Evaluating the effectiveness of facilitating Inquiry Based Learning on Facebook to advance domain knowledge and develop enquiry skills

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Feziwe Lindiwe Yvonne Khomo

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Supervisor: [redacted]
Dr. Delene Heukelman

Date: 26/03/2019

Co-Supervisor: [redacted]
Dr Jane Phyllida Skinner

Date: 26.03.2019

Declaration

I hereby declare that this dissertation submitted for Masters of Information and Communication Technology in the Faculty of Accounting and Informatics is my own work and it has not been submitted for any other qualification or to any other higher education institution except at the Durban University of Technology. All sources used in this study were cited, referenced and acknowledged as depicted in the references.

26/03/2019

Feziwe Lindiwe Yvonne Khomo **Date**

Abstract

This research involved a quest to discover a way, involving technology, which would encourage students to take the lead and take ownership of their own learning and rely less on the lecturer. It sought to investigate a learning approach that would encourage students to be proactive in their learning whilst increasing their domain knowledge. The study was instigated by a concern for what the researcher experienced as students' negative attitude towards learning. She identified Inquiry Based Learning (IBL) as a learning model that would ignite critical and creative skills and encourage students to take responsibility of their own learning. Thus, the purpose of the study was to investigate a technology-assisted approach to investigate a technology-assisted approach to developing skills for discovering and creating new knowledge.

Taking into consideration that most students of the 21st century own technological tools and most have accounts on social network platforms, the study sought to determine whether IBL could be facilitated on the social network platform, Facebook. A case-study, mixed-methods approach was employed. The researcher relied on statistical analysis done by the program SPSS for the analysis of the quantitative data and a qualitative program, NVivo, for analyzing words selected by the students. In addition, observation of the interactions on Facebook assisted materially in drawing conclusions as to whether the objectives were met.

In terms of determining an appropriate IBL-oriented model for the study, the findings suggest that the intrinsic attributes of IBL such as collaboration, interaction and engagement can be enhanced on Facebook as students attempted to answer the questions related to an Inquiry Based Scenario question. However, only a limited number of the respondents found the approach and the intervention fully effective.

In terms of exploring the usage of Facebook, students expressed a sense of fulfilment and appreciation for the platform with regard to sharing and accessing information. On the other hand, a majority also found the experience challenging; were not fully enthusiastic about this form of learning; and nor did they feel that it would be sufficient if used in isolation from traditional learning methods. In addition, the researcher acknowledged that participation on Facebook was not as she had envisaged it. Further, the study evaluated the facilitation of an IBL "Classroom" environment on

Facebook. The interaction on Facebook and the responses to the perception regarding this objective indicated positive results. However, only a limited number of respondents acknowledged that the “classroom” challenged their thinking capabilities, stretched their thinking, or led to deeper thinking.

Lastly, the study observed improvements in understanding learning material and the development of a higher order of learning by taking into account (with the assistance of NVivo) the choice of words used in answering the questions related to the IBL scenario posted on Facebook. Further, based on the attempts of the participants to tackle the questions, the researcher concluded that an improvement was attained. In addition, the responses by the students acknowledge that domain knowledge and understanding of the learning unit was improved. It is, however, also important to note that the limited time frame allocated for the study, and the lack of a systematic approach in scaffolding the teaching principles and learning process, had an effect on students’ adoption of the intervention and on the desired outcomes.

Based on the findings and challenges encountered, the researcher was able to shed light on certain aspects that need to be considered for an effective inclusion of technological instruments within traditional learning. The study confirmed important aspects revealed in the literature, while the positive effective of the intervention on desired outcomes was encouraging. It could therefore be concluded that the findings were able to address the main objectives of the study.

Dedication

I dedicate this dissertation to my husband, Mthokozisi Samuel Khomo, for his unwavering support and motivation throughout the duration of this study.

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List of Abbreviations

CM	Number of Users
CP	Social Capabilities
IBL	Inquiry Based Learning
PE	Perceived Ease of Use
PP	Perceived Playfulness
PU	Perceived Usefulness
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
TAM	Technology Acceptance Technology
UI	User Intention

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Chapter One

Introduction and the background of the study

1.1 Introduction

The research focused on determining an innovative learning approach that would encourage students to take ownership of their own learning whilst developing cognitive skills. Therefore, the purpose for this study was to investigate whether Inquiry Based Learning (IBL) can be facilitated on the social network site, Facebook, thus creating a learning environment that will foster the development of critical and creative skills. The study was premised on the suggestion that the cultivation of critical and creative thinking skills are imperative for students to acquire in preparation of leading a generative and productive civic, personal, and professional life (Emanuel and Challons-Lipton 2012).

A case study design was chosen to determine how effective Facebook would prove in facilitating IBL. According to Yin (2014) a case study is an empirical enquiry that investigates a phenomenon in order to get an in-depth understanding of its context. As a specific group of students was available, nineteen from one class, a case study was appropriate.

1.2 Context of the study

Institutions of higher learning on a global level have acknowledged that the incorporation of technological tools, in the form of e-learning, complement traditional learning in facilitating and improving the attainment and usage of knowledge. These interventions' notable impact on teaching and learning is ideally the development of rich collaborative environments that can improve academic standards (Arkorful and Abaidoo 2015). The lack of professional training in the usage of technological tools has, however, been described as the greatest hindrance in advancing meaningful teaching in the 21st century (Al-Rahmi, Othman, and Yusuf,2015).

The research was based on first-year students studying the E-Commerce Fundamentals module at Oval International College in Durban, KwaZulu-Natal (KZN), a private institution of higher learning in South Africa. The researcher administered the E-Commerce Fundamentals module to these students. The majority of the students are black students from historically black institutions, that were controlled by the apartheid

era governments in the former homelands, where access to resources such as libraries and computers was, and is still, scarce (Bozalek *et al.* 2012) as cited in Leibowitz *et al.* (2014).

1.3 Rationale for the research

The justification for the research was in acknowledging that an appropriate approach to learning is essential for students to become academically successful and that technology may be the most effective way to develop such an approach. In addition, an appropriate approach ignites understanding and enjoyment, and offers an opportunity to reflect on, and apply, what has been learned (Biggs 2003). Therefore, the researcher identified Inquiry Based Learning (IBL), an approach that aims to stimulate learning through questioning, that promotes the creation of new knowledge, and that develops better understanding (Spronken-Smith *et al.* 2008) as cited in Spronken-Smith *et al. (*2012). In a teaching and learning environment that incorporates an IBL approach the educator assumes a facilitator position and students are encouraged to take responsibility by self-directing, coordinating and organising their own learning (Kutar, Griffiths and Wood 2015). In addition, social media activities are widely supported within this age group (Roehl *et al.* 2013). Therefore, the researcher identified Facebook as an appropriate social media platform that could provide a good access tool in which IBL objectives can be achieved beyond the limited class hours. The motivation of this learning approach was premised on the following challenges:

- The bulk of the module was theory based thus the lecturer had to be creative in promoting engagement and participation
- Students often memorized notes to pass tests and exams
- Students were generally over-reliant on the lecturer to gain knowledge
- The lecturer had to constantly encourage and make follow-ups to ensure that students completed assignments and class activities on time
- Commitment and attendance were low

1.4 Research problem and aims

Traditionally, students are perceived to have been conditioned to an approach where they only have to memorize their notes and reproduce them in assessments

representing Bloom's lowest order in his taxonomy of learning (Bloom 1956). Educators in higher institutions of education have succumbed to this perception and can be seen as responsible for perpetuating it (Blane 2015). Therefore, students are unable to display initiative and problem solving skills (Samah, 2009). If educators intend to instil understanding of information, rather than allowing the memorization of information and facts, active and constructive learning should be adopted (Roehl *et al.* 2013). Emanuel *et al.* (2012) further state that creative and critical thinking is essential in order to uproot the tendency of over relying on course texts, memorization, course outlines and general spoon-feeding.

1.4.1 Problem statement

There is insufficient usage of learning mediums that encourage the development of cognitive skills and discourage reliance on spoon feeding and memorization amongst students (Roehl *et al.* 2013). This study identified Facebook as a possible alternative innovative learning tool in promoting active and constructive learning.

1.4.2 Aim

To determine whether IBL can be facilitated on Facebook, the social network site, thereby providing an alternative medium for encouraging creative and critical thinking.

1.4.3 Objectives

- To determine the appropriate IBL model approach
- To explore whether students can access learning materials via Facebook
- To assess the levels of usage of Facebook by students
- To create an IBL "classroom" environment on Facebook
- To assess any improvement of understanding of learning material and the development of higher order thinking skills achieved with the use of IBL on Facebook

1.4.4 Research Question:

Will using Facebook as a tool to facilitate IBL result in an improvement of students' ability to think critically and solve problems?

Research sub-questions:

- Which IBL model would be the appropriate approach?
- Can these students access learning material via Facebook?
- To what level do these students use Facebook?
- Can an IBL “classroom” environment be created on Facebook?
- Can this intervention improve their understanding of the learning material and lead to the development of higher order thinking skills?

1.5 Research Methodology

1.5.1 Research design

A case study method was selected for this study. The strength of a case study lies in its ability to investigate a phenomenon within its context. It is an empirical enquiry that investigates a phenomenon in order to get an in-depth understanding of its context (Yin 2014). Thus a case study was appropriate for this study, as the researcher wanted to examine the effects of the incorporation of inquiry based learning through Facebook and establish its impact on students’ domain knowledge and inquiry based learning skills.

1.5.2 Target population

Alvi (2016) defines a population as the total collection of elements that meet a specific criterion from which a researcher wishes to make inferences. The population for this study is focused on 1st year students at Oval International College, Durban, KwaZulu-Natal.

1.5.3 Sample

The researcher purposefully selected a sample to reveal content pertaining to a group of interest (Patton 2015) as cited in Gentles *et al*. (2015). The population sample was based on:

- 1st year Bachelor Degree in Information Technology students
- Attending the E-commerce fundamental module as part of their course
- 19 students between the ages of 19 – 22 years
- The majority did not achieve the minimum requirement for entrance into University
- The majority were from previously disadvantaged backgrounds

The interest in this sample was premised on the fact that the researcher administered the E-commerce Fundamentals module to these students.

1.6 Data gathering and data analysis

1.6.1 Learning on Facebook

A learning unit from the E-commerce Fundamental module, guided by a lesson plan and objectives of intended outcomes, using an IBL model, was administered to the students on Facebook. For the purpose of broadening and improving understanding of domain knowledge, a problem inquiry scenario was adopted.

Thus, the scenario was used on Facebook as a catalyst for further engagement and collaboration beyond the limited classroom time. A timeframe of a week was allocated for this exercise. The researcher was interested in evaluating students' ability to comprehend, apply, analyse, synthesise and evaluate learnt concepts from the learning unit and appropriate them accordingly in a manner that showed an improvement in understanding of content and domain knowledge. Thus, the researcher was guided by Bloom's Taxonomy of six hierarchical levels, ordered from least to most complex: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation (Bloom 1956). Therefore, based on the interaction, engagement and collaboration in as far as tackling the questions related to the problem inquiry scenario, the researcher was able to analyse and draw conclusions as to whether students' higher order of thinking was tapped.

1.6.2 NVivo analysis on Facebook:

For the purpose of assessing how meaning and understanding was established on Facebook, data was analysed using a software computer tool, NVivo. NVivo affords researchers the ability to manage qualitative data by allowing increased focus on ways of examining recorded data. It has the ability to classify and manipulate data into nodes. In addition, NVivo can display the nodes in different formats (Bazeley and Jackson 2013). In this case, the researcher employed NVivo to analyse selected words used by students in the Facebook group in answering the problem inquiry scenario assignment questions. Thus, NVivo assisted in identifying the choice of words used by students in answering the questions and the program presented them in graphical format.

Therefore, NVivo was able to present and to quantify the data of interest in a manner that revealed insights. For instance, the researcher was able to establish the ability of students to recall the relevant concepts pertaining to the questions. This was useful information as it assisted the researcher in gauging students' knowledge and comprehension of what and when to use the concepts. Thus, NVivo assisted the researcher in interpreting students' behaviour in so far as the study was concerned.

1.6.3 SPSS analysis

In addition, the researcher employed a closed-ended questionnaire using a 5-point Lickert scale to capture data regarding aspects of the Facebook experience as a learning platform, allowing students to select statements that best described their own experience. According to Mcguirk and O'Neill (2016) questionnaires are a form of data gathering technique used for capturing data from generating sources.

Data from the questionnaire was analysed using SPSS (Statistical Package for the Social Sciences), a software program that has the ability to sort and analyse data in an orderly and sensible way (Garth 2008). The researcher used the program to accept data gathered from the questionnaire as its data entry. Upon processing the data, the output was presented in a graphic and table format which was used by the researcher in interpreting the results.

1.7 Anonymity and confidentiality

The participants were informed that their identity would be protected at all times and their responses were kept as confidential.

1.8 Ethical considerations

According to Saunders *et al.* (2009), ethical concerns will emerge as the researcher plans the research, seeks access to the organization and individuals to collect, analyze and report research data. According to Plowright (2011) participants are supposed to be informed about the study before its implementation. Thus, participants were informed that their participation was completely voluntary and that they were entitled to withdraw from the study at any stage. In addition, the study commenced after formal written permission to conduct the study was received from the Chief Director of Oval International, Durban [see Appendix D].

1.9 Contributions of the study

This research will contribute towards establishing innovate approaches that enhance learning and promote the development of cognitive skills. As stated in the problem statement, there is insufficient usage of innovative mediums that promote cognitive skills development. Therefore, this study anticipates that the findings will defuse skepticisms and fears surrounding the inclusion of technological tools in traditional learning environments, such as the perceptions that technological platforms have the potential of perpetuating low levels of class attendance amongst students (Evans 2013) and whether social platforms can produce desired learning outcomes (Oktavia, Warnars and Soroto 2017).

In addition, the study hopes to highlight and reveal challenges and hindrances that affect the implementation of innovative technological tools and, most importantly, contribute in understanding the causes of these obstacles, while contributing to finding solutions. Further, the study has established that students of the 21st century own more technological gadgets than ever before, and a majority of them own social network accounts as their preferred mode of communication with peers and family (Tang *et al.* 2016). Therefore, the study anticipates providing practical solutions to how educators can incorporate students' tools of interest in the quest for developing cognitive skills in an innovative way.

1.10 The Structure of the dissertation

The study is composed of five chapters, as follows.

Chapter One introduces the context of the study with the challenges that provoked the study, thereby providing a rationale for embarking on the study. In addition, the chapter outlines the problem, and explains the aims and objectives of the study. Further, this chapter gives an overview of each chapter of the study.

Chapter Two is a literature review of scholarly articles that highlight the role of social technological instruments as vehicles of modern learning, facilitating learning, the roles of educators, and the designs and implications of the technological tools. Therefore, this chapter touches on social media as a learning tool, the factors which motivate the use of social networks as teaching and learning tools, the importance of application design

in meeting learning objectives using web-based learning, facilitation of IBL in web-based applications, and the role of educators in successfully promoting enquiry-based learning through social media.

Chapter Three outlines the research methodology of the study which includes a description of the research design, the target population, the data gathering tools and data analysis techniques.

Chapter Four provides a full interpretation of the findings produced by the data analysis tools and techniques. The findings are inferences based on the responses from the questionnaire, the findings from the NVivo program analysis and the Facebook responses.

Chapter Five helps shed light in determining whether the aim and objectives of the study were achieved and gives a broader holistic perspective and overview of the underlying elements that directly and indirectly affected the study. Further, this chapter discusses conclusions, limitations and suggestions for future research.

1.11 Conclusion

Chapter One gave an overall overview of the study, a description of its context, a background to what prompted the investigation and a detailed summary of each chapter within the dissertation. The next chapter is purely focussed on a review of the relevant literature.

Chapter Two
Literature review

2.1 Background

According to Frank and Hatak (2014) a literature review is a collection of data pertaining to a research topic of interest. The current study seeks to determine whether Inquiry Based Learning can be facilitated on a social network, in particular Facebook. The review of the literature begins by looking at social media as a learning tool and also into factors which motivate the use of social networks as teaching and learning tools. A lot of people have been drawn to social media for communication and interaction purposes (Rauniar, Rawski, Yang and Johnson 2014). Some Institutions of learning have incorporated social networks into their teaching and learning practises for the purpose of encouraging learning beyond the limited class time-frames, and to improve learning objectives and goals. The rewarding effects, such as enjoyment and satisfaction, have led to the attraction of these platforms (Preece, Rogers and Sharp 2015).

Davis (1985) designed the Technology Acceptance Model (TAM) which established that users of technological applications choose, and continue to use, an application based on specific criteria, subject to the user's perception and intention to meet desired objectives and goals. The utility functions and features therefore are a determining factor in the adoption of an application, and have a direct effect on perception and intended usage. Hence, the researcher looks at findings regarding the design implications of an interface.

According to Jalali, Sherbino, Frank and Sutherland (2015), a notable impact of social media is its ability to encourage individual users to reflect on prior knowledge and past events in relation to acquiring new knowledge. In addition, social media platforms expose individuals to information that they were not aware of initially. Thus, the literature review further looks at findings regarding the role of educators in developing soft skills and the facilitation of Inquiry Based Learning on the web.

2.2 Social media as a learning tool

Social media entails a lot of communication and relationship building as well as dissemination and retrieval of information (Brookfield 2015). According to Erlandsson *et al.* (2016) social media platforms afford people the ability to communicate and share their thoughts, thus mimicking human communication on the internet. In order for the communication to remain alive and active, users need to participate in the conversation by posting comments and appreciating others' views.

The current generation is exposed to more web technology and digital media than any other generation before them. Students interact and communicate with friends and family through social media. The average student subscribes to a social media site. Smart phones, laptops and tablets are readily available and affordable, hence social media sites are easily accessible and communication is instant (Roehl *et al.,* 2013).

According to Jalali *et al*. (2015), individuals that appear to be experts in a certain topic are seen as "influencers" and have the ability to keep conversation active on social sites. This is evident in a study conducted by Erlandson *et al*. (2016), the findings of which indicate that users on social platforms tend to follow each other and participate in the same topics. This behaviour is attributed to the fact that users share the same interest. Further, it is possible to identify influential users using "association rule learning", which is a technique used to identify items that happen to be in the same space at a given time. An "item" in the study was regarded as a user participating in the communication process on the platform. The study was able to establish that if users were participating on a certain topic and one of them progressed onto another topic, the chances were that one or two of the users would follow the first user. Thus, the first user is referred to as an "influential user" and has an impact on other users' behaviour. Hence, behaviour of other users becomes predictable in relation to the "influential user".

Social media as universal platforms allow interaction and accessibility to information (Rowan-Keynon, *et al.* 2016)."Social media can foster active student engagement, democratize the classroom in ways impossible before, and create a participatory hearing environment that accommodates quieter introverts much better than was typically done in the past" (Brookfield 2015:54.). According to Blumberg (2015:96) "Using social media to learn, reflect, collaborate and create knowledge fosters the habits

of mind of lifelong learning and constructivism". In addition, social media has transformed the way content is presented, while its inception has encouraged online discussions, exchange of information and the involvement of a wider audience across the globe (Apostolovo 2013).

According to Haworth (2016) online learning tools need to be customizable in order to meet students' needs and objectives. In addition, they need to be compatible to meet current standards which demand the usage of mobile devices in the creation and delivery of content on the internet which should remain accessible at all times. The use of mobile technologies in knowledge discovery is referred to as "mobile learning" (Patil *et al*. 2016).

Haworth (2016) further states that portable online learning tools give students options about how to collaborate and communicate. In addition, mobile devices have outpaced desktops and laptops and are a preferred mode of learning amongst students. According to Cochrane (2014) mobile devices are powerful tools that contribute to the development of cognitive skills, and promote collaboration and engagement amongst participants.

A study by Patil *et al*. (2016) hoped to reveal perceptions, attitudes and involvement towards mobile learning regardless of efficiency. The study indicated that students showed a positive attitude towards mobile learning and claimed that they would partake in it if implemented in their institutions. Students readily embraced the incorporation of mobile learning because every student owned a mobile or smart phone, thus discussions and communications took place at any time regardless of location. It is worth noting however that the number of discussions pertaining to mobile learning were very low. This was attributed to that fact that mobile learning was not currently part of students' assessment and was not implemented in other departments. However, the authors conclude that technologies such as mobile learning assist in the delivery of quality content, and that their adoption can be a calculated strategic move in student-centred learning environments.

Another study by Evan (2013) investigated the impact of social media as a learning tool amongst tertiary students in Brunel University in the United Kingdom. The study involved 252 1st year undergraduate students. The objective of the study was to determine how much influence the usage of a social media, Twitter, had on the learning

experience of students. An electronic questionnaire was used to survey attitudes and experiences of using Twitter. The variables of interest were the following:

1. Does the usage of Twitter encourage engagement?
2. Does the usage of Twitter improve interpersonal relations between tutor and students?
3. Does the usage of Twitter have a negative influence on class attendance?

The findings of the study indicated that there was a strong correlation between engagement and Twitter usage pertaining to activities of social exchange and information sharing, whilst the usage of Twitter had no effect on interpersonal relations and on class attendance. According to Evans (2013) the choice of using educational tweets as opposed to social tweets must be considered carefully as they have different effects on the way students perceive tutors. Evans (2013) further suggest that educators that wish to build their credibility should consider social tweets and be mindful that the usage of Twitter will not automatically break down barriers between them and students. In addition, educators need not fear that the usage of such platforms will have a negative effect on student attendance.

In another study Oktavia, Warnars and Adi (2017) looked into the concepts of knowledge management systems that facilitate information sharing, as well as into the social media concepts that encourage collaboration and communication amongst peers. Further, the study investigated how knowledge management systems and social media concepts can be integrated to improve learning processes. In addition, the study stipulated a conceptual model that can be used to identify the concepts. According to these authors knowledge management systems are used for the collection and retention of information such as documents, videos and pictures for the purpose of encouraging information sharing and the continuity of learning amongst its members. In addition, social media is a source of information because of the vast amount of data available. It promotes interaction, collaboration and communication and affords participants on the web the opportunity to exchange and access information much more rapidly than before. It can be seen as a dynamic system in which instructors and learners can decide where and when learning can take place. Oktavia *et al*. (2017) further state that social media has the ability to enhance learning skills and encourage authentic learning in student-centred environments. Further, social learning eliminates obstacles that hinder

interaction whilst improving learning in terms of efficiency, and contributes to the broadening of minds and perspectives in approaching and solving problems.

In conclusion, Oktavia *et al*. (2017) suggest that the implementation of knowledge management systems with the integration of social media concepts in a quest to encourage knowledge sharing, will promote flexibility and functionality that can lead to improved learning experiences and desired outcomes.

2.3 Factors which motivate the use of social networks as teaching and learning tools.

According to Miljkovic, Petojevic, and Zizovic (2016) motivation as an element has an indirect effect on students' intention to develop cognitive skills, involving the acquisition of knowledge, and then in transferring and using these skills in distance learning systems. In addition, motivation amongst learners influences and determines the progress of learning outcomes. It also has the ability to facilitate teaching and learning processes. Miljkovic *et al*. (2016) further outline how emotions have an effect on motivation in relation to computer interaction. Apparently students that exhibit positive emotions tend to be creative and flexible in their thinking abilities. Thus, the adoption of technology should play a role in retaining the positive emotions of students when it comes to communication and exchange of information. Miljkovic *et al.* (2016) further suggest that efficient and effective feedback, by both the instructors and the system, indirectly encourages students' creativeness and problem-solving skills to surface. Feedback, which could be in the form of positive appraisal, has a good effect on performance and evokes feelings of satisfaction and confidence, thereby igniting positive emotions.

According to Barkley (2010) one way of fostering an environment that encourages engagement and collaboration, with the intention of acquiring and creating new knowledge, is through the creation of a 'community of learners'. However, as long as students do not experience a sense of belonging and are uncomfortable communicating with fellow students, the motivation to participate in discussions will be minimal. Thus, the possibility of promoting active learning is diminished. This concurs with Kimmerle, Moskaliuk, Oeberst and Cress (2015) who states that a sense of belonging amongst participants needs to exist in order for participants to appreciate the social community.

Further, in order for the spirit of collaboration to flourish, learners need to work together and create goals as a collective. In addition, learning and knowledge development takes place in well-structured communities where participants are encouraged to share their own knowledge and allow others to build on it. The act leads to enhancement and revision of knowledge as long as participants recognise the processes and rules of the particular community.

According to Preece *et al.* (2014), the chance of adopting an application lies in its ability to demonstrate its contribution in assisting a user in achieving usability goals. Therefore, an application should be seen as an effective tool for achieving intended goals and, in terms of efficiency, the application must be seen to be fast in the deliverance of its service. For example, feedback and response time has to be instant. In addition, its utilities must afford the user the opportunity to perform a task with ease. When an application is found to be easy to learn further engagement with it is increased. In addition, the user's experience has a determining factor when it comes to adopting an application. According to Kimmerle *et al*. (2015), if an application is found to evoke feelings such as satisfaction, enjoyment, excitement and entertainment the likelihood of adopting the application becomes a reality because of its rewarding effects. Therefore, developers of applications have to take into consideration design implication principles when it comes to developing an acceptable application (Preece *et al*. 2014).

Jang (2015) determined that the adoption of collaboration technologies is attributed to convenience as a decision factor. The selected mode of technology should be convenient to all participants in terms of familiarity, accessibility, ease of use and the ability to collaborate privately. In addition, a positive correlation exists between achieved learning experiences and the preferred technology chosen by participants. This is evident from a study conducted by Apostolovo (2013) in which learners attest that the adoption of social media for learning purposes was due to familiarity, ease of use, individual affordability and network effects.

Another study by Everson, Gundlach and Miller (2013), which explored the usage of social media in an introductory statistics course, indicated that students did not participate in sites that they regarded as uncomfortable to use or unfamiliar. Students only engaged in sites that they regarded to be easy to use and convenient for everyone to use. This concurs with Rauniar *et al*. (2014) who sought to discover why millions of

people are drawn to social media, in particular Facebook. The paper examined the acceptance of social media usage by taking into account the Technology Acceptance Model (TAM) that states that User Intention (UI) to use social media sites is based on perceived usefulness and trustworthiness of a site. The model demonstrates that the variables Perceived Usefulness (PU) and Perceived Ease of Use (PE) have an influence in the adoption of technology. Therefore, if a user finds an application enhancing his/her performance the particular application is perceived to be useful. In addition, if a person is freed from “memory load” and manipulating with the intention of achieving goals is effortless, the application is regarded as easy to use (Davis 1985). The findings are alignment with the TAM. Therefore, if objectives and goals are met on the site, the user is likely to have a positive attitude and the intention to revisit the site is increased. In terms of trust, it is also imperative that security issues are addressed in order to alleviate feelings of insecurity as far as social sites are concerned.

Rauniar *et al*. (2014) added additional variables to make the TAM Model more meaningful when it comes to understanding the acceptance and usage of social media. They added: the Number of Users (CM), Social Capabilities (CP) and Perceived Playfulness (PP). The study was able to establish that there is a relationship between social media’s CP and PU. For instance, if the features and tools of the application enhance a user’s activities, the user is likely to visit the site again as opposed to an encounter with frustrating and confusing tools. In addition, the study was able to demonstrate that a relationship does exist between PP and PU, that is, if users find the site to present some form of entertainment, bringing forth pleasure and enjoyment, the site is perceived to be worth revisiting. The study also established that users perceive a site to be useful based on the network’s CM on the social site. Therefore, if a user can relate to, or has an offline relationship with, users that participate on a particular site, the user is highly likely to accept the usage of the social network site.

A study by Sanmamed, Carril and Sotomayor (2017) also investigated the factors which motivate students to use social media. The variable “versatility” was identified as having influence on students’ attraction to the usage of social networks because of the flexible and adaptable character of social networks in terms of facilitating, connecting and establishing meaningful relationships. In addition, versatility in terms of interaction affords students the ability to communicate and share information with peers. The study

suggests that it is imperative to take into account the social network characteristics that influence the usage of these platforms, in order to transform them from social to cognitive spheres.

It is worth noting that Sanmamed *et al.* (2017) revealed that students had limited experience in using social networks as a learning platform, whilst by the same token they recognised its potential as a learning tool under the construct “assessment for school learning" which was associated with motives to use social networks. In a separate study by Sobaith, Moustafa and Ghandforoush (2016), social media was found to be of value in the academic space because of its ability to close the digital gap between students and institutions.

2.4 Application design

According to Preece *et al.* (2015), interactive products that had users in mind were found generally to be easy to use, effective and pleasurable to use. These elements can be achieved if a designer takes into consideration the following questions:

1. Who is going to use the product?
2. Where are they going to use it?
3. What activities will the user be doing when interacting with the product?

The key question according to these authors is “how do you optimize user interaction with the system” in order to achieve the above desired outcomes?

Wang *et al.* (2012) looked at factors that influence learning satisfaction, student learning outcomes and performance. The outcome of the study indicated that incorporation of technology should be such that it complements, and is simultaneously in alignment with, teaching practises. The findings indicated that learning management systems have to be flexible in order to meet students’ and instructors’ needs and objectives. In this particular study, the ability to reconfigure the interface, the affordance to interact in different ways, and the ability to present content in different formats, are key in applying effective teaching practises and attaining desired outcomes and good student performance.

A study by Falahah and Rosmala (2011) based on three universities in Indonesia investigated usage of social networks in higher education institutions. The findings indicated that functionality and purpose of features played a significant role in the adoption of web-based learning. A similar study by Motighain, Hassanzadeh and Moghadam (2012), based on 20 instructors from two universities in Iran, assessed the influence of IS (information systems)-oriented, psychological and behavioural factors on instructors' adoption of web-based learning systems using an integrated model. The findings indicated that Perceived ease of use (PE), Perceived usefulness (PU) and system quality, all had a direct influence on the intension to use web-based system technologies. This suggests that the applications need to meet the intended purpose and be in alignment with users' objectives.

2.5 Facilitating Inquiry Based Learning (IBL) on web-based applications

According to Kutar, Griffiths and Wood (2015), Inquiry Based Learning (IBL) promotes an environment that encourages students to take responsibility for their own learning through a process of self-directed inquiry or research, which inspires deep and reflective learning during knowledge discovery, thereby developing critical and creative skills. A critical thinker is able to find meaning and express it from different perspectives and interpret, analyse, evaluate and infer information in a logical manner. In addition, a strong critical student is able to express their own understanding and explain how it was reached. Creative thinkers are able to explore ideas and find more than one correct answer (Emanuel, Challons-Lipton 2012).

In an IBL environment educators take the role of facilitators rather than deliverers of information as facts, and subsequently students and educators have constructive engagements. Students are expected to raise questions and solve problems in a systematic way during the analysis of collected data (Chu 2014). This concurs with Rodriguez-Triana *et al*. (2015) who state that the main goal of IBL is to encourage students to develop their own line of questioning and to consider the validity of their responses by taking into account their own hypothesis, performed experiments, and their reflection on past events and observations.

The study conducted by Chu (2014) illustrated how the integration of social media platforms with collaborative teaching, influences the development of core competencies and skilful writing and communicating. In addition, the study established that IBL, in conjunction with social media platforms such as wiki, plays a fundamental role in the development and nurturing of soft skills, information, media and technological skills. Students found the incorporation of wiki to have improved learning experiences, encouraged interaction, and afforded the ability to complete tasks anywhere.

A study by Kutar *et al.* (2015) investigated the effects of incorporating information technology in encouraging creativity in the learning process. The motivation of using IBL, using an innovative approach, was to enhance and develop cognitive skills through engaged studying, deeper learning and taking ownership of students' own learning. The aim of the study was to encourage students to adopt a range of technologies to accomplish their work. The presentation of modules was redesigned in order to encourage interaction and collaboration whilst taking into consideration the objectives of the modules. The results indicated that the technologies afforded the students an opportunity to be creative and this was attributed to their flexibility and the systematic scaffolding of the learning process which they afforded.

Another study conducted by Neville *et al*. (2013) investigated whether social network sites have the ability to encourage the application of acquired knowledge proactively and practically in an educational sphere. The findings indicated that social network sites do have the ability to enhance and develop skillsets attained in traditional learning environments. In addition, these sites have the capability of enhancing insight into a particular domain through collaboration, and they give students an opportunity to connect with experts. Feedback is quick thus affording students the advantage of taking available opportunities.

A study by Mikroyannidis (2014) demonstrated, using the web based project weSPOT linked to different social media sites, that students were stimulated to reach optimal inquiry levels by selecting appropriate IBL models. This is also apparent in a study by Kong and Song (2014), where an approach was adopted that defined the core principals of teaching and learning. A guided IBL model was developed and implemented with the intention of increasing domain knowledge and fostering inquiry skills. The model incorporated an experimental design and observation. A social platform, Edmodo, was

used as a means of extending discussions, stimulating collaborative knowledge and deeper learning beyond class time. The results indicated that the participants had been afforded an opportunity to reflect on, and monitor, their performance, and to revisit strategies in their quest for developing cognitive skills. Students displayed the ability to reflect on different perspectives through enquiry and this was evident in the way projects were completed. In addition, students displayed a deeper understanding of domain knowledge and critical thinking skills were advanced as students strove to complete projects collectively.

In a similar study at the University of Australia, in a quest to retain biology students and assist students to master the subject, Thalluri and Penman (2014) investigated how educators at the University improved learning experiences. Educators acknowledged poor basic foundational knowledge as one of the challenges that contributed to failing biology. They also hoped to minimize the fear of taking up the course as students considered it difficult to master. The “Thalluri-Penman model”, a student-focused and interactive framework for teaching and learning health sciences, was adopted. The model was composed of many features such as IBL, and it identified relevant empowering and improving learning experiences. IBL was considered as student-centred, with the ability to develop problem solving skills. In addition, a variety of information technologies were incorporated as a means to enhance and improve learning experience whilst increasing domain knowledge and fostering inquiry skills. It is interesting to note that the social site Facebook was identified as the best option for continued engagement and active learning. A survey, consisting of a 25-item Likert scale and open-ended questionnaire, was conducted amongst seventeen 2nd year students at the end of the course. The findings showed that “Facebook provided students many opportunities for learning” (100%). Facebook also assisted students’ learning about the topics (90%), helped them direct their own learning (80%), and enhanced understanding of disease processes (80%). All students maintained that it was an innovative (100%) and most that it was an effective (80%) way to learn. It increased students’ interest in the subject (100%), resulting in their being well engaged with the course content (80%). The sample might be small, however, the results are strongly in favour of the value of Facebook as a learning tool in this instance. Educators might therefore be inclined to recognize such developments and their possible potential.

2.6 The role of educators in successfully promoting enquiry-based learning through social media

Traditionally teachers were seen as deliverers of information and students as passive recipients, and it is still the case that students in secondary schools and universities seldom take an active role in their own learning, seeing the mentoring part as exclusively for the teachers (Mikroyannidis *et al.* 2013). However, according to Roehl *et al.* (2013), if educators intend to instil understanding of information, rather than allowing the memorization of information and facts, active and constructive learning should be adopted. Further, the culture of spoon-feeding, memorizing content and passive learning inhibits students from being critical and creative thinkers, subsequently causing failure to retain, apply and articulate what has been learned. This concurs with Emanuel *et al*. (2012) who support the incorporation of instructional strategies that favour the development of critical and creative skills as opposed to learning limitations such as the over-reliance on spoon-feeding, memorization, course scope, attendance score and credits. Therefore, strategically incorporating enhancing methods such as IBL would enhance traditional teaching and learning.

One of the objectives of an educator is to create a conducive environment that will perpetuate meaningful learning through the development of critical and creative skills (Blaschke 2014). According to Sie *et al.(*2013), there is a correlation between creativity and innovation. Further, the connecting of the right peers in a network leads to more creativity. Therefore, learners should be encouraged to engage in order to develop soft skills: “Student engagement is a process and a product that is experienced on a continuum and results from the synergistic interaction between motivation and active learning” (Barkley 2010:8). Hou (2014) established that a community of learners that work together on matters of engagement and collaboration are likely to develop deeper learning and thinking skills. In addition, if trust and confidence is prevalent amongst students their ability and potential is further promoted, which is likely to increase deeper understanding of domain knowledge and a greater grasp of content.

However, the success of building a virtual learning community demands that the learning process be well explained and understood. In addition, the proper managing of mobile social presences via social media is equally important in the quest for building learning communities (Chuang 2016). This is in alignment with the findings of Haworth

(2016) who states that social media as a self-directed learning tool can be a means by which learners are able to track, organise, direct and manage their own learning. However, in order for learners to get to that point, they need to first understand teaching principles, learning processes and the assessment adopted for evaluation one's learning. Haworth (2016) further states that educators need to take into consideration challenges regarding cognitive learning before the introduction of social platforms.

A study conducted by Blaschke (2014) explored the incorporation of social media (Google Docs, Diigo, mind mapping, and e-portfolio software) in promoting cognitive and meta-cognitive development in an undergraduate online course. The study was conducted at the University of Maryland, University College and involved 131 students over a period of six terms. The findings indicated that students perceived the inclusion of social media, in conjunction with unique learning activities that promoted self-reflection, information discovery and collaborative information creation, as influencing the development of effective interactive skills. Apparently, the e-portfolio/learning journal Google Docs, and mind map tools, were the most effective. According to the findings students showed competence in the usage of Google Docs (69.5%), blogs (64.2%), Twitter (62.6%), mind-maps (55.7%), wikis (54.9%) and Diigo (41.2%) respectively. Over 70% of the students believed that the approach helped in the construction of new knowledge, and allowed them to reflect on, and have a better understanding of, the course and their individual learning processes. The positive results were attributed to the following:

1. Monitoring students' ability to learn online, research skills and writing skills
2. The incorporation of learning activities that promote self-reflection, information discovery and collaborative information creation;
3. Assessing learner achievement and negotiating assessment processes;
4. Shifting from teacher-centred to learner-centeredness;
5. Giving students the freedom to choose topics and preferred social platforms.

It is worth mentioning that the positive outcomes were not as a result of the course design but of student autonomy, as students had the freedom to select platforms with which they were familiar and comfortable. Thus, the affordance to choose preferred media promoted higher levels of engagement. The study further suggests that the incorporation of social media should be in alignment with objectives and goals of the

learning activities. In addition, the study suggested that the following should be taken into consideration:

1. Privacy issues should be addressed;
2. Instructors must allocate time to monitor social media usage;
3. The activities should capacitate learners for the future, thus building capability.

Further, students received the necessary support and clear expectations were outlined. This is in alignment with Everson, Gundlach and Millers' (2013) findings that suggest that the usage of social sites in terms of engagement and collaboration did not take place simultaneously – requirements and expectation had to be revisited and explained further. According to Neville *et al.* (2013) the incorporation of social networks does pose challenges to most students, thus careful introduction and support to the students is key. In a separate study by Apostolovo (2013), social media was found to be a means by which teaching practises can be enhanced and improved, as well as a means of providing learning support to learners.

A similar study by Roehl *et al*. (2013) looked at how to engage millennial students through active learning strategies using the "flipped classroom model", in which students assume responsibilities for their own individual learning experiences by taking the lead. Educators use various technologies to provide content prepared for students prior to attending a lecture. In turn, students use the accessed content during classroom time to complete assignment tasks and collaborate in peer groups.

The findings suggest that the usage of technology innovatively has the ability of improving learning and teaching outcomes in this situation. Instructors are afforded the ability to address various styles of learning through the incorporation of collaborative technologies, thus attending to student needs. In addition, communication and connection between instructor and student are improved and it becomes easier to assess how students grasp content. Students are also afforded the opportunity to freely interact with content thus becoming aware of their learning styles and learning processes.

Roehl *et al*. (2013) further state that learning takes places when a student is able to apply an instruction to complete a task or an assignment. The noted outcomes are

improved knowledge and improved test scores. The study suggests that students experienced greater innovation and cooperation compared to students only exposed to traditional learning. Further, for the desired outcomes to manifest, clear expectations of what is required have to be outlined and proper application of information has to be presented as a way of verification. According to Roehl *et al*. (2013), such strategies require at least a month to be embraced and appreciated in terms of recognizing their value and contribution.

It is worth mentioning that not all students were happy with the radical transition that required group work to complete assignment activities. Some students preferred to work alone in completing assignment tasks. Roehl *et al*. (2013) further acknowledged that not all modules are suited for such learning strategies and the modification of content will depend on the technology used.

In another study by Everson *et al.* (2013) different social media sites were incorporated into an introductory statistics course to gauge whether these could develop statistical reasoning and thinking. Students were encouraged to share, critique, reflect and deliberate on articles that related to the course work. This method was found to encourage active learning and engagement and thus a higher order of learning was achieved. However, it is interesting to note that even teachers with a good understanding of IBL models, and who have the ability to apply them in different contexts and inquiry activities, will not guarantee the inquiry process taking place on the web. This is also evident in a study by Kong and Song (2014) based on a qualitative research methodology. The findings indicated that only a limited number of posts relating to science inquiry skills on the social platform, Edmodo, were present and this was attributed to inadequate support and encouragement from teachers. The studies suggest that students' behaviour towards learning is dependent on the implementation method, and on teacher involvement and participation.

The findings correlate to some degree with a study conducted by Blewett (2016) in South Africa in which a cyber-ethnography approach was used to observe how students learned using digital technologies. The main focus of the study was to observe how students created and shared content on a Facebook page. The ability to self-direct, reflect and develop critical and creative skills was a gradual process. In addition,

Facebook afforded students opportunities such as accessing, connecting and communicating. According to Blewett (2016), understanding how students learn using technological applications is important in establishing how these technologies can be implemented in a teaching environment in order to achieve the desired learning outcomes. Blewett also found that the introduction of technologies and the training of educators to use computers is not enough. Educators need a systematic approach that gives guidance on how to integrate and implement technologies in a learning environment. Hence, he developed the “Activating Classroom Teaching Model” which seeks to take advantage of the opportunities that technologies afford to students during learning, whilst developing creative and critical skills.

Another study by Jang (2015), investigated the impact of social media and collaboration technologies on learning experience and performance in higher education, and the outcomes again indicated an increase in domain knowledge and the development of soft skills. The success of the study was attributed to the design of teaching methods that focused on how to incorporate collaborative learning that facilitates the development of soft skills and domain knowledge acquisition. The study suggests that instructors have to be knowledgeable about what students know about the use of social networks and must be able to give advice and technical assistance. This concurs with Miljkovic *et al.’s* (2016) observation that the application of innovative technologies should be in conjunction with teaching strategies. Saidi (2014), also finds that one way of improving learning experiences is by encouraging student engagement through effective teaching methodologies, assessment practices and a conducive social environment. This is also in agreement with Conole (2016) who finds that the adoption of technologies in conjunction with best teaching practises brings about enhanced learning abilities and assured quality, therefore encouraging institutions to revisit their teaching practises and methods. According to Fırat, Altınpulluk, Kılınç and Büyük (2017) social media can be seen as a platform from which students can receive great benefits, such as:

1. Academic success;
2. Improved communication skills;
3. Instant support and guidance;
4. Improved ability to access useful information.

Further, the presentation and the dissemination of information in conjunction with learning technologies, in particular institutional pages, has to appeal to students (Firat *et al.* 2017).

Again a study by Callaghan (2012) assessed factors that affect behaviour and learning in social network sites in a school in the western region of Sydney. Ning, a social network application with tools similar to social sites was used. The study suggests that teacher involvement and presence on the network site motivated students to participate and complete tasks. Kimmerle , Moskaliuk ,Oeberst and Cress (2015) points out that educators need to be mindful that their requirements such as learning targets, grades and curriculum hold no bearing on learner behaviour in a learning community. These requirements are only seen as triggers into how learners behave. Therefore, in order to produce desired outcomes in terms of education objectives, the effects of the requirements must be in alignment with the operation processes and rules of the community.

A quasi experimental study done on campus, and with distance online students, by Oyarzun and Morrison (2013) investigated whether the implementation of a cooperative learning strategy would increase a sense of community in terms of cognitive or learner achievement, and social and teaching presence in online education courses. The study was premised on the understanding that distance online learners feel isolated. The study employed a group investigation strategy which embodies instructional strategies as a prerequisite of completing assignments in groups. Two units of study were presented as an individual treatment and as a cooperative treatment for both campus students and for online students. Further, the study sought to determine whether cooperative learning would increase learning satisfaction.

It was found that, in terms of assessing learners' achievement, there was no significant difference as both groups were able to achieve intended instructional outcomes regardless of instructional method. Thus, the prediction that cooperative learning treatment would increase cognitive, social and learning satisfaction had no basis with campus students as shown by the survey score. However, teaching and cognitive presence improved with campus students in favour of individual assignment treatment whilst social and cognitive presence showed an improvement with online students in

favour of cooperative treatment. Even though the findings suggest that a community of enquiry can be built online and ease the feeling of isolation amongst distant learners, the study suggests that cooperative learning had no effect on inquiry community development and the results indicated that there was no significant difference in satisfaction with either group in relation to cooperative learning. In addition, achievements in terms of prescribed outcomes did not affect online students. Thus, the cooperative learning strategy did not influence online students' achievement or satisfaction to any marked degree. According to Oyarzun *et al*. (2013), this could be attributed to the calibre of the learners, the effective deliverance of assignment instructions, or an indication that a more subtle breakdown of instructions during assignment development should have been used. In addition, the assignments could have been presented in a hierarchical format so that cognitive learning would have been progressive. However, the online students indicated that they were more satisfied with the cooperative treatment than with the individual treatment, whilst campus students were more satisfied with the individual treatment. It therefore appears from the findings both that campus students in this experiment still favoured more traditional teaching methods, and that the quality of the support provided by lecturers for online input may have made a significant difference.

2.7 Conclusion

This chapter has revealed views, findings and recommendations regarding the adoption of innovative strategic teaching and learning methodologies that promote cognitive skills through the use of technology. The review gives insights into how technological applications can be used as learning tools, while the characteristics that motivate learners to accept the usage of the applications were also visited. While the current study is based upon Facebook and the application of IBL specifically, the findings exposed the researcher to important fundamentals that are applicable to innovative technological methods regardless of the platform adopted in improving learning outcomes. The literature review further pointed to important factors that need to be taken into account during the application and development of online and social network-enabled courses in order for users to appreciate the end product. In addition, the review was able to give insight into educators' roles in developing soft skills and the facilitation of IBL on the web, and pointed out challenges as well as the positive elements that need to be taken into account

A literature review is not a series of summaries of research articles. Instead it is a synthesis of ideas from the literature, and its purpose is to answer a research question. Reading one author will not give the answer to a research question. But when you read many authors you can weigh and compare what they say in order to arrive at an informed answer

Chapter Three
Research Methodology

3.1 Introduction

This chapter gives a detailed description of the research methodology adopted for the study. A research methodology is a strategy employed by researchers in conducting and planning a research study. Its main function is to assist the researcher in serving the research purpose (Yazan 2015). A detailed research design, which is a framework that details the sequence of steps to be followed in order to achieve the aims and objectives of the study, is discussed. This chapter also discusses the research methods adopted and the rationale for selecting them. Further, the chapter gives a description of the target population and the sample size from which inferences could be made. In addition, the description of the type of data gathering tool and techniques used for the study are discussed, including how the data was analysed and the procedures followed.

3.2 Research Site

The research site was Oval International College, which is a private college based in Durban, KwaZulu-Natal. The institution caters for both local students and students coming from afar, mostly South Africans. The researcher was a lecturer in the Science and Technology Department. A case-study based on a particular group within the institution guided this study. The researcher administered a module to the students and this was used for the primary data collection. Data was collected from the students in one of the campus venues.

3.2.1 Student profile

The students were composed of young and vibrant students between the ages of 19 – 22 years. The majority did not achieve minimum entrance requirement for admission to University and most of the students were from a previously disadvantage background.

3.3 Research Design

A research design depicts a sequence of steps that are able to link empirical data in a logical manner to the initial question and to the conclusion of a research proposition. It

also provides an outline for interpreting research findings (Yin 1994) as cited in Yazan (2015). This concurs with (Ragin 1994) as cited in Flick (2018) who states that a research design is a plan of action for collecting data that will be able to answer a research question, from the minute of collection to the analysis phase.

According to Cheek (2012), a research design is a framework that adopts a systematic approach to the interrelated components that are involved in a research process. The components encompass the theoretical, methodological and ethical considerations of the study. Further, the assumptions or theoretical beliefs of the researcher, can provide a frame of reference that influences and shapes the research design, for instance a topic of interest, in particular in qualitative research. In addition, Cheek (2012) states that a research design assists a researcher in deciding on the composition of the study and how it will unfold. Thus the design gives direction as to what route is the most suitable for the study in order to achieve the set objectives. Lastly, the design also forms a basis for the researcher to consider what contribution the particular study will make to the field of interest.

A case study using a mixed method approach, was adopted for this research. The rationale was for the purpose of achieving a holistic overview and understanding the phenomenon, where the adoption of either a quantitative or qualitative approach in isolation would be insufficient.

3.3.1 Case studies

(Miriam 1998) as cited in Yazan (2015) explains that a case study is a holistic description of a phenomenon within specified parameters. Its distinct characteristics are its ability to draw on a particular situation, in order that it can achieve a clear description of the phenomenon and that it can reveal the phenomenon in greater depth, thus giving insight. This concurs with Yin (2014) who states that the strength of a case study lies in its ability to investigate a phenomenon within its context employing an empirical enquiry in order to get an in-depth understanding of its context. Further, it takes a holistic overview of all the relevant components of the study such as the research question, the proposition of the study, elements to be analysed and their linkage with the proposition. Lastly, it considers the criteria used to interpret the data.

The researcher chose to use a case study because of her interest in a particular group of 19 students from one class to whom she administered the module E-Commerce Fundamentals, which was part of their course. Thus, the researcher was closely associated and familiar with the context in which the phenomenon operated. The case study allowed the researcher to look at the phenomenon from all angles and get an overall rich picture. She wanted to determine how effective Facebook would prove in facilitating IBL. She was able to observe how learning took place on Facebook in terms of engagement and collaboration amongst the students.

3.3.2 Qualitative Research

According to Mcguirk *et al*. (2016), a qualitative research study seeks to understand the experiences encountered by people in a given reality through multiple points of reference, multiple interpretations and perspectives describing a specific reality. This concurs with (Higgins and Green 2008) as cited in Claydon (2015) who state that a qualitative research study is interpretative by nature and it normally adopts more than one kind of method in order to get multiple truths pertaining to the given reality of the study. Further, qualitative data is collected in circumstances where different perspectives and views exist that describe the nature of a particular system or reality. This is in alignment with Morgan (2017) who states that qualitative research is inductive in nature, where understanding of a reality begins by observing and then progresses through processes such as exploration and discovery in which a set of purposes are aligned to meaning and interpretations. Therefore, a qualitative study has the ability to examine a situation or a behaviour of people in depth and in detail (Morgan 2017).

3.3.3 Quantitative Research

A quantitative approach focuses on measurements, taking into cognizance the standardized measurement protocols that guide objective procedures and the separation of the researcher from the people within the study (Morgan 2017).

Quantitative research techniques afford researchers the ability to record, verify and present information in the form of numbers and to transfer data into computer programs for further processing that can produce meaningful and interpretative information (Neuman 2006 in Choy 2014).

According to Claydon (2015), a quantitative approach displays answers related to a certain reality using numerical data for the purpose of providing answers that are in close proximity to the truth, thus a true reflection of the given reality. Further, the advantage of using numerical statistics is in their ability to work effectively with limited information. In addition, they are able to adopt a systematic approach efficiently and attempt to provide accurate data in situations where data appears to be confusing. Quantitative data is also useful in establishing a correlation between variables and outputs (Choy 2014).

In order to participate in the IBL assignment activity and post their comments in relation to the activity, students were directed to the Facebook group which was created by the researcher, and which students were requested to join. The researcher employed NVivo, a qualitative data analysis tool, to identify applicable words used in response to questions posed to students related to the inquiry-based scenario on Facebook. The purpose was to assess whether there was an increase in domain understanding and higher order thinking. The study used closed-ended questionnaires as a form of data collection in which students selected statements that best described their opinions and experience regarding learning on Facebook. This assisted the researcher in getting an insight and in-depth understanding of views which differed amongst participants. In addition, the use of a closed-ended questionnaire made it easy to transform responses into a quantified format and easy to transfer it into a computer-readable format. The usage of quantitative techniques provided statistical frequencies of the students' perceptions on enquiry-based learning on Facebook. This information assisted the researcher in drawing conclusions and making recommendation as the presentation shed more light on the issues in a graphical and tabulated format. The researcher was able to compare and contrast the responses which broadened her insights. For instance, although 89% of the respondents indicated that learning with peers took place on Facebook and that it was easy to share and access information on Facebook, only 68% agreed that they were able to apply their own knowledge to solve a problem with their team mates. Further, only 42% of the respondents agreed that the form of learning challenged thinking capabilities and stretched their minds. Therefore, the numerical presentation of data gave a broader perspective of how effective the initiative was and allowed for the consideration of some of the hurdles that clearly existed.

3.3.4 Mixed methods

Souto *et al.* (2014) have explained that a mixed method approach relies on the combination of the strengths of both quantitative and qualitative methods, thereby allowing the possibility of making informed conclusions based on the inferences drawn by both methods, where the development of understanding would be incomplete if either method was used in isolation (Jonson *et al.* 2013) as cited in Agerfalk (2013). This concurs with (Mingers 2001) as cited in Agerfalk (2013) who argues that in order to get the overall picture of a social phenomenon it is fundamental that the objective, subjective and inter-subjective perspectives be taken into account, and that this can be achieved through the use of both qualitative and quantitative techniques as neither can provide the same insight. He further states that the key to this approach is the ability to maximize a strategy that will facilitate high quality inferences.

The adoption of mixed methods afforded the researcher the ability to classify and categorize responses and interpretations of qualitative findings into quantifiable dimensions by employing a quantitative approach. Hence, the 19 responses of the students based on the 26 questions of the questionnaire were classified and categorized using a graphical and table format. Therefore, the transferring of qualitative data into quantifiable dimensions helped the researcher to grasp the quantitative results and the qualitative data thus contributing to understanding of the research problem. The combination of both methods allowed the researcher to identify differences and similarities in findings, thus giving more understanding of the study from different angles, which enabled a better understanding and the attainment of a richer picture. For instance, the researcher was able to easily establish where participants shared the same view and where there was divergence. This is referred to as ‘triangulation’ (Jonson *et al.* 2013 in Agerfalk 2013). The approach also assisted in clarifying the results of one method, the methods complemented each other. Therefore, the numeric presentation of qualitative data helped in clarifying the stance of the participants on certain perspectives based on the number of responses regarding a particular question. This is in accordance with Agerfalk (2013) who has established that the strength of a mixed method approach is in its ability to evaluate a social phenomenon holistically. In addition, the usage of both approaches in participative interaction provides complete

understanding of the different rationalities that are focal point in terms of the social fabric and its technicalities.

3.4 Research Problem and aims

According to Cheek (2012) the aim and objectives of a research study concentrate on the focal point of the study and what it hopes to achieve. In addition, the objectives and aims serve as a guideline in identifying the appropriate research methods and data gathering techniques. The methods must be congruent with the aim and objectives of the study. For instance, the data collecting technique must be able to link back to what the research hopes to achieve as outlined by the aim and objectives. This section is therefore a reflection, in more detail, of the aim and objectives discussed in Chapter 1, and a reminder of the purpose of this study, ensuring that the researcher had not been side tracked from the focal point.

As discussed above, traditionally students are perceived to have been conditioned to a spoon-feeding approach, and it is generally recognized that educators in higher education institutions continue in this vane, and so help to perpetuate this perception (Blane, 2015). According to Roehl *et al*. (2013) students are therefore often unable to display initiative and lack problem-solving skills, and if educators intend to instil understanding of information rather than allowing the memorization of information and facts, then more active and constructive learning should be adopted. There is insufficient usage of learning mediums that encourage the development of cognitive skills and discourage reliance on spoon feeding and memorization amongst students (Roehl *et al.* 2013). This study therefore identified Facebook as a potential instrument that can be adopted and used as an innovative learning medium to help to rectify this situation.

3.4.1 Aim

The study aimed at determining whether IBL could be facilitated on Facebook, the social network site, thereby providing an alternative medium for encouraging creative and critical thinking. The researcher wanted to examine the effects of the incorporation of inquiry-based learning on Facebook and establish its impact on students' domain knowledge and inquiry-based learning skills.

3.4.2 Objectives

The following specific objectives served as points of reference in the attainment of the aim of the study:

- To determine an appropriate IBL model approach utilizing technology;
- To explore the level of usage of Facebook by these students;
- To determine whether students can access learning material via Facebook;
- To create an IBL “classroom” environment on Facebook;
- To assess any improvement of understanding of learning material and the development of higher order thinking skills achieved with the use of IBL on Facebook.

The researcher opted to use questionnaires as the data gathering instruments. The content and structure of the questionnaire were based on, and related to, the broader research question, taking into account what was being examined and investigated (Flick 2018). Therefore, the research question and its sub-questions served as the catalyst in ensuring that all critical points were taken into consideration.

3.4.3 Question:

Will using Facebook as a tool to facilitate IBL result in an improvement of students’ ability to think critically and solve problems?

Research sub-questions:

- Which IBL model would be the appropriate approach?
- To what level do these students use Facebook?
- Can these students access learning material via Facebook?
- Can an IBL “classroom” environment be created on Facebook?
- Can this intervention improve students’ understanding of the learning material and lead to the development of higher order thinking skills?

3.5 Target Population

According to Alvi (2016) a target population refers to a set of members who meet specific criteria required for the research investigation. Therefore, the results of the investigation apply to them, thus the results make inferences concerning them.

3.5.1 Sample

The study selected a purposive sample. According to (Patton 2015) as cited in Gentles *et al.* (2015) purposeful sampling is appropriate in a case study investigation. A purposeful sample has notable strengths as it has the ability to zoom in and select rich informative cases that reveal insightful details pertaining to the sample in a systematic way. The researcher purposefully selected the whole class to be the sample of the study –19 students in total. The researcher was responsible for administering the E-Commerce Fundamentals module to these students. Further, the power and logic of selecting a purposeful sample lies in its ability to bring forth rich in-depth information (Gentles *et al.* 2015).

The sample size for this study was based on students at Oval International in Durban, KZN:

- 1st year BSc in Information Technology students
- Attending E-Commerce Fundamentals as part of their course
- 19 students between the ages of 19 – 22 years

3.6 Data gathering technique

Data gathering is a process that involves the collection of data from participants in a research project. In selecting a data gathering technique researchers are guided by the objectives of the study, readily available and alternative information sources, the context of the reality of the study, and its culture and ethical considerations (Mcguirk *et al.* 2016).

3.6.1 A problem inquiry scenario

In order to assess whether there was an improvement in understanding of domain knowledge, a problem inquiry scenario was used. According to Bradfield, Cairns and George (2015) a problem inquiry scenario has the ability to tackle complex issues,

where there is no right or wrong answer that supersedes a given answer. It encourages a trans-disciplinary approach where teaching and learning is organized around the construction of meaning in a social context. In addition, it encourages learning that requires engagement for further understanding on a broader level such as an economical, societal and ecological context.

The problem inquiry scenario was based on a learning unit from the E-Commerce Fundamentals module, guided by a lesson plan and objectives of intended outcomes, using an IBL model (See Appendix F). The scenario was administered on Facebook, for further engagement and collaboration beyond the limited classroom time. A period of a week was allocated for this exercise.

3.7 Data analysis

3.7.1 NVivo

In this study, for the purpose of assessing whether an increase in domain knowledge was established on Facebook, a software computer tool, NVivo, was adopted, for the purpose of data analysis. NVivo is specifically a qualitative data analysis tool. It affords researchers the ability to manage data by allowing increased focus on ways of examining recorded data. It has the ability to classify and manipulate data into themes. In addition, Nvivo can display the themes in different formats (Bazeley *et al.* 2013).

Nvivo was employed to identify words that were used to answer the question in relation to the scenario. Therefore, a question was posed to the students who were expected to discuss their reasoning in tackling the given question. The choice of words was expected to show underlying understanding of the concepts to the learning unit and the ability of students to apply the words in the context of the scenario, thus showing an ability to apply knowledge in a way that showed understanding. Hence, Nvivo picked the words and presented the words in a graphical format, with a weighted average percentage for each word. Further, the scenarios were based on marketing models and principals, hence students were not expected to deviate from them if they understood them. Therefore, the researcher expected them to use known specific words. This helped the researcher determine whether the students' cognitive capacity was increased and whether their grasp of the content improved.

3.7.2 Questionnaires

The research study opted to use questionnaires for further data collection purposes. A questionnaire is a document that has a series of questions that are either open-ended or closed-ended. It is used to invite participants to respond to the questions (Rowley 2014). This is in alignment with Mcguirk *et al.* (2016) who state that a questionnaire is a technique utilized in research studies for collecting data from data generating sources and analysis. DeLyser *et al.*(2010) as cited in Mcguirk *et al.* (2016) further explain that questionnaires have the ability to afford a researcher the ability to quantify findings and bring forth insights and understanding of certain behaviours and patterns within complex realities and aspects that influence and shape experiences. According to Mcguirk *et al.* (2016:3) insights revealed by questionnaires are in relation to "processes, values, attitudes and interpretations" of the particular phenomenon. In addition, questionnaires' content has the ability to link back to the research question and unfold in-depth understanding of critical aspects such as "relevant processes, concepts and relationships" (Mcguirk *et al.*2016:4).

3.7.3 Questionnaire design

During the design process of the questionnaire the researcher was guided by literature that described the proper construction of questions and also the appropriate selection of words that would be simple to understand for the participants and help the researcher achieve her objectives. According to (Babbie 2013) in Mcguirk *et al.* (2016) the choice of words needs to be simple and beyond the wording, clarity, sequence and logic is important for the success of obtaining data and for understanding the purpose of the research. Further, it is important to understand the jargon and vernacular of the participants. The researcher also used the approach and similar choice of wording used by Li, Helou and Gillet (2012) in constructing a questionnaire using a different study as a guide. The structure used simple English and the questioning followed a logical systematic approach that was clear.

The study used closed-ended questions as a tool for collecting data. A questionnaire that prompted the participants (students) to select a point of scale which was used as an indication of the intensity with which an opinion or attitude was held regarding aspects of Facebook experience as a learning platform. Therefore, students indicated how strongly they agreed or disagreed with a series of statements that best described

their own experience (Rowley 2014). This assisted the researcher in not only determining attitudes and opinions but also afforded the researcher the opportunity to identify and classify the logic of the different sets of responses, identifying similarity and differences, and their relation to components that shape a social reality. It was also easy to code and analyze responses using the closed-ended questionnaires. [see Appendix E].

3.7.4 Questionnaire distribution

The distribution of the documents took place in the venue in which the module, E-Commerce Fundamentals, was administered by the researcher. This was done before the beginning of the lecture. Two sets of documents were given to the participants. One document was a consent form that participants had to read and sign as an indication of understanding the purpose of the study and recording that they participated of their own free will. [see Appendix C]. The other document was the questionnaire. In a bid to ensure that the students understood each question, before the commencement of data collection the researcher went through the questionnaire to ensure that questions were clear to everyone for appropriate answering. Further, the researcher was present during data collection and indicated to the participants they could ask for clarity at any point and the questions were simple and took into consideration the level of the students and their vernacular.

Upon completion the participants handed over the documents by placing them back into a box that was provided. The students were given 45 minutes to complete the forms.

3.7.5 Pilot study

A pilot study is a process that involves pretesting of the tool employed in collecting data. Pilot testing is valuable in the sense that it is able to point out discrepancies and the weakness in the instrument of choice. It affords the researcher the ability to evaluate the instrument in terms of its appropriateness and efficiency in collecting data (Plowright 2011). It also serves as a guide in ensuring that questions are clear and on point and not confusing participants. Hence, a pilot study minimizes the possibility of unanswered questions due to lack of clarity (Gray 2014).

However, in this study a pilot study was not done for either the qualitative or the quantitative data collection, as it was not possible to select a few students from the class

prior to the main study and give them the exercise in advance, and the questionnaire relied upon the experience of the prior exercise. The decision was intentional.

The researcher wanted to get an authentic reaction from the respondents as the students had no prior online learning. These were first-year students who were accustomed to traditional learning. The students were also getting to know each other as they came from different high schools and solid relationships were not yet formed. It is worth noting that the scenario conducted on Facebook was also an indirect attempt to assist students answer questions for an upcoming Assignment 1, for assessment marks. Therefore, the researcher attempted to give the shy and introverted members of the group an opportunity to express their views in a comfortable environment of their choice whilst monitoring cognitive improvement.

3.8 Limitations of the study

The study was a case study that was confined to a specific group of participants that was composed of only 19 students**.** The researcher acknowledges that the sample was not big for generalization purposes but it had the potential of giving insight and understanding to the particular context (Rowley 2014). Therefore, the findings could provide valuable insight to tertiary institutions operating in a similar context.

3.9 Ethical Considerations

Ethical concerns emerge as the researcher plans the research, seeks access to the organization and individuals to collect, analyze and report research data (Saunders *et al.* 2009). Plowright (2011) further states that participants need to know what the purpose of the study is all about. Thus, the researcher informed the participants of the purpose and objective of conducting the study. This was done on two separate occasions. The first time the researcher alerted the students of the research initiation [see Appendix A and Appendix B], and the second time was on the day of data collection, when the questionnaires were distributed. The researcher further stated that it was not a compulsory task, and that it was a voluntary act with no penalties attachments. In addition, participants were informed that they could withdraw at any point if they felt uncomfortable. Participants were further assured that their information was only for research purposes and that there was no monetary value to be gained. In

addition, the participants were also informed that their identity would be protected at all times and their responses will be kept as confidential.

Written permission to conduct the study was obtained from the Chief Director of Oval International, Durban. Students were also given a consent form, and they were requested to sign as an indication that they understood the purpose of the study and participated voluntarily. This is in alignment with Plowright (2011) who states that participants need to be informed of the particulars of the study before engaging with it so that they can make an informed decision. Upon signing students placed the consent forms in a box that was provided by the researcher.

In order to encourage the usage of Facebook for learning, a reward of airtime was offered to the top three participants in terms of the number of postings and number of "Likes" received. According to Miljkovic *et al.* (2016) rewarding of students does encourage participation and involvement.

3.10 Conclusion

The chapter demonstrated how the research methodology was conducted and its composition was outlined and explained. A presentation of the research design revealed its components and what guided it. The method chosen for the research and its selected techniques were clarified and the aim and objectives of the study were re-visited. Further, the location, population and sample size and the procedure followed in collecting data were discussed. Lastly, the chapter touched on the research limitations and ethical considerations. The following chapter covers data analysis and interpretations of the findings of the study.

Chapter Four
Data Analysis

4.1 Introduction

The previous chapter described the research methodology and data collection process. Raw data collected and processed must be analyzed in order to produce meaning (Yazan 2015). This chapter starts by describing how data were evaluated to prove its validity in ensuring internal consistency of variables. According to Rubin and Babbie (2010), establishing the validity and reliability of data measuring instruments is crucial to scientific research. Data were exported to, and analysed, using the SPSS program. In addition, NVivo, a qualitative data analysis tool, was used to assess students' qualitative responses to two questions. Histogram structures and bar charts are used to present and explain the results**.**

4.1.1 Data Reliability

Cronbach's Alpha evaluates the internal consistency of a questionnaire with multiple Likert scale items (Pesaran and Smith 2016). The aim for capturing the data was to measure the perceived experience of learning on Facebook. Therefore, a questionnaire was the research tool chosen to collect data that would be used to measure the perception of participants of learning on Facebook. Furthermore, the questionnaire aimed at evaluating Facebook's suitability for educational learning, for collaborative learning, for promoting critical and creative thinking, and as a smart way of learning.

Items of a questionnaire are expected to tap into the same concept, therefore they need to produce similar output (Babbie 2013) in Mcguirk *et al.* (2016). All items in the questionnaire were responded to on a Likert-scale, where 1= strongly agree, 2=agree, 3=neutral, 4=disagree and 5=strongly disagree. The scale in the questionnaire selected by a respondent was an indication of the perceived value by the respondent. To determine whether the items in the questionnaire all reliably measured the same construct (perceived value), Cronbach's Alpha was calculated using the questionnaires completed by the 19 participants. The collected data were used as input into SPSS for reliability analysis on the perceived value in relation to the 26 Items of the questionnaire;

Cronbach's Alpha showed the questionnaire to reach an acceptable reliability of α =0.8, as can be seen in Table 4.1.

Table 4-1 Reliability Statistics from SPSS

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.882	.874	26

4.1.2 Validity

Validity is the degree to which the study accurately answers the questions it intends to answer by reducing the possibility of getting wrong answers (Saunders, Lewis and Thornhill 2009). Therefore, the researcher sought to ensure that the study measured what it intended to investigate by employing an applicable instrument for interpreting the analysed data. Statistical analysis was used for this study, in conjunction with NVivo, which was used to analyze the qualitative data, to confirm findings, thereby improving the validity of the findings.

4.2 Data Interpretation

Mean and Standard Deviation of the Normal distribution curve of the data set were used to analyze data. The Mean $\dot{x}$, which is the middle focal point of the curve, which represents the average of each variable item of data is used to calculate the Standard Deviation s. The Standard Deviation s, represents the dispersion of the data within the range of the Mean on the curve (Ballman 1997). Therefore, Standard Deviation s, is the distance from the centre to the change of curvature of the curve points on curve. The values are shown in Table 4.2.

Table 4-2 Themes: Item statistics

Theme	Descriptive	Mean	Std. Deviation	N
	1.Easy to share and access information on Facebook	1.84	.602	19
1.Facebook suited for educational learning	2. Easy to learn on Facebook	2.84	1.385	19
	3. Learning takes place on Facebook	2.68	1.376	19
	4. Facebook tools are sufficient for learning	3.00	.943	19
	5. Enjoyed flexibility and Freedom while learning	2.21	1.032	19
	6. I understand the Learning unit better	2.42	1.071	19
	7. Views were appropriate for learning	2.84	.834	19
	8.The Initiative increased Interest in the learning unit	2.63	.955	19
	9. Facebook allows learning with peers	2.00	.667	19
2.Facebook encouraged collaborative learning	10. Facebook allows team learning	2.11	.809	19
	11. Peers inspired me and added value to learning	2.47	.841	19
	12. The initiative allowed sharing of understanding	1.74	.733	19
	13. Facebook allowed for other perspectives	2.42	.607	19
	14. I felt like a problem solving team mate	2.21	.787	19
3.Facebook allowed critical, and creative thinking	15. Application of knowledge was allowed	2.42	1.017	19
	16.This Learning allowed for reflection and rethinking	2.21	.713	19
	17. I questioned peers' views	2.42	.769	19
	18. Stretched me to think deeper	2.74	.933	19
	19.Experience motivated me to take ownership of my own learning	2.37	.831	19
	20. Facebook makes learning easier	2.79	1.228	19
	21.The initiative facilitated the development of other ways of learning	2.16	.688	19
	22.Thinking capabilities changed	2.89	.937	19
4.Facebook is a smart way of learning	23.This form of learning is effective	2.74	1.240	19
	24. Facebook is innovative	2.74	.991	19
	25.The form of learning links Life with creative learning	2.37	1.012	19
	26. I would recommend the initiative	2.63	1.165	19

Each of the themes as shown in Table 4.2 address one of the objectives of the study and is analyzed in terms of the objective it represents.

4.2.1 Theme1: Facebook, a tool suited for educational learning

According to Preece *et al.* (2015), an educational tool ought to assist students in achieving goals and to perform tasks with ease. To establish whether Facebook could be considered as an educational tool, eight categories were analysed: “Facebook allows the sharing and accessing of information”, “it is easy to learn on Facebook”, “learning takes place on Facebook”, “Facebook is sufficient for learning”, “enjoyed flexibility and freedom”, “understanding learning unit better”, “views appropriate for learning” and “interest in learning unit increased”. The diagram below is a combination of all the categories in relation to each other. It is obvious from the display that some categories show a similar behavior of pattern in comparison to their counterparts. Therefore, in order to establish meaning and more clarity the researcher has grouped the graphs accordingly. Thus, the subsequent diagrams below are a breakdown of the combined categories within this theme.

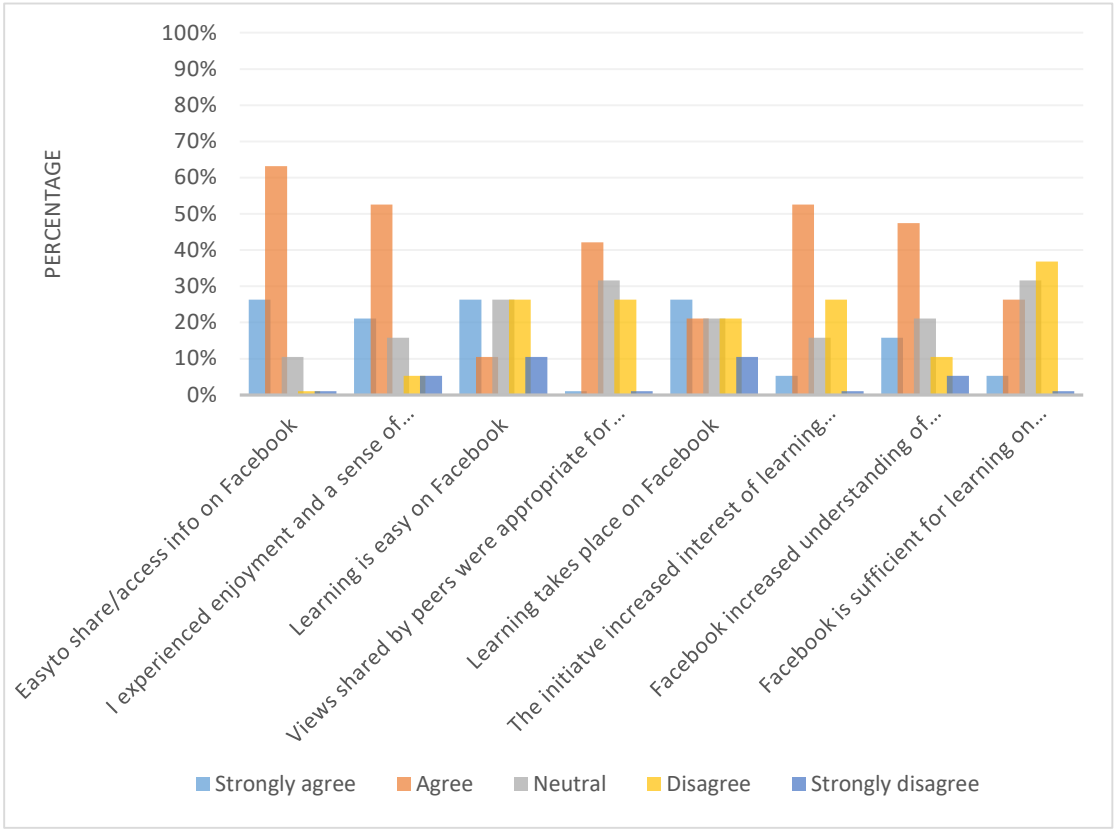

Figure 4-1 Facebook, a tool suited for educational learning

Figure 4.1 shows the results for Theme 1. Questions that produced similar results were subsequently grouped together (Figures 4.2, 4.3 and 4.4) to identify trends within Theme 1.

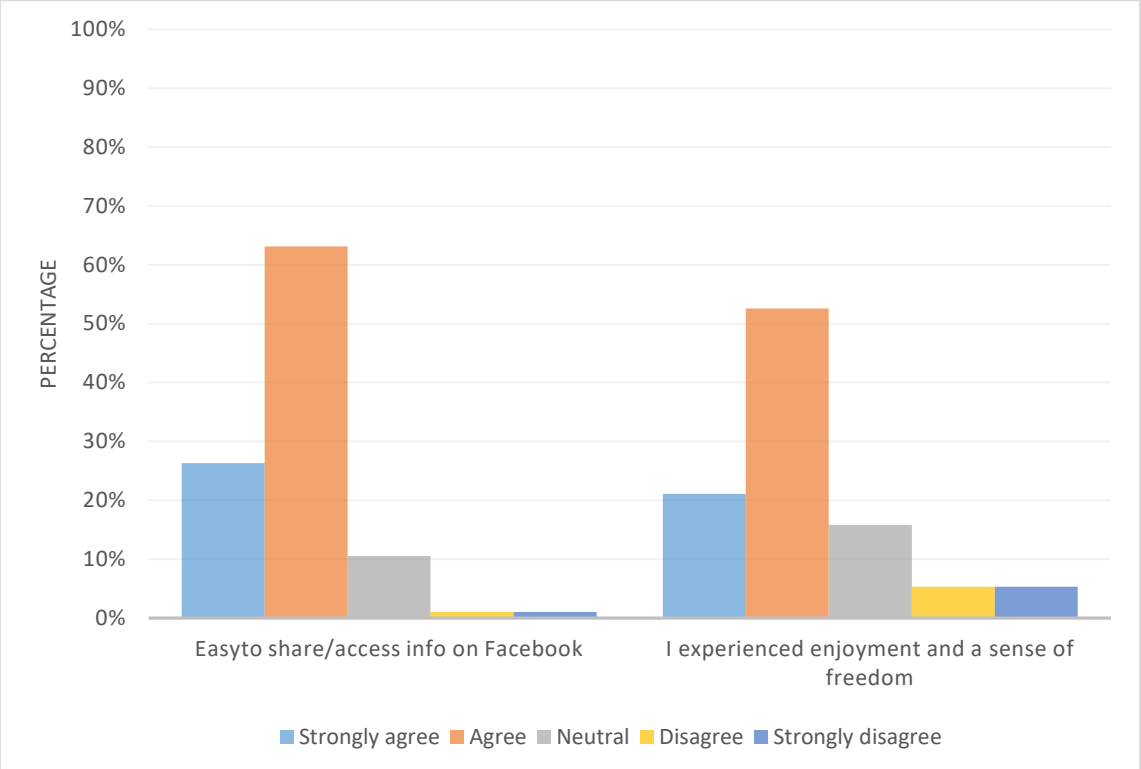

Figure 4-2 Facebook, a tool for educational learning

In Theme 1: Facebook, a tool suited for educational learning, the two categories, “Easy to share/access info on Facebook” and “I experienced enjoyment and a sense of freedom”, participants were clearly in agreement as depicted in figure 4.2. The responses to both statements indicate that participants enjoyed the experience and found it easy to share information.

According to Tang and Hew (2016), the inclusion of technological tools as a means of extending learning in a real time situation allows participants an opportunity to communicate with peers through sharing and accessing information. In response to “accessing and sharing information on Facebook, the results showed 5 (26.32%) strongly agreed that “it was easy to share and access information” whilst 12 (63.16%) agreed and only 2 (10.53%) gave a neutral response. An overwhelming majority 17 of 19 (89%) agreed that “it was easy to share and access information” on Facebook. This

was in alignment with Rowan-Kenyon(2016).The perception had a low SD (0.602), suggesting a consistent reaction.

The findings are in alignment with Erlandsson *et al*. (2016) that attest that social media promotes the sharing of information.

With reference to enjoying the experience, 4 (21.05%) strongly agreed whilst 10(52.63%) agreed that they "experienced enjoyment and a sense of freedom while learning on Facebook". Thus, 14 of 19 (73 %) were in agreement. This was in alignment with Miljkovic *et al.*'s (2016) statement that emotions have an effect on motivation in relation to computer interaction. According to Kimmerle (2015) such emotions are rewarding. 3(16%) gave a neutral response while only1(5%) disagreed and strongly disagreed. The perception had a low SD (1.032).

Looking at the second grouping of responses in Theme 1, responses to "Learning is easy on Facebook", "Views shared by peers were appropriate for learning" and "Learning takes place on Facebook", the following results are shown in Figure 4.3:

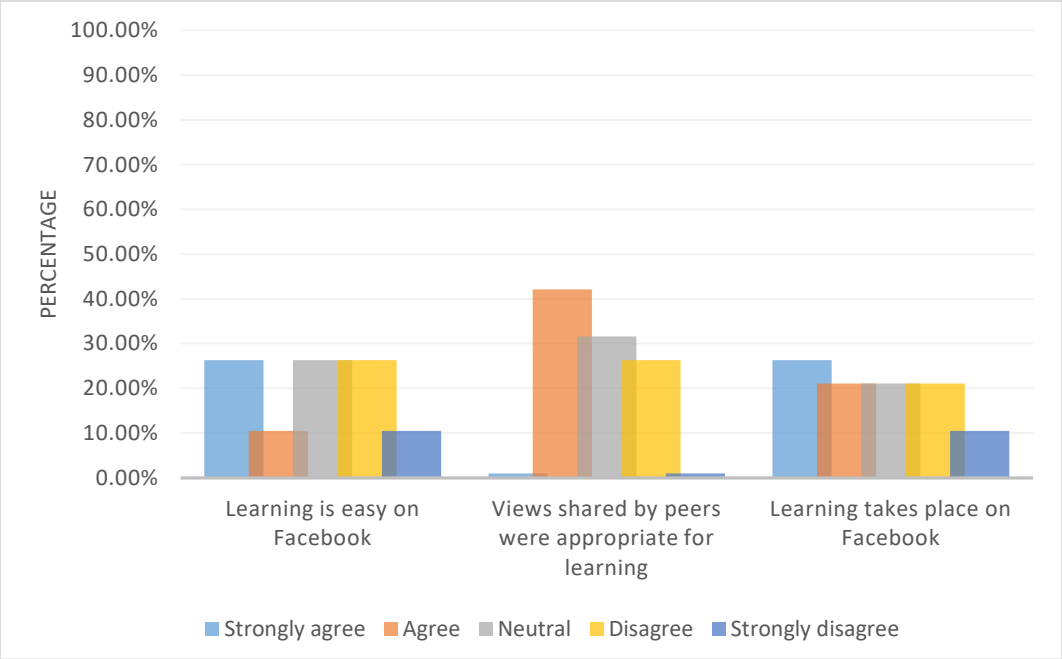

Figure 4-3 Facebook, a tool suited for educational learning

The responses to the above three depicted categories “Learning is easy on Facebook”, “Views shared by peers were appropriate for learning” and “Learning takes place on Facebook”, were more reserved and while some participants agreed, others did not.

The results show that 5 (26.32%) strongly agreed and only 2(10.53%) agreed that “it was easy to learn on Facebook”. 5 (26.32%) of respondents gave a neutral response, 5(26.32%) disagreed, whilst 2(10.53%) strongly disagreed. Therefore, only 7 of 19 (37%) respondents were in agreement with “Learning was easy on Facebook”. Thus, a notable observation, the number of respondents that found learning to be easy on Facebook was equivalent to those in disagreement with the statement “it was easy to learn on Facebook”. Therefore, in terms of whether it was easy to learn on Facebook, the reaction was conflicting. The perception had a low SD (1.315).

The results for the category “views shared by peers were appropriate and in alignment with learning”, show that only 8(42.11%) agreed whilst 7 of 19 (37%) disagreed, 6 (31.56%) gave a neutral response, and 5 (26.32%) respondents disagreed. Thus, only 8 of 19 (42%) found the views by peers appropriate and in alignment with learning. The SD in relation to the average, was low (0.834), an indication of a consistent reaction.

According to Jang (2015), students need to familiarize themselves with the learning tool before adopting it. In this case, it was the first time for students to use Facebook as a learning platform. It is also possible that the timeframe for the exercise was not sufficient to adopt, adjust and embrace Facebook as a learning platform. The introduction of online tools such as social networks as a learning strategy require at least a month to be embraced and recognized for adding value (Roehl *et a*l. 2013). This is in alignment with Tang *et al.* (2016), who point out that short-term studies are prone to novelty effects.

Therefore, it is no surprise that the results showed that only 5 (26.32%) strongly agreed whilst 4(21.05%) agreed that “learning takes place on Facebook”. 4(21.05%) gave a neutral response. 4(21.05%) disagreed and 2(10.53%) strongly disagreed. Thus, only 9 of 19 (47%), respondents agreed that learning took place on Facebook. The perception had a low SD (1.375).

The responses within Theme 1 to the categories “The initiative increased interest of the learning unit” and “Facebook increased understanding of the learning unit” and “Facebook was a sufficient tool for learning” are shown in Figure 4.4:

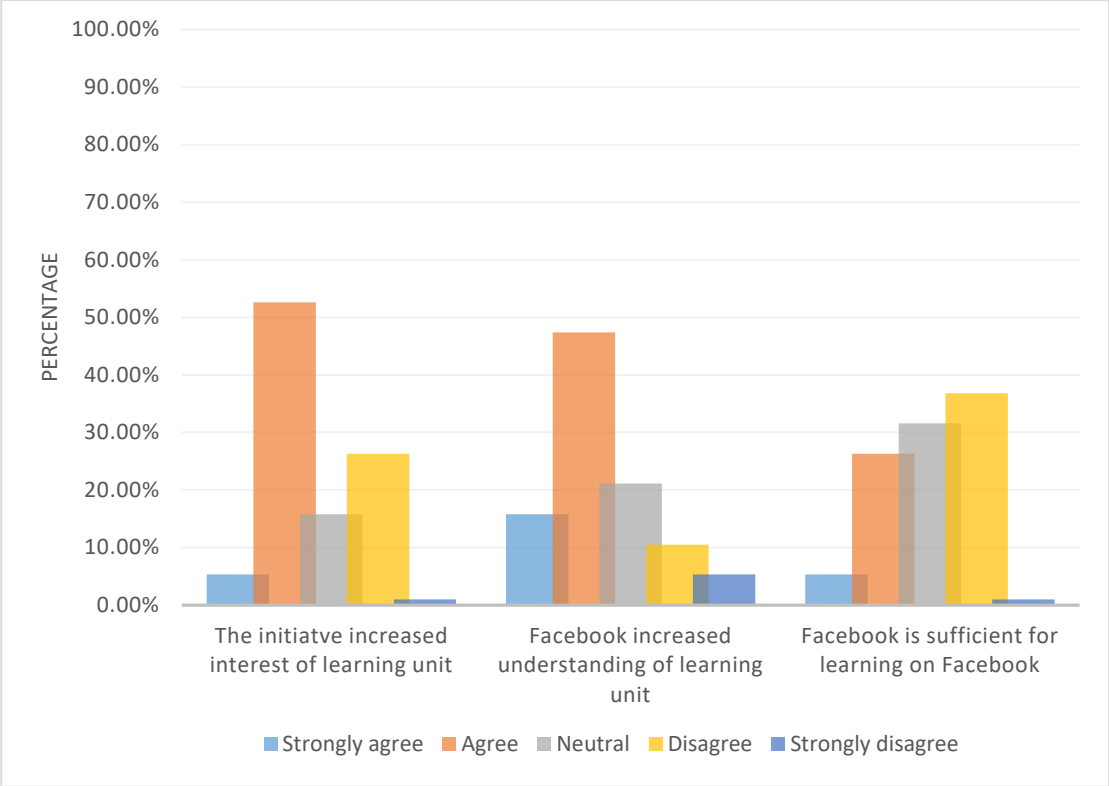

Figure 4-4 Facebook, a tool suited for educational learning

Responses to the statements depicted in Figure 4.4: “The initiative increased interest of the learning unit” and “Facebook increased understanding of the learning unit” both yielded results leaning towards agreement, while the response to “Facebook is sufficient for learning” clearly indicated that Facebook should only be considered as a supporting tool to learning.

The results show that 1(5.26%) strongly agreed whilst 10(52.63%) agreed that learning on Facebook “initiated an increased interest in the learning unit”.3 (15.79%) gave a neutral response, whilst 5(26.32%) disagreed that Facebook initiated an increased interest in the learning unit. Thus, 11of 19 (58%) agreed that an “interest in the learning unit” was evoked using Facebook as a learning platform. The results were also consistent, with a low SD (0.955), close to the average. Further, the results showed that 3(15.79%) strongly agreed whilst 9(47.37%) agreed that learning on “Facebook increased understanding of the Learning unit”. 4(10.8%) gave a neutral response, whilst 2(5.4%) disagreed and 1(5.26%) strongly disagreed. Therefore, 12 of 19 (63%) agreed that “understanding of the learning unit improved” through the usage of Facebook as a learning platform. The perception had a low SD (1.071). These two categories indeed

yielded results leaning towards agreement with the statements. The results suggest that social media has the potential of building intellectual curiosity (Tuzel and Hobbs 2017), colluding with Chuang (2016) that Facebook could play a meaningful role in informal learning. Therefore, Facebook as a learning tool has a positive impact.

By the same token, the results suggest that Facebook as a learning tool cannot operate in isolation, but can be adopted as a supporting tool. This is evident to the responses of the category “Facebook was a sufficient tool for learning”, only 6 (32%) agreed that 6 (32%) were neutral and 7 (37%) disagreed. The perception had quite a low SD (0.943), an indication of a consistent reaction.

The results of Theme 1 are in agreement with Preece *et al.* (2014), that an application can only be adopted for learning if found to be an easy tool for learning and its features enhance users’ activities (Rauniar *et al.* 2014). In this case, the possibility of adopting Facebook as an educational learning tool revealed interesting results. An overwhelming majority of the participants indicated that Facebook allowed them an opportunity to access and share information. Thus, participants were able to communicate, interact and engage with peers, supporting the notion that social platforms encourage interaction and accessibility to information (Rowan-Keynon 2016).. Therefore, Facebook allowed learning with peers. In addition, participants experienced flexibility and freedom, suggesting that the experience was rewarding. However, in terms of “It’s easy to learn on Facebook”, “Learning takes place on Facebook”, “Facebook is sufficient for learning” and “views were appropriate for learning” the results indicated otherwise, suggesting that students were not ready for an online platform. The results suggest that the researcher did not take into consideration challenges regarding learning on social networks (Harworth 2016).

4.2.2 Theme 2: Facebook allows collaborative learning

Participant responses to the statements grouped under Theme 2 are displayed in Figure 4.5. According to Chuang (2016) collaborative learning, supported by technology, improves interaction and teamwork thus promoting the sharing of knowledge and expertise amongst participants, however social presence is important in order to facilitate online learning. Therefore, students need to respect, co-operate and work with one another and the mode of learning should support learning with peers and promote team learning.

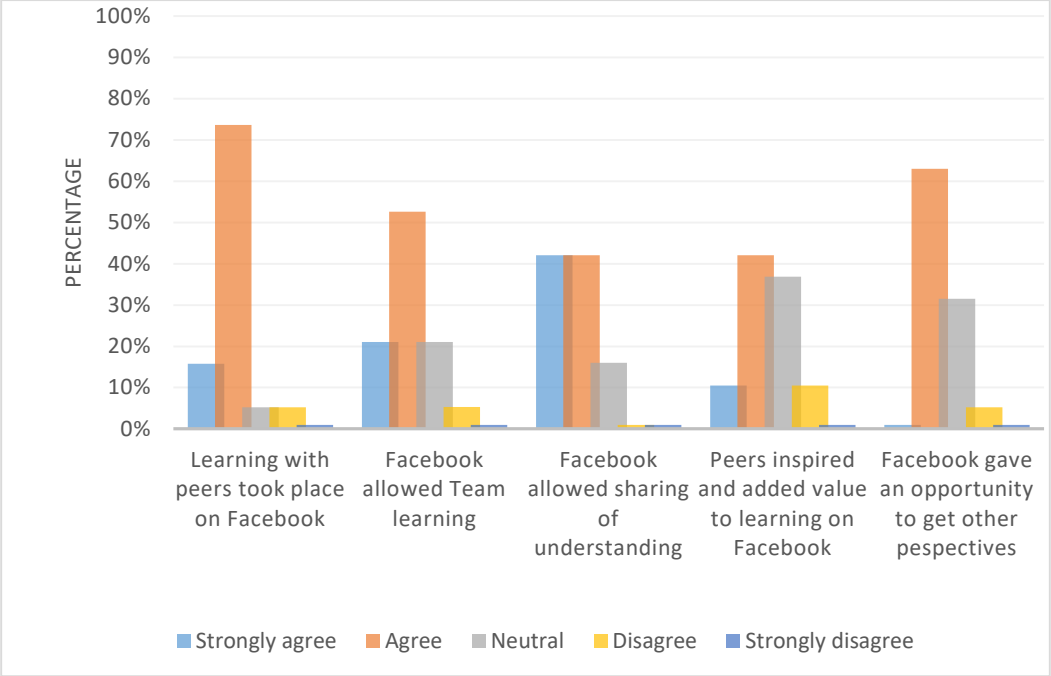

Figure 4-5 Facebook allows collaborative learning

Figure 4.5 is a combination of all the categories within the theme, Facebook allows collaborative learning: “Facebook allows learning with peers”, “Facebook allows team learning”, “Peers inspired and added value to learning”, “The initiative allowed sharing of understanding” and “Facebook allowed for other perspectives”.

A closer observation of the results suggests the responses in the statements paint a similar pattern, however, it is also obvious that some statements elicited a more matching pattern in comparison to the other statements. Thus, the statements with similar trends are grouped in figures 4.6 and 4.7. Therefore, the diagrams below are a breakdown of the combined categories in the diagram above, Figure 4.5.

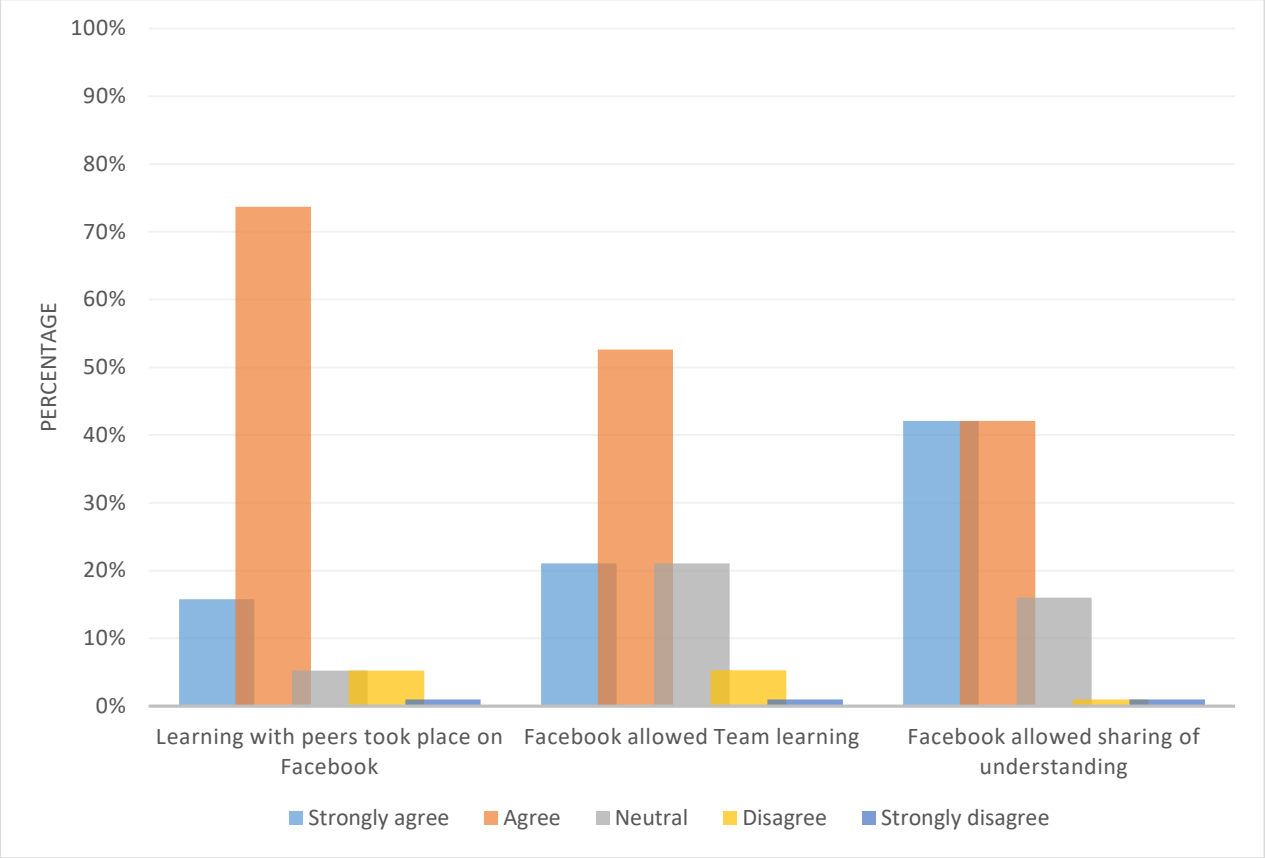

Figure 4-6 Facebook allows collaborative learning

The Figure 4.6 suggests a correlation of behaviour in responses to the categories "Learning with peers took place on Facebook", "Facebook allowed Team learning" and "Facebook allowed sharing of understanding". It is evident that a similar trend is apparent in these three categories within Theme 2: Facebook allows collaborative learning.

The results showed that 3 (15.79%) strongly agreed whilst 14(73.68%) agreed that Facebook allowed them to learn with peers and only 1(5.26%) gave a neutral response, whilst only 1(5.26%) disagreed. Thus,17 of 19 (89%) of the respondents agreed, "Learning with peers took place on Facebook". The results, suggest that the level of understanding increased through interaction with fellow peers. The perception had a low SD (0.667).

In addition, the results show that 4(21.05%) strongly agreed whilst 10(52.63%) agreed the initiative on Facebook allowed "Team-Learning".4(21.05%) gave a neutral response, whilst only 1(5.26%) respondent disagreed. Thus, an overwhelming majority of 14 of 19

(74%), respondents agreed that “team work” was established through the usage of Facebook as a learning platform.

Further, the results show that 8(42.11%) strongly agreed and 8(42.11%) agreed that the usage of Facebook as a learning platform “allowed sharing of understanding” while 3(8.1%) gave a neutral response. The majority of the respondents 16 of 19 (84%) of the respondents agreed that Facebook “allowed sharing of understanding”. It is interesting to note that none of the respondents were in disagreement. Thus, to a large degree, respondents were able to share understanding and therefore created knowledge together. The perception had a low SD (0.733). This coincides with Cochrane (2014), who claims that social platforms promote collaboration and engagement amongst participants. The perception had a low SD(0.809), consistent reaction .

The last two statements from Theme 2, shown in Figure 4.7, lean towards an agreement, although not as clearly defined as the previous statements, and collude with Chuang (2016), that technological tools can facilitate the distribution of knowledge. The results show that 2(10.53%) strongly agreed and 8(42.11%) agreed that their peers inspired and added value to learning on Facebook, which is marginally above 50%, however, 7 (36.84%) of the respondents, gave a neutral response, which may be interpreted as either positive or negative, whilst only 2(10.53%) respondents disagreed. Thus, it could be interpreted that 10 of 19 (63%) respondents leaned towards agreement that fellow “peers inspired them and added value” to their learning using Facebook, or it could be interpreted that 9 of 19 disagreed, suggesting that responses on whether students’ knowledge was increased or not were divided. The perception had a low SD (0.847).

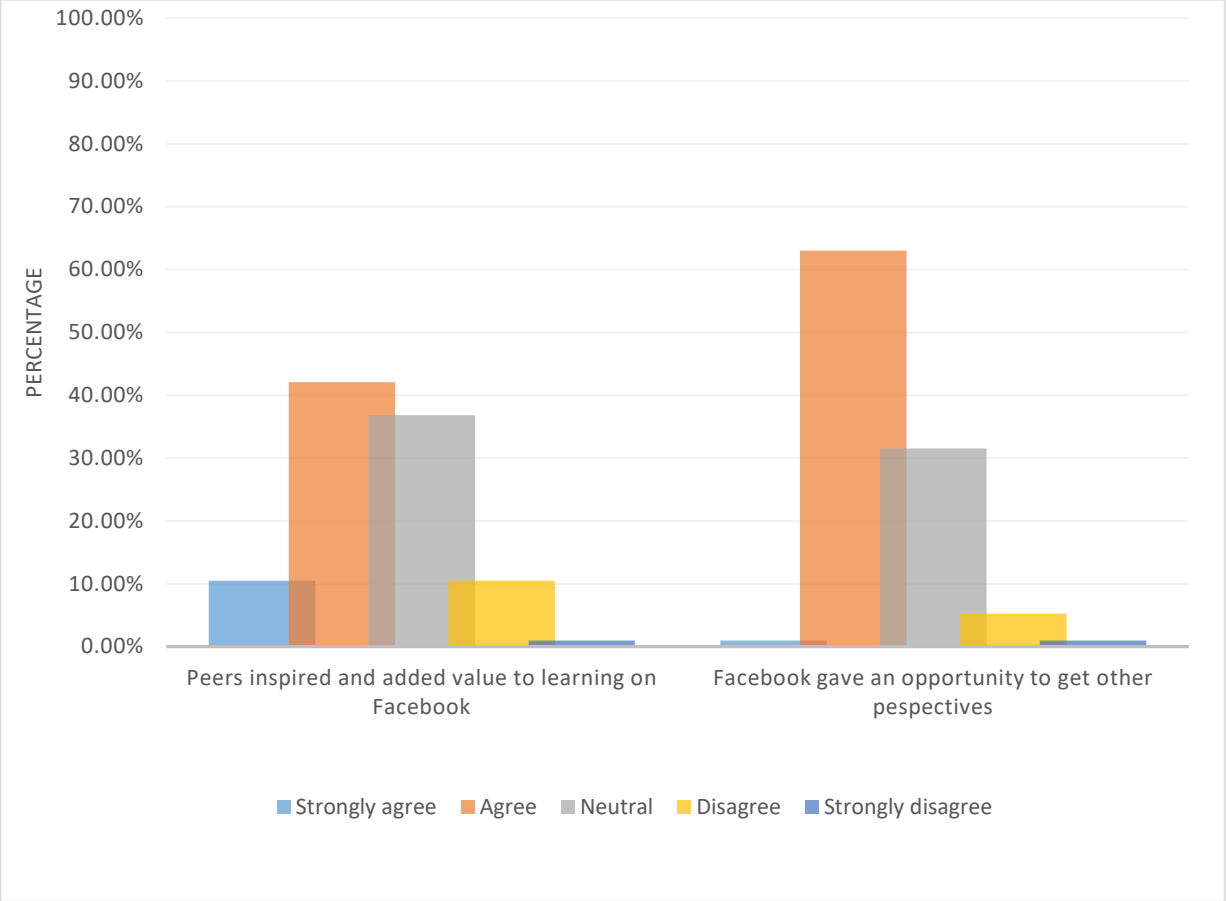

Figure 4-7 Facebook allows collaborative learning

The results also show 13(63%) agreed that learning on Facebook afforded "An opportunity to get other perspectives, thus improving understanding" whilst 6(31.56%) gave a neutral response and only 1(5.26%) respondent disagreed.

Therefore, the majority, 13 of 19(63%) respondents once again agreed that learning on Facebook affords an opportunity to get other perspectives thus improving understanding. This was an indication that students' domain knowledge and understanding was increased. The perception had a low SD (0.607).

The results in this section suggest that Facebook as a technological learning platform encouraged co-operation and allowed students to interact, engage and collaborate. In addition, the results suggest that to a relative degree the students found that the platform added value to their own learning through sharing.

4.2.3 Theme 3: Facebook allowed for critical and creative thinking

The purpose of the study was to establish whether IBL could be facilitated on Facebook. According to Kutar *et al*. (2015), IBL encourages learners to take responsibility for their own learning and ignites critical and creative thinking. Hence, the inclusion of these statements.

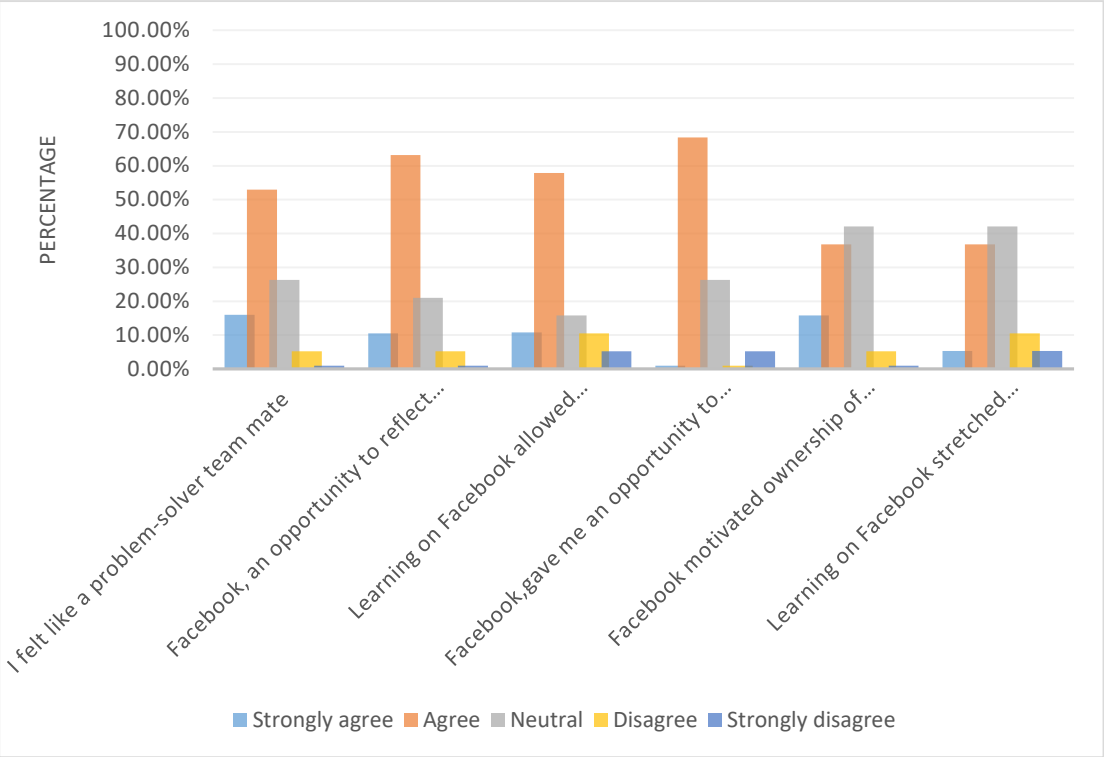

Figure 4-8 Facebook allowed critical and creative thinking

Figure 4.8 depicts Theme 3: Facebook allowed critical and creative thinking, with its categories" Facebook promotes problem solving with team mates "," Facebook promotes the application of knowledge", "Facebook allows for reflection and rethinking", "I was able to question views on Facebook", "I was stretched to think deeper"," and "Experience motivated me to take ownership". Therefore, the diagram is a combination of all the categories together.

Figure 4.8 clearly demonstrates a congruous pattern depicting a trend that interlinks the statements. However, it is obvious that certain statements yielded a similar consistent response in comparison to others. Thus, the categories in figures 4.9 and 4.10 are a breakdown of the figure 4.8. They are grouped according to a similar pattern that suggests that the responses in relation to the categories are in agreement.

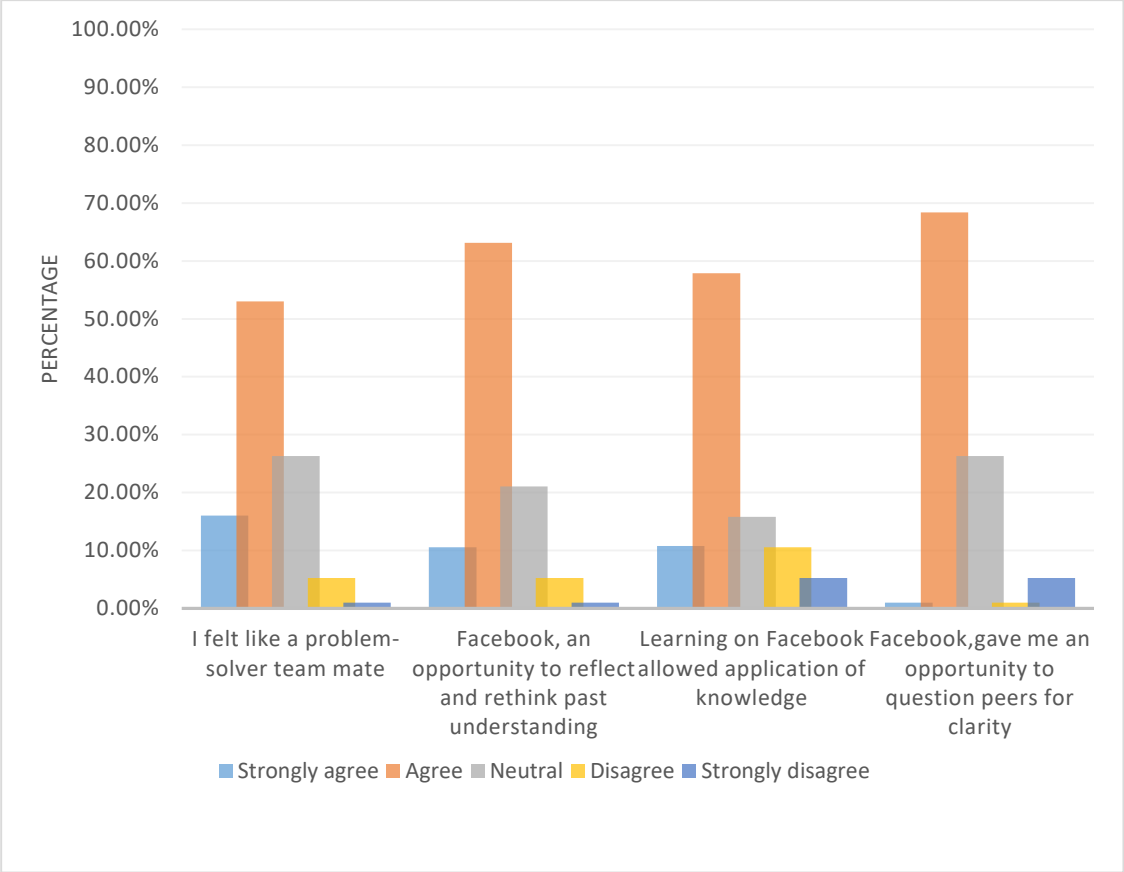

Figure 4-9 Facebook allowed critical and creative thinking

Clearly the statements within Figure 4.9, “I felt like a problem-solver team mate”, “Facebook, an opportunity to reflect and rethink past understanding”, “Learning on Facebook allowed application of knowledge” and “Facebook gave me an opportunity to question peers for clarity” display a similar trend in comparison to the other statements within this theme: Facebook therefore allowed for critical and critical thinking.

The results showed that 3(16%) strongly agreed whilst 10(53%) agreed that the learning on Facebook “felt like a team mate solving a problem” while 5(26.32%) gave a neutral response and only 1(5.3%) disagreed. The results indicate that 13 of 19 (68.46%) agreed. Therefore, the majority of the respondents “felt like a valued teammate” through problem solving as a team on Facebook. The perception had quite a low SD (0.787), a consistent reaction, close to the average. These results are in agreement with the category “learning on Facebook allowed application of knowledge”.

Further, the results in Figure 4.9 show a similar response for the statement “Facebook allowed for reflection and rethinking” were 2(10.53%) strongly agreed,12(63.16%)

agreed 4 (21.05%) gave a neutral response, whilst only 1(5.26%) respondent disagreed. Thus, 14 0f 19 (74%) of respondents were in agreement that learning on Facebook enabled them to reflect and rethink past understanding. The results are in alignment with Rodriguez-Triana *et al.* (2015) that IBL encourages students to revisit their own hypotheses, to perform experiments and to reflect on past events and observations. Thus, the results suggest that Facebook was able to facilitate IBL. The responses to perception had a low SD (0.713).

The results for “application of own knowledge” show that 2(10.79%) strongly agreed whilst 11(57.89%) agreed that 3 (15.79%) gave a neutral response, whilst only 2(10.53%) disagreed and only 1(5.26%) strongly disagreed. Thus, results also indicate that 13 of 19 (68%) were in agreement that “application of own knowledge” took place whilst using Facebook as a learning platform. Therefore, respondents were afforded the opportunity to apply their own knowledge to further create knowledge. The perception had a low SD (1.017), a consistent reaction. Therefore, social media can be used as a mode of communication where tasks seem complex and uncertain (Cheung *et al.* 2011).

The statement that learning on Facebook “allowed for an opportunity to question my peers’ views for clarity” produced responses of 13(68.4%) agreeing, whilst 5(26.32%) gave a neutral response, and only 1(5.26%) respondent strongly disagreed. Thus, the majority,13 of 19 (68%) respondents agreed that learning on Facebook gave them an opportunity to question views on Facebook for clarity. Thus, increasing insight and understanding. According to Chu (2014), a conducive IBL environment encourages students to raise questions. Therefore, the results seem to confirm the statement. The perception had quite a low SD (0.769), a consistent reaction

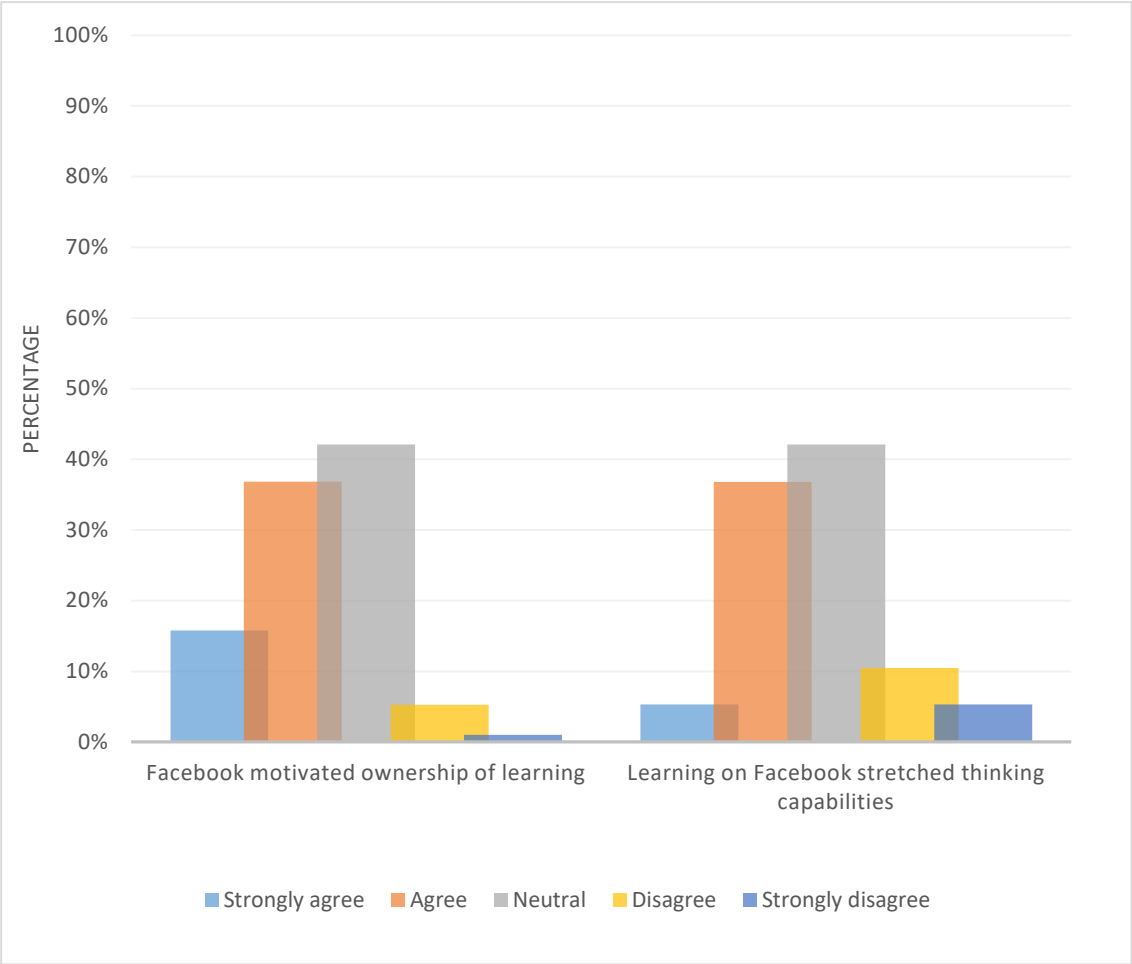

Figure 4-10 Facebook allowed critical and creative thinking

Figure 4.10 depicts results for the statements “Facebook motivated ownership of learning” and “Learning on Facebook stretched thinking capabilities”, showing that the responses were cautious, reserved and the patterns were in agreement.

The results show that 3(15.79%) strongly agreed whilst 7(36.84%) agreed that Facebook motivated them to take ownership of their own learning. 8(42.11%) gave a neutral response, whilst only 1 (5.26%) disagreed. Thus, 10 of 19 (53%) agreed that “Facebook motivated them in taking ownership of their own learning”. An average result suggesting that Facebook could influence the students to take initiative and be responsible for their learning. Therefore, to a certain extent, the results agree with Haworth (2016) who states that social media as a self-directed learning tool can be a means by which learners are able to track, organize, direct and manage their own learning. The perception had a low SD (0.831).

The next statement also yielded cautious responses. Only 1(5.3%) strongly agreed and 7(36.8%) agreed that learning on Facebook “stretched thinking on a deeper level”, 8 (42.11%) gave a neutral response, whilst 2(10.5%) and only 1(5.3%), of the respondents disagreed and strongly disagreed respectively. An interesting coincidence was that, 42% of the respondents agreed whilst 42% were neutral. According to Oyarzun *et al*. (2013) educators need to take into cognizance the level and calibre of students when introducing higher order of thinking. The results indicate that this important aspect was overlooked. The perception had a low SD (0.933), a consistent reaction.

The purpose of the study was to evaluate the effectiveness of facilitating IBL on Facebook in enhancing cognitive skills. According to the results, the responses in Theme 3 suggest that Facebook facilitated learning as a collective. Students were able to apply knowledge to further create new knowledge and students were able to work together as a team. In addition, the results suggest that students were able to reflect on their own understanding and other perspectives as students were able to question peers for further clarity. However, the responses in relation to Facebook encouraging students to take the lead and igniting deeper thinking were not strong.

4.2.4 Theme 4: Facebook is a smart way of learning

Technology is innovative, and simplifies and enhances tasks through the adoption of efficient and smart ways (Preece *et al.* 2015). Theme 4 was directed at determining whether respondents found Facebook a smart way of learning, whether it added value to their learning. The full set of responses to the seven statements, “Facebook facilitated the development of other ways of learning”, “Facebook was able to link life with creative learning, “Facebook makes learning easier”,” Facebook challenged thinking capabilities”,” Facebook was innovative”, “I would recommend learning through Facebook” and “Facebook was effective” are shown in Figure 4.11.

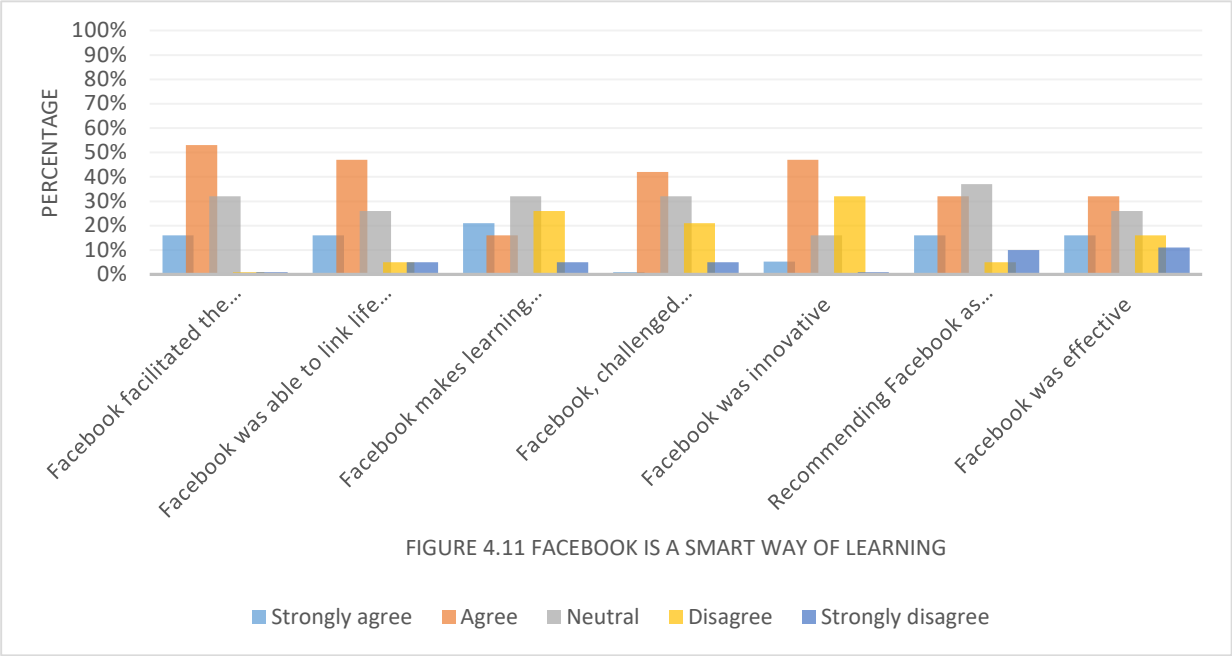

Figure 4-11 Facebook is a smart way of learning

The responses to the statements are again grouped in figures 4.12 and 4.13, to show similar responses for the purpose of analysing the results.

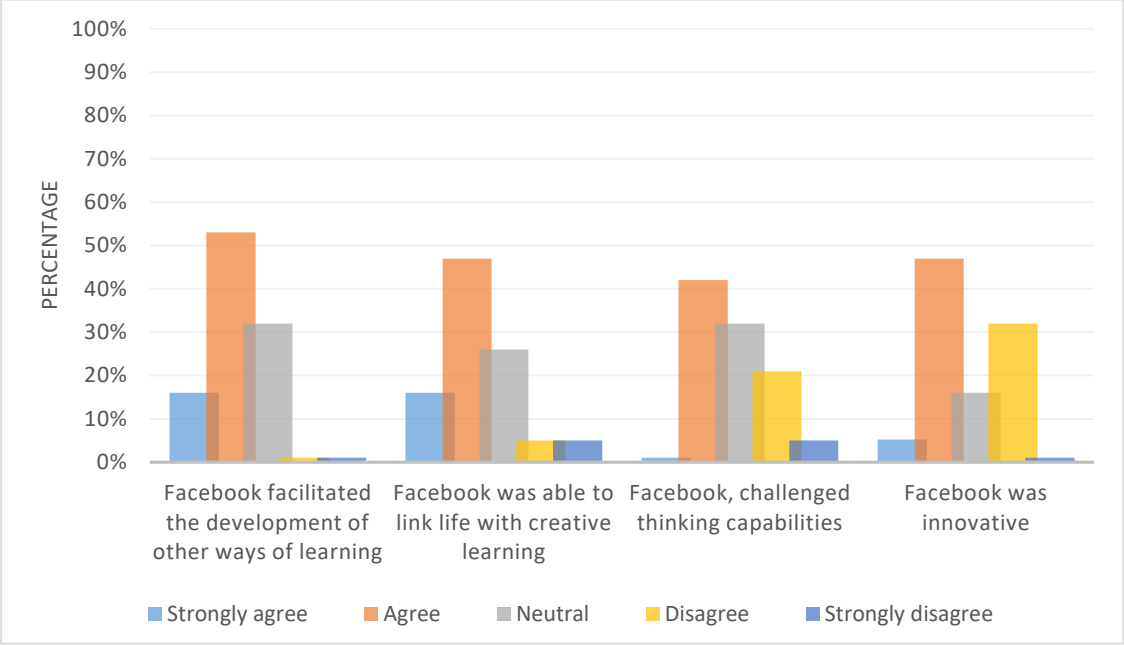

Figure 4-12 Facebook is a smart way of learning

Figure 4.12 clearly shows that the four statements “Facebook facilitated the development of other ways of learning”, “Facebook was able to link life with creative learning”, “Facebook challenged thinking capabilities” and” Facebook was innovative” elicited similar responses; the respondents were in agreement.

The results in relation to whether Facebook as a learning platform “facilitated the development of other ways of learning”, 3(16%) strongly agreed, 10(52.63%) agreed, 6(32%) gave neutral responses, a possibility that these respondents felt uncomfortable, as found in a similar study by Everson *et al.* (2013). It is interesting to note that none of the respondents were in disagreement with the statement “Facebook, facilitated the development of other ways of learning”, 13(69%) were in agreement. The category had a low SD (0.688).

The established pattern continued in relation to the statement “learning on Facebook was able to link life with creative learning”, 3(16%) strongly agreed and 9(47%) agreed, 5(26%) gave neutral responses and only 1 (5.3%) disagreed and strongly disagreed that “Facebook linked daily life with creative learning”. Thus, 12(63%) were in agreement with the statement. It also had a low SD (1.012).

The results suggest that, to a large degree, respondents were able to develop other forms of learning and created knowledge together, therefore suggesting that the respondents were able to build new knowledge on what they already knew. This was in alignment with Neville *et al*. (2013), who claims that social networks enhance and develop skillsets attained in traditional learning environments.

The response trend slightly changed, yet a similar pattern continued in relation to the statement “Facebook challenged their thinking capabilities” with 8(42%) agreed, 6 (32%) gave a neutral response suggesting a negative or positive response. It is possible that respondents required more time to adapt. As discussed above, according to Roehl *et al.* (2013), such strategies require at least a month for adaptation and recognizing their value. Only 4(21%) and only 1(5%), disagreed and strongly disagreed respectively with this statement “Facebook challenged thinking capabilities”. The SD (0.937) was low.

In terms of whether “learning on Facebook was innovative”, the last category depicted in the group Figure 4.12, it was apparent that a similar trend is also noticeable with the

statement “Learning on Facebook was an innovative” with only 1(5.3%) strongly agreed, 9(47.4%) agreed,3 (15.8%) gave a neutral response, whilst 6(31.6%) respondents disagreed. Thus, only 10 of 19 (53%) agreed that learning using Facebook was” an innovative initiative”. Therefore, the results, just above average found learning on Facebook creative. The statement had a low SD(0.991).

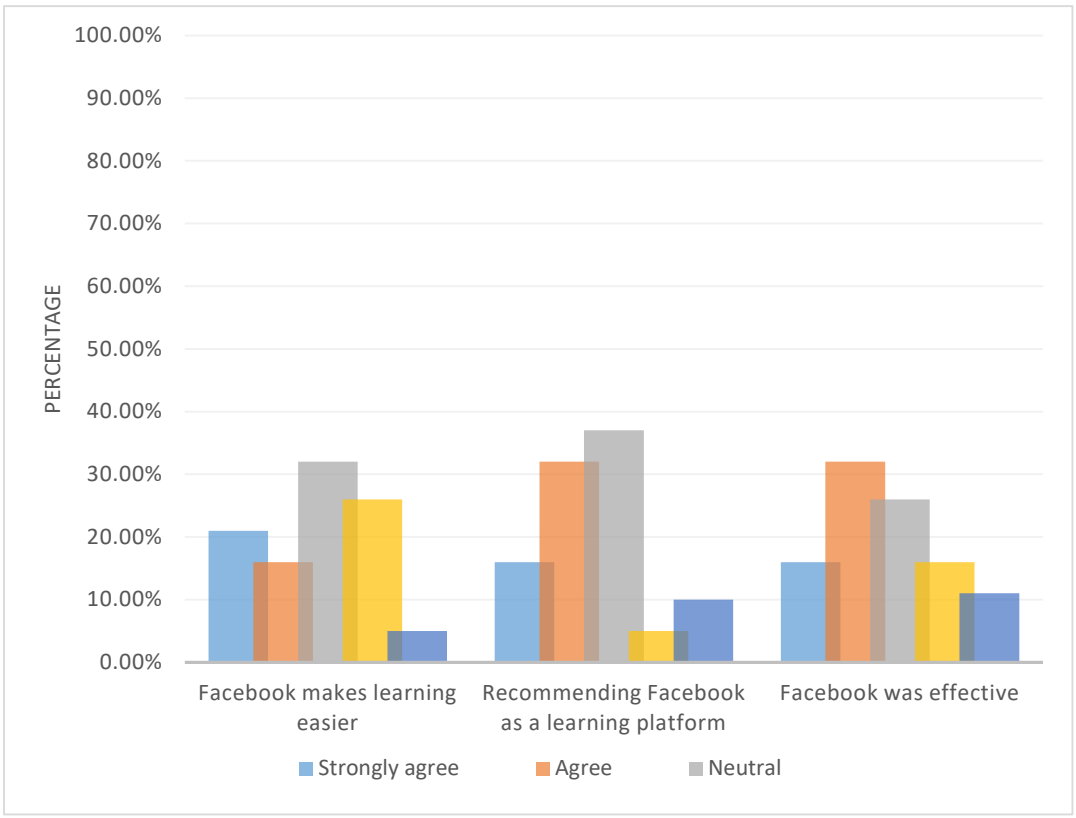

Figure 4-13 Facebook is a smart way of learning

Therefore, in terms of whether learning on Facebook was smart, the respondents were not dismissive of the intervention. In addition, the results suggest that students were able to engage and collaborate in the creation of new knowledge, as Facebook afforded the students the ability to link life with creative learning. However, the majority disagreed that their thinking capabilities were challenged. Therefore, it was no surprise that only 53% of the students found the initiative innovative.

Figure 4.13 displays the three categories from the combined categories depicted in Figure 4.11. It is evident that the three statements “Facebook makes learning easier”, “I would recommend Facebook as a learning platform” and “Facebook was effective” lean towards an agreement.

The results in relation to “Facebook makes learning easier” show that 4(21.1%) strongly agreed and 3(15.8%) agreed. Thus, only 7 of 19 (37%) respondents were in agreement, and 6(31.6%) were neutral whilst 5(26.3%) disagreed and 1(5.3%) strongly disagreed. The results suggest that learners were uncertain and their reactions were not forthright. The responses to this statement, had a low SD (1.228). According to Haworth (2016) educators need to understand the challenges pertaining to cognitive learning before the introduction of social platforms.

From Figure 4.13, the results pertaining to statement “I would recommend Facebook as a learning platform” revealed that only 3(15.79%) strongly agreed whilst only 6(31.58%) of respondents were in agreement with the statement, 7(36.84%) gave a neutral response, whilst 1(5.3%) respondent disagreed and only 2(10.5%) respondents strongly disagreed. Therefore, only 9 of 19 (47%) agreed to recommending learning on Facebook. The category had a low SD(1.165). The results support the finding of Blewett (2016), that time should be taken in observing how students learn in relation to technological instruments, in this case Facebook.

Further, the results showed that only 3(15.79%) strongly agreed whilst 6(31.58%) agreed with the statement “Learning on Facebook was effective”, 5 (26.32%) gave a neutral response, whilst 3(15.79%) disagreed and only 2(10.53%) respondents strongly disagreed. Therefore, only 9 of 19 (47%) in this instance were in agreement that learning on Facebook was effective. An interesting coincidence is that, 26.32% of the respondents disagreed, whilst 26.32% were neutral. According to Oyuzun *et al.* (2013) learning instruction should be clear in order for learning to be effective. The results indicate that the learning instructions may not have been sufficiently clear. The category had a low SD (1.240).

The results in relation to the statement “Facebook makes learning easier” suggest that the respondents were not enthusiastic about the intervention, thus did not find learning on Facebook easy. This suggests that the researcher did not take time to understand how students use technological instruments for learning purposes (Blewett 2016). Thus, only 37% respondents agreed with the statement “Facebook makes learning easier”. Hence, only 47% of the respondents indicated that they would recommend Facebook as a learning platform nor found Facebook effective as a learning platform. The outcome suggests that the teaching strategy employed by the researcher was not in alignment

with incorporation of Facebook, as a learning platform (Conole 2016). Therefore, students did not experience the full benefits of this initiative. Further, it is imperative that technological applications should work in conjunction with teaching methods and practices (Firat *et al.* 2017).

4.2.5 Facebook Analysis

A group on Facebook was created and the students were requested to join the group. It was used as a “classroom” for learning away from the limited time on the college premises. Two questions based on a scenario were posted on the group. Students were expected to comment and share their views as to how they would approach the problem to answer the questions in relation to the scenario. (See Appendix F).

The questions were as follows:

1. You have been tasked to explore other revenue generating alternatives. Currently your super market is using an advertising supported revenue model. For a strategic alliance that would make sense, which other revenue models would you consider? Give your recommendations and support your argument.
2. Your Company is embarking on a new venture, producing funky bags for university students. As a new intern, you have identified social platforms in attracting your new market and generate sales. How would you implement the four Marketing Ps’ as a strategy?

It is worth noting that the initiative was also an indirect attempt to assist students to answer questions for an upcoming Assignment 1, for assessment marks.

4.2.5.1 Nivo Analysis

NVivo, a qualitative data analysis tool, was used to assess students’ responses to two questions based on the Inquiry Based scenario used for learning on the Facebook group.

NVivo was able to display the words identified in a bar chart format, giving weighted percentage value for the words in response to the two questions related to the Inquiry based scenario. According to (Stein *et al*. 2016), weighted percentage averages have the ability to describe categorical measures.

The response to the first question related to exploring other revenue generating alternatives. The image below shows words picked-up by NVivo used to identify revenue-generating alternatives:

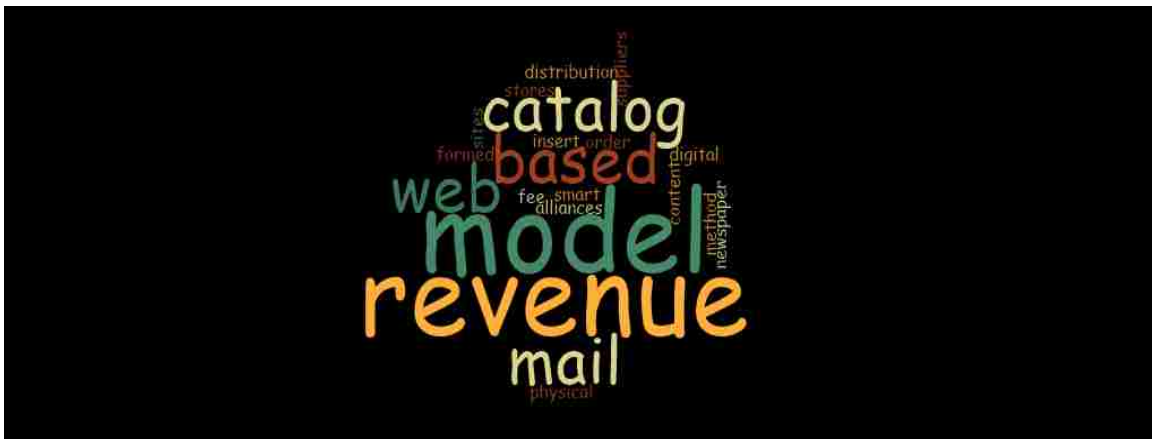

Figure 4-14 Revenue generating alternatives

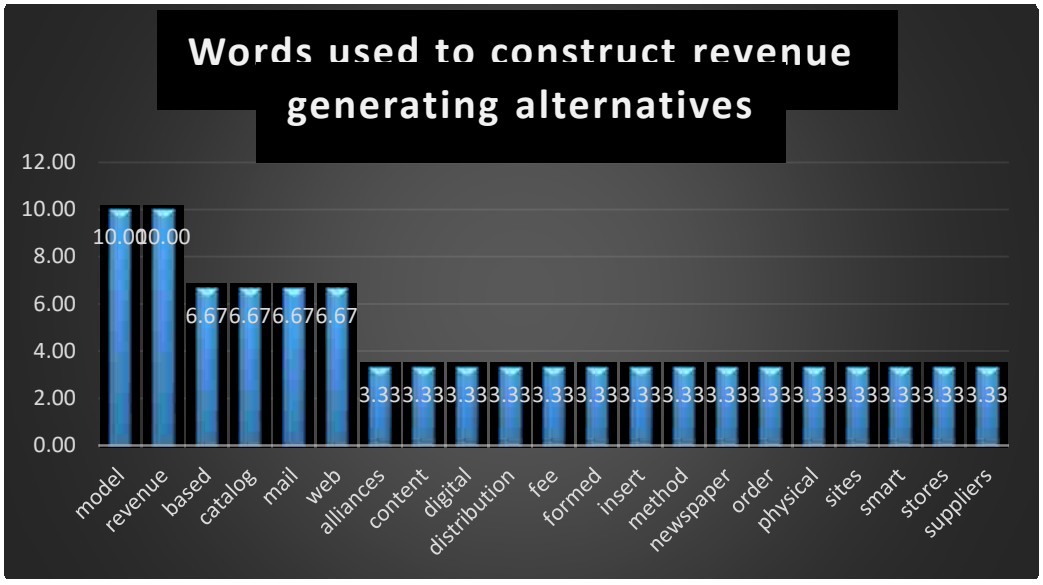

Figure 4-15 Series weighted percentage bar chart area

The 2 words ‘model’ and ‘revenue’ had weighted percentage value of 10% whilst the 4 words ‘based’, ‘catalog’, ‘mail’ and ‘web’ had a value of 6.66%. Lastly, the words ‘alliance’, ‘content’, ‘digital’, ‘distribution’, ‘fee’, ‘formed’, ‘insert’, ‘formed’, ‘newspaper’, ‘order’, ‘physical’, ‘sites’, ‘smart’, ‘stores’ and ‘supplies’ had a value of 3.33%. The value of a total weighted percentage of the students was 97%.

The results were an indication that students showed an ability to select appropriate words in answering the question. In addition, students showed that they understood what concepts where applicable to the question. This was informative and useful in so far as gauging progress in terms of grasping of the content. The results show that domain knowledge of the learning unit increased. However, in order to assess whether students were able to apply knowledge in answering the question the responses on the Facebook group were studied. Thus, the focus was on determining students' ability to apply the concepts appropriately. Therefore, NVivo assisted in picking out the correct words, the total weighted percentage of the words was a high score and impressive.

The second question related to the implementation of the Four Marketing Ps' as instructed in the question on Facebook. The four Marketing Ps' are concepts or ingredients used in capturing and promoting a product's unique selling points (Ryan, 2016). Therefore, the intention was to investigate the ability of students to recall the concepts and apply them appropriately. The image 4.16, below shows words picked-up by NVivo used to identify words to describe the implementation of the Four Marketing Ps:

Figure 4-16 Implementation of the four marketing Ps

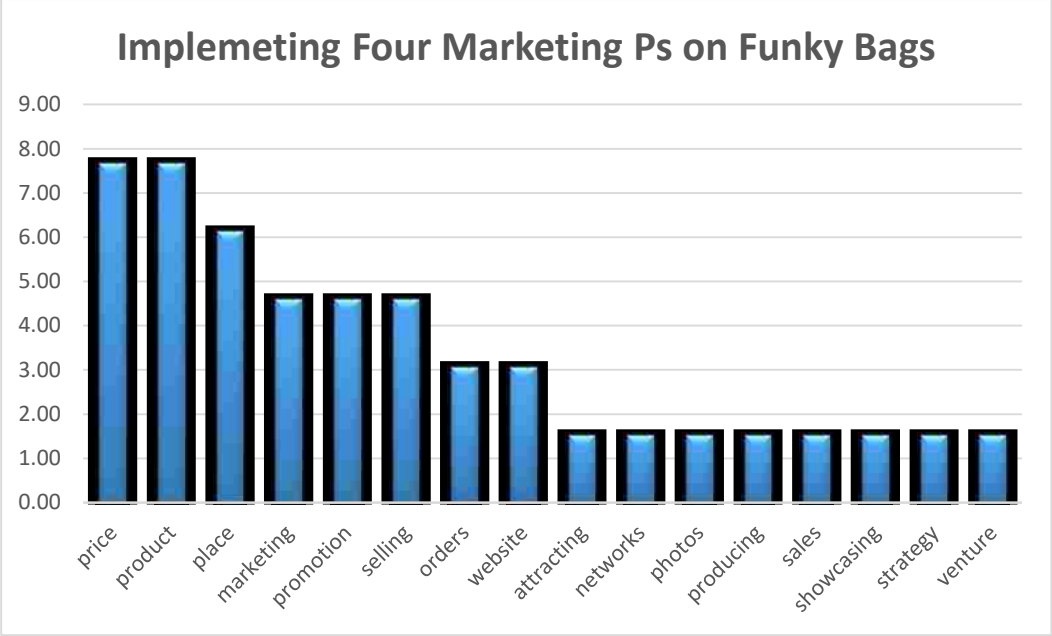

Figure 4-16 Implementing four marketing Ps bar chart area

The two words ‘price’ and ‘product’ had a weighted percentage value of 8%, ‘price’ had 6%, whilst ‘marketing’, ’promotion’ and ‘selling’ had a value of 5%, orders and website had 3%, and lastly ‘attracting’, ’networks’, ’photos’, ’producing’, ’sales’, ’showcasing’, ’strategy’ and ‘venture’ had a value of 2%. The value of a total weighted percentage of the students was 59%. This was not a high score, an indication that there was still room for development. However, results were satisfactory and encouraging. Students’ showed an ability to recall and use the appropriate words in answering the question. Therefore, students showed an understanding of what concepts were applicable.

4.2.5.2 Facebook Responses

Further, the Facebook responses suggest that the understanding level was increased through this experiment and afforded the students the ability to apply acquired knowledge to the questions as required (see Figures 4.18 and 4.22). Students were able to reflect and think about what they had learnt previously and made it applicable and relevant. The results concur with Rodriguez-Triana *et al. (*2015) who states that IBL promotes the ability to question and reconsider one’s understanding whilst reflecting on past events and hypotheses. In addition, in an IBL setup students are expected to raise questions and solve problems systematically (Chu 2014).

Figure 4.18 to Figure 4.22 are some of the posts that show that students were able to interact, engage and collaborate via the Facebook classroom. Some students ticked the "like" gesture if a peer's comment resonated with them or made sense and asked for further clarity. Thus, learning took place on Facebook.

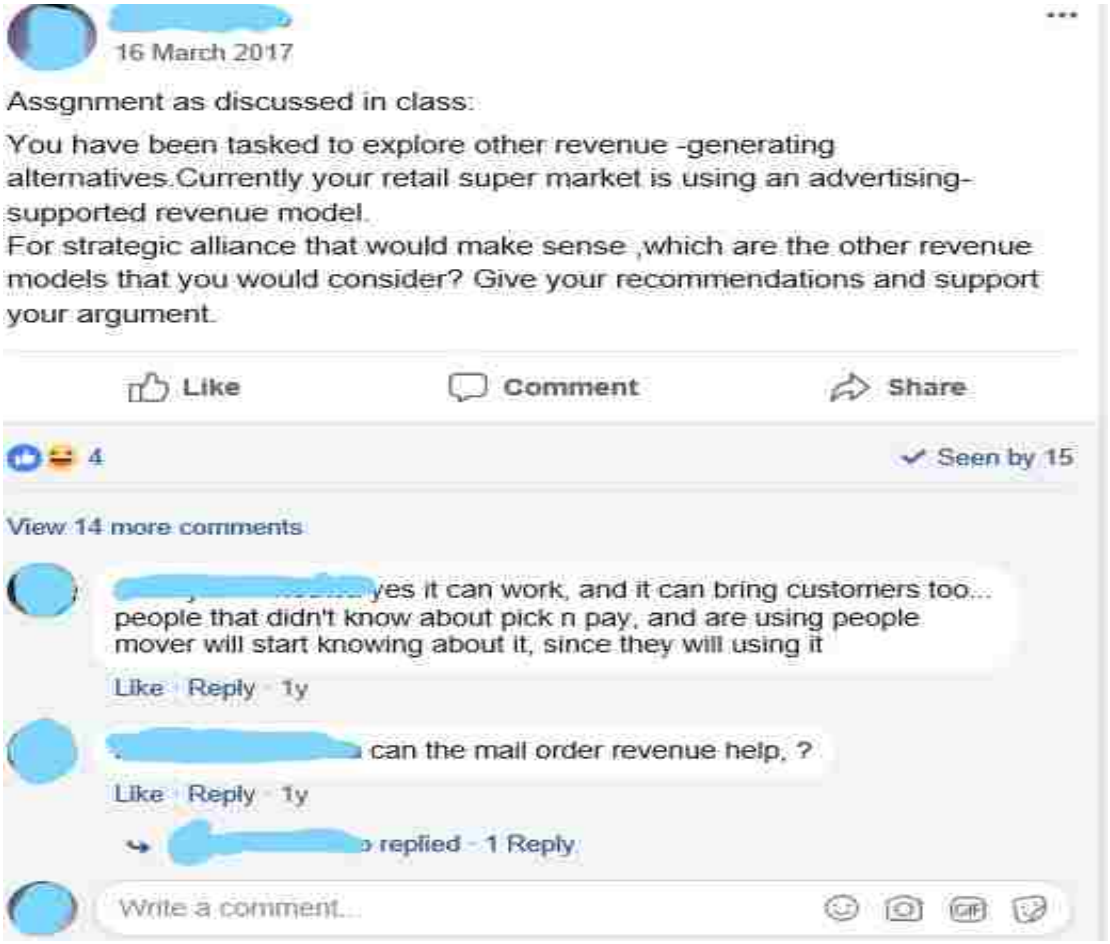

Figure 4.18 Classroom

The assignment question using a scenario on Facebook was a good illustration of how students shared views whilst answering the questions related to the scenario, but students also applied knowledge, as Figure 4.19 illustrates.

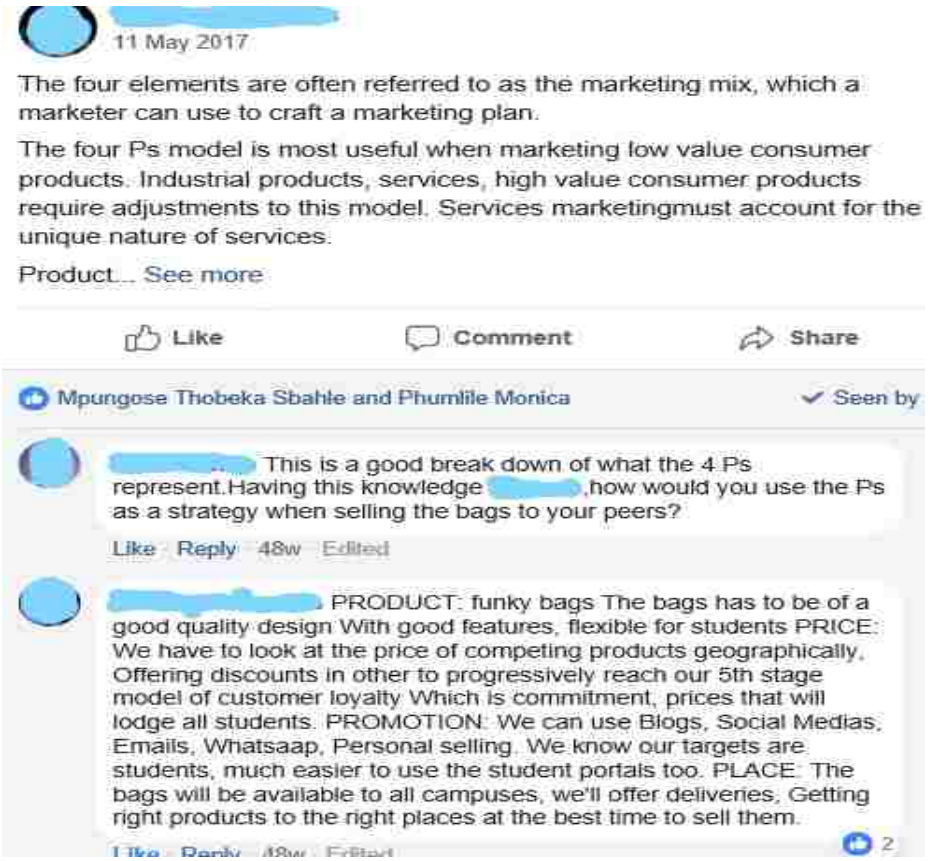

Figure 4.19 Application of knowledge

Students also collaborated to construct new knowledge and increase understanding, as Figure 4.20 shows.

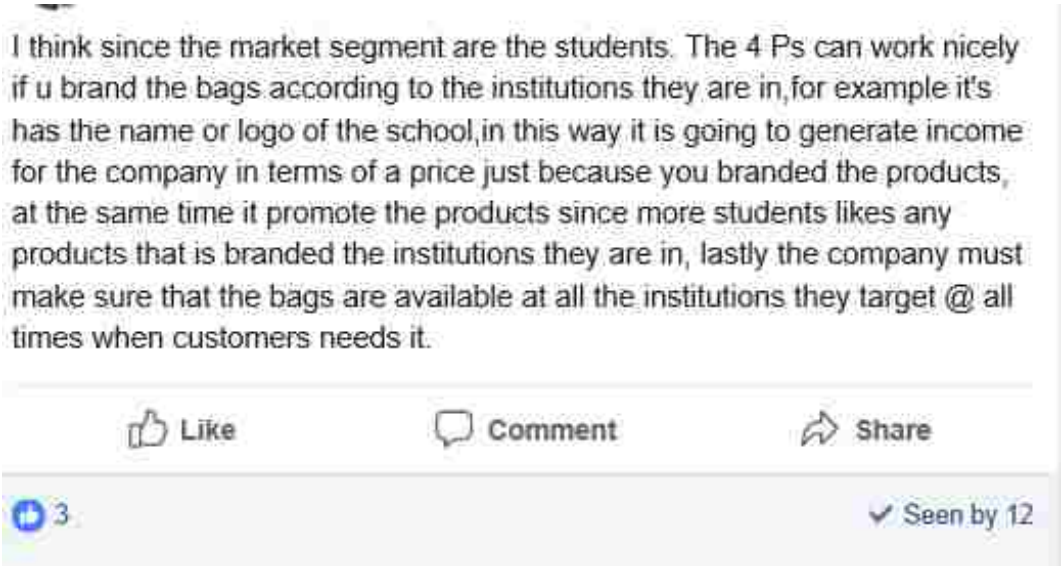

Figure 4.20 Responses showed understanding

Figure 4.21 Constructing knowledge, showing understanding

Figure 4.22 below illustrates the sharing of information on Facebook. This was in alignment with Erlandsson *et al.*'s (2016) conclusion that social media allows communication and sharing of thoughts and concurs with Rowan-Kenyon(2016) who suggests that social media encourages interaction and accessibility to information.

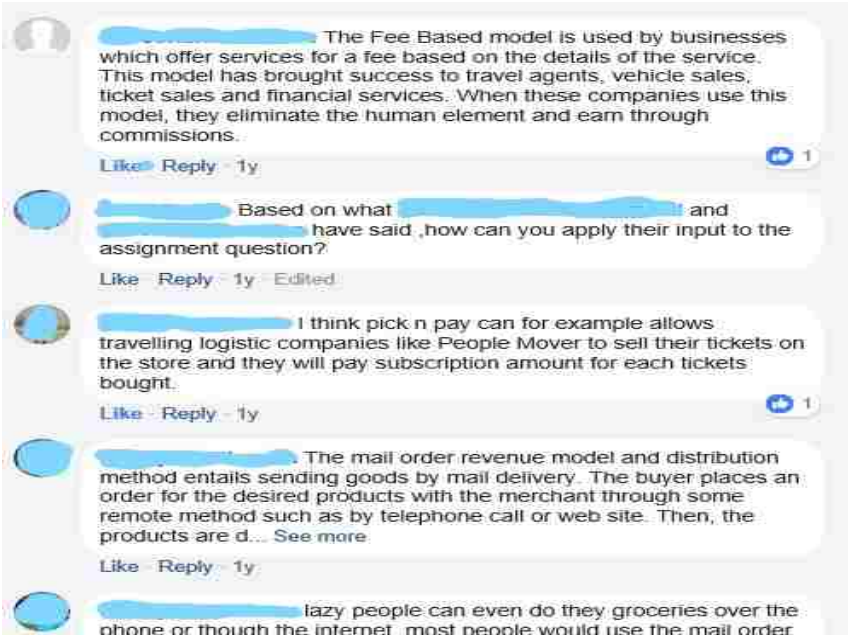

Figure 4.22 Sharing information

4.3 Conclusion

The first section of this chapter covers the statistical analysis of data that was processed by the SPSS program. The intention was to attain the objectives of the study and this was achieved through the grouping of responses to the items of the questionnaire into 4 themes.

Theme 1: Facebook, a tool suited for educational learning. The results indicated that Facebook as a learning tool had a positive impact in assisting students achieve their objectives. Therefore, it enabled learning to take place. In addition, the results suggested that it is essential to take into consideration the challenges students encounter in adopting a technological tool as a learning platform. Further, the results outlined the importance of strategically introducing such an intervention.

Theme 2: Facebook allows collaborative learning. The results suggested that the level of understanding was increased, thus, students were able to share understanding and created knowledge together. Therefore, Facebook as a learning platform did, to a degree, add value to students' learning through sharing.

Theme 3: Facebook allowed critical and creative thinking. The results suggested that Facebook encouraged learning as a team whilst increasing the level of understanding by reflecting on other perspectives and getting clarity. However, in terms of whether the initiative encouraged the students to take the lead in their own learning, the results were not conclusive.

Theme 4: Facebook is a smart way of learning. The results indicated that Facebook facilitated other forms of learning in that students were able to create new knowledge as a collective. However, it is worth noting that the results suggested that students required more time to adjust and appreciate the initiative. Thus, only a slightly above average response agreed that learning on Facebook was creative and on whether learning was made easier by employing Facebook as a learning tool, the results were inconclusive. Instead, the results suggested that enough time is required in observing how students learn with the incorporation of technological tools.

The findings brought forth much needed insight in ascertaining whether Facebook, as a learning platform, was useful in facilitating Inquiry Based Learning.

The second section, NVivo program shed light on what words students were able to recall and use in answering the questions, confirming how well they mastered the concepts. The results assisted in gauging students' progress and ability to select appropriate words. Therefore, students understood the key concepts applicable to the questions related to the learning unit. The next chapter will discuss the findings further and establish whether the objectives of this study were achieved.

Chapter Five
Conclusions and Recommendations

5.1 Introduction

The previous chapter dealt with analysing data and interpreting processed data in order to establish meaning and make sense of the phenomenon that was under investigation. This chapter links the aim, objectives and research questions of this study to the findings presented in Chapter 4. Conclusions are drawn and some recommendations are made based on data collected and analysed.

5.2 Discussion

This section focuses on determining whether the objectives of this study were attained. Each objective of the study is discussed at length by focussing on the analysed data and the interpretations. This confirms whether the aim and research questions of this study were attained or not.

5.2.1 Objective 1: Determining of an appropriate IBL model approach

The main purpose of this objective was to determine whether an IBL environment could be established on Facebook. Therefore, this section determines the viability of incorporating IBL on Facebook. In an IBL-conducive environment the educator becomes a facilitator and the students direct and take up ownership of their own learning (Roehl *et al.* 2013). Therefore, such learning encourages less reliance on educators, and students become proactive and take the lead in discovering and creating knowledge.

A problem inquiry scenario, an IBL model that has the ability to address complex issues in a social context, conducted on Facebook, was adopted for the study. The intention was to encourage collaboration and engagement amongst the students, whilst establishing meaning, in an attempt to increase understanding and broaden the mind, thus developing creative and critical thinking (Bradfield 2015).

To establish whether the model was appropriate and produced the desired outcomes, the analysed results, in relation to perceived experience that embodied the characteristics of the model, were analysed. The previous chapter's analysis depicted

Theme 3: “Facebook allowed critical and creative thinking” embodied the characteristics of an IBL model,” Facebook promotes problem solving with team mates “,” Facebook promotes the application of knowledge”, “Facebook allows for reflection and rethinking”, “I was able to question views on Facebook”, “I was stretched to think deeper”,” and “Experience motivated me to take ownership”.

The results suggest that Facebook, which is based within a social context, encouraged learning as a team whilst increasing the level of understanding by reflecting on other perspectives and getting clarity this concurs with Blumberg (2015) who suggest that the usage of social media for learning, reflecting, collaborating and creating knowledge produce lifelong learning and constructivism. However, in terms of whether the initiative encouraged the students to take the lead in their own learning, the results were not conclusive.The overall responses indicated that the model was appropriate.

5.2.2 Objective 2: To determine whether students can access learning material via Facebook

This objective was aligned to the findings from Theme 1: “Facebook was suited for educational learning”, which analysed the following categories**:** “Facebook allows the sharing and accessing of information”; “it is easy to learn on Facebook”; “learning takes place on Facebook”; “Facebook is sufficient for learning”; “enjoyed flexibility and freedom”; “understanding learning unit better”; “views appropriate for learning” and “interest in learning unit increased”.

The results indicated that Facebook as a learning tool had a positive impact in assisting students to access information, learn from others and promoted understanding. Therefore, it enabled learning to take place. Further, students experienced positive emotions. According to Kimmerle (2015), such emotions encourage the usage of an application as it will be easily adopted and readily used.

In addition, the results suggested that it is essential to take into consideration the challenges students encounter in adopting a technological tool as a learning platform. Further, the results outlined the importance of strategically introducing such an intervention (Blewett 2016).

The responses also suggested that participants still appreciate traditional teaching and learning techniques and value their role, thus endorsing the ideas of Evans (2013) who

established that the inclusion of technological learning platforms do not have a negative effect on student attendance, while also suggesting that technological learning tools alone cannot operate in isolation. However, the participants did not reject the positive effects of learning on Facebook, responses suggest that collaboration, engagement and sharing did take place on Facebook.

5.2.3 Objective 3: Exploring the level of usage of Facebook by students

The participants were first year students and had no prior relationship with their peers. In fact, most of the students were not friends on Facebook prior to the study. According to Kimmerle (2015) in order for learning to take place online, a “community” of the participants has to be established first and every individual must feel and develop a sense of belonging. In addition, for interaction and engagement to take place the communication process and rules have to be developed and agreed upon as a collective (Blaschke 2014). Therefore, students might have been uncomfortable to express or challenge the view of others on line, and probably did not want to appear or sound stupid. This was evident as on numerous occasions students asked the researcher to confirm particular responses for relevance before posting on Facebook. The researcher had to assure the students that the intention was to learn and that there was no right or wrong answer. The response was in according with Bradfield *et al*. (2015) who claim that a problem scenario help solves complex issues where there is no right or wrong answer that persuade a given answer.

It is also worth mentioning that the usage of Facebook by the students was not as overwhelming as anticipated, as most students had expressed having accounts on Facebook. This was attributed to the cost of data and the students mostly relied on Wifi on the college premises. They also expressed dissatisfaction with the Wifi connection, regarding it as poor and unreliable, and this could be due to the limited amount of bandwidth allocated to students in comparison to the amount of traffic on it. This is in alignment with Apostolovo (2013) who states that individual affordability and network effects are essential elements that determine the usage of collaboration technologies such as social networks as learning tools.

5.2.4 Objective 4. Evaluating the facilitation of an IBL “classroom” environment on Facebook

The objective, “Evaluating the facilitation of an IBL classroom environment on Facebook” were represented by the analysed data from Theme 2: “Facebook encouraged collaborative learning” which covered the categories: “Facebook allows learning with peers”, “Facebook allows team learning”, “Peers inspired and added value to learning”, “The initiative allowed sharing of understanding” and “Facebook allowed for other perspectives”.

Oktavia *et al*. (2017) contend that knowledge is best established in a coherent environment, such as the social media outlet Facebook, which promotes and encourages interaction and collaboration in establishing meaning by evaluating other perspectives. Students were able to use acquired knowledge and expressed understanding by applying knowledge to the given scenarios on Facebook. In addition, the line of questioning enouraged the students to do so.This is in alignment with Justice *et al.* (2007) that states that IBL constitutes a process that encourages students to seek knowledge and new understanding and that the teaching method should follow that process. Students were able to articulate their responses in a meaningful way that showed understanding.

Wells (2010) established that an IBL environment encourages active learning and fruitful dialogue amongst students thus solving a given task as a collective. This is evident from the results that suggested that the level of understanding was increased, thus, students were able to share understanding and created knowledge together. Therefore, Facebook as a learning platform did to a degree add value to students’ learning through sharing. Therefore, understanding of the learning units’ concepts was generally achieved through the sharing of understanding. The responses are testimony that an “IBL classroom’’ was established on Facebook for the majority of students. The results concur with Oktavia *et al.* (2017) that social media promote authentic learning that embodies collaboration, interaction and communication.

The overall responses and the depiction of the Facebook interaction suggests that a “classroom” was facilitated on Facebook.

Objective 5: An assessment of improvement of understanding of learning material and the development of higher order of Learning

The attributes of Objective 5 of this study are linked to the data analysed pertaining to Theme 4: “Facebook is a smart way of learning” that represented the categories: “Facebook facilitated the development of other ways of learning”, “Facebook was able to link life with creative learning, “Facebook makes learning easier”,” Facebook challenged thinking capabilities”,” Facebook was innovative”, “I would recommend learning through Facebook” and “Facebook was effective”.

The results indicated that Facebook facilitated other forms of learning in that students were able to create new knowledge as a collective. However, it is worth noting that the results suggest that students required more time to adjust and appreciate the initiative. The results suggest that enough time is required in observing how students learn with the incorporation of technological tools. According to Roehl *et al.* (2013) the incorporation of social networks as a learning strategy requires at least a month for students to adapt. In addition, the results are in alignment with Barkley (2010) who suggests that as long as participants feel uncomfortable and uneasy, communication will not flow as a sense of belonging does not exist. It was also clear from the responses that this form of learning was not always appreciated, suggesting that the students were moved from a comfort zone. Hence, the acceptance of such learning was not welcomed and students did not display initiative and problem solving skills to the satisfaction of the researcher. This is alignment with Samah(2009) who suggests that students tend to lack these skills. According to Haworth (2016) before social media is adopted as a means of self-directing, tracking, organising and managing one’s learning, it is imperative that students understand the learning principles, learning process and evaluation processes first.

Thus, the results suggest the need for educators’ alertness towards challenges regarding cognitive achievement before the further introduction of technological instruments. In addition, educators need to be aware of cognitive learning challenges and address them first (Saidi 2014). It is possible that the researcher did not gauge the readiness of the participants nor explain expectations and processes clearly enough (Chuang 2016). Therefore, the results suggested that these students required additional guidance and further scaffolding of the intervention.

The results presented by NVivo, the software analysis tool that analyzed the choice of words used by the students, indicate that there was an improvement of understanding and the development of higher order of learning. For instance, in results to the first question that related to the given scenario on Facebook that required students to "explore other revenue generating alternatives". The total weighted percentage was 97%. The results indicated that the students understood the learning unit. Hence, they were able to apply their understanding in a relevant manner by selecting appropriate words. These results suggest that a higher order of learning was achieved. The results related to the second question required students to demonstrate "Implementation of the four marketing Ps as a strategy". The total weighted percentage was 59%. This was an indication that the students showed an acceptable level of understanding and higher of thinking was achieved.

5.3 Limitations and suggestions

The limitation to this study was that the participants in the case study were first year students. They were still adapting to their new-found environment and relationships with their peers were not yet fully developed. Hence, the social community required on learning social platforms was not available. Students were hesitant to partake in the initiative and often required assurance and feedback from the researcher. Giving feedback and appraisal has a positive effect and evokes feelings of confidence (Miljkovic *et al.* 2016). It was clear in some instances, students did not want to appear stupid amongst their friends and therefore lacked confidence in participating, and as a result generally the same students posted and commented whilst others just appreciated the comments by ticking the "like" button. Hence, it is important that the social community be established offline before it advances online. In addition, the researcher overlooked how students learn using technological tools and assumed that, since all students were familiar with the social network Facebook, learning would be easy.

The study has also revealed that the time frame allowed for the study was not enough for the students to fully appreciate and adopt the incorporation of Facebook as a learning tool. The time frame for the study was only a week. According to Roel *et al.* (2013) such interventions require a month at least to be adopted.

Lastly, affordability and connectivity to the internet is essential for such initiatives. In this particular study, students relied on the campus Wi-Fi with a limited bandwidth. Hence, students constantly complained about the poor connectivity. Thus, connectivity issues need to be addressed first, before embarking on such intervention in order for collaboration and interaction on the technological tools to be effective (Apostolova 2013).

5.4 Recommendations

According to Neville *et al.* (2013), social media platforms have the ability of capacitating and enhancing skillsets achieved through traditional learning. This has been evident in the study, as students were able to collaborate, share information and apply concepts accordingly. However, in order to enjoy and experience the full benefits of introducing technological tools in a student-centered environment, educators need to be diligent and take note of the challenges that might hinder a conducive environment for encouraging interaction and engagement in the creation of critical and creative skills. Thus educators need to take into consideration challenges pertaining to cognitive learning. In addition, before students adopt a self-directing tool, that will compel them to track, organize and manage their own learning, clear teaching principles and assessment methods should be outlined (Haworth 2016). Thus, students require support and guidance with clear expectations given, and educators need to invest time to understand how their students learn with the aid of technological tools, whilst systematically introducing the identified tool (Blewett 2016). Further, the technological tool must be such that it complements, and is simultaneously in alignment with, other teaching practices (Wang *et al.* 2012).

It is also advisable that educators ensure that a community of leaners is established first before the introduction of such interventions. Students need to feel that they belong and are acceptable to their peers. If this aspect is ignored, participation on the technological platforms with fellow students will be minimal (Barkley 2010). Therefore, it is imperative that students experience a sense of belonging to appreciate the social community, thereby enabling them to set their own rules (Kimmerle *et al.* 2015). In addition, there is evidence that connecting appropriate peers on a social network could translate into creativity (Sie *et al.* 2013) and there is a correlation between creativity and innovation. It is also apparent that a learning tool is only an enabler of learning that can contribute

to cognitive skills (Cochrane 2014). The success of virtual learning depends on well explained processes (Chuang 2016), and the application functions and features must assist students in meeting their learning objectives (Falahah *et al.* 2011).

5.5 Conclusion

The main object of the study was to evaluate the effectiveness of implementing IBL on Facebook in order to develop a higher level of interactive learning. It was established that this form of learning requires a conducive environment that promotes engagement and collaboration. The study results revealed that collaboration and engagement on Facebook took place and participants learned from each other. Therefore, the findings concur with Conole (2016) who's findings suggest that the adoption of technologies in conjunction with best teaching practices birth learning abilities and improved quality. Further, the IBL model adopted was appropriate for the level of students. The main purpose of IBL is to encourage students to take ownership of their own learning by taking the lead, while the educator becomes a facilitator. This was generally evident from the results of the study.

It is important to note that, as far as the IBL attribute that cultivates deeper thinking and stretching of the mind, limited respondents agreed that this was achieved, however, some of the engagements on Facebook indicated that students' ability to relate their understanding to the given assignment scenario showed that thinking capacity was stretched. Further, concerning the attribute of IBL that promotes application of knowledge in order to broaden the mind and understanding, the majority of the respondents were in agreement that the activity allowed them to apply knowledge and their own understanding. This was also evident from students' expressions on Facebook. Therefore, the classroom, established on Facebook, according to the majority of the respondents who agreed that they felt like "part of a team" and "solved problem together", met the criteria for an IBL classroom.

In terms of the usage of Facebook, the results of the study suggest that students were not yet fully receptive of the intervention of Facebook as a mode of learning. The activity also made it clear that the initiative was uncomfortable for some learners who were not confident enough to express their views freely on Facebook. This was attributed to the fact that the participants were first year students and relationships were at an infant

stage. In addition, it was their first time at a tertiary institution, hence they were also adapting to a new environment and new forms of engaging with peers and educators.

Reference List

Al-Rahmi, W. M., Othman, M. S. and Yusuf, L. M. 2015. The role of social media foe collaborative learning to improve academic performance of students and researchers in Malysian higher education. *International Review of Research in Open and Distributed Learning,* 16(4): 177-204. Available: http://files.eric.ed.gov/fulltext/EJ1082203.pdf (Accessed 21 June 2017).

Alvi, M. H. 2016. *A manual for selecting sampling techniques in research*. Available: http://mpra.ub.uni-muenchen.de/70218/ (Accessed 15 March 2018).

Apostolovo, M. 2013. SEEU use of social media: teaching and learning through sharing knowledge. *SEEU Review*, 9(2): 61-94.

Arkorful, V. and Abaidoo, N. 2015. The role of e-learning, advantages and disadvantages of its adoption in higher education. *International Journal of Instructional Technology & Distance Learning,* 12(01): 29-43.

Ballman, K. 1997. Greater emphasis on variation in an introductory statistics course. *Journal of Statistics Education*, 5(2): 1-8.

Barkley, E. 2010. *Student engagement techniques: a handbook for college faculty*. San Francisco,CA: Jossey-Bass.

Bazeley, P. and Jackson, K. 2013. *Qualitative data analysis with NVivo*. London: Sage.

Blane, J. T. 2015. Reducing "Spoon-Feeding" to promote independent thinking. Available: http://www.citethisforme.com/topic-ideas/other/Project%20Based%20Learning%20in%20Education-19100259 (Accessed 5 May 2018).

Blaschke, L. M. 2014. Using social media to engage and develop the online learner in self-determined learning. *Research in Learning Technology,* 22: 1-23. Available: http://dx.doi.org/10.3402/rlt.v22.21635 (Accessed 21 June 2017).

Blewett, C. 2016. *Activated classroom teaching: A pedagogy for digital age*. Beta 1.04 ed. [Durban]: Teachernology Publicastions.

Bloom, B. S. 1956. *Taxonomy of educational objectives: cognitive domain* New York: Mckay.

Blumberg, P. 2015. How critical reflection benefits faculty as they implement learner-centered teaching. *New Directions for Teaching and Learning*, 2015(144): 87-97.

Bradfield, R., Cairns, G. and George, W. 2015. Teaching scenario analysis : an action learning pedagogy. *Technological Forecasting and Social Change,* 100: 44-52. Available: http://dx.doi.org/10.1016/j.techfore.2015.05.005 (Accessed 5 May 2018).

Brookfield, S. D. 2015. Teaching students to think critically about social media. *New Directions for Teaching and Learning*, 2015(144): 47-56.

Callaghan, E. and Bower, M. 2013. Learning through social networking sites- the critical role of the teacher. *Educational Media International*, 49(1): 1-17.

Choy, L. T. 2014. The strengths and weaknesses of research methodology: comparison and complimentary between qualitative and quantitative approaches. *ISOR Journal Of Humanities and Social Science,* 19(4): 99-104. Available: http://isorjournals.org (Accessed 15 March 2018).

Chu, S. 2014. Developing 21st century skills with plagiarism-free inquiry learning,collaborative teaching,social media, and gamification. *Sam-publcation\published materials\Conference papers*, 5(31): 1-16.

Chuang, H.-H. 2016. Leveraging CRT awareness in creating web-based projects through use of online collaborative learning for pre-service teachers. *Educational Technology Research and Development*, 64(4): 857-876.

Claydon, L. S. 2015. Rigour in quantitative research. *Nursing Standard,* 29(47): 43-48. Available: http://journals.rcni.com/nursing-standard/rigour-in-quantitative-research-ns.29.47.43.e8820 (Accessed 15 March 2018).

Cochrane, T. 2014. Critical success factors for transforming pedagogy with mobile 2.0. *British Journal of Educational Technology*, 45(1): 65-82.

Conole, G. 2016. Designing effective massive open online courses. *Educational Media International*, 52(4): 239-252.

Davis, F. 1985. A technology acceptance model for empirically testing new end-user information systems: theory and results. Ph.D, Massachusetts Institute of Technology.

Emanuel, R. C. and Challons-Lipton, S. 2012. Helping students transition to critical and creative thinking at the intersection of communication and art. *International Journal of Humanities and Social Science,* 2(11): 1-9.

Erlandsson, F., Bródka, P., Borg, A. and Johnson, H. 2016. Finding influential users in social media using association rule learning. *Entropy,* 18: 1-15. Available: http://www.mdpi.com/1099-4300/18/5/164 (Accessed 5 March 2018).

Evans, C. 2013. Twitter for teaching: can social media be used to enhance the process of learning? *British Journal of Educational Technology,* 45(5): 902-915.

Everson, M., Gundlach, E. and Miller, J. 2013. Social media and the introductory statistics course. *Computers in Human Behavior*, 29(5): A69-A81.

Falahah and Rosmala, D. 2012. Study of Social Networking usage in Higher Education Environment. *Procedia - Social and Behavioral Sciences*, 67: 156-166.

Fırat, M., Altınpulluk, H., Kılınç, H. and Büyük, K. 2017. Determining open education related social media usage trends in Turkey using a holistic social network analysis. *Educational Sciences: Theory & Practice*, 17(4): 1361-1382.
Frank, H. and Hatak, I. 2014. *Doing a research literature review*. Cheltenham: Edward Elgar.

Garth, A. 2008. *Analysing data using SPSS*. Sheffield: Sheffield Hallam University.

Gentles, S. J., Charles, C., Ploeg, J. and Mckibbon, A. 2015. Sampling in qualitative research: insights from an overview of the methods literature. *The Qualitative Report,* 20(4): 1772-1789.

Gray, D. E. 2014. *Doing research in the real world*. 3rd ed. London: Sage Publications Ltd.

Haworth, R. 2016. Personal learning environments: a solution for self-directed learners. *TechTrends*, 60(4): 359-364.

Hou, S. 2014. Intergrating problem-based learning with community-engaged learning in teaching program development and implementation. *Universal Journal of Educational Research,* 2(1): 1-9. Available: http://www.hrpub.org (Accessed 03 July 2017).

Jalali, A., Sherbino, J., Frank, J. and Sutherland, S. 2015. Social media and medical education: exploring the potential of Twitter as a learning tool. *International Review of Psychiatry*, 27(2): 140-146.

Jang, Y. 2015. Convenience matters: a qualitative study on the impact of use of social media and collaboration technologies on learning experience and performance in higher education. *Education for Information*, 31: 73-98.

Justice, C., Rice, J., Warry, S., Miller, I. S. and Sammon, S. 2007. Inquiry in higher education: reflections and directions on course design and teaching methods. *Innovation in Higher Education*, 31: 201-214.

Kimmerle, J., Moskaliuk, J., Oeberst, A. and Cress, U. 2015. Learning and collective knowledge construction with social media: a process-oriented perspective. *Educational Psychologist*, 50(2): 120-137.

Kong, S. C. and Song, Y. 2014. The impact of a priciple-based pedagogigical design on inquiry-based learning in a seamless learning enviroment in Hong Kong. *Educational Technology & Society.*, 17(2): 121-141.

Kutar, M., Griffiths, M. and Wood, J. 2015. Ecstasi project:using technology to encourage creativity in the assessment process. *Proceedings of UK Academy for Information Systems,* : 1-11. Available: http://usir.salford.ac.uk/35385/ (Accessed 22 May 2018).

Leibowitz, B., Bozalek, V., van Schalkwyk, S. and Winberg, C. 2014. Institutional context matters: the professional development of academics as teachers in South African higher education. *Higher Education*, 69(1): 315-330.

Li, N., Helou, S. E. and Gillet, D. 2012. Using social media for collaborative learning in higher education: a case study. Available: http://infoscience.epfl.ch/record/170400/files/ACHI2012_React.pdf (Accessed 3 February 2015).

Mcguirk, P. M. and O'Neill, P. 2016. Using questionnaires in qualitative human geography. In: Hay, I. ed. *Qualitative research methods in human geography*. Canada: Oxford University Press.

Mikroyannidis, A. 2014. weSPOT: a personal and social toolkit for inquiry-based learning. *In: Internationational Conferance on Web & Open Access to Learning (ICWOAL,2014),25-27 Nov 2014.Dubai,UAE.IEEE.*,

Miljkovic, B., Petojevic, A. and Zizovic, M. 2016. Monitoring the effect of motivation on mastering knowledge and skills in distance learning systems. *Vojnotehnicki Glasnik*, 64(4): 1009-1032.

Morgan, D. L. 2017. *Research design and research methods*. Thousand Oaks, Calif.: SAGE Publications Ltd.

Neville, K. and Heavin, C. 2013. Using social media to support the learning needs of future IS security professionals. *The Electronic Journal of e-Learning*, 11(1): 29-38.

Oktavia, T., Warnars, H. L. H. S. and Soroto, A. 2017. Intergration model of knowledge management and social media for higher education. *Telkomnika*, 15(2): 678-685.

Oyarzun, B. A. and Morrison, G. R. 2013. Cooperative learning effects an achievement and community of inquiry in online education. *The Quartely Review of Distance Education* 14(4): 181-194.

Patil, R. N., Almale, B. D., Patil, M., Gujrathi, A., Dhakne-Palwe, S., Patil, A. R. and Gosavi, S. 2016. Attitudes and perceptions of medical undergraduates towards mobile learning. *Journal of Clinical and Diagnostic Research:JCDR,* 10(10): 2-10. Available: http://doi.org/10.7860/JCDR/2016/20214.8682 (Accessed 10 March 2018).

Pesaran, M. H. and Smith, R. P. 2016. Counterfactual analysis in macroeconometrics: an empirical investigation into the effects of quantitative easing. *Research in Economics*, 70(2): 262-280.

Plowright, D. 2011. *Using mixed methods: framework for an intergrated methodology*. London: Sage Publications Ltd.

Preece, J., Rogers, Y. and Sharp, H. 2015. *Interaction design: beyond human-computer interaction*. 4th ed. Chichester: John Wiley & Sons.

Rauniar, R., Rawski, G., Yang, J. and Johnson, B. 2014. Technology acceptance model(TAM) and social media usage: an empirical study on Facebook. *Journal of Enterprise Information Management*, 27(1): 6-30.

Rodriguez-Triana, M., Holzer, A., Voznuik, A. and Gillet, D. 2015. Orchestrating Learning Spaces : an analysis of teacher needs. *14th International Conferance on Web-based Learning*: 131-142.

Roehl, A., Reddy, S. L. and Shannon, G. J. 2013. The flipped classroom: an opportunity to engage millennial students through active learning strategies. *Journal of Consumer and Family Sciences,* 105(2). Available:http://pdfs.semanticscholar.org/daa3/b94cdc7b52b3381a7c7e21022a7a8c005f84.pdf (Accessed 22 July 2017).

Rowan-Kenyon, H. T., Aleman, A. M. and Bryan, K. G. 2016. Social media in higher education. *ASHE Higher Education Report,* 42(5): 7-128.

Rowley, J. 2014. Designing and using research questionnaires. *Management Research Review*, 37(3): 308-330.

Rubin, A. and Babbie, E. R. 2010. *Essential research methods for social work* 2nd ed. Australia: Brook & Cole.

Ryan, D. 2016. *Understanding digital marketing : marketing strategies for engaging the digital generation*. 4th ed. New York: Kogan Page Ltd.

Saidi, A. 2014. *Using formative assessment and social media for effective learning*. Available: http://gupea.ub.gu.se/bitstream/2077/38432/1/gupea_2077_38432_1.pdf (Accessed 21 June 2017).

Samah, H., Jusoff, H. and Silong, A. 2009. Does Spoon-feeding Impede Idependent Learning? *Canadian Social science,* 5(3): 82-90. Available: http://www.cscanada.org (Accessed 25 April 2018).

Sanmamed, M. G., Carril, P. M. and Sotomayor, I. A. 2017. Factors which motivate the use of social networks by students. *Psicothema*, 29(2): 204-210.

Sarwar, A., Ketavan, K. and Butt, N. S. 2015. Impact of elearning perception and elearning adantages on elearning for stress mamagement. *Mediaing Role of eLearning for Corporate Training*, 11(2): 241-258.

Saunders, M., Lewis, P. and Thornhill, A. 2009. *Research methods for business students*. Harlow: Pearson Education Limited.

Sie, R. L., Pataraia, N., Boursinou, E., Rajagopal, K., Margaryan, A., Falconer, I., Bitter-Rijpkema, M., Littlejohn, A. and Sloep, P. B. 2013. Goals, motivation for, and outcomes of personal learning through networks: results of a tweetstorm. *Educational Technology & Society*, 16(3): 59-75.

Sobaith, A. E., Moustafa, M. A. and Ghandforoush, P. 2016. To use or not to use? social media in higher education in developing countries. *Computers in Human Behavior*, 58: 296-305.

Spronken-Smith, R., Walker, R., Batchelor, J., O'Steen, B. and Angelo, T. 2012. Evaluating student perceptions of learning processes and intended learning outcomes under inquiry approaches. *Assessment & Evaluation in Higher Education*, 37(1): 57-72.

Stein, R. E., Storfer-Isser, A., Kerker, B. D., Garner, A., Szilagyi, M., Hoagwood, K. E., O'Connor, K. G. and Horwitz, S. M. 2016. Beyond ADHD: how well are we doing? *Academic Pediatrics*, 16(2): 115-121.

Tang, Y. and Hew, K. F. 2016. Using Twitter for education: beneficial or simply a waste of time? *Computers & Education*, 106: 97-118.

Tuzel, S. and Hobbs, R. 2017. The use of social media and popular culture to advance cross-cultural understanding. *Media Education Research Journal*, 200(51): 63-72.

Thalluri, J. and Penman, J. 2014. Addressing Diversity in Health Science Students by Enhancing Flexibility Through e-Learning. *The Electronic journal of e-Learning* 12(1): 89-100.

Wang, X., Yu, C. and Wei, J. 2012. Social media peer communication and impacts purchase intentions: a consumer socialization framwork. *Journal of Interactive Marketing*, 26(4): 198-208.

Yazan, B. 2015. Three approached to case study methods in education: Yin,Merriam, and Stake. *The Qualitative Report*, 20(2): 134-152.

Yin, R. 2014. *Case study research: design and methods*. 5th ed. Los Angels: Sage.

Appendix A

Research Office
Old Hotel School Basement Offices, Ritson Campus,
Faculty of Accounting and Informatics
Durban University of Technology

P O Box 1334
Durban, 4000
South Africa

Tel: 031 373 5599
Fax: 086 206 8257
Email: musawenkosin1@dut.ac.za

www.dut.ac.za

30 November 2016

Proposal approval: Feziwe F. Khomo, Student number 21122746

Dear Mrs Khomo

MASTERS: Information and Communications Technology

We are pleased to advise that the Faculty of Accounting and Informatics Research Committee approved, and the Higher Degrees Committee further **noted**, the following:

1. Research proposal and dissertation title:

   Evaluating the effectiveness of facilitating inquiry based learning on Facebook to advance domain knowledge and develop enquiry skills

   Supervisor: Dr D. Heukelman
   Co-supervisor: Dr J. Skinner

   Please note that any proposed changes in the dissertation title require the approval of your supervisor/s, the Faculty Research Committee, as well as ratification thereof by the Higher Degrees Committee.

2. Please note that you are required to re-register each year.

Should you experience any problems relating to your research, your supervisor must be informed soon as possible. If the difficulties persist, you should approach your Head of Department, in the first instance. Thereafter you may report the matter to the Faculty Research Office or the Executive Dean of the Faculty.

Please refer to the 2016 General Rule Book concerning the rules relating to postgraduate studies which include inter alia acceptable minimum and maximum timeframes, submission of thesis/dissertations, etc. You are also advised to read the Postgraduate Students' Guide which is available on the DUT website http://research.dut.ac.za.

Please do not hesitate to contact the Faculty Research office for any assistance. We wish you success in your studies.

Regards

[redacted]

Mr M Ngibe
Faculty Research Officer

Cc FRC Chairperson: Dr D. Heukelman
Supervisor: Dr D. Heukelman
Co-supervisor: Dr J. Skinner
Head of Department: Mrs K. Singh
Faculty Officer: Mrs N. Singh-Sakichand

Appendix B

LETTER OF INFORMATION

Title of the Research Study: Evaluating the effectiveness of facilitating Inquiry Based Learning on Facebook to advance domain knowledge and develop enquiry skills

Principal Investigator/s/researcher: FLY Khomo (Master of Information and Communication Information)

Co-Investigator/s/supervisor/s: Dr. Delene Heukelman (DTech.) and Dr. Jane Phyllida, Skinner (PhD)

Brief Introduction and Purpose of the Study:
The research focused on determining an innovative learning approach that would encourage students to take ownership of their own learning whilst developing cognitive skills

Objectives

- To determine the appropriate IBL model approach
- To explore the level of usage of Facebook by these students
- To create an IBL "classroom" environment on Facebook
- To determine whether students can access learning material via Facebook
- To assess any improvement of understanding of learning material and the development of higher order thinking skills achieved with the use of IBL on Facebook.

Outline of the Procedures:
A case study using a mixed method approach, will be adopted for this research. The research will be done at Oval International College, which is a private college based in Durban, KwaZulu-Natal. The study will commence after receiving a letter of consent from the Director of the institution approving the request to conduct the study and approval from the participants by signing consent forms.

A learning unit from the E-commerce fundamental module, guided by a lesson plan and objectives of intended outcomes, using an IBL model, will be administered to the students on Facebook. A problem inquiry scenario will be adopted. In order to participate in the IBL assignment activity and post their comments in relation to the activity, students will be directed to the Facebook group which will be created by the researcher, and students will be requested to join. A timeframe of a week will be allocated for this exercise.
For the purpose of assessing how meaning and understanding will be established

on Facebook, data will be analysed using a software computer tool, NVivo. In addition, the researcher will employ a closed-ended questionnaire using a 5-point Lickert scale to capture data regarding aspects of Facebook experience as a learning platform, allowing students to select statements that best describe their own experience.

Risks or Discomforts to the Participant: There are no notable risks from participating in the study.

Benefits: The research will contribute towards establishing innovative approaches to enhance learning that promote the development of cognitive skills.

Reason/s/why the Participant May Be Withdrawn from the Study: Participating in the study is voluntary and participants can withdraw at any time with no penalty.

Remuneration: No remuneration will be paid to the participants.

Costs of the Study: Participant will not be expected to cover any costs towards the study

Confidentiality: Data will remain under the ownership of DUT. electronic data will be protected by passwords

Research-related Injury: Not applicable

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher (0721719066), my supervisor 0313735562 or the Institutional Research Ethics Administrator on 031 373 2900. Complaints can be reported to Dr. Skinner on 0319043045/0836585951 or Dr. Heukelman on 0313735562.

General:

Potential participants must be assured that participation is voluntary and the approximate number of participants to be included should be disclosed. A copy of the information letter should be issued to participants. The information letter and consent form must be translated and provided in the primary spoken language of the research population e.g. isiZulu.

Appendix C

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, _____ (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Appendix D

Oval International
Computer Education

Head Office: 27 -31 Joe Slovo (Field) Street, Durban, 4000
P.O. Box 2671, Umhlanga Rocks, 4320
Phone: 031-3056192 Fax: 031-3062150

Ayanda Khumalo
Research Officer
Faculty of Accounting and Informatics
Durban University of Technology
Ritson Campus,
P.O. Box 1334
Durban, 4000
South Africa

20 January 2017

Sir/Madam

Authorisation to Conduct Research at Oval International Computer Education

This letter will serve as authorisation for the researcher, Feziwe Khomo (student number: 21122746), to conduct research with regards to her Master's degree dissertation entitled: **Evaluating the Effectiveness of Facilitating Inquiry Based Learning on Facebook to Advance Domain Knowledge and Develop Enquiry Skills** at Oval International Education (Durban campus).

We look forward to the outcome of the research.

[redacted]

Authorised Signatory

20 January 2017

Date

Dr Saritha Beni
Chief Academic Officer

Printed Name and Title of Authorised Signatory

Appendix E

Bachelor of Science: First year Students, Oval International College

Research Project Questionnaire: Enquiry Based Learning on Facebook

INSTRUCTION

- Thank you for taking time to respond to the research questionnaire.
- The questionnaire is for a Master study titled: **Evaluating the effectiveness of facilitating inquiry based learning on Facebook to advance domain knowledge and develop enquiry skills.** It will take you no longer than 15-20 minutes.
- Mark the relevant box with a cross (X).

Statement	strongly agree	agree	neutral	disagree	Strongly disagree
1. It is easy to share and access information on Facebook					
2. Learning is easy and comfortable on Facebook for me					
3. Learning can take place on facebook					
4. Facebook tools/features are sufficient for learning					
5. I enjoyed flexibility and freedom while learning					

6. Facebook gave me an opportunity to learn with peers					
7. The experience motivated me to take ownership and responsibility for my own learning					
8. The initiative increased my interest in the learning unit					
9. The initiative further assisted me in understanding the learning unit					
10. The initiative facilitated the development of other ways of learning					
11. The initiative gave me the opportunity to share my understanding in a simple and sensible way					

12. This form of learning combines and links everyday life with creative learning					
13. Facebook can make it easier to learn					
14. Facebook provided the opportunity to be part of a team while learning					
15. I felt as though I was helping solve a problem collectively with my team mates					
16. I was able to apply my knowledge of the subject to fit with the context and requirements					
17. This form of learning gave me an opportunity to reflect and rethink on my understanding					
18. I was also able to question my peers views for clarity					

19. Facebook gave me the opportunity to get other perspectives thus improving my understanding					
20. I found every view appropriate and in alignment with learning					
21. This form of learning challenged my thinking capabilities					
22. I found this form of learning stretching me to think more deeper					
23. My peers contribution inspired me and added value to my learning					
24. I found this form of learning effective					
25. I found the use of Facebook innovative					
26. I recommend this initiative to other students					

Appendix F

ASSIGNMENT AND MEMO

Facebook group activity: E-Commerce Fundamentals

Learning Unit 3: Selling on the Web and Building a Web Presence

MARKS: 20

DATE : 16/03/2017

ASSIGNMENT QUESTION **[20} Marks]**

1.1. Your company, is embarking on a new venture, producing funky bags for university students. As a new intern, you have identified social platforms in attracting your new market to generate sales.
How would you implement the principle of the "Four Marketing Ps'" as a strategy? Explain how you would take advantage of this principle.
Memo
Students must show understanding of the four marketing Ps: Product, Price, Place and Promotion. In addition, demonstrate ability to describe how they would demonstrate their usage on the web.

1.2. You have been tasked to explore the revenue generating alternatives. Currently your retail supermarket is using an advertising -supported revenue model. For strategic alliance that would make sense, which are other revenue models that would you consider?
Give your recommendations and support your arguments.
Memo
Students must be able to identify the revenue models: Web catlog, Digital content, Fee based model, Advertising-subscription mixed and explain the advantage of such models in a retail set-up

NOTE:

- Students are encouraged to work together and learn from each other
- All students are requested to participate on the Facebook group by building on peers views or by adding own perspective
- The assignment activity is only for one 1 weak for each question.
- Students with highest score of participation in terms of comments will be rewarded with air time vouchers.

OVAL ASSIGNMENT MARKING MEMO AND RUBRIC

STUDENT NAME: _____

STUDENT NUMBER: _____

Criteria	Maximum Marks	Student's Marks
Appropriate Content	70%	
Academic Excellence	15%	
Creativity	15%	
FINAL MARK	**100%**	
Lecturer's Comments		
Lecturer Name		
Lecturer Signature		
Date		
Internal Moderator's Comments		
Internal Moderator's Name		
Internal Moderator's Signature		