, while 4% marked strongly disagreed. The respondents who do not have computer literacy illustrated 50% do not know if online nursing games are relevant to the classroom teaching and learning, 25% of the respondents agreed, 13% disagreed, and 12% were not sure.

Overall, the findings showed that computer skill do not have an impact on contents and its relevancy. This may be that the gamified educational activity does not require high technology equipment or higher level of computer literacy. A relevant gamified activity was developed to assess students learning effectiveness and engagement, in which the result indicated a continued learning beyond expectation by large number of the students with no indication of special skill acquisition (Ibanez, Di-Serio, Delgado-Kloos, 2014.299).

QUESTION 4 & 8: COMPUTER LITERACY LEVEL OF RESPONDENTS AND THE CONTRIBUTION OF ONLINE NURSING GAMES

The questions intend to examine the relationship between the two variables. The table below 4.20 revealed the result accordingly.

Table 4.20: Computer literacy level and online nursing games contribute toward learning

Computer literacy level	Very effective	Effective	somewhat effective	Ineffective	X ² value	p-value
Basic	15	43	34	8	11,8198	0,2237
Intermediary	3	57	33	7		
Proficient	24	28	48	0		
Unskilled	0	25	50	25		

There is no significant found ($X^2=11.8198$, $p>0.05$, $V=0.1666$) between computer literacy level of respondents and online nursing games contribute toward learning. From the result in the table 4.20 showed 43% of the respondents with basic computer literacy level clearly indicated online nursing games are effective towards their learning process, noticeably 34% indicated somewhat effective, followed by 15% of the respondents marked that online nursing games are very effective, and 8% showed that online nursing games are ineffective towards learning process. Accordingly, the respondents who has intermediary computer literacy level (57%) indicated effective, 33% somewhat effective, while 7% showed ineffective and 3% very effective. The respondents who are proficient in computer literacy indicated its somewhat effective (48%), 28% stated its effective and 24% showed very effective. Finally, some respondents do not have skill on computer and 50% of those

indicated that online nursing games are somewhat effective, 25% effective, while 25% indicated ineffective.

According to the result, the computer literacy level does not affect the opportunities obtained using gamification by nursing students. Additionally, gamification serves as powerful tool that magnify user’s attention, significantly impact behaviour and engagement in activities (Fijačko et al., 2020:134), as well as creation of relaxation in the students’ learning process in form of fun (Alsewier, 2018:19)

QUESTION 4 & 9: COMPUTER LITERACY LEVEL OF RESPONDENT AND UNDERSANDING THE CONTENT

As indicated above, the questions intended to evaluate the effect of computer literacy and the question online nursing games helps with understanding the content being taught. Below is the result presented in Table 4.21.

Table 4.21: Computer literacy level and online nursing games help with understanding the content being taught

Computer literacy level	Always	Very often	Sometimes	Rarely	Never	X ² value	p-value
Basic	6	27	46	6	15	10,2814	0,5913
Intermediary	3	31	46	5	15		
Proficient	12	20	52	4	12		
Unskilled	0	11	33	11	45		

According to the findings, no significant relationship between the variables ($X^2 = 10.2814$, $df=12$, $p>0.05$) exist. In Table 4.21, the respondents with basic computer literacy (46%) indicated that it does help in understanding online nursing games and the content being taught, 27% indicated very often does, 15% showed that online nursing games never help in understanding the content, 6% showed online nursing games always help in understanding the content, 6% illustrated that it rarely does. The respondents with no skill on computer 45% illustrated that online nursing games never help in understanding the content, yet 33% indicated that sometimes online nursing games help them in understanding the content, 11% mentioned rarely, 11% showed very often accordingly. The

result showed that computer skill level does not affect understanding the content of gamification. Thus, it is designed to help the students in promoting understanding (Information Resources Management, 2018:3).

QUESTION 4 & 10: COMPUTER LITERACY LEVEL OF RESPONDENT AND ONLINE NURSING GAMES MOTIVATE

The questions were to determine the relationship between the respondents' level of study and online nursing games motivate in learning the content. These findings are presented in Figure 4.22.

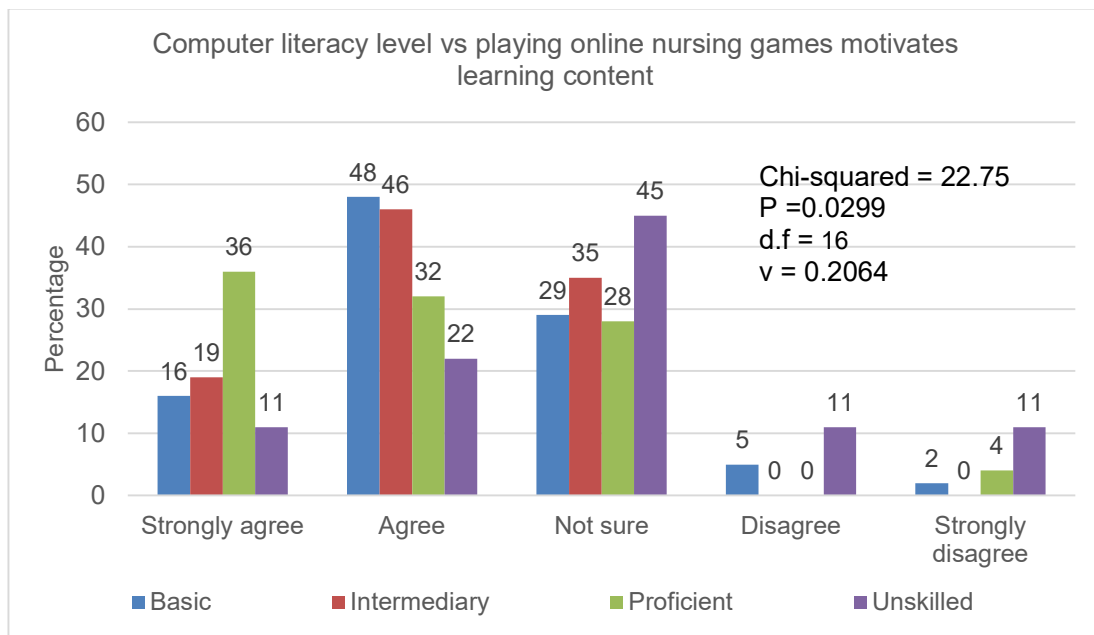


Figure 4.22: Computer literacy level and online nursing games motivate me to learn the content

Computer literacy level and the fact that online gaming motivates learning content showed to have a significant but medium association, ($X^2 = 22.75$, $P = 0.0299$, $V = 0.2064$). The result from Figure 4.22 showed that within the unskilled computer literacy level, 45% were not sure that playing games motivates learning content was significantly higher as compared to those who agree or disagreed. Many of the respondents (45%) have no skill on computer and were not sure on how online nursing games would motivate them to learn the content. Yet 22% of the respondents agreed that online nursing games motivates them

to learn the content, 11% strongly agreed, while 11% disagree and 11% strongly disagreed that online nursing games motivates them to learn the content.

Similarly, 48% of respondents who had basic computer literacy indicated that they agree in comparison to other respondents who were not sure or even disagreed. The respondents who obtained intermediary level of computer agreed at 46% that online nursing games motivates them to learn the content, 35% were not sure, and some 19% strongly agreed. It can be seen 36% of the respondents with proficient computer literacy level strongly agreed that online nursing games motivates them to learn the content, 32% also agreed, 28% were not sure, whereas only 4% strongly disagreed.

According to the findings, computer literacy has influence in terms of motivation in learning the online nursing game content. The presented results can possibly be due to some factors such the ability to navigate through more advanced technology that can possibly make the nursing students more motivated, especially the digital natives. Fox (2014:35) support the notions, that technology positively affect motivation of students with fewer skills in using electronic resources. However, it is crucial to understand the motivational needs of the target user group (Morschheuser *et al.*, 2018:222), in order to provide a valuable knowledge of nursing students' nature to achieve positive learning objectives need to be accounted for.

QUESTION 4 & 11: COMPUTER LITERACY LEVEL OF RESPONDENTS AND ONLINE GAMES AS ADDITIONAL LEARNING TOOL

The relationship between the computer literacy level of respondents and online nursing games as an additional learning were analysed. Table 4.22 provides these results.

Table 4.22: Computer literacy level and online nursing games can be an important additional learning tool

Computer literacy level	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	X ² value	p-value
Basic	39	41	17	2	1	15,9557	0,1933
Intermediary	29	52	16	0	3		
Proficient	52	36	8	0	4		

Unskilled	34	22	22	11	11		
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There was no significant evidence of association between respondents' computer literacy levels and how the respondents think about the online gaming being an important learning tool (X^2 15,9557, $P > 0.05$). As indicated in Table 4.22, 41% of the respondents who have basic level of computer literacy agreed that online nursing games can be an important learning tool, followed by 39% who strongly agreed, 17% who were not sure, 2% who disagreed and 1% who strongly disagreed. Accordingly, majority (52%) of those with intermediary computer literacy agreed that online nursing games can be an important additional learning tool, followed by 29% who strongly agreed, 16% were not sure, and 3% who strongly disagreed. AS expected, most (52%) of respondents who are proficient in computer skills strongly agreed that online nursing games can be an important additional learning tool, 36% in this category agreed, only 8% indicated that they were not sure, whereas 4% strongly disagreed. The result indicated that 34% of the respondents with no computer literacy strongly agreed that online nursing games can be an important additional learning tool to them, 22% agreed, 22% were not sure, then 11% disagreed or strongly disagreed.

Interestingly, the findings showed that majority of the respondents irrespective of the computer skill level significantly agreed that online nursing games can be an important additional tool. Indeed, gamification can be incorporated to promote acceptability and willingness as the technology emerge (Koivisto & Malik, 2020:9), and does not require other intermediate devices (Campillo.Ferrer et al., 2020:1), such as Kahoot, or quiz. As a result, it is important to conduct more research study on the acceptance of gamification for both nursing students and nurse educators (Fijačko et al., 2020:140).

4.6 HYPOTHESIS TESTING AND RESULT

Table 4.23: H1 Demographic data of the respondents.

Age	Percent (Freq)	X^2 -value	df	Probability	Remark	H_0
18-24	43.28% (87)	143.0050	4	<.0001	Significant	Accepted
25-34	32.34% (65)					
35-44	22.39% (45)					

45-54	1.49% (3)					
>55	0.50% (1)					
Female	81.00% (162)	76.8800	1	<.0001	Significant	
Male	19.00% (38)					
Level 1	2.04% (4)	55.9592	3	<.0001	Significant	
Level 2	32.14% (63)					
Level 3	35.20% (69)					
Level 4	30.61% (60)					
Basic computer literacy level	59% (118)	133.3483	3	<.0001	Significant	
Intermediary	22% (44)					
Proficient	14% (29)					
Unskilled	5% (10)					

• H_0 -The demographic characteristic of the nursing students is significant in utilisation of gamification among nursing students.

- The demographic characteristics of the respondents presented in Table 4.23, shows that there is difference between the characteristics of nursing students who utilise gamification. Meanwhile, the result provided a vital and key information on the respondents related to utilisation of gamification. Understanding the target group characteristics and their needs considered to be very important part of the principles of designing gamification (Morschheuser et al., 2018:225, Alsewier, 2018:19 & Kiryakova et al., 2014:2).

H_0 was accepted because p-value was < 0.0001 which is highly significant.

Table 4.24: H2 Utilisation of gamification by nursing students

VARIABLES	X ² value	Df	p-value	Remark	H ₀
Playing nursing games	39.70	5	0.001	Significant	Accepted
Content relevant to classroom teaching and learning	120.05	5	0.001	Significant	
Contribution of online nursing games on learning	54.17	3	0.001	Significant	
Understanding the content	102.40	4	0.001	Significant	
Motivate to learn the content	111.72	4	0.001	Significant	

Additional learning tool	134.81	4	0.001	Significant	
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H₀ -Nursing students utilise gamification for learning.

- Results in Table 4.24 represents the summary of the result that the nursing students use gamification, only 125 (68%) of the 184 respondents indicated that they play online nursing games. Of these 79 (45%) of the 176 respondents indicated that online games are relevant. Similarly, majority (84%) of 182 respondents indicated that playing games helps them with understanding while 63% indicated that gamification motivates learning and 80.21% indicated that online gaming is an important tool for their learning.

H₀ was accepted because P-value was < 0.0001 indicating that nursing students utilise gamification for learning but not all play online nursing games. The result was supported by the findings of Fijačko et al., (2020:137) that nursing students utilised gamification and showed positive effect towards their learning such as motivation, engagement, interest, learning and knowledge acquisition.

Table 4.25: H3 Relationships between demographic data and utilisation of gamification

VARIABLES	PNG(R) H ₀	CRTL(R) H ₀	HCL(R) H ₀	UC(R) H ₀	MLC(R) H ₀	ALT(Re) H ₀
Age	0.2770	0.0223	0.3552	0.4210	.0001	0.001
18-24	(NS)	(S)	(NS)	(NS)	(S)	(S)
25-34	Rejected	Accepted	Rejected	Rejected	Accepted	Accepted
35-44						
45-54						
>55						
Gender	0.1097	0.3714	0.4815	0.0843	0.9479	0.89
	(NS)	(NS)	(NS)	(S)	(NS)	(NS)
	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected

Level of study	0.8423 (NS) Rejected	0.2376 (NS) Rejected	0.2960 (NS) Rejected	0.7798 (NS) Rejected	0.5427 (NS) Rejected	0.5799 (NS) Rejected
Computer literacy level	0.6537 (NS) Rejected	0.5120 (NS) Rejected	0.2237 (NS) Rejected	0.513 (NS) Rejected	0.0299 (S) Accepted	0.1933 (NS) Rejected

PNG-Play nursing game, CRTL-Content relevant to teaching and learning, CL-Contribute to learning, UC-Understand the content, MLC-Motivate to learn the content, ALT-Additional learning tool, S-Significant, NS-No significant and R-Remark.

•H₀-There is a relationship between the demographic data and utilising gamification by nursing students

- The hypothesis that there is a relationship between age and playing online nursing games (p=0.2770), contribution of online nursing games towards learning (p=0.3552), gaming helps with understanding (p=0.4210) was rejected at 5% level of significance. However, the hypothesis that there is a relationship between age and relevancy of gaming towards learning (p=0.0223), gaming motivates learning (p<0.001) and online gaming being an important tool (p<0.001) was accepted since p was <0.05.
- The hypothesis that there is a relationship between gender and playing online games. (p=0.1097), relevancy of gaming towards learning (p=0.3714), contribution of online games towards learning (p=0.4815), gaming helps with understanding (p=0.0843), gaming motivates learning (p=0.9479) and online gaming being an important tool (p=8900) were all rejected since p>0.05.
- The hypothesis that there is relationship between study level and playing online games. (p=0.8423), relevancy of gaming towards learning (p=0.2376), contribution of online games towards learning (p=0.2960), gaming helps with understanding (p=0.7798), gaming motivates learning (p=0.5427) and online gaming being an important tool (p=5799) was rejected since p>0.05.
- The hypothesis that there is relationship between computer literacy level and playing online.

Nursing games ($p=0.6537$), relevancy of gaming towards learning ($p=0.5120$), contribution of online nursing games towards learning ($p=0.2237$), gaming helps with understanding ($p=0.513$) and online gaming being an important tool ($p=1933$) was rejected since $p>0.05$. But the hypothesis that there is relationship between computer literacy level and that gaming motivates learning ($p=0.0299$) was accepted at 5% level of significance.

The result clearly indicated the potential benefits that the nursing students may gain through employing gamification in their learning process as proven by the previous studies (chapter 2), Such as, assessing understanding, perception, self-efficacy, ambition, social comparison, internal and external motivation, and psychomotor skills within various areas of nursing (Fijačko et al., 2020:134).

H_0 was partially supported by the results, while majority of the results proved otherwise that there is no significant relationship between some demographic variables and utilisation of gamification variables. Meanwhile, the findings were all accepted accordingly. Further detail will be discussed in chapter five (5).

4.7 CONCLUSION

In this chapter the data analysis and results on utilisation of gamification, demographic characteristics of the participants and relationships between gamification and demographic data of the participants were presented. These were with the aid of tables and charts using either percentages or frequency. The demographic data of the participants provided a crucial information on participants characteristics related to utilisation of gamification as a learning method. Additionally, the relationship between demographic characteristics and utilisation of gamification were presented accordingly. The results obtained were guided using research question and hypothesis of the study. Chapter five (5) of the study will discuss the findings, conclude, provide limitation of the study, and make recommendations for the NEIs and for further research.

CHAPTER 5

DISCUSSION OF FINDINGS, RECOMMENDATIONS, LIMITATIONS OF THE STUDY AND CONCLUSIONS

5.1 INTRODUCTION

The results of the analysed data from the questionnaire used was presented in chapter four (4). This chapter presents the discussions of the findings, conclusions based on the result of this study on evaluating the utilisation of gamification as learning method among nursing students in selected NEIs in Gauteng. Recommendations will be explained below for further action, and limitations of the study accordingly.

5.2 AIM, OBJECTIVES, RESEARCH QUESTIONS AND HYPOTHESIS OF THE RESEARCH STUDY

Aim of the research study

This study aimed to evaluate utilisation of gamification as a learning method among nursing students in selected nursing education institutions.

Objectives of the study

- To describe the demographic data on utilisation of gamification among nursing students.
- To evaluate the utilisation of gamification among nursing students as a learning method.
- To determine the relationship between the demographic data and utilisation of gamification.

Research question

- How can the utilisation of gamification as a learning method among nursing students in selected NEIs be evaluated?

Hypotheses

- The demographic characteristic of the nursing students is significant in utilisation of gamification among nursing students.
- Nursing students utilise gamification for learning.

- There is a relationship between the demographic data and utilising gamification by nursing students.

5.3 DISCUSSION OF FINDINGS

The discussions will be presented chronologically according to the findings and the structured questionnaire. The discussion will be guided by the objectives and hypotheses of the research.

5.3.1 Demographic data

The demographic data of the respondents discussed in this section are age, gender, level of study and computer literacy level.

- **Hypothesis 1 (H1)**-The demographic characteristic of the nursing students is significant in utilisation of gamification among nursing students. The hypothesis H1 was accepted with p-value of $p < 0.0001$ (see Section 4.5, Table 4.23).

In this study, the respondents ages were between 18 years old and above 55 (18->55) years old. The ages were grouped in to five: 18-24, 25-34, 35-44, 45-54, and >55. The results revealed that, majority of the respondents were between the age group of 18-24 (43.28%) years old (See table 4.1, questions 1). This age group tends to utilise gamification in their learning more than the older nursing students. The result is in line with the prove that age and gender differs in terms of technology acceptance and adaptation (Koivisto & Hamari, 2014 :180) where younger persons accept technology relatively easier than older persons. A formal basic training on technology is therefore recommended to assist older nursing students to acquire skills necessary for utilising gamification for educational purposes.

From the result presented, majority of the respondents were predominantly female nursing students (81%), and male nursing students as the minority (19%) (see section 4.3, Figure 4.1). This finding correlates with SANC statistics, (2018), which found that the enrolled nursing students in Gauteng province are female biased. As pointed out by Koivisto & Hamari, (2014:179) women significantly have more social benefits through using gamification for learning than men who are more competitive. Although, there is a gender gap of female domination in this study and nursing profession. This explained the potential

benefits of gamification in nursing education to improve the nursing students' learning and achieve learning objectives.

In terms of respondents' level of study, the result showed similar distribution between level two to three (2-3) and level three with the highest respondents of 35%. Level one (1) were very few because of the exclusion application for R171 (Figure 4.2). In this case, level one nursing student respondents might not represent the entire population from level one of R425. Meanwhile, the result indicates that nursing students from all level of study can equally benefit from gamification in their learning experiences. There is no study found that reviewed study level related to utilisation of gamification especially in the field of nursing education and within higher education in general. There is a need for further studies to look at and relate study level needs in other to build on the current literature database.

A significant number of respondents have basic computer literacy level 59% and only 5% lack computer skill. This implies that the respondents can positively apply their computer skills for simple activities and access to educational resources such as gamification. Therefore, there is a need to encourage and support nursing students to utilise gamification to enhance their learning. Computer literacy and increased technological skills has proven to have positive effects on digital gaming (Koivisto & Hamari, 2014:181), as such assessment of nursing students' skills related to information technology should be included (Billings & Halstead, 2012:531).

This is in line with the argument that understanding age, gender, and education are important related to acceptance and adoption of technology (Koivisto, 2017:54), and this broaden learning, more successfully, and more reliable when the stakeholder's characteristics are observed completely (Signori, Guimarães, Severo, Rotta, 2018:117). Thus, this indicates the importance of involving nursing students to actively participate in research study that concerns their education to make appropriate recommendations.

5.3.2 Utilisation of gamification by nursing students

- **Hypothesis 2 (H2)**- Nursing students utilise gamification for learning.

The result proved that nursing students utilise gamification in their learning process. Therefore, hypothesis H1 was accepted because p-value is $p < 0.0001$ (see Section 4.5, table 4.24).

The majority (85%) of the respondents have smartphone. This might broaden the nursing students to adopt gamification in their learning process widely. Gamification is accessible through devices like smart phones, tablets, or laptops (Campillo-Ferrer et al., 2020:2). In this regard, the findings implied that acquisition of smartphones by most of the students provided a great opportunity to integrate gamification as an additional method of learning.

The result indicated that majority of the respondents (80%) were interested in utilising gamification to enhance their learning ($p < 0.0001$) at variance level (daily, weekly, monthly, not sure, and rare occasion) with 26% highest from the respondent who use gamification rarely. Only 20% of respondents indicated that they never use gamification. This is in line with the recommendation made to examine the impact of time (Koivisto & Hamari, 2014:181), and the basic chronological of playing (Williams, Yee, & Caplan, 2008:997). The findings are very helpful to determine the utilisation of gamification among nursing students based on statistical evidence. Thus, the potential use of gamification in nursing education is positive and suggested to be employed formally as an additional learning method to support the nursing students learning effectively.

Majority of the respondents (45%) agreed that the content of gamification was relevant to the classroom teaching and learning ($p < 0.0001$), and only 8% disagreed that the used of gamification by the respondents were not relevant. This is a positive indication that the nursing students can potentially benefit more when gamification is appropriately designed specially based on their profile.

More than half of the respondents 55% found that gamification is effective as it contributes positively towards the nursing students' leaning ($p < 0.0001$), while only 7% found gamification as ineffective. This indicates that nursing students utilise gamification and believed that the content contributes effectively towards their learning ($p < 0.0001$). This implies that gamification can be adopted within nursing education to achieve various skills within learning objectives. For example, creativity, innovation and contribute towards understanding (Campillo-Ferrer et al., 2020:2).

It was revealed that majority of the respondents 46% indicated that gamification sometimes help them to understand the content, while 33% indicated that gamification does help to understand the content, and 16% indicated gamification never help them with understanding the content that is being taught (See section figure 4.8, question 9 ($p < 0.0001$)). The results indicate that nurse educators should help to select gamification that is more accurate and appropriately designed within the learning objectives, to help the nursing students to understand the content accordingly. As supported that gamification content must provide understanding (Kingsley & Grabners, 2015:51), and nurse educators can assist the nursing students with understanding of the content and complex concepts therein (Garnett & Butto, 2018:20).

Most of the respondents (63%) agreed that gamification motivates them to learn the content, whereas only 6% disagreed that gamification motivates their learning (See figure 4.9, question 10, ($p < 0.0001$)). The results support the theory that gamification motivate to promote learning (Kapp, 2013:125), as well as making effort in resolving various challenges related to learning (Alsawaier, 2016:6). This implies that gamification can be employed into teaching and learning, and for nursing students who are lacking or lost interest or motivation towards learning to strengthening their learning potential.

About 43% of the respondents agreed that gamification can be an important additional learning tool, and 40% of the respondent disagreed (See figure 4.10, question 11, ($p < 0.0001$)). As supported by Kim & Suh, (2018:17), the contents of gamification comply with the needs of the nursing students, digital application, and innovative technique. At the same time acknowledging the needs of students (autonomy) to make own choices and take control on their learning (Alsawaier, 2016:31). The results show that gamification is gradually making its way to teaching and learning. Moreover, this broadens the knowledge of gamification within the nursing education field. In this regard, the welcoming and voluntary adoption of gamification by nursing students should be acknowledged as it provides all the necessary support to utilise gamification accordingly. It is not merely the use of ICT, but the noticeable active involvement of nursing students towards utilisation of gamification for learning to achieve the desired learning objectives (Signori, et al., 2018:117). The authors added that the experiences in which the students acquire and

develop knowledge using methods like gamification provides them with an individual learning space (Signori, et al., 2018:22).

According to the findings, most of the respondents (64%) do not have access to internet, while 36% indicated that they have access to internet (See Figure 4.12, question 12). This implies that many of the nursing students possibly purchase data to access gamification for learning. Hence, it is recommended that NEIs should fully support nursing students with effective and accessible internet to encourage and motivate them to learn using gamification. In fact, it was proven that gamification is user-friendly and requires limited technical expertise (Campillo-Ferrer, et al., 2020:2), with an adequate internet connection (Morschheuser et al., 2017:1306).

With regards to access to gamification by nursing students, the result indicates that 65% of the respondents buy data for themselves to utilise gamification, 25% use college Wi-Fi, 2% use municipal Wi-Fi, 2% used both self-subscription and college Wi-Fi access (See Figure 4.13, question 13). This might be a factor that contributed towards the opinion of some nursing students' disagreement to have gamification as an additional learning tool. Similarly, the result revealed that the respondents 55% do not experience problem with the college Wi-Fi, and 45% indicated that they do have problem with the college Wi-Fi (See Figure 4,13, question 14). This indicates the necessity of NEIs management to acknowledge the importance of a seamless and effective internet connection for nursing students to access educational resources to support their learning experiences.

About half of the respondents 52% indicated that they have no problem with college Wi-Fi. Nineteen percent (19%) indicated that sometimes they were unable to connect to college Wi-Fi, due to either slow connectivity, over usage, poor Wi-Fi signals or dead signal. Some mentioned that college Wi-Fi is only accessible whilst on campus (See Table 4.2, question 15). This is in line with findings that technical and operational problems can lead to frustration or underutilisation due to lack of infrastructure (Castro & Gonçalves, (2018:1044), and lack of relevant network capacity that supports play high tech gaming (Capdarest-Arest, Opuda & Keiko Stark, 2019:567). This indicates that issues related to lack of internet or devices can reduce the chance of accessing gamification effectively and can also affect the willingness of utilising gamification for learning.

There were majority of respondents 46%, that believed that there is data restriction within the NEIs, some of the respondents were not sure about the data restriction 41%, while very few believed that there are no such restrictions within the NEIs 13% (See Figure 4.14, question 16). This implied that, there is a potential problem with regards to internet access for nursing students to fully utilise gamification for learning.

Additionally, a significant number of respondents opted that the data subscription is very expensive to utilise gamification for learning 67%, some of the respondents 31% indicated that the cost of the data is fair, and only few 2% indicated that they access gamification for free (See Figure 4.15, question 17).

The nature of support towards nursing students in utilising gamification in which the results indicated that more than half of the respondents 60% were supported by their fellow nursing students, and very few 8% claimed to have being supported by the nurse educators (see Figure 4.16, question 18). The result indicated the significant influence of peer group in their learning process. This is proven by Alsem, (2018:30) who states that users are more likely to be influenced by peer group. Nurse educators are encouraged to be more involved to support collaborative learning among their students.

The result also indicated that 48% of the respondents were not sure whether the lecturers or nurse educators encouraged them to utilise gamification in their learning, 27% also agreed that they were encouraged by the nurse educators, and 25% also disagreed with the statement (See Figure 4.17, question 19). The result indicated the rate of nurse educators' support towards nursing students on utilisation of gamification is limited. Although, most of the responses were not specific. Hence there is tendency of nurse educators encouraging the nursing students to utilise any available online educational resources to boost their learning. This provides nursing students with more access to technology at their fingertips (Billings & Halstead, 2012:134).

The utilisation of gamification is not formally integrated within the selected NEIs, and the respondents were asked to state their views on why they think it is not formally integrated. The result revealed that most of the respondents mentioned that, it may be due to lack of access to device and internet 27%, some mentioned that inadequate knowledge and skills

on gamification application 20%, some of the respondents were not sure why gamification is not implemented formally into teaching and learning 17%, it is a new concept and it is not well known 9%, few of the respondents indicated that they prepare traditional method 8%, , some of the respondents indicated that the theory time is not enough to cover the required content 7%, and few of the participants believed it will distract some students 2%. Teaching method have undergone through a significant change innovatively over the years which aim to boost students' learning (Signori et al., 2018:177), which include increase development of technology with tools and content available to be employed in teaching by faculty nursing education (Billings & Halstead, 2012:134), such as gamification in education which evidently proved to be effective for teaching and learning when employed appropriately (see chapter 2). Based on the comprehensive systematic review carried out to provide an up-to-date summary of the evidence related to gamification/serious game in health profession, the result proved that there are limited reviews of the literature in health professions education (Gentry et al., 2019:16). Hence, it is recommended to conduct a study to determine the nurse educators' views related to gamification in teaching and learning.

5.3.3 The relationship between demographic data of respondents and utilisation of gamification

- **Hypothesis 3 (H3)**-There is relationship between the demographic data and utilising gamification by nursing students.

This section sought to understand the relationship between the demographic characteristics of the participants and utilisation of gamification among nursing students. The results partially confirmed that there is a relationship between the demographic data and utilisation of gamification statistically. Therefore, all the findings in this study have been accepted accordingly (see Section 4.5, table 4.25).

In terms of age and utilisation of gamification, the result showed that age group has no effect on utilising gamification in nursing education context $p>0.05$ (See section 4.5, table 4.3). The result demonstrated a relationship between the age and the content of gamification relevancy $p<0.001$ (Section 4.5, table 4.4). However, there was no effect exist between the age and the gamification contribution towards learning of the respondents $p>0.05$ (See section 4.5, table 4.5). The age of the respondent has no impact in understanding the content $p>0.05$ (See section 4.5, table 4.6). A relationship exists between

the age of the respondents and motivation to learn the content $p < 0.05$ (See section 4.5, table 4.7). The result for the respondents' opinions of gamification to be an important additional learning tool showed that age impacts the decisions made by the respondents $p < 0.05$ (See section 4.5, table 4.8). The result was supported by the previous study that there was no evident of age difference in gamification application (Aslem, 2018:42), the older individuals play games highly with median age of 35.3 years old (Williams, Yee, & Caplan, 2008:1007, and Garnett & Button, 2018:16), as contradicted to the claim that there is age and gender variation in terms technology acceptance (Koivisto & Hamari, 2014 :180). This called for further research study in educational domain (Klock, Gasparini, Pimenta, Hamari, 2020:407), especially within health arena (Stood, 2019:765). This implies that the older nursing students can potentially benefit from utilising gamification in their learning process. Hence, gamification can be employed in all age groups of nursing students and they can potentially benefit equally when carefully employed. As proven that age have no effect on the benefits of gamification (Koivisto & Hamari, 2014:184). However, the results indicate that the respondents' motivational factors should be examined carefully to make learning more appealing using gamification.

For the respondents' gender and utilising gamification, the result revealed that gender does not have effect on utilising gamification for learning $p > 0.05$, there is no relationship exists between the respondents' gender and content of gamification relevancy $p > 0.05$. the contribution of gamification towards learning $p > 0.05$, gamification helping with understanding the content $p > 0.05$, gamification motivates respondents to learn the content, and the opinion for gamification as an important additional learning too $p > 0.05$ (see Section 4.5, table 4.25). This indicates that nursing students can utilise gamification for learning irrespective of gender group. The findings of this study supported the prove that both males nursing students and nursing females commonly play mobile games respectfully (Garnett & Button, 2018:19). However, further study is required to confirm the findings. And finding by Aslem (2018:42), that there was no proof of gender difference detected in the result.

The result on respondents' study level and utilisation of gamification showed that study level does not have effect on using gamification for learning $p > 0.05$. The result further indicated the study level of respondents does not have relationship to the opinion of content relevant to teaching and learning $p > 0.05$. There is no relationship exist between the study level of

the respondents and gamification contribute towards learning $p>0.05$, study level and help with understanding the content $p>0.05$, study level and motivate to learn the content $p>0.05$, and study level and gamification as an important additional learning tool $p>0.05$ (see Section 4.5, table 4.25). Meanwhile, all the nursing students from all levels of study can possibly have equal chance of benefiting from gamification in their learning process. Although, there is currently no study conducted on all study levels within a specific context related to utilisation of gamification. However, more research is needed on all nursing students from all levels of study to prove the result of this study. The previous study was conducted on undergraduates nursing student and the result indicated that the nursing students showed positives emotion in gamification experience (Márquez-Hernández *et al.*, 2019:37), and level three nursing students results indicated nursing students' interest in applying badges in their learning (Garnett & Button, 2018:1).

Based on the results (see Section 4.5, table 4.25), it was indicated that computer literacy has no effect on utilising gamification for learning $p>0.05$. It was also evident that there is no relationship between the respondent' computer literacy level and the opinion that gamification content is relevant to the classroom teaching and learning $p>0.05$. Furthermore, the result indicated that there was no indication of relationship between the respondents' computer literacy level and the contribution of gamification towards learning $p>0.05$. Similarly, the result indicated that computer literacy level of the respondents does not have influence on understanding the content of gamification being taught $p>0.05$. The result indicated that there is relationship between the respondents' computer literacy level and their motivation to learn the content of gamification $p<0.05$. Finally, there was no indication of relationship between the respondents' computer literacy level and opinion of employing gamification as an important additional learning tool $p>0.05$. This implies that computer skills acquired by nursing students provides an important opportunity to adapt to the modern learning environment. It was stated that the current advancement of technology provided the academic and educational field with various innovations that remarkably changes learning process globally (Signori *et al.*, 2018:123). Gamification is an effective tool and provides flexibility that can be employed easily on extensive problems including complex issues and solve these problems (Zichermann and Cunningham, 2011:1), that can be developed based on gender neutral (Koivisto & Hamari, 2014:183), and principle of

universal design can be applied when developing content in multiple modalities to enable access to all students (Alexander et al.,2019:15).

5.4 RECOMMENDATIONS

In this study, the recommendations provide some clarity and direction for the necessary action to be taken that will assist nurse educators to utilise gamification as a teaching and learning method in nursing education.

5.4.1 Recommendations for future research

- It is important to conduct a similar study or studies in other NEIs within Gauteng and South Africa at large. This will provide more data that will enable comparison which will indicate similarities and uniqueness (if any) between NEIs, provinces and provide a National outlook.
- More research study is required in nursing education related to age and gender especially with the significant gender disparity in nursing profession.
- Nurse educators play a huge role in students learning. It is important to carry out a study from among nurse educators to obtain information on their views, and challenges on utilisation of gamification in teaching and learning.
- An experimental study needs to be carried out to measure the effects of gamification as teaching and learning method in nursing education.
- A similar study can be done using qualitative approach to evaluate the utilisation of gamification as learning method among nursing students.

5.4.2 Recommendations for nursing education

Nursing students' needs, learning styles and preferences considered to be important aspect in teaching and learning. Educators are required to adapt numerous teaching methods and approaches to meet the nursing students' needs and requirements to actively participate in their learning. The adaption of information technology in education is a trending approach to make teaching and learning more engaging and motivating, such as gamification. Below are recommendations based on the literature review (chapter 2) and findings of this study (chapter 4).

- The findings revealed that nursing students utilise gamification in their learning. Hence, nurse educators can add gamification formally as an additional tool for teaching and learning as proved to be relevant, contribute towards learning, helps with understanding, motivates nursing students to learn.
- The NEIs management should encourage the nurse educators to support nursing students in accessing gamification for learning to meet their needs accordingly.
- It is recommended to design, develop, and integrate gamification for learning based on the nursing students' profile to obtain greater learning outcome. This can be achieved by consulting the specialist or gamification guidelines to execute effectively and successfully.
- More information and communication technology support are necessary to support nursing students learning.
- Effective and reliable internet connection to access gamification for learning freely without any perceived restrictions.
- Training of nurse educators on gamification design, and application for instructional purpose. As supported by Billing & Halstead (2012:531) that "information and instructional technology must be up to date and support the achievement of program goals" to encourage dynamic learning environment.
- It is important to provide the nurse educators with the professional development training especially with current technology within educational domain. Faculty can provide opportunities by developing the use of hardware and software resources within the colleges such as advanced computer laboratory for teaching and learning and ensure adequate maintenance to promote nursing students' skills (Billings & Halstead, 2012:531).

5.5 CONTRIBUTION TO THE BODY OF KNOWLEDGE

The aim of this study was to evaluate utilisation of gamification among nursing students as a learning method in selected NEIs in Gauteng. The findings of the study significantly contribute towards the body of knowledge in nursing education field within South Africa and globally.

- The literature review in chapter two (2) was supported by the findings of this study that nursing students utilise gamification for learning and positively impact nursing students' learning through valid and reliable statistical evidence. Although, some

aspect of the study was not found in the current literature such as study that comprised all levels of nursing students and examining utilisation of gamification based on content relevancy, contribution, and understanding, as indicated in limitations of this study.

- The results provide an encouraging background and deep insight into gamification in nursing education field within South African context.
- The findings of the study identified the students' needs and vividly made a recommendations to ensure the needs of the nursing students is effectively acknowledged for their academic success.

5.6 LIMITATIONS

The data collection process came with some unforeseen challenges, even though the researcher tried to collect data at best possible within extended period to present the most effective results considering the present coronavirus pandemic. The study was a success at the end and the following limitations were identified in this study.

- The study was conducted within selected NEIs in Gauteng. Meanwhile, there are five NEIs in Gauteng and only two were randomly selected because of limited resources on the researcher. However, the results of this study cannot be generalised.
- The accessibility of the respondents was strictly limited due to emergence of coronavirus pandemic, contributed to an unfavourable situation of movement restrictions. As a result, online survey was alternatively used to collect data. However, some of the nursing students' participants were hesitant to use online survey and some could not return their questionnaires due to alternate classroom lectures. Even though the NEIs were willing and extremely helpful in reaching out the potential participants during the critical times.
- The literature on gamification application within nursing education realm, is relatively limited. This made it impossible to compare some of the results of this study with other studies. However, the researcher aligned the results with relevant recommendations.
- The total number of enrolled nursing students for R425 from level one to four (1 to 4) in 2018 were 2375 as opposed to the current total of 1220 for both NEIs at present. This is due to the implementation of the new R171 programme that replaces

the R425 which commenced in January 2020 starting from the newly enrolled level one nursing students. The level three and four (as at 2018) graduated by the year 2020. The researcher could not access all the level one nursing students as proposed before the implementation of the new nursing programme. As a result, the level one nursing students (R171) were excluded based on exclusion criteria except for the nursing students who were repeating the level (R425).

5.7 FINAL CONCLUSIONS

The study aimed to evaluate the utilisation of gamification as a learning method among nursing students in selected NEIs in Gauteng using a non-experiential descriptive quantitative survey design. The research study was guided by the aim of the study, research questions and hypothesis of the study as a benchmark. The use of structured survey questionnaire and online survey was used to collect data from nursing students.

The study provided valuable information on the participants' characteristics, utilisation of gamification among nursing students in their learning. It was shown that nursing students utilise gamification for learning and confirmed that the content of gamification nursing students use is relevant to the classroom teaching and learning, contributes towards their learning process, helps them with understanding the content, motivates them to learn, and can be an important additional learning tool as well as the relationships which can contribute to the achievement of the learning outcomes. However, the study revealed some challenges in utilising gamification for learning. Recommendations were made accordingly, and the limitations of the study were also identified.

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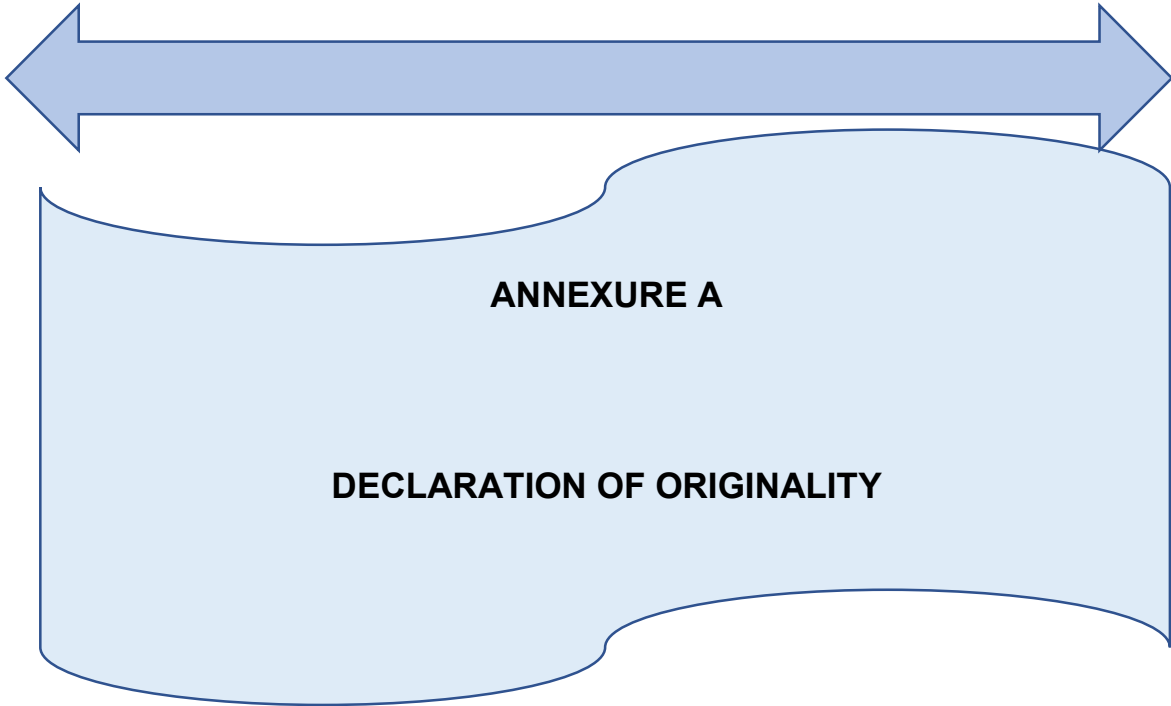
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ANNEXURE A

DECLARATION OF ORIGINALITY UNIVERSITY OF PRETORIA

The Department of Nursing Science places great emphasis upon integrity and ethical conduct in the preparation of all written work submitted for academic evaluation. While academic staff teach you about referencing techniques and how to avoid plagiarism, you too have a responsibility in this regard. If you are at any stage uncertain as to what is required, you should speak to your lecturer before any written work is submitted.

You are guilty of plagiarism if you copy something from another author's work (eg a book, an article or a website) without acknowledging the source and pass it off as your own. In effect you are stealing something that belongs to someone else. This is not only the case when you copy work word-forward (verbatim), but also when you submit someone else's work in a slightly altered form (paraphrase) or use a line of argument without acknowledging it. You are not allowed to use work previously produced by another student. You are also not allowed to let anybody copy your work with the intention of passing it off as his/her work. Students who commit plagiarism will not be given any credit for plagiarised work. The matter may also be referred to the Disciplinary Committee (Students) for a ruling. Plagiarism is regarded as a serious contravention of the University's rules and can lead to expulsion from the University. The declaration which follows must accompany all written work submitted while you are a student of the Department of Department of Nursing Science. No written work will be accepted unless the declaration has been completed and attached.

Full names of student: Fatima Isa Abdullahi

Student number: 18293434

Topic of work: **Evaluating the Utilisation of gamification as a learning method among nursing students in selected Nursing Education Institutions in Gauteng.**

Declaration

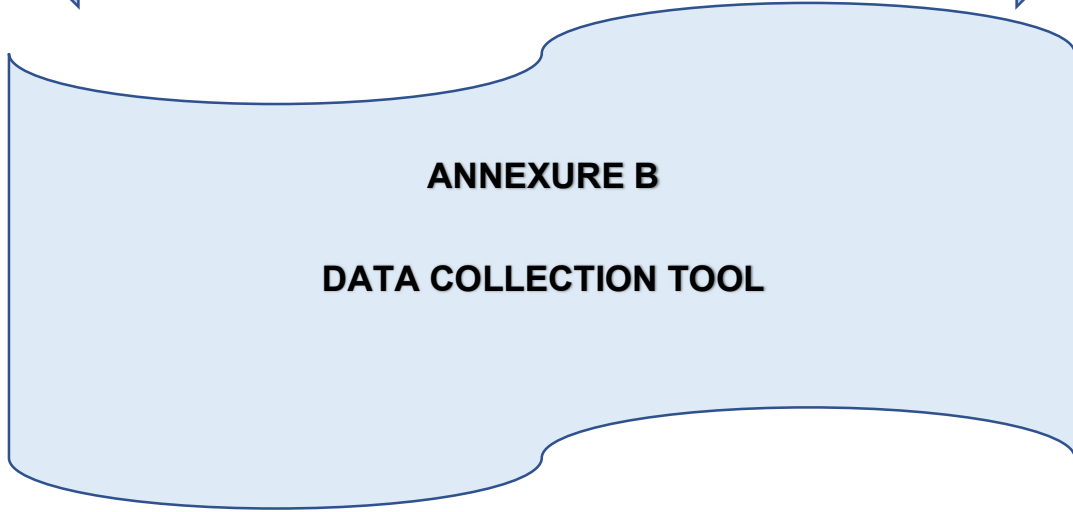
1. I understand what plagiarism is and am aware of the University's policy in this regard.
2. I declare that this research proposal (eg essay, report, project, assignment, dissertation, thesis, etc.) is my own original work. Where other people's work has been used (either from a printed source, Internet, or any other source), this has been

properly acknowledged and referenced in accordance with departmental requirements.

3. I have not used work previously produced by another student or any other person to hand in as my own.
4. I have not allowed and will not allow anyone to copy my work with the intention of passing it off as his or her own work.

SIGNATURE

F I Abdullahi



ANNEXURE B

DATA COLLECTION INSTRUMENT

Questionnaire

Topic: Evaluating utilisation of gamification as a learning method among nursing students in selected Nursing Education Institutions in Gauteng.

Date.....

Respondent Identification code.....C1/01

Dear respondent

Thank you for agreeing to take part in this research project as titled above. Please remember that your participation is entirely voluntary, and your privacy and confidentiality is assured. This questionnaire is divided into three sections. Section A has demographic data and section B consists of questions to assess your utilisation of gamification. Please fill all the information and pay attention to all instructions. Also feel free to ask questions where you need clarity.

INSTRUCTIONS:

1. Answer all questions
2. Fill each provided space according to your best knowledge

SECTION A DEMOGRAPHIC DATA Purpose of this section is to get to know you and your level of study at the college.

1. Age

- 18-24
- 24-34
- 35-44
- 45-54
- Over 55

2. Gender

- Female
- Male
- other

3. Level of study

Level 1

Level 2

Level 3

Level 4

4 Computer

literacy level

Basic

Intermediary

Proficient

Unskilled

SECTION B. THE UTILISATION OF GAMIFICATION BY NURSING STUDENTS

Purpose of this section is to evaluate if you are using any online nursing games in your learning.

5. What type of device do you have?

Smartphone

Tablet

Laptop

Desktop PC

If other, please specify,

6. How often do you play any nursing game?

Daily

Weekly

Monthly

Rarely

- Not sure
 - Never
7. The content of the online nursing games you play are relevant to the classroom teaching and learning
- Strongly agree
 - Agree
 - Neither agree nor disagree
 - Disagree
 - Strongly disagree
 - I don't know
8. Tick the contribution of playing online nursing games on your learning process
- Very effective
 - Effective
 - Somewhat effective
 - Ineffective
 - Not applicable
- 9 Does gamification help you in understanding the content being taught?
- Always
 - Very often
 - Sometimes
 - Rarely
 - Never
10. Playing online nursing games motivates me to learn the content
- Strongly agree
 - Agree
 - Neither agree nor disagree
 - Disagree
 - Strongly disagree
11. Online nursing games can be an important additional learning tool.
- Strongly agree

- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

12. Do you have free access to internet?

- Yes
- No

13. How do you access games?

- Self-subscription
- College Wi-Fi

If other, please specify

14. Do you experience problems with the college Wi-Fi?

- Yes
- No

15. If yes, what type of problem do you encounter?

16. Do you have restriction on data access in the institution?

- Yes
- No
- Not sure

17. What are the costs of data subscription when play online nursing games outside the school?

- Very expensive
- Fair
- Free

18. I get support for online games from:

- College-
library
- Educator

Classmates

If other,

please

specify

19. The lecturers encourage me to use online nursing games in my learning.

Strongly agree

Agree

Neither agree nor disagree

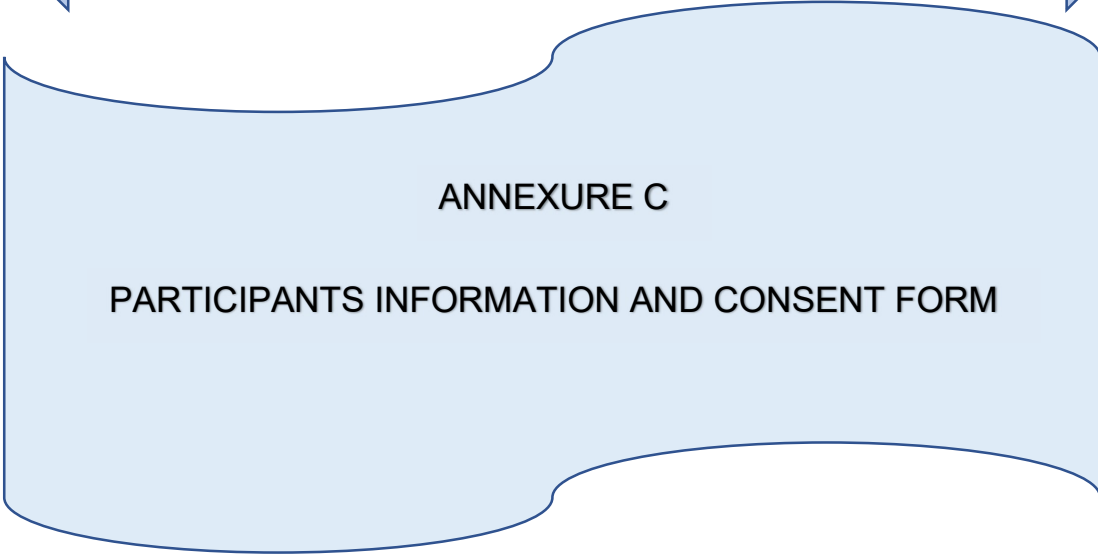
Disagree

Strongly disagree

20. Why do you think gamification is not implemented in your classroom?

End of questionnaire

Thank you for responding to the questions.



ANNEXURE C

PARTICIPANT'S INFORMATION & INFORMED CONSENT DOCUMENT

Researcher's name Fatima Isa Abdullahi

Student Number: 18293434

Department of Nursing Sciences

University of Pretoria

Dear Student ...C1/01.....

I am a master student in nursing education in the Department of Nursing Sciences, University of Pretoria.

You are invited to volunteer to participate in research project on: **EVALUATING THE UTILISATION OF GAMIFICATION AS A LEARNING METHOD AMONG NURSING STUDENTS IN SELECTED NURSING EDUCATION INSTITUTIONS IN GAUTENG PROVINCE**

This letter gives information to help you to decide if you want to take part in this study. Before you agree you should fully understand what is involved. If you do not understand the information or have any other questions, do not hesitate to ask. You should not agree to take part unless you are completely happy about what we expect of you.

The purpose of the study is to evaluate the utilisation of gamification as a learning method among nursing students.

I would like you to complete a questionnaire. This may take about 20 minutes. I will collect the questionnaire from you before you leave. It will be kept in a safe place to ensure confidentiality. Please do not write your name on the questionnaire. This will ensure confidentiality. I will be available to help you with the questionnaire or to fill it in on your behalf.

Research Ethics Committee of the University of Pretoria, Faculty of Health Sciences, telephone numbers 012 356 3084 / 012 356 3085 granted written approval for this study.

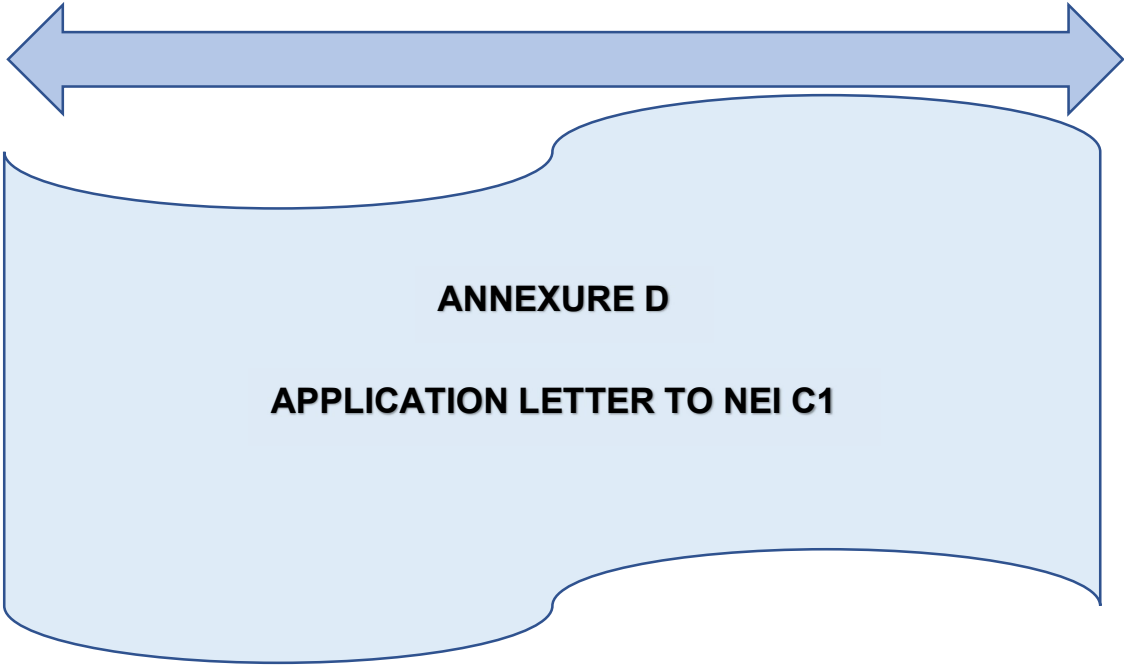
Your participation in this study is voluntary. You can refuse to participate or stop at any time without giving any reason. As you do not write your name on the questionnaire, you give the information anonymously. Once you have given the questionnaire back, you cannot recall your consent. I will not be able to trace your information. Therefore, you will also not be identified as a participant in any publication that comes from this study.

In the event of questions asked, which will cause emotional distress, then the researcher is able to refer you to a competent counselling.

Note: The implication of completing the questionnaire is that informed consent has been obtained from you. Thus, any information derived from your form (which will be totally anonymous) may be used for e.g., publication, by the researcher.

We sincerely appreciate your help.

Yours truly,
Fatima Isa Abdullahi



ANNEXURE D

Mrs Fatima Abdullahi
1162 Geelhout Street
Moregloed,
Pretoria.
0186
27th February 2020

The Principal,
S G Lourens Nursing College.

REQUEST FOR PERMISSION TO CONDUCT DATA COLLECTION FOR RESEARCH STUDY

Dear Mrs Tjale,

My name is Fatima Isa Abdullahi, a master's student (Student No;18293434), from Department of Nursing Science, Faculty of Health Sciences University of Pretoria. The research I wish to conduct is: EVALUATING THE UTILISATION OF GAMIFICATION AS A LEARNING METHOD AMONG NURSING STUDENTS IN SELECTED NURSING EDUCATION INSTITUTIONS IN GAUTENG.

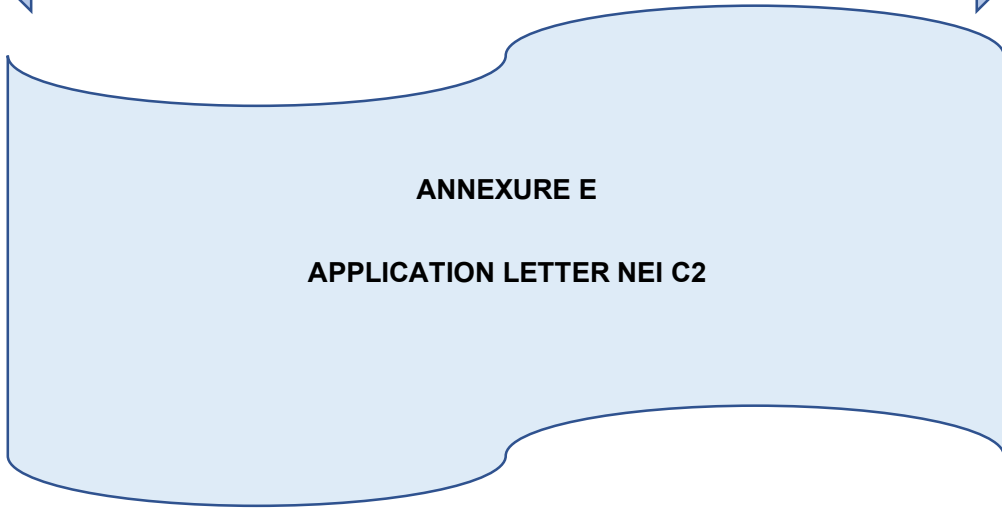
I am hereby seeking your consent to conduct data collection from S G Lourens Nursing College in March 2020. The participants of the study are the enrolled nursing students from level one to four (1-4). I have attached all the relevant documents related to the field of study. I would really appreciate your consideration to successfully complete the requirements of the study.

Yours faithfully

Mrs Fatima I Abdullahi

Contact No: 0738496245/0609450836

Email: fiabdullahi@yahoo.com



ANNEXURE E

Mrs Fatima Abdullahi
1162 Geelhout Street
Moregloed,
Pretoria.
0186
27th February 2020

The Principal,
Ann Latsky Nursing College.

REQUEST FOR PERMISSION TO CONDUCT DATA COLLECTION FOR RESEARCH STUDY

Dear Sir/Madam,

My name is Fatima Isa Abdullahi, a master's student (Student No;18293434), from Department of Nursing Science, Faculty of Health Sciences University of Pretoria. The research I wish to conduct is: EVALUATING THE UTILISATION OF GAMIFICATION AS A LEARNING METHOD AMONG NURSING STUDENTS IN SELECTED NURSING EDUCATION INSTITUTIONS IN GAUTENG.

I am hereby seeking your consent to conduct data collection from Ann Latsky Nursing College in March 2020. The participants of the study are the enrolled nursing students from level one to four (1-4). I have attached all the relevant documents related to the field of study.

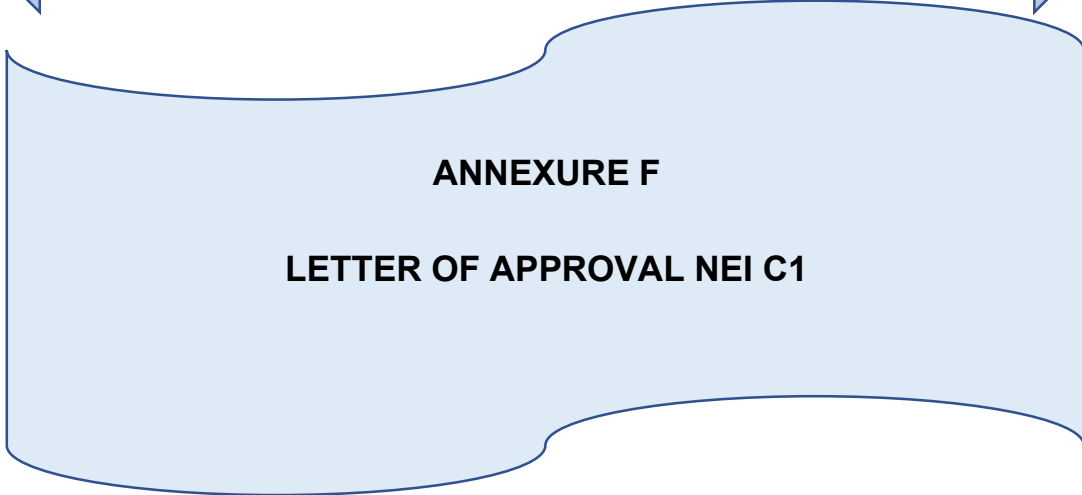
I would really appreciate your consideration to successfully complete the requirements of the study.

Yours faithfully

Mrs Fatima I Abdullahi

Contact No: 0738496245/0609450836

Email: fiabdullahi@yahoo.com



ANNEXURE F

LETTER OF APPROVAL NEI C1



GAUTENG PROVINCE

HEALTH
REPUBLIC OF SOUTH AFRICA

Enquiries: Dr RG Malapela
Tel : 012 319 5769
E-mail : Grace.Malapela@gauteng.gov.za or
gmalapela@gmail.com
Date : 02 March 2020

Ms. FI Abdullahi FI
Protocol number: GP 201911-055

SUBJECT: APPROVAL FOR DATA COLLECTION AT SG LOURENS NURSING COLLEGE

This serves as a response to your request in undertaking the study on: "Evaluating utilization of gamification as a learning method among nursing students in selected nursing education institutions in Gauteng"

Permission is hereby granted for the collection of data as indicated in your proposal.

Please take note of the following:

- All information and data collection should be treated as confidential and ethical considerations adhered to as stated in the proposal.
- At the end of the study kindly furnish the college with the study results.
- After completion of your research study, we would appreciate if you could donate a hard copy to the library.
- The committee might invite you to present during their annual research day.

Warm regards

Dr. RG Malapela (Research Committee Chairperson)

Ms. M.P. Tšhepo (College Principal)

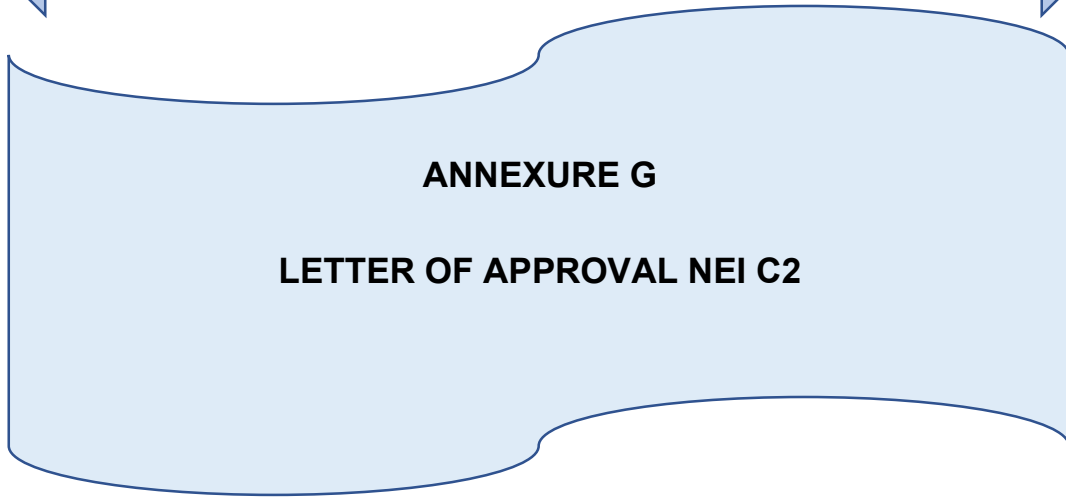
02. 03. 2020

Date:

05/03/2020

Date:





ANNEXURE G

LETTER OF APPROVAL NEI C2



GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

Enquiries: Ms. SS Bokaba

Tel +(27) 011 644 8944/079 307 3711

Email:Stellah.bokaba@gauteng.gov.za

TO: Ms. F Abdullahi

FROM: Ms. SS Bokaba (Research chairperson)

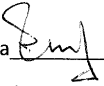
DATE: 24.07.2020

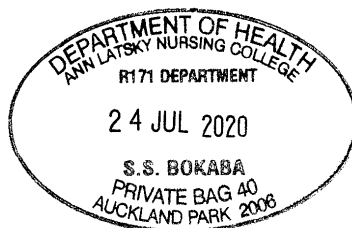
SUBJECT: APPROVAL TO CONDUCT A STUDY AT ANN LATSKY NURSING COLLEGE

This serves to inform you that you are hereby granted permission to conduct your study at Ann Latsky Nursing college.

The college requires that upon completion, you kindly share the results of your study during the annual research presentation day. Information regarding the research presentation day will be forwarded to you. You are further requested to donate a copy of your dissertation to the college library.

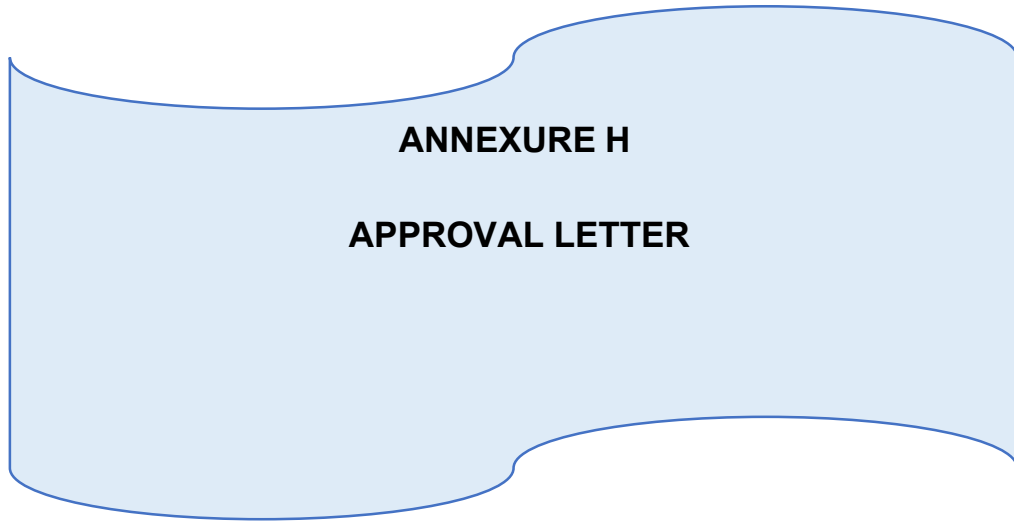
Regards

SS Bokaba 
Research chairperson



Ann Latsky Nursing College
Private Bag 40, AUCKLANDPARK, 2006 ☎ (011) 644-8900 📠 (086-443-7935)





ANNEXURE H



www.up.ac.za

Faculty of Health Sciences
School of Health Care Sciences
Room 3-75. HW Snyman North
University of Pretoria,
Private Bag X323
ARCADIA
0007
Tel: 012 356-3233
Joyce.mothabeng@up.ac.za

18 October 2019

Faculty Ethics Committee

Faculty of Health Sciences

University of Pretoria

To whom it may concern,

Evaluation of a protocol for the following student:

**Student FI Abdullahi - Department of Nursing Science (MNur); student number:
18293434**

**Title: Evaluating utilisation of gamification as a learning method among nursing
students in selected nursing education institutions in Gauteng**

This letter serves to confirm that the above mentioned protocol was discussed by the Postgraduate Committee of the School of Health Care Sciences during the meeting of 09 October 2019. The proposal was accepted with minor changes, and the corrections were effected. It is hereby referred to your committee for ethical clearance.

Sincerely yours,

J.Mothabeng.

Professor DJ Mothabeng

Chairperson: Research and postgraduate committee

School of Health Care Sciences



ANNEXURE I



Faculty of Health Sciences

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.

- FWA 00002567, Approved dd 22 May 2002 and Expires 03/20/2022.
- IRB 0000 2235 IORG0001762 Approved dd 22/04/2014 and Expires 03/14/2020.

21 November 2019

Approval Certificate New Application

Ethics Reference No.: 817/2019

Title: EVALUATING UTILISATION OF GAMIFICATION AS A LEARNING METHOD AMONG NURSING STUDENTS IN SELECTED NURSING EDUCATION INSTITUTIONS IN GAUTENG

Dear Mrs FI Abdullahi

The **New Application** as supported by documents received between 2019-10-22 and 2019-11-20 for your research, was approved by the Faculty of Health Sciences Research Ethics Committee on its quorate meeting of 2019-11-20.

Please note the following about your ethics approval:

- Ethics Approval is valid for 1 year and needs to be renewed annually by 2020-11-21.
- Please remember to use your protocol number (817/2019) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, monitor the conduct of your research, or suspend or withdraw ethics approval.

Ethics approval is subject to the following:

- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

We wish you the best with your research.

Yours sincerely

Dr R Sommers

MBChB MMed (Int) MPharmMed PhD

Deputy Chairperson of the Faculty of Health Sciences Research Ethics Committee, University of Pretoria

The Faculty of Health Sciences Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes, Second Edition 2015 (Department of Health)

Research Ethics Committee
Room 4-80, Level 4, Tswelopele Building
University of Pretoria, Private Bag x323
Gezina 0031, South Africa
Tel +27 (0)12 356 3084
Email: deepika.behari@up.ac.za
www.up.ac.za

Fakulteit Gesondheidswetenskappe
Lefapha la Disaense tsa Maphelo

22 January 2021

**Approval Certificate
Annual Renewal**

Ethics Reference No.: 817/2019

Title: EVALUATING UTILISATION OF GAMIFICATION AS A LEARNING METHOD AMONG NURSING STUDENTS IN SELECTED NURSING EDUCATION INSTITUTIONS IN GAUTENG

Dear Mrs FI Abdullahi

The **Annual Renewal** as supported by documents received between 2020-10-15 and 2021-01-20 for your research, was approved by the Faculty of Health Sciences Research Ethics Committee on 2021-01-20 as resolved by its quorate meeting.

Please note the following about your ethics approval:

- Renewal of ethics approval is valid for 1 year, subsequent annual renewal will become due on 2022-01-22.
- Please remember to use your protocol number (817/2019) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, monitor the conduct of your research, or suspend or withdraw ethics approval.

Ethics approval is subject to the following:

- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

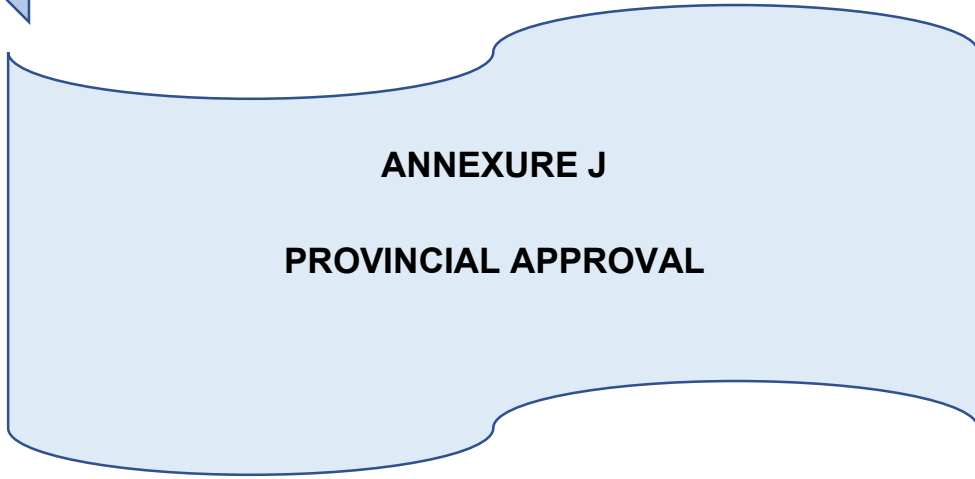
We wish you the best with your research.

Yours sincerely

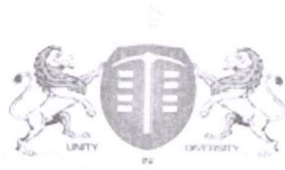


Dr R Sommers
MBChB MMed (Int) MPharmMed PhD
Deputy Chairperson of the Faculty of Health Sciences Research Ethics Committee, University of Pretoria

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ANNEXURE J



GAUTENG PROVINCE

REPUBLIC OF SOUTH AFRICA

Outcome of the provincial protocol review committee

RESEARCHER'S NAME (PI)	ABDULLAHI FI
ORGANIZATION/INSTITUTION	UNIVERSITY OF PRETORIA
RESEARCH TITLE	EVALUATING UTILISATION OF GAMIFICATION AS A LEARNING METHOD AMONG NURSING STUDENTS IN SELECTED NURSING EDUCATION INSTITUTIONS IN GAUTENG.
CONTACT NUMBER	+27738496245
PROTOCOL NUMBER/PROPOSAL NUMBER	GP 201911 055 GP
SITES	SG LOURENS AND ANN LATSKY NURSING COLLEGES

Your permission to conduct the above-mentioned research has been reviewed by the Province and the permission has been granted.

It is requested that you submit the research report on completion of your study and present the findings and the recommendations to the Gauteng Department of Health.

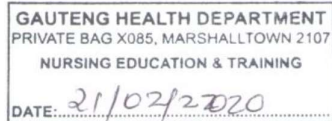
YES Permission granted

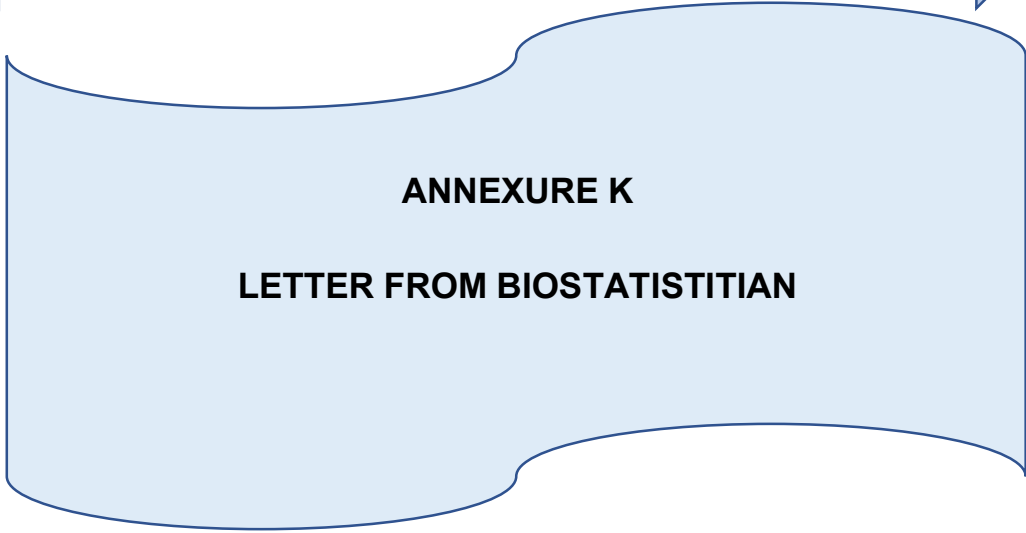
Recommended by

MS N. GIDIMISANA

ACTING DIRECTOR: NURSING EDUCATION AND TRAINING

DATE: 21/02/2020





ANNEXURE K



AGRICULTURAL RESEARCH COUNCIL

BIOMETRY

PO Box 8783, Pretoria, 0001 South Africa
Phone: (012) 427 9811 Fax: (012) 427 9743 (Int: +27 21)
E-mail: NgwaneC@arc.agric.za • Web site:
www.arc.agric.za

Letter of clearance

This letter confirms that **Fatima Isa Abdullahi** (student no. 18293434) studying at the University of Pretoria discussed the project titled **Assessing utilisation of gamification as a learning method among nursing students in selected nursing education institutions in Gauteng** with **Cynthia Boitumelo Ngwane** (a statistician working for Biometry at Agricultural Research Council).

I hereby confirm that I assisted the student with determining the sample size, sampling, data collection validity and reliability methods. I will also be assisting the student through data analysis and interpretation of the results. The data analysis tool to be used to achieve the study objectives will be Chi-squared test for equal proportions and association and Cramers V test. All data will be analysed using SAS statistical software package.

Name Cynthia Boitumelo Ngwane

Date 31 May 2019

Signature

