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Developing a factor-model to understand the impact of factors on higher education students' likelihood to e-cheat

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DEVELOPING A FACTOR-MODEL TO UNDERSTAND THE IMPACT OF FACTORS ON HIGHER EDUCATION STUDENTS' LIKELIHOOD TO E-CHEAT

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CERTIFICATION

I, Zeenath Reza Khan, declare that this thesis, submitted in fulfillment of the requirements for the award of Doctor of Philosophy, in the School of Information Systems and Technology, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Zeenath Reza Khan

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ABSTRACT

"I'm for truth no matter who tells it. I'm for justice no matter who it is for or against. I'm a human being first and foremost, and as such I am for whoever and whatever benefits humanity as a whole"

-Malcolm X

Most educators strive to develop in their students a certain level of academic integrity that they hope will be carried into the workplace. Academic integrity can benefit higher education, workplaces and the greater society by promoting integrity, scientific progress and responsible citizenship. But, academic dishonesty has been a concern for academics and researchers as long as educational institutions have existed. In the last few decades, the concerns have increased due to an increase in the reporting of cases of cheating in academic settings.

To date, many studies have been carried out that report instances of increasing cheating, some have researched ways to curb academic dishonesty and others have focused on the factors that may have influenced students' cheating behavior. But all measures currently in practice seem to be reactive, rather than proactive. Trying to assess why a student has cheated may not help understand why a student will be inclined to cheat in the future. There has been limited research into the factors that may influence a student's likelihood to cheat.

Furthermore, over the past few years, researchers and academics have expressed growing concern over occurrences of academic dishonesty, especially among higher education students, sparked by advances in and the increased use of technology. It is believed that technology including the Internet has given students easy access to resources that can be easily copied and reproduced as their own thus potentially blurring students' understanding of originality and ownership. This has also given birth to new types of academic dishonesty that can be grouped under a new term coined, e-cheating.

This thesis defines e-cheating, provides a consolidated list of factors that influence students' likelihood to e-cheat and describes the development of the **Khan's Factor Model** intended for use by individuals, researchers and industry to understand the

factors that influence students' likelihood to e-cheat. The research model has been developed by first using Interpretive Structural Modeling and then testing the model using Structural Equation Modeling. Moreover, data analysis and evaluation have validated the **Khan's Factor Model**, and have provided insight into the various factors that do influence students' likelihood to e-cheat, leading to recommendations that can help deter and curb e-cheating among higher education students, ultimately concluding that with ICT-savvy students in classrooms, stakeholders such as universities, teachers and parents need to work towards solutions that are intrinsically motivated in order to enhance overall student integrity.

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"O you who believe!...be with those who are true (in words and deeds)"

Surah Tauba: 119, The Holy Qur'an

Before I can even begin to thank all those who supported me in my journey, I need to first reflect on how this journey began.

My husband always tells me that I am a 'Black & White' person, i.e. something is simply either right or wrong. It is right to help a child cross the road. It is wrong to help a student pass an exam or assignment. It is right to always tell the truth. It is wrong to hurt someone's feelings with a truth if it can be spared.

When I was growing up, my parents wanted me to become an MBBS doctor. But I cannot stand blood, so that was not to be. So I decided I would aim to continue my studies till I completed a PhD. I thought I could do something in journalism because it would give me the power to pen down the truth. Then I thought I could do something in environmental journalism because that would give me the power to do something good. Then I met Dr. Lejla Vrazalic.

After working with her for a year, Lejla suggested that given my perceptions in life, I look into the area of integrity and ethics. I began reading up on this topic and I could actually see the problem take shape. Everywhere I looked, students were struggling with decisions on whether to cheat in an exam or plagiarize. School teachers and university lecturers were struggling to make students understand why they shouldn't cheat. I began to study student behavior, teachers' attitudes, and educational institutions' struggle with student integrity, along with Dr. Ghassan al Qaimari. In so doing, I stumbled upon the problem of students becoming high-tech when cheating. That's when I met Dr. Peter Hyland.

I approached Peter when he visited our campus in Dubai from Wollongong to see if he could give me some direction to my research and some advice on my admissions. Peter was my Knight in Shining Armour where my PhD is concerned. He not only gave me a direction, but guided me to acquire a full-fee waiver scholarship at University of

Wollongong to pursue my PhD. At every step of the way, Peter challenged me on issues pertaining to my dissertation, discussed at length my thesis' strengths and weaknesses and became my primary supervisor. He was a beacon of hope in my stormy days all through my six years. I am grateful to him for his patience, support, encouragement and belief that I would make it. When he couldn't give me written feedback due to a surgery on his shoulder, he would send me audio feedbacks from Wollongong, Australia to Dubai, UAE. A year after his retirement from UOW, Peter continued to assist and guide me till he handed me over to the very-capable hands of Dr. Mark Freeman.

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To my daughter, Samara Zeenath Stephen, for being such a patient soul, always waiting for mommy to take time out of my schedule to spend it with her and never showing annoyance when I couldn’t.

And to Allah s.w.t. for all the blessings He has bestowed on me and those around me.

Thank you all!

DEDICATION

I would like to dedicate my work to **my parents**. To my dad for always being proud of my achievements. To my mom for all your wisdom and guidance that led me towards everything that would make dad proud. Mom and dad, what a team you two make!

To **my daughter**. Darling, I can hardly wait to see you grow up. You will be such a kind and generous person, full of mischief and fun! I love you!

And to **my husband**. You have always been my dream come true. Thank you for making my other dreams come true too!

A tribute to two incredible women whose life-stories have been ones of inspiration, dedication, courage and honesty that my mom always shared with me - my grandmothers, Ayesha Khatoun and Sepa-ara Kobra Banu

Ladies, you were life's true heroes!

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CHAPTER 1: INTRODUCTION

‘Teachers know it. Parents know it. We all do it. It’s cheating, not bank robbery. It’s even easier now with smart phones and such. It’s no big deal. Everyone does it, you know!’

- *Second Year Finance Major Student*

1.1 Introduction

It is a common perception (or potentially a misperception) that younger individuals in a society have a natural tendency to do the least amount of work necessary to get something done. This is typically attributed to the reason that there is always something far more interesting awaiting their time and effort. Therefore, cheating, by any means, is not a new phenomenon. In formal education settings, students seem to be getting progressively smarter, more conniving and more hands-on with new technologies that come their way to enable cheating to be faster, easier and more cost-effective.

Cheating can be simply defined as the act of using someone else’s work for one’s own benefit. The copied work can be an idea, a written piece of work which may be scholarly in nature, a song, a painting, anything that has not been created or developed by the user but rather taken from another (Jones, 2001). Electronic cheating (or e-cheating) is defined as using some form of Information Communication Technology (ICT) to perform academic dishonesty in or out of a classroom setting to gain unfair advantage over other students (King & Case, 2007). To understand the concept of e-cheating, it is helpful to understand that ICT, for the purposes of this study, can include any electronic technology associated with computers, computer-networks and telecommunications such as mobile phones, smart phones, PCs, laptops, hand-held computers, software and the Internet. ICT has been defined as any technology, device, software or tool used for the purpose of communication, exchange, storage and manipulation of information (Granville, Leonard & Manning, 2000; Stevenson, 1997).

Every year academic institutions highlight their concerns over the growing number of cheating cases. In 2012, Harvard University announced 125 cases of cheating in final exams of a course titled Introduction to Congress (Harrington, 2012). Many teachers around the world have tried to come up with new techniques to combat cheating in and out of their classrooms. Both schools and universities spend a proportion of their annual budget by either buying products or software with the developers and marketers promise to help curb cheating. These products are also advertised to train faculty, restructure curricula to help curb cheating in their institutions in the hope that this may increase academic integrity and potentially increase annual revenue or world-rankings. As some online websites are using technologies to facilitate cheating by selling research papers and assignments to students, universities are also using technology to combat and reduce cheating. The Herald and Fairfax investigation in 2014 exposed an online business that provided more than 900 assignments to students from almost every university of New South Wales in Australia, putting Australian education's reputation at risk (Harrison, 2014).

But why do students cheat, or more specifically why do students use technology to enable them to cheat? It is believed that the answer to this question is the key to understanding the phenomenon of why students e-cheat in classrooms or in their assessable tasks. It is also believed that understanding why students' e-cheat can help in the development of tools and techniques that will aid teachers to develop policies, introduce them and improve teaching tools that will help reduce e-cheating. Surprisingly, research into factors that influence academically dishonest behavior among students has predominantly focused on studying students' cheating behavior rather than e-cheating, with ad-hoc factor models proposed.

To this effect, it is believed that a better model of the factors that lead to e-cheating should be developed, given the increasing focus on technology in learning environments. It is also believed that a strong, conceptual model can be developed based on the existing literature and then by conducting a survey to gather data to test the model. ***This thesis aims to fulfill this gap in the research.***

This chapter provides an overview of the thesis by first presenting a background to the research problem, then providing a description of the research objectives, an analysis of the significance of this study to various stakeholders followed by the research methodology that is used to achieve the research objectives, highlighting the study's significance. Finally the chapter provides an overview of the overall structure of this thesis.

1.2 Background

Academic integrity in Higher Education (HE) is the moral and ethical codes in academia which include upholding honor, maintaining standards and avoiding unacceptable behavior such as cheating (and e-cheating). It has been defined as a commitment made by students and teachers to uphold values such as honesty, trust, fairness, respect and responsibilities in the face of difficulties (CAI, 1999). Any act that does not uphold such values mentioned above are considered as academic dishonesty which has previously been defined as cheating, plagiarism, falsification, fabrication and aiding cheating (CIP, 2003).

Though academic dishonesty is not new, it has come under focus for over eighty years when empirical studies started highlighting the frequency of unethical practices among students at universities (Davis et al., 1992; Whitley, 1998; Bowers, 1964) and studies showed a high correlation between unethical behavior in students to unethical behavior in employees, which has placed doubts on the value of the education provided by universities (Nelson, 2002; Sims, 1995; Harding et al., 2004; Nonis & Swift, 2001). Employers expect universities to play a significant role in ensuring the values of integrity are instilled in students before they graduate because HE is meant to be the basis for professional training and careers (Nelson, 2002). On this basis of HE, students are able to find stable employment, enjoy better jobs, earn higher salaries and live longer lives (Campbell, 2011). Research has shown a high frequency of cheating taking place in universities and other unethical behavior among students; with some researchers placing the number at as high as 75% (McCabe, Trevino, & Butterfield, 2001; Bowers, 1964; McCabe & Trevino, 1997; Cizek, 1999). This is a serious concern for universities and employers alike (Grimes, 2004; Khan, Samuel & Al Qaimari, 2006) because higher education has been defined as the educational level that includes teaching, research, applied knowledge, gaining skills, integrity and experience that employers want (UNESCO, 1998).

With the diffusion of ICT in HE, researchers suggest that the problem of academic dishonesty has become more problematic. The explosion of ICT usage in HE has pushed learning beyond traditional classroom settings (Anderson, 2010), improving delivery of content, access to education, improving student understanding and increasing overall quality of education and knowledge creation (Kozma, 2005).

The increased use of ICT allowed universities to offer blended and distance learning programs, and gave rise to digital literacies that included using ICT skills to share and create information; navigate, search and sort information; to research organize and manage information (UNESCO, 2009). This change has given rise to digital natives who use ICT to communicate, entertain and learn (Anderson, 2010); this unfortunately has clashed with university practices, particularly in areas of academic honesty (Seed, 2009). Primarily because students thought, behaved and learned differently due to their continuous exposure to collaboration through the use of ICT (Bennett, Maton & Kervin, 2008). Some researchers insist that due to this shift in student behavior, thinking and learning, a whole new set of cheating behaviors can be seen among students. It has been argued that this is due to the increase in digital literacies and e-learning (Cordova & Thornhill, 2007; Rovai, 2000; Hulme & Locasto, 2003).

Many of the traditional cheating behaviors have been modified due to the use of ICTs. However, although literature presents extensive studies into the various types of traditional cheating behaviors, very few studies have focused on studying e-cheating behaviors among HE students. Studies suggest that e-cheating behaviors are common place due to existence of online databases, digital libraries and easy access to resources using devices such as desktops and netbooks (Weinstein & Dobkin, 2002). Many studies provide empirical studies that show e-cheating on the rise (McCabe & Trevino, 1997; Fain & Bates, 2002) and this raises the question on the quality and integrity of HE degrees and the graduate qualities students are taking into the workplace.

Prior researcher has suggested strategies to try and curb academic dishonesty among HE students. However, most of the detection, awareness and prevention strategies are reactive to e-cheating cases, rather than proactive actions to reduce the reasons why e-cheating occurs (Goosney & Duda, 2009); increasing the distance between students and teachers and adding to the problem (Freedman, 2004; Zwagerman, 2008). One of the proactive strategies is to develop a model of factors that influence HE students to e-cheat.

Despite the obvious importance of knowledge on what influences students to e-cheat in HE, there appears to be very little research on e-cheating. Furthermore, existing studies propose ad-hoc models of factors based on existing literature and theories, of which very few are actually empirically validated through statistical analysis to understand why students e-cheat. The current research attempts to address this apparent shortcoming by studying the existing literature to build a conceptual factor model and validate it. In doing so, this research contributes to a better understanding of the interrelationships of various factors that influence e-cheating in HE students.

1.3 The Purpose of Study and Research Objectives

The primary goal of this study is to **develop and validate a conceptual model of the factors, which influence e-cheating in higher education**.

It has been observed in Section 1.2 that there is a growing concern over e-cheating instances among HE students. Although some strategies exist that attempt to curb such unethical behavior among students, most of these are reactive strategies, doing very little to predict and ultimately reduce students' likelihood to e-cheat. It has also been observed that most of the existing studies focus on traditional cheating behaviors, not e-cheating behaviors. It is argued that due to the existing studies that have identified factors and proposed ad-hoc factor-models, there is a significant gap in the study. The gap highlights the need for a comprehensive list of factors, and a scientifically developed factor model that is both comprehensive and can provide a clear understanding of what influences students' likelihood to e-cheat. Research has also shown that there is a variation in the classification of some of the factors, and whether some factors should be included as second level or primary level factors. It is currently unclear how extensive the proposed models really are and whether one works better than another. Understanding the right classification of the factors, and considering factors that are at the right level of hierarchy is beneficial for developing a comprehensive factor model.

Preliminary studies have suggested that technology use among the HE students has in fact given rise to increased possible factors that may influence and increase students' likelihood to e-cheat. However, no comprehensive study of such technological factors has been fully conducted. An understanding of the technological factors impacting students' likelihood to e-cheat would allow the development of a comprehensive factor model that would allow a better understanding of the problem of e-cheating among HE students. Analysis of the proposed factor model and validation process would provide basis for understanding the causes for students' likelihood to e-cheat.

The research objectives posed follow:

(1) To develop a comprehensive conceptual model of factors that influence the students' likelihood to e-cheat
(2) To validate that conceptual model in practice

1.4 Significance of the Research Study

This research can be justified by a number of factors and associated objectives. Previous research in the field of academic dishonesty has focused on the challenges in understanding HE students' cheating behavior. Previously proposed factor models have looked at factors that influence students' cheating behavior. Previous research has also been limited to non-technological factors, while the increased use of ICT in HE has changed student behavior and understanding of academic honesty. Traditional cheating behaviors have included unethical and unacceptable behaviors of students. E-cheating behaviors involve using ICT in conducting unethical and unacceptable behaviors, so understanding what these factors are and how they can influence student behavior is therefore important. It is also important to understand how all the factors interact with each other and/or directly to influence students' e-cheating behaviors.

Currently, there is no comprehensive factor model that has been developed using scientific methods to identify all of the factors, their relationships and influence on students' likelihood to e-cheat. As a result, it is difficult for stakeholders such as parents, teachers, schools, universities, governments and policy makers to take a proactive stand to preventing student e-cheating.

1.5 Overview of the study

This study was carried out in three broad phases:

1. Phase one was a review of literature on the underlying concepts including:
    - Understanding HE and its importance
    - Understanding information communication technology, its evolution and use in HE
    - Understanding codes of conduct and academic integrity in HE
    - Understanding influence of ICT on academic integrity
    - Identification and classification of factors to be integrated into the factor model
    - Methods to be used in developing and validating the factor model

2. Phase two involved the development of the factor model
    - As part of the methodologies, an appropriate qualitative method (interpretive structural modeling - ISM) was selected to develop the factor model and hypotheses. The development process was critically selected based on existing literature and then recorded through a step by step process.

3. Validation of the factor model
    - To validate the factor model, an appropriate survey model was selected. A suitable sample that represented the target population (HE students) and sample size. A survey instrument was developed and used to collect data. To validate the factor model, a combination of analysis tools was chosen. To test the appropriateness and retention of all the identified factors, exploratory factor analysis (EFA) was used. Finally, to validate and test the accuracy of the factor model and test the relationships and hypotheses, a method of analysis was chosen (structural equation modeling- SEM).
    - The results were used to develop the **Khan's Factor Model** of factors, including ICT factors that influenced students' likelihood to e-cheat. The **Khan's Factor Model** was developed and validated with the use of both quantitative and qualitative statistical analysis.

1.6 Structure of the Thesis

The thesis consists of a total of six chapters and is organized as follows:

Chapter 1: **Introduction**, this chapter, has presented a broad overview of the research and has included the background to the research, its purpose, significance and a brief overview of the methodologies used.

Chapter 2: **Literature Review**, the following chapter, presents the current literature relevant to this study. It is divided into three main sections:

(1) importance and current state of higher education, impact of ICT on HE and academic integrity in HE;

(2) definition and prevalence of cheating and e-cheating in HE; and

(3) a comprehensive list of factors and prior factor models from existing literature,

The chapter also proposes a list of technological factors and classifies the factors into attitudinal, psychological, technological, demographic, and contextual taxonomies. This chapter demonstrates that this thesis is based on a significant body of research and further clarifies the problem being addressed in this study.

Chapter 3: Methodology describes the mixed-method approach used in this study. It provides a description of the qualitative methods and procedures that are used to develop the **factor model** including a list of hypotheses and providing the initial conceptual factor model. It also provides the benchmark steps for similar studies to use such qualitative methods to develop conceptual models. It then provides methods used to validate and test the factor model using quantitative methods and methods of analysis to test the hypotheses and paths in the models. The procedures used to validate and test the model are described, covering selection of survey type, sample size and developing survey instrument and analyzing the responses.

Chapter 4: Results and Analysis provides a detailed analysis of the results collected using the survey instrument. These results include evaluation of the interrelationships of factors and their relationship to students' likelihood to e-cheat.

Chapter 5: Discussion is based on the results and analysis provided in Chapter 4, and following the validation process, the actual implications and some interesting findings of the results are presented.

Chapter 6: Conclusion draws together the key contributions and conclusions of this study, describing the significance of the study, recommendations and lessons learned to key stakeholders, identifying the limitations of the study and providing suggestions for future research.

CHAPTER 2: LITERATURE REVIEW

"If you tell the truth, you don't have to remember what you said"

Mark Twain

As stated in Chapter One: Introduction, the aim of this study is 'to develop and validate a conceptual model of the factors which influence e-cheating in higher education'. To achieve this aim, it is necessary to understand the main concepts that relate to it. A conceptual framework that clearly defines not only higher education (HE), but also its importance in the modern world, its integration with information communication technology, its ethics and integrity is presented in Figure 2.1.

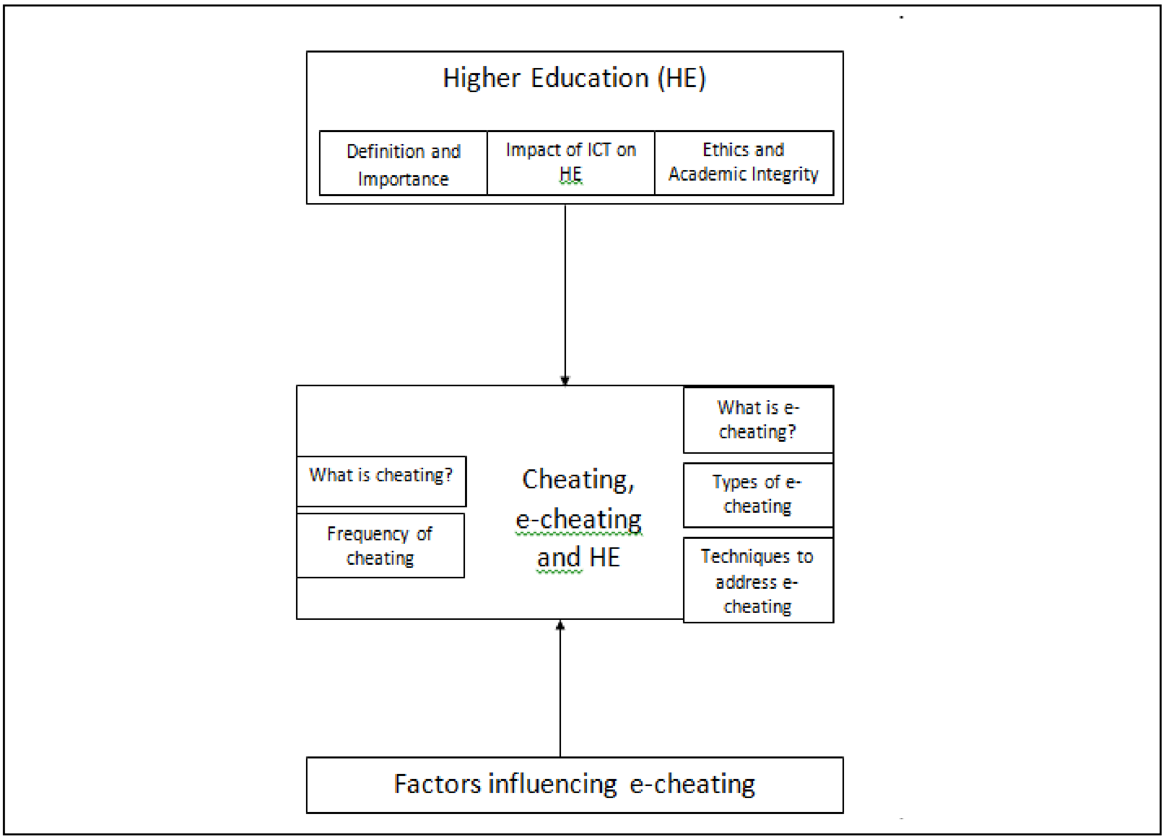

Figure 2-1: *Conceptual Framework*

This chapter provides a review of cheating in HE, its frequency, e-cheating instances in HE, techniques used by students to e-cheat and finally the factors that influence e-cheating in HE.

2.1 Higher Education in Modern Society

This section presents definitions of HE as previously presented in the literature and develops a working definition that will be used for the purposes of the study. This section then discusses the importance of HE in modern society.

2.1.1 What is higher education?

A review of literature has shown there are three types of definitions put forward describing HE, focusing on:

- the scope of HE
- characteristics that define HE and
- a hybrid of both characteristics and scope.

Scope of the definition in this context tends to include the perceptions of authors or academics, places at which higher education takes place, its levels of knowledge distribution; and characteristics of the definition imply the qualities of HE, what HE does for its students and how it prepares its students. For a complete review of HE and to develop its working definition for this study, all three types will be reviewed.

The National Committee of Inquiry into Higher Education in the United Kingdom (UK) defines the characteristics of HE as ‘embracing, teaching, learning, scholarship and research’ (National Committee, 1997). The National Committee also put forward three scope-based definitions of HE as ‘all-post-secondary education’, ‘all education taken by adults’ and ‘all education at a level above that which is normally achieved at the end of upper secondary schooling’ (National Committee, 1997).

A definition by Queensland Department of Education, Training and Employment, in Australia, defines the scope of higher education as any education at degree level (DETE Education, 2012). The definition further highlights the scope of HE as including an associate degree, a bachelor’s degree, a graduate certificate, a graduate diploma, a master’s degree or a doctoral degree (DETE Education, 2012).

Other scope-based definitions state that HE is a ‘part of tertiary education leading to a degree or equivalent diploma’ (Campbell & Rozsnyai, 2002, p. 132).

In 2003, the Higher Education Funding Council for England (2003) defined the scope of HE in the UK as:

> *Higher education ...include[s] degree courses, postgraduate courses and Higher National Diplomas. Higher education takes place in universities and higher education colleges, and in some further education colleges.*

For Association Europeenne des Conservatoires (2004), their HE definition includes both the characteristic and scope of HE:

> *Education which is carried out after the typical period of school-based training and at a demonstrably higher level. Students typically enter higher education at around 18, although higher education may form part of lifelong learning. Although the professional aspect of higher education is increasingly important, higher education has traditionally been seen as entailing intellectual activity of a relatively advanced nature for its own sake*

Another definition of higher education that encompasses both the scope and characteristics of higher education has been put forward by the Association des Etats Généraux des Etudiants de l'Europe that claim higher education is part of tertiary education (AEGEE, 2010). It further states that higher education is any university level education with characteristics to work towards the student achieving some kind of certificate or degree of completion and preparing for the job market, with an underlying theoretical base (AEGEE, 2010).

Furthermore, 'a higher education provider is a body that is established or recognised by the Commonwealth or a state or territory government to issue qualifications in the higher education sector. It may be a university, self-accrediting institution or non-self-accrediting institution' (AQF, 2013, p. 96)

For the purpose of this study, and taking into consideration the above definitions of higher education and higher education providers, a complete definition of higher education is put forward which is believed to lend itself to this research and the purpose of this study:

> *Higher education is an educational level that follows the completion of secondary level education and often includes teaching, research, applied knowledge, gaining skills and experience, which result in a diploma or degree.*

2.1.2 So why is higher education important?

Around the world, the number of HE students is increasing because an increasing number of students and parents are realizing the importance and benefits of attaining HE. A survey of over 1400 Americans conducted in 2000 reported some 'eighty seven percent of respondents believed that a [higher education] had become as important as a high school diploma in the country' (Immerwahr & Foleno, 2000).

Recent studies in the United Arab Emirates (UAE) and in the UK have both reported steady increases in their HE student populations to eighty percent and ninety percent respectively over a two-year period (Nazzal, 2012; HESA, 2012). Other studies have projected the world's HE student numbers to be over 262 million by the year 2025 (Maslen, 2012)

HE is believed to be important because it is the basis for most professional training and jobs and gives graduates a host of choices (UNESCO, 1998). Employers are looking for individuals with skill sets and a HE environment is designed to enable students to develop a systematic understanding and fundamental basis for concepts that are key to industries such as: medicine, law, accounting, business, and information and communication technology.

Eddy Campbell, president and vice-chancellor of University of New Brunswick identified the benefits of HE with having stable employment, healthier and longer lives, enjoying jobs, and earning higher salaries (Campbell, 2011).

The US Census Bureau in 2004 reported that, on average, a high school drop-out earned around $20,000 whereas a person with high school diploma earned $30,000 while a college graduate earned over $54,000 (Allen, 2007).

Furthermore, a report from the Treasury Education Department in the USA stated that

> *'there is substantial evidence that education raises earnings. The median weekly earnings for a full-time, full-year bachelor's degree holder in 2011 was 64 percent higher than those for a high school graduate…'*
>
> *(Treasury.gov, 2012)*

The difference in income may have a direct impact on a family's household income, thus also impacting the economy of a country as a whole.

Furthermore, some studies have shown that an increase in higher education students has given rise to a constant influx of earnings for the education sector not just in particular countries, but globally, making higher education a global marketplace. Higher Education Statistics Agency in the UK reported an increase of higher education students from £25.4 billion in 2008-2009 to £27.6 billion in 2010-2011 (HESA, 2012).

The UNESCO, in a report published in 2012, stated in regard to the Global Financial Crisis of 2008, that 'higher education systems in many jurisdictions have continued to expand, and cross border enrolments flourish despite the crisis' (UNESCO, 2012, p. 3).

The report also quotes Varghese (2010) who argues

> *'the fact that the higher education sector, once an easy target for budget cuts, appears to be more protected during the current crisis period than in previous ones. ... reflects a major change in attitude towards investing in higher education – a greater recognition of the contributions of higher education and research to economic growth and national competitiveness. Thus ... higher education is now seen as part of the solution and is being included as an element in recovery plans and stimulus packages'*
>
> (Varghese, 2010 as cited in UNESCO, 2012, p. 3).

The above statistics clearly show the importance of HE in the modern world. Moreover, the section highlights the expectations employers have while hiring HE degree holders. Not just employers, but industries and society as a whole have certain expectations that graduates of higher education actually have the skill sets associated with their degrees. This invariably includes learning those skills, applying the required knowledge taught and being confident and honest in their applications. Cheating in any form that demonstrates academic dishonesty undermines this expectation and so potentially undermines the value of the degrees and invariably the value of HE as a whole (Martin, 2014).

As stated in Chapter One, e-cheating is any type of cheating (academic dishonesty) which relies on or uses ICT. The next section defines ICT, its impacts on higher education and the different ICT tools that are currently in use for HE purposes that invariably underpin e-cheating.

2.2 Information Communication Technology and Higher Education

This section of the chapter discusses ICT and HE. It explains the important changes in ICT that may be affecting HE, and it describes some common technologies that will underpin the discussion of e-cheating in subsequent chapters.

2.2.1 Information Communication Technology definition

Throughout the literature, the terms information technology (IT) and ICT are often used interchangeably. Some studies define the term IT as any computer or computer-related devices, hardware or software used to store, retrieve and manipulate, and communicate information. This term first appeared in 1958 in the Harvard Business Review (Leavitt & Whistler, 1958).

However, ICT was first coined by Dennis Stevenson in his 1997 report to the UK government and promoted by the new National Curriculum documents for the UK in 2000. Stevenson (1997) defined ICT as any information and/or communication technology.

According to the University of Queensland (2012), ICT is any form of computer or communication devices, technology, or software that may be used to create, design, store, transmit, interpret and manipulate information in its many formats.

A similar definition has been put forward by Granville et al. (2000) who state that '[ICT] is the combined utilization of electronics, telecommunications, software, networks, and decentralized computer workstations, and the integration of information media' (p. 19).

For the purpose of this research, the definition of ICT will be taken to be:

> *Any technology, technological device, software or tool used for the purpose of communication, exchange, storage, manipulation, accessing and processing of information including but not restricted to Personal Digital assistants (PDAs), mobile devices, smartphones, tablets, laptops, Personal Computers (PCs), the Internet, USB storage or other storage devices.*

2.2.2 The influence of ICT

Over the past few decades, ICT has had a tremendous influence on both the practices and procedures of almost all forms of business and government including fields such as law, medicine, travel, sports and engineering. The ways these fields currently engage in work are different to the ways they used to work, the impact of ICT has been described as a third industrial revolution (UNESCO, 2005). Where many traditional jobs, like the repetitive manual tasks of blue collar factory workers, have been lost, new jobs have been created because of ICT such as programmers, system analysts, developers, computer engineers and software engineers (Anderson, 2010).

The speed at which ICT has evolved and been diffused in society is unprecedented. It took 75 years for a technology such as the telephone to reach 50 million users; it took the World Wide Web four years to reach the same number of users (Prima Braga et al., 2005). According to Bekker (2005), from 2004 to 2005 the number of e-mail users worldwide increased by 15% to 651 million and the daily traffic constituted 76.8 billion messages.

Anderson (2010) notes that the explosion of ICT usage has pushed learning beyond the traditional classroom. The storage of information and knowledge almost doubles each year, to the point where Anderson (2010) states that each day 24 million new blog-posts are updated, over a billion songs are shared, and more than 7000 scientific and technical articles and papers are published. He also states that this explosion in information has implications for learning because it makes it possible to generate, store, transmit, retrieve and process information faster and with greater ease, thereby, taking learning beyond the classroom environment.

However, according to authors such as Soloway and Prior (1996), Collis (2002), and Oliver (2002), the impact of ICT on education has not been as significant as it would be expected, with impeding factors including a lack of finance, training, motivation and even interest among teachers to adopt ICT into their classrooms. Despite such opposing views, ICTs are increasingly becoming part of HE institutions around the world. A study in the UAE alone has shown that the rate of use of ICT by HE students has increased by almost 200% between 2008 and 2011 both inside and outside of the classroom regardless of factors such as areas of study, gender, age, or nationality (Khan, 2012).

2.2.3 ICT in Higher Education

This section presents definitions of ICT in HE and the role of ICT use in HE. It then presents a brief history of ICTs in HE, the impact of the Internet on HE, facilitating distance learning, blended learning and e-learning, all of which have had major impacts on HE, giving rise to the need for digital literacies. The section ends by pinpointing various technologies that underpin e-cheating and are regularly used by students in HE.

2.2.3.1 Definition of ICT in HE

Gwang-Jo (2009, p4) defines ICT in HE as a 'comprehensive approach to innovate education systems, methods, and management through information communication technology'. Ngoma (2010, p. 7) provides a slightly different definition of ICT in education as 'a reliable vehicle for education, a platform for communication, and a powerful tool for economic growth'. Collis (1999) suggests that ICT in HE allows for the distribution of information and publications; communication between teachers and students; collaboration among students in the form of discussions and group work; information handling through search engines and accessing multimedia databases; specific teaching and learning purposes such as interactive tutorials, simulations, tests, quizzes, video-conferencing that encourage lecture participation and course integration using Internet-based learning management systems (Collis, 1999).

Similarly, Gwang-Jo describes the scope of use of ICT in HE as 'a subject; a tool to innovation of teaching-learning practice through digital content, multimedia, teaching-learning methods; an administrative tool such as a learning management information system; an expansion of learning opportunity with distance learning and as a facilitator of higher-order thinking skills such as learner-centered, tailored learning' (Gwang-Jo, 2009, p. 4).

Conversely, UNESCO describes the scope of use of ICTs in higher education as developing course materials, delivering and sharing various content, creating and delivering content presentations and lectures, allowing communication between students, teachers and others (UNESCO, 2010). Unlike most other sources, UNESCO also includes in its scope using ICT for academic research, administrative support and student enrolment as further contributing to higher education (UNESCO, 2010).

2.2.3.2 Role of ICT in HE

A study by Kozma and Anderson (2002) has described the role of ICT in HE as a bridge between classrooms and the real world, providing tools to enhance learning, allowing students and teachers greater flexibility and opportunity for communication. In 2005, Kozma added several new roles of ICT in HE. These included improving the delivery of and access to education; becoming the focus of learning as students are becoming better prepared for work by learning ICT skills; improving student understanding and increasing quality of education and knowledge creation, innovation, information sharing (Kozma, 2005). It could be argued that with the developments in ICT, the availability to students and teachers between 2002 and 2005 resulted in a new set of observations by Kozma that had not been observed at the time of the earlier study. These developments include development of laptops, increased Internet access, and e-learning (Aslan & Reigeluth, 2011).

According to some studies (for example, Resta & Patru (2010) and Bransford, Brown & Cocking (1999)), the role of ICT in HE has been described as one that has altered the role of teachers and students. Teachers are no longer looked on as the sole sources of information and knowledge, but rather as guides to help students learn, as supporters and coaches. Consequently, student roles have changed from passive recipients to active participants, researching information, communicating with teachers, outsiders and each other, and producing essays and reports based on evidence they gather, generally becoming more responsible.

Hepp, Hinostroza, Laval & Rehbein (2004) describes the role of ICT in HE as one that which enhances and improves teaching and learning practices, that effectively allows students and teachers to build communities, share information, and that enhances the efficient integration of information pertaining to students, teachers, curricula budgets, management, activities. Conversely, researchers such as Unwin (2009, p. 214) and Anderson (2009, p. 3) suggest that the role of ICT in HE is to improve teaching, and enhance educational opportunities.

An interesting observation about the role of ICT in HE is the variability reported, the role of improving communication seems to be the only common role that all studies identify.

2.2.3.3 A brief history of ICT in HE

However varied the role of ICT in HE is reported, studies agree that the impact of ICT on HE has not been instantaneous. The use of instructional radio and television in the 1920s through to 1950s 'laid the foundation of machine-use in educational settings' (Aslan & Reigeluth, 2011). Self-scoring tests and mechanical teaching machines such as those used by Pressey in the 1920s gave rise to Computer Assisted Instruction (CAI) in the 1960s (Smith & Smith, 1966). The earliest recorded use of computers in education date back to the 1940s with the first operational computers used at Harvard and then at the University of Pennsylvania (Molnar, 1997). According to Levien (1972), the use of computers was primarily concentrated in the fields of mathematics, science and engineering mostly as problem-solving tools.

Donald Bitier began PLATO in the 1950s, a large-scale project to promote the use of computers in education through time-sharing (Molnar, 1997). As a result, several thousand terminals were used in HE as computer-assisted instruction tools connected to mainframe computers (Aslan & Reigeluth, 2011).

In the 1960s, Kemeny and Kurtz further transformed the role of computers in education by adopting the recently demonstrated concept of time-sharing by Bitier to use computers for teaching and research activities. They later developed an easy-to-use programming language called BASIC (Molnar, 1997). In the 1960s, other researchers such as Suppes and Atkinson focused their studies on computer-assisted instruction in mathematics and reading that allowed students to take active roles in learning (Taylor, 1980).

In the 1970s, Papert developed a programming language called LOGO that helped improve students' ability to thinking critically and solve mathematical problems (Molnar, 1997).

Bork (1985) suggests that by the late 1970s, the computer that were once very large and expensive, became low-cost microcomputers called personal computers that were apparently the 'primary influence on educational system' (Bork, 1985). Statistics show that by 1974, two million students were using computers in their classes (Molnar, 1997).

In the 1980s, Apple introduced a new network system that allowed teachers to communicate with students via computer networks (Aslan & Reigeluth, 2011).

Research has shown that in the 1980s programming languages and computer science began to be taught, as educators such as Dwyer and Critchfield (1978), and Luehrmann and Peckham (1984) claimed that it was necessary to teach programming before students could use computers properly. With computer programming being taught, more programmers graduated who produced programs that gave rise to the necessity for computer training at different levels. This came to be known as computer-based education (Carnoy, 2004). Computer-based education spread rapidly in the 1980s due to the easy availability of the personal computers, the need to study programming and the need to have skills to use programs (Molnar, 1997).

Research has shown that 'drill and practice' was a common type of computer use in education in the 1980s where students were given problems that they could try to solve through text or graphics based on previously taught concepts and content (Morrison, Lowther & DeMeulle; 1999). Another form of use was tutorials that allowed students to provide solutions repeatedly and expect remedial responses when learners provided wrong solutions (Jonassen, 1996).

Jonassen further presented studies on Intelligent Tutorial Systems, which were developed in the 1980s and 1990s, and aided in the teaching of:

- procedural knowledge,
- problem solving skills, and

- the ability to think and understand (commonly known as cognitive development) (Jonassen, 1996, p. 6).

Some researchers suggest that the next pattern in ICT development in HE combined artificial intelligence, cognitive science and ICT to improve problem solving skills and learning (Brown & Lewis, 1968; Papert, 1980; Molnar, 1997). This involved the development of intelligent computer-assisted instructions (ICAIs). Brown (1977) and later Anderson (1993) each developed intelligent tutors or ICAIs to assist in the cognitive development of their students that furthered the popularity of ICT in HE.

Molnar (1997) suggested that a ‘combination of artificial intelligence, cognitive science and advanced technologies [had the ability to] dramatically improve learning and problem solving’.

Studies have shown that besides ICAIs, in the 1990s other applications of computers in education appeared such as word processing, spreadsheet and database management systems which became popular applications for students as they made students work more easily, faster and more efficiently (Morrison et. al., 1999).

According to Pelgrum and Law (2003), towards the end of the 1980s, the term ‘computer’ was replaced by ‘information technology’ (IT) due to a shift in focus from technology to retrieving and storing information. In the 1990s, a further shift occurred when the term ‘information technology’ was replaced by ‘information communication technology’ when email became readily available to the general public (Pelgrum & Law, 2003).

2.2.3.4 Impact of the Internet as an ICT on HE

Although studies have shown that the Internet, a service that allows users to transfer files, send emails, access information and read news (White, 2008), was developed in the 1960s and 1970s as the TCP/IP protocol, penetrated into HE in the 1990s (Aslan & Reigeluth, 2011).

In 1989 Robert Cailliau and Tim Berners-Lee developed a service that allowed sharing of files, documents, information, graphics, sounds and more (White, 2008). This service was termed the World Wide Web (Web or WWW) and became popular among HE providers between 1990 and 2001 as it provided the capacity for teachers and students to interact, and allow information accessibility beyond geographical barriers (White, 2008; Aslan & Reigeluth, 2011).

After 2001, research identifies that the Web further developed and included other free and remote services such as Google, Wikipedia, Facebook and Twitter (White, 2008). This use of the Web became popular among students and teachers alike as it went beyond the static websites, allowing interaction and collaboration between students and teachers, this has been termed Web 2.0 (Rielly, 2005; Bosco, 2006). The Internet and its various services such as search engines, social media, email, blogs, podcasts, learning management systems and other by-products further influenced and transformed the learning process by making everything accessible and ready-to-digest (Anderson, 2010).

Research has also shown that the development of laptops with wireless technology, coupled with the Internet and the Web further affected HE students and their learning environment, presenting opportunities such as assessments through electronic means and multiple-choice quiz systems (Aslan & Reigeluth, 2011).

Studies have shown that the Internet has impacted HE students by removing constraints such as time and place, thus offering education to students who were otherwise incapable of attending class due to various factors ranging from transportation, finance and work-commitments (Young, 2002; Oliver, 2002).

Due to the Internet, many HE providers have begun to offer distance learning programs or virtual degree programs, hosting classes online, using video-conferencing, Web logging or blogging, and even social media to create an almost face-to-face classroom condition for students (Molnar, 1997). Studies have shown that 'for students the Internet has become a valuable source of information because of its potential to enhance the educational experience' (Jones, Reid & Bartlett, 2006).

2.2.3.4.1 E-learning and digital literacies in HE

Research suggests that ICTs in HE, particularly the Internet and the Web, have increased efficiencies in areas such as program delivery, flexible delivery in terms of time and location (Oliver & Short, 1996), the ability to provide tailor-made programs for individual student needs (Kennedy & McNaught, 1997), and the use of the Internet for communication and information access (Oliver & Towers, 2000).

Researchers such as Allen and Seaman (2008) and Spector et al. (2008) have reported significant changes in how learning occurs and is communicated. Depending on the learning objectives, the target audience, the types of content being taught, and the level of accessibility, two types of primary course delivery in HE have been presented. One type has been recognized as the traditional (face-to-face) learning where all the course content is delivered by the teacher/lecturer verbally or in writing and the primary emphasis is on learning (Allen & Seaman 2008; Spector et al. 2008). A second type is e-learning (electronic learning) that includes computer-aided instruction, using electronic applications and processes at differing levels to learn (Bencheva, 2010). Research explains that e-learning includes all types of electronically supported learning and teaching which include in-and-out-of-classroom educational experiences (AADM, 2009). It is a computer-based, network-enabled transfer of knowledge and skills that allows Web-based learning, blended learning, online learning, distance learning and m-learning where content is often delivered through the Internet, CD-ROMs, and other ICTs (Bencheva, 2010). Studies have shown that e-learning is a technological advancement for HE (Al-Saai, Al-Kaabi & Al-Muftah; 2011).

According to research, during a Computer-Based Training (CBT) Systems seminar in Los Angeles in 1999, the term e-learning was used for the first time in a professional environment (History of e-learning, 2009). However, the concept behind e-learning, that of a learning environment away from the actual classroom or learning from a distance, predates the computer by almost 100 years (Aranda, 2007). Studies have shown that this type of learning dates back to the 18th century United States where Caleb Phillips, teacher of short hand, placed advertisements to recruit students via the Boston Gazette to teach them via correspondence (Moore & Kearsley, 2005; Sullivan, 2009). Isaac Pitman was credited to offer the first distance learning via correspondence in Great Britain (Moore & Kearsley, 2005). More structured distance learning degrees were offered by the University of London in 1858, Boston in 1873 and University of Queensland in 1911 (Culatta, 2011).

However, e-learning applications are specific software applications that focus on students' ability to discover, understand, and learn through experience, problem solving skills and research (AADM, 2009; Bencheva, 2010). Moreover, because learning is a social process, e-learning tools have gained popularity among HE providers and students (Wenger, 1998). For instance, ICTs such as Blackboard, WebCT and so on 'encourage student collaboration; improve team working skill and independent thinking' (Border, Stoudt & Warnock; 2006). At the same time, most libraries around the globe are trying to offer online services that 'combine the benefits of a traditional library and the Internet' (Icon, 2002), making information more accessible to students, thus facilitating e-learning environments in HE.

Aranda (2007) suggests that e-learning is a broad term and can include various types of learning environments. According to studies, such as Allen and Seaman (2008), Spector et al. (2008), Anderson (2010), Bencheva (2010), and Harriman (2013), different types of e-learning have been described as:

- **Web-facilitated learning:** where the course content is delivered traditionally but the teachers/lecturers use the Internet and the Web to deliver some part of the course

- **Blended learning:** where the teacher/lecturer combines the face-to-face learning with methods of using computer technology in teaching and learning, commonly known as computer-mediated instructions. Researchers such as Simonson (2006, p. 5), Bonk and Graham (2005) and Culatta (2011), have stated that any distance learning course that requires both a physical (on-site) and non-physical (via electronic media) presence is considered as blended learning course.

- **M-learning (mobile learning):** where students and teachers use hand-held devices such as PDAs, smart phones, laptops and other hand-held ICT to conduct the learning

- **Online learning:** where learning is 'on demand' and almost all the course content is delivered via the Internet and the Web and may include text, graphics, audio, video, animations, discussions, email and assessments

- **Distance learning:** where courses are predominately web-based using discussion forums, video conferencing, mobile learning devices and print media (Culatta, 2011). When teachers and students engage in distance learning, they may communicate asynchronously through printed or electronic media and/or any other ICT that allows them to communicate with each other (Rashid & Elahi, 2012). Distance learning is also described as a learning environment where the student and teacher are not in the same physical location, or at the same location but not at the same time. Distance learning has been defined as a system that allows students to participate in learning activities without actually being face-to-face with the instructors and/or other learners (Culatta, 2011). Rashid and Elahi (2012) have described distance learning as education that is delivered to students who are 'not physically on site to receive their education'.

Figure 2.2 below illustrates the spectrum of e-learning in terms of level of usage of ICT:

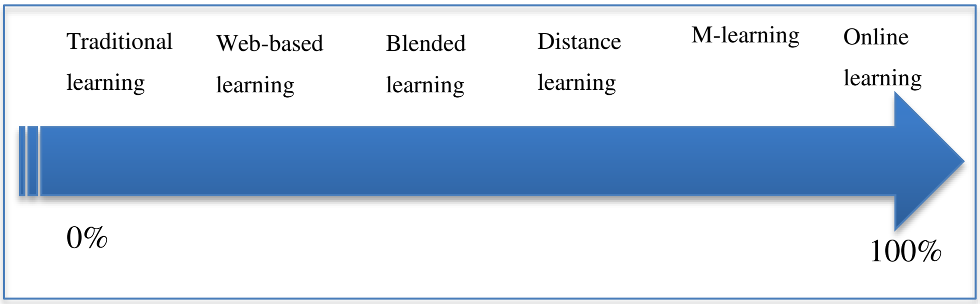

Figure 2-2: *Spectrum of e-learning (Source: Bencheva, 2010)*

Contradictory studies by Aranda (2007) and Moore, Dickson-Deane & Galyen (2011) have presented arguments that distance learning may, in fact, not be a type of e-learning. Their arguments state that distance learning does not necessarily use ICT, but focuses more on the geographical location of the teacher and students, whereas e-learning is a term used to describe a learning environment that uses varied levels of ICT to communicate and deliver content (Aranda, 2007; Moore, et al. 2011). Culatta (2011) further describes distance learning as a form of education that may use all forms of ICT including radio, television, computer-aided instruction, and e-learning to deliver content. Figure 2.3 below describes the spectrum of delivery modes in terms of time and space, and illustrates the relationship among distance and e-learning (Bencheva, 2010):

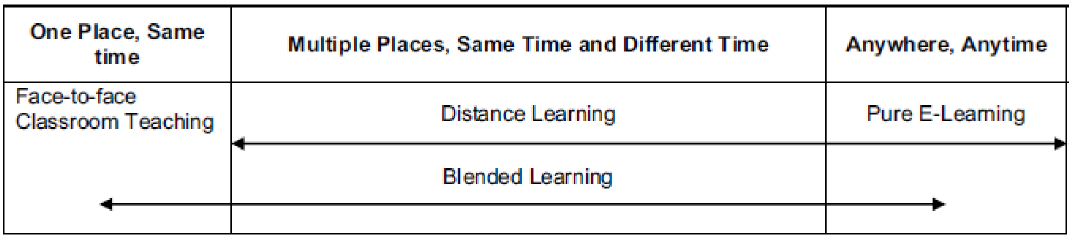

Figure 2-3*: Spectrum of delivery modes (Source: Bencheva, 2010)*

Regardless of whether distance learning is a part of e-learning or not, studies have shown that HE institutions prefer to incorporate some form of e-learning because:

- it allows students the flexibility to digest information and respond,
- it enhances communication both between teachers and students, and among students in terms of quality, quantity and urgency,
- it increases the transfer of knowledge
- it allows open discussion between learners where every learner gets equal chance to voice their opinions
- it helps overcome distance and time barriers
- it aids higher learning, higher motivation and involvement

(Bencheva, 2010)

Other studies have shown that various forms of e-learning, especially mixes of traditional, online and sometimes distance learning are popular among HE for their 'pedagogical richness, access to knowledge, social interaction, cost effectiveness and ease of revision' and have gained steady momentum over the years (Osguthorpe & Graham, 2003). Studies show that e-learning began at the same time that a computer was developed for practical use, personal use, and specifically for educational use in the 1970s and 80s (Aranda, 2007). According to Sullivan (2009) and Aranda (2007), the increased use of personal computer and then the growth of the Internet improved distance learning and e-learning and made them easier to use.

Research has shown that the widespread use of e-learning and other ICTs in HE have been driven by the shift in HE from teacher-centered educational models (Martin, 2005), where students sit passively receiving lessons from instructors (Halperin, 1994) to student-centered models where students become active learners, developing problem-solving skills, interacting with instructors and teachers (Piaget, 1932; Piaget, 1954; Vygotsky, 1978; Dewey, 1997). Studies have shown that student-centered learning is deemed more effective by researchers, students and teachers alike in HE (Kember, 2009), and so ICTs and e-learning environments are seen as key factors in realizing learning environments (Martin, 2005; Torero & Braun, 2006, p. 14). Due to this importance, studies have shown that digital literacy has been recognized as an essential generic skill among HE students (Martin, 2005).

2.2.3.4.2 Digital Literacy

Before defining digital literacy, it is important to understand what is meant by the term literacy.

Gee (2012) defines traditional literacy as including the reading, writing and testing of a student, which determines whether the student is literate or illiterate. According to the European Commission, literacy typically refers to a person's ability to read in order to gain knowledge, to write succinctly and to critically analyze written words in order to gain intellectual understanding (European Commission, 2013). The Government of Canada's Human Resources and Skills Development department defines literacy as reading, writing, and the ability to use documents and numbers (HRSDC, 2011a). The National Institute for Literacy's Workforce Investment Act of 1998 defines literacy only as a person's ability to read, write and speak coherently to be able to communicate and carry out roles within society (Castrogiovanno, 2008).

However, the complexities of literacy have led researchers to introduce the term multiliteracies (New London Group, 1996). Lonsdale and McCurry (2004) argue that literacy consists of a wide range of skills and understandings, and that every new domain has its own literacy.

A definition put forward by Dubin and Kuhlman (1992) has described literacy in broad terms to include competency, knowledge and skills beyond academic literacy such as reading and writing, but also digital literacy, computer literacy and automobile literacy where the word literacy actually refers to the understanding and working-knowledge of the first word in each of the expressions.

Researchers have proposed terms such as academic literacies (Jacobs, 2005; Lea & Street, 2011) or critical literacies (Unsworth, 2001; Lonsdale & McCurry, 2004) in the academic context that are often used to categorize student literacy skills. This argument has led to the development of the literacy terms digital literacies (Eshet-Alkali & Amichai-Hamberger, 2004; Erstad, Gilje & deLange; 2007), information literacies (Loveless & Longman, 1998; Lonsdale & McCurry, 2004) and computer literacies (Selber, 2004).

According to UNESCO (2009), abilities that form part of digital literacies include:

> *'using ICT skills to create and share information; searching, sifting, scanning, and sorting information; navigating through screens of information; locating and evaluating information; using ICT to research and solve problems; making multimedia presentations; retrieving, organizing, managing, and creating information; and sending and receiving messages'*

According to the Ministry of Education, Government of British Columbia (2011), digital literacy is:

> *'the interest, attitude and ability of individuals to appropriately use digital technology and communication tools to access, manage, integrate, analyze and evaluate information, construct new knowledge, create and communicate with others in order to participate effectively in society' (p. 1).*

For the purpose of this study, digital literacy may be defined as the ability to read, write, critically analyze and process, create and develop an understanding using ICTs.

According to Jones, Ramanau & Healing (2010) digital literacy among students in HE is now common place, so much so that they are being termed 'net generations' or 'digital natives'. This is emphasized by Anderson (2010), whose study shows that higher education students are considered to be a part of the 'net generation' as they use 'technology and multi-modal texts for [everything including] recreation, entertainment, communication as well as learning' (p. 21). Other studies such as Prensky (2001) and Tapscott (1998) have also described HE students born between 1980 and 1994 as ‘digital natives’. Studies have shown that these students often arrive at universities with some well-established digital practices of their own due to the numerous ICTs they use on a daily basis inside and outside classrooms. Helen Beetham, a consultant expert in information and digital technologies for education and research in UK stated that one area of issue is with regard to referencing and plagiarism, which ‘are areas where students’ own digital practices and cultures clash with those of the university’ (Anyangwe, 2012, p. 2); this argument is also supported by Seed (2009).

Studies have also shown that the understanding of academic practices among ‘digital native’ students with high level of digital literacies and those who are engaged in some form of e-learning environment in their universities, actively using ICTs, may vary greatly (Bennett et al., 2008) because ‘they think, behave and learn differently as a result of continuous, pervasive exposure to modern technology’ (Bennett & Maton, 2010, p5).

Based on the arguments presented in this section, the next section will describe the major ICTs that are used in HE by students and teachers. This will include ICTs used to facilitate e-learning, and how they are used by students. This analysis will allow for an understanding of how these ICTs may facilitate e-cheating among HE students.

2.2.4 ICTs used in HE

There are many different technologies that are considered as ICT tools and devices. Figure 2.4, below, highlights some of the common tools and devices used for capturing, interpreting, storing and transforming information.

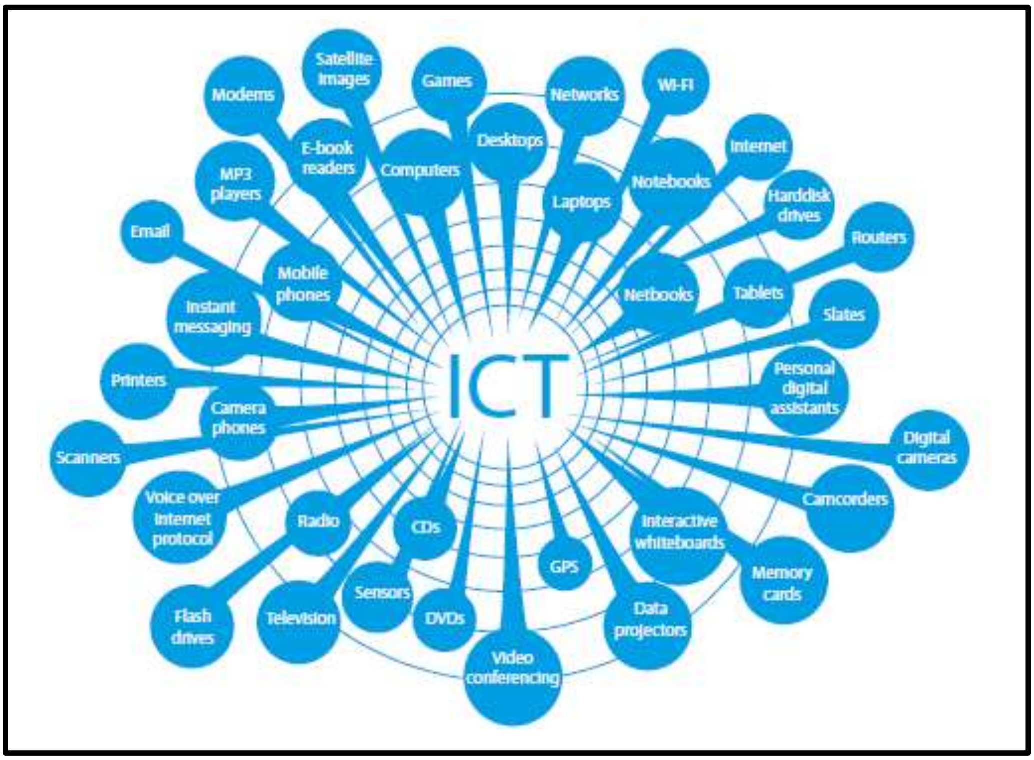

Figure 2-4*: ICT technologies (Source: Anderson, 2010)*

Almost all of the above mentioned technologies can and are being commonly used in HE. These aid in the delivery of e-learning and blended learning and are tools that underpin a student's level of digital literacy. These technologies have been divided into eight categories based on the technology and purpose of use, as discussed below:

- Computing technologies: different forms of computer systems that allow students and teachers to use applications or specialized application software, to browse the Web and to communicate (Wells, 2010). Devices typically include computers, desktops, laptops, notebooks, netbooks and slates.

- Mobile computing: any human-computer interaction which involves communication, hardware and software on-the-go (Wells, 2010). Devices typically include PDAs, tablets, mobile phones and smartphones.

- Input and/or Output technologies: communicate between information processing systems and users or other systems by sending or receiving signals and data (Wells, 2010). Technologies typically include digital cameras, camcorders, data projectors, television, radio, camera phones, scanners and printers.

- Storage technologies: used to store information, images and sounds obtained through input technologies (Lynn, 1990). Devices typically include hard disk, memory cards, DVDs, CDs, flash drives (USB drives).

- Peripheral technologies: connected to the computer but not part of it. They expand the computer's capabilities (Wells, 2010). Devices typically include networks, routers, modems, Wi-Fi, GPS satellites and sensors.

- Blended learning technologies: used by registered teachers to upload lecture notes and slides, stream videos, online quizzes, interviews, lectures and tutorials. Students can use these technologies (usually through a Web browser) to communicate with their teachers through online discussions and forums (Anderson, 2010). Devices typically include interactive whiteboards, video conferencing, Voice over Internet Protocol (VoIP), and network based serious games.

- Internet technologies: a network of networks including the Web which is the largest wide area network having millions of websites that can be accessed at the click of a button (Anderson, 2010). The Internet offers many services that students use on a regular basis, especially where HE is concerned. Some of these are:

- e-mail: electronic messages that allow for exchange of messages between users

- e-books and e-libraries: these are online repositories or databases of conference papers, journal articles, books, news articles that are made available to registered users, both teachers and students

- Google: is one of the most popular search engines that use other search engines to bring forward information as a result of search-key words. The resultant websites can be academic or non-academic sources

- Wikipedia: is an encyclopedia written by contributing readers over the Web and thus comes in many languages and free to access. However, the authenticity of the information is often questionable (Moran, 2011)

- Social Networking Sites (such as Facebook): are free platforms that allow users to design upload profiles. These profiles can include personal and professional information, photos, videos and comments.

2.3 HE and Codes of Conduct

This section describes codes of conduct, their importance and the roles they play within an organizational setting, how employers view HE and codes of conduct, academic integrity and dishonesty.

2.3.1 Codes of Conduct

Codes of conduct are instruments used to indicate the desirable standards of behavior between employers and employees. Almost all profession bodies have codes of conduct as do many businesses.

Professional codes of conduct, sometimes known as codes of practice or codes of ethics, are often formed over many years by teams of practitioners with extensive knowledge of the field/profession. Professional codes of conduct are essential for professionals because the codes define standards that can be followed regardless of a professional's geographic location, ethnicity and background. These are designed to maintain ethical standards within the same profession.

According to Seun (2009), an organizational code of conduct can:

- highlight what kind of behavior is expected out of employees and employers
- are guiding principles on how each should treat others
- reduce the chances of employees or employers abusing each other, or their skills/knowledge/position
- mean that employees or employers cannot claim ignorance of what is expected
- increase and focus accountability within the organization
- improve corporate governance
- aid in the enhancement of one's role
- enhance organizational conduct and reduce bad practices
- help with solutions to areas that may be problematic

2.3.2 HE and Codes of Conduct

HE is believed to be generally important because it is the basis for most professional training and careers (Nelson, 2002, p. 1). As it was stated in section 2.1.2, employers are looking for individuals with skill sets and HE is designed as a learning environment that will develop students with a systematic understanding and basis for concepts that are key to industries such as medicine, law, accounting, business and information and communication technology.

Previous studies have shown that there exists 'a high degree of correlation between cheating in school and unethical behaviors at work' (Sims, 1995). Similar studies have been carried out by many researchers including Beck and Ajzen (1991), Sims (1993), Nonis & Swift (2001), Whitley & Keith-Spiegel (2002); Grimes (2004); Harding et al., 2004; Khan, et al. (2006); and Graves (2008). Their research shows a direct correlation between HE students who cheat in classrooms and employees who indulge in dishonest behavior in offices, in society and later in life. Therefore, employers expect HE to play a significant role in training students in ethics and codes of conduct.

HE has its own set of codes of ethics that organizations and society are well aware of due to academic institutions' handbooks, codes of practice or honor codes that are made available through these institutions' brochures and websites. The next section discusses these codes of ethics, academic integrity and HE, and highlights some major issues related to academic dishonesty.

2.3.2.1 Academic Integrity in HE

Academic integrity is the code of conduct or moral and ethical code in academia. It includes upholding honor, maintaining academic standards and avoiding improper behaviors such as cheating and plagiarism.

While it would seem unbelievable from a twenty-first century perspective, according to Gallant (2008), the eighteenth century understanding of academic integrity was rooted in an individual maintaining his/her image as an upstanding citizen. This meant that back then if an individual had to indulge in any acts of dishonesty, the acts would be seen as a necessary means to keep his/her appearance intact. For instance, according to research, in the eighteenth century, academics, researchers, even journalists constantly copied paragraphs from each other without credit or payment (Lynch, 2006).

However, by the nineteenth century this view began to change as the focus was shifting from individual honor to the organization's honor and individuals were now expected to provide original work or give due credit and acknowledgement where required; for instance, in academia, an increasing number of professors were expected to publish authentic and original work related to their teaching and/or research.

By the 1970s, schools and HE providers began to set down codes of conduct for their teachers and students within their policies designed to curb unfair advantage among student and teacher bodies (Gallant, 2008).

One of the leading research centers on ethics, the Center for Academic Integrity at Duke University, defines academic integrity based on five basic values. It states that academic integrity is a commitment made by students and teachers in the face of difficulties to uphold values such as honesty, trust, fairness, respect and responsibility (CAI, 1999); each of these values is further described by the CAI:

- **Honesty** as both intellectual and personal honesty in every academic aspect such as 'learning, teaching, research and service (CAI, 1999).
- **Trust** as a level of confidence in people and the system that allows and encourages 'free exchange of ideas' (CAI, 1999).
- **Fairness** as clear standards of assessment that are applied fairly to students and staff (CAI, 1999).
- **Respect** as the ability to acknowledge that learning is a participatory practice and due respect must be given to the varying perspectives of others (CAI, 1999).
- **Responsibility** is defined as a belief that each student or staff member is individually accountable for his/her actions.

The literature defines academic dishonesty as cheating that occurs during a formal assessment in an academic setting such as during exams, while writing research papers or reports. Some key areas of the academic dishonesty that have been identified in the literature include plagiarism, cheating, falsification and fabrication, and aiding cheating (CIP, 2003).

Prior research has argued that the advent of ICT and particularly the Internet and the Web has substantially increased the risk of academic dishonesty being conducted by HE students (CIP, 2003; McCabe, 1999; McCabe & Trevino, 1997; McCabe & Trevino, 1996; McCabe, Trevino & Butterfield; 2002; Scanlon & Neumann, 2002). As mentioned in Section 2.1.2 any form of cheating undermines academic integrity and ultimately, HE. If employers have to trust and depend on graduates from HE institutions, these institutions' codes of conduct have to be rigid and thoroughly imbedded into graduate skills and attributes that will then be taken in to the workforce.

The next section will look at cheating, e-cheating, types of e-cheating, ICTs that underpin e-cheating, how academics try to curb e-cheating and ultimately why it is necessary to look at factors that influence HE students to cheat.

2.4 Cheating, e-cheating and HE

This section discusses cheating in HE and how prevalent cheating really is in HE, according to prior studies. Then it discusses e-cheating, its issues, and the major types of e-cheating, particularly using ICTs. The section concludes with studying various technologies used in HE to curb e-cheating and discusses the importance of developing a conceptual model of factors that will aid in understanding why HE students e-cheat.

2.4.1 Cheating in HE

Cheating can occur in any field such as medicine, law, accounting, at work and even in human relationships. Cheating in academic settings is considered as academic misconduct or academic dishonesty. However, few studies actually define cheating in an academic setting. Most of the literature focuses on either the instances of cheating or how to curb cheating. Most university websites and student-conduct pages provide their own definitions of cheating. The University of Wollongong in Australia for instance, defines cheating as:

> *'behaving deceitfully or dishonestly in examinations, in the preparation of assessable items and during in-class tests' (UOW, 2010, p5)*

The University of California in Berkeley defines cheating as:

> *'fraud, deceit, or dishonesty in an academic assignment, or using or attempting to use materials, or assisting others in using materials that are prohibited or inappropriate in the context of the academic assignment in question' (UC Berkeley, 2013)*

The University of California, Los Angeles, defines cheating as:

> *'Intentionally or without authorization from the instructor, using or attempting to use unauthorized materials, information, or study aids in any academic exercise. 'Unauthorized materials' include other students' test papers during examinations.'(UCLA, 2011)*

The Florida Institute of Technology defines cheating as:

> *'any deceitful or fraudulent attempt to evade rules, standards, practices, customs, mores, and norms to gain an unfair advantage or to protect someone who has done so' (Jones, 2001)*

Most definitions in the literature focus on cheating in an exam setting or during the completion of assignments but do not consider, for instance, student behavior while copying others' work without permission. If cheating is any 'fraud, deceit or dishonesty' in an academic setting to gain 'an unfair advantage', then any action that breaches academic integrity may be considered as cheating, based on the definition of academic integrity provided in section 2.3.2.1. Furthermore, Bailey (2014) suggested that in order to understand, define and combat student dishonesty, it is necessary to understand that academic integrity does not happen in a vacuum, that it is not separate from "real world" integrity, and that the two impact each other and are deeply related. For instance, the misconduct of copying someone else' work without due acknowledgement or authorization would be considered as a form of cheating. When students copy music, images, software and try to reuse these as their own without authorization, this act is called piracy (Jones, 2001). When students copy words and ideas without acknowledgment the act is commonly known as plagiarism (Jones, 2001). UNESCO has defined piracy as the unauthorized reproduction of someone else's work without the authorization of the right owner(s) (UNESCO, 2007). Plagiarism also can be defined as a situation where a person uses another person's ideas, thoughts, creativity, and words while trying to pass it off as own without their permission, and this term seems to be most popularly used in academia rather than piracy (McCabe & Trevino, 1997).Bailey (2014) explains that in learning how to cope with plagiarism, particularly plagiarism online, educators and researchers need to have a good understanding of the law pertaining to copyright, right-holders and protection of their work, because the overall topic still remains that of content misuse and hence piracy is considered as a form of academic misconduct (Bailey, 2014).

Harvey (1995) defines plagiarism as a subtle form of cheating, describing it as 'passing off a source's information, ideas, or words as your own by omitting to cite them—an act of lying, cheating, and stealing'. The University of Birmingham in the UK and the University of Southern Queensland in Australia also define plagiarism as a form of cheating (University of Birmingham, 2013; USQ, 2009). On the other hand, the Federal Bureau of Investigation in the USA defines piracy as 'robbing people of their ideas, inventions, and creative expressions – what's called intellectual property – everything from trade secrets and proprietary products and parts of movies and music and software' (FBI, 2013).

Another academically dishonest behavior is falsifying data in order to produce results for a research paper that would also be considered as cheating.

Taking into consideration that cheating can encompass behaviors such as cheating in exams, plagiarizing or falsifying data in research, two studies have proposed more comprehensive definitions of cheating, the first proposed is a definition that includes seven different behaviors that can be considered as cheating by Carnegie Mellon University (Human Computer Institute, 2013), and a second study by Newstead, Franklyn-Stokes & Arrmnstead (1996) that proposes 21 cheating behaviors, which is considered to be a comprehensive list in the literature.

Carnegie Mellon University gives a more comprehensive definition of cheating which includes:

- 'The use of unauthorized materials including computer programs in preparation of an assignment or during an examination.

- The submission or use of falsified data.
- The submission of work that is not the student's own.
- Plagiarism- use or close imitation of the language and thoughts of another author and the representation of them as one's own original work
- The use of an alternate/stand-in/proxy during an examination.
- Supplying unauthorized data to another student for the preparation of an assignment or during an examination.
- Collaboration in the preparation of an assignment, unless specifically required or allowed by the instructor, will usually be viewed as cheating. Each student, therefore, is responsible for understanding the policies of the instructor offering any course as they refer to the amount of help and collaboration permitted in preparation of assignments.'

(Human Computer Interaction Institute, 2013)

Newstead et al. (1996) have proposed 21 different types of behaviors that can be considered as cheating through a study conducted in 1996. These 21 cheating behaviors include:

1. 'Paraphrasing material from another source without acknowledging the original author
2. Inventing data (i.e., entering nonexistent results into the database)
3. Allowing own coursework to be copied by another student
4. Fabricating references or a bibliography
5. Copying material for coursework from a book or other publication without acknowledging the source
6. Altering data (e.g., adjusting data to obtain a significant result)
7. Copying another student's coursework with their knowledge

8. Ensuring the availability of books or journal articles in the library by deliberately mis-shelving them so that other students cannot find them, or by cutting out the relevant article or chapter
9. In a situation where students mark each other's work, coming to an agreement with another student or students to mark each other's work more generously than it merits
10. Submitting a piece of coursework as an individual piece of work when it has actually been written jointly with another student
11. Doing another student's coursework for them
12. Copying from a neighbor during an examination without them realizing
13. Lying about medical or other circumstances to get an extended deadline or exemption from a piece of work
14. Taking unauthorized material into an examination (e.g., cribs)
15. Illicitly gaining advance information about the contents of an examination paper
16. Copying another student's coursework without their knowledge
17. Submitting coursework from an outside source (e.g., a former student offers to sell pre-prepared essays; 'essay banks')
18. Premeditated collusion between two or more students to communicate answers to each other during an examination
19. Lying about medical or other circumstances to get special consideration by examiners (e.g., the Exam Board to take a more lenient view of results; extra time to complete the exam)
20. Attempting to obtain special consideration by offering or receiving favors through, for example, bribery, seduction, corruption
21. Taking an examination for someone else or having someone else take an

examination for a student

(Newstead, et al., 1996, pg. 232)

Given the above definitions and descriptions, and with the understanding that there may be an array of actions that all define student cheating that are out of the scope of this study (eg. removing relevant material from library so others do not get access to it) the working definition of cheating for the purpose of this study is:

the act of using unauthorized and/or unacknowledged materials, methods or someone else's work for one's own benefit. The work copied can be an idea, a written piece of work which may be scholarly in nature, a song, a painting, anything that has not been created, produced or developed by the user.

2.4.2 Instances of cheating in HE

Cheating in an academic setting is nothing new. Studies have shown that cheating has existed for millennia, but it became the focus of academic research over eighty years ago when papers were published with empirical data on cheating (Davis et al., 1992; Blankenship & Whitley, 2000). Over a hundred years ago, Registrar of Stanford University wrote "and the freshman sees the game of cheating going on almost as a matter of course" (Elliot, 1911, p77). The literature presents statistics on the frequency of cheating among HE students over the past decades (McCabe & Trevino, 1993; Genereux & McLeod, 1995; Ekstein, 2003; Popyack et al., 2003; Rowe, 2004; Hemby, Wilkinson & Crews, 2006; Underwood, 2006; King, Guyette & Piotrowski, 2009; Tanner & Piper, 2010). However, the frequency of cheating which has been reported in the literature has varied over time, ranging from approximately 20 percent in the 1940s (Davis et al., 1992) to about 75 percent in recent years (McCabe et al., 2001). Bowers reported that in 1964, 75% of students engaged in some form of cheating in an academic setting (Bowers, 1964). This study was repeated by McCabe and Trevino in 1997 and later by Cizek (1999) (as cited in Finn & Frone, 2004) both of which reported similar results. Sheard and Dick (2011) cited 63% in their study in 2010, a marked drop from the previous studies. Sims (1993), Slobogin (2002 qtd in Graves, 2008) and McCabe (2005) also cited lower rates of cheating in the 1960s than that cited by Bowers, and a decline in the frequency of cheating after the mid-1990s and into the 2000. Studies have shown that HE students grow up in a society that is plagued by unethical behavior by business leaders, politicians, doctors, governments, even teachers and other academics (McCabe & Trevino, 1996). Therefore, McCabe and Trevino rationalizes the drop in instances occasionally over the years based on how students define cheating, the academic society's rejection of some behaviors as cheating, the increased use of technology to curb cheating that may have made students more ethical or wary of being caught (Khadaroo, 2012).

Furthermore, Cole and McCabe (1996) and Brown and Emmett (2001) point out that it is difficult to compare results from different studies because they are carried out in different times. Other problems of comparison include 'the measurement of different academic misconduct behaviors, behaviors measured over different periods of time, and the use of different student academic misconduct and class sizes' (CCSU, 2004). The literature suggests that the method of measuring and capturing instances of cheating may also be a cause for discrepancies (Nelson & Schaefer, 1986; Karlins, Michaels & Podlogar, 1988). According to these studies, methods such as questionnaires return higher levels of cheating than 'observational methods' due to a tendency of students to report higher levels of cheating than actually exist' (CCSU, 2004). However, it is worthwhile to also note here that while observations are based on a single point in time, questionnaires may cover a period of students' study-life, so may invariably provide a higher level of instances over time.

Despite the complexity and contradictions in research pertaining to the frequency of cheating among HE students, most studies agree that there is a concern over the existence and prevalence of cheating instances among HE students and that the frequency of cheating among HE students seems to be a serious problem, with unacceptable levels of cheating over a very long time frame. (Dohanue & Heard, 1997; Kleiner & Lord, 1999; McCabe & Trevino, 1993: McCabe & Trevino, 1997; McCabe et al., 2001; Whitley, 1998).

Now that frequency of cheating in academia has been discussed, the next section presents the impacts of technology on cheating instances leading to e-cheating in HE.

2.4.3 e-Cheating in HE

As digital literacy increases and e-learning becomes more widespread, some researchers have asserted that there may exist a whole new set of cheating behaviors that may not have existed outside of the digital world, and that may in fact be significantly enhanced by the digital world (Rovai, 2000; Ekstein, 2003; Hulme & Locasto, 2003; Rowe, 2004; Cordova & Thornhill, 2007; Fletcher, Tobias & Wisher, 2007; King et al., 2009; Apampa, Wills & Argles, 2010; Tanner & Piper, 2010).

The ICTs discussed in the section 2.2.4 have made many of the traditional cheating behaviors easier; giving rise to new styles of cheating that have never previously existed. These enhanced methods of cheating using digital technology and the new types of behaviors are described as e-cheating. Although in current literature, the term e-cheating is used to define the new styles of traditional cheating using ICTs, previous authors have used a wide range of terminologies to describe the phenomenon and behaviors. These terms include e-plagiarism, cyber-plagiarism, cyber-cheating, and e-cheating.

Some authors, such as McCabe (2001), McMurtry (2001), Sterngold (2004), Schiller (2005), Jones (2009) and Ramzan et al. (2012) have used the terms cyber-plagiarism or e-plagiarism to describe e-cheating. Plagiarism has been greatly facilitated by electronic media; for instance students can simply copy and paste information from other students and/or other web sources to make it their own. This phenomenon has been described by McCabe (2001) as 'copy and paste plagiarism'. It is believed that at the time of McCabe's study, his definition was the entire extent of what is now known as e-cheating. So, his terms 'copy and paste plagiarism' may have been used to actually define e-cheating at the time of his study. Other authors such as McMurtry (2001) and Schiller (2005) agree with McCabe and define e-cheating as electronic plagiarism or e-plagiarism. Ramzan et al. (2012) do not use the term e-cheating but define the behavior as plagiarism using technology. Jones (2009) defines it as cyber-plagiarism, not e-plagiarism. Sterngold (2004) also uses the term digital-plagiarism to mean e-plagiarism.

Other definitions of e-cheating exist in literature that use the term cyber-cheating rather than e-cheating (see Flannery, 2004). Some researchers support the use of the term cyber cheating because they define such academic dishonesty as cyber-crime and hence borrow the term 'cyber' to describe cheating using Internet (Yar, 2005; Selwyn, 2008). This definition is further clarified by Daniel (2012) who suggests that the cyber cheating or cyber misbehavior is when students use the Internet to violate copyright laws. Studies such as McMurtry (2001), Park (2003), Scanlon and Neumann (2002) define cyber cheating as online plagiarism.

However, one of the most commonly used terms being used widely in literature is e-cheating, and therefore is the term used in this study. The actual terminology e-cheating or electronic cheating has been defined by King and Case (2007) as:

> *'using information technology (IT) to aid in the process of cheating in a class. This includes the use of personal digital assistants (PDAs), camera or picture cell phones, two-way pagers, programmable calculators, computers, the Internet, and so on to gain an unfair advantage.'*

Westine (2011) defines e-cheating simply as 'using technology to support academic dishonesty'.

Another definition of e-cheating was proposed by Adeoye (2010) suggesting that e-cheating is in fact the use of ICT during examinations in classroom settings. This description suggests that students' act of getting intentional or unintentional help from someone in a test or an exam using ICTs such as tablets, smart phones and Bluetooth students is e-cheating. It has been defined further by Osborne (2012) to suggest that students are creatively using:

- instant messaging to pass answers between one another or to get help from outsiders,
- WiFi connections on their smart phones to look up answers during exams
- Bluetooth headsets, pens, ear-pieces, and mp3 files for the same purposes
- printing labels with information (e.g. formulas) on watches or drink labels
- storing data on calculators
- hacking into university databases to get hold of exam papers or question banks.

Osborne (2012) goes on to further define e-cheating beyond the scope of examinations as:

- falsifying data or references from online databases, e-libraries, e-books by using tablets, PDAs, laptops, desktops, scanners, printers, email and Wi-Fi;
- getting someone else to sit for exams by developing false identification using Internet applications, tablets, PDAs, smart phones, printers and scanners: and
- buying essays and reports from paper mills on the web (Osborne, 2012).

According to McMurtry, paper mills are 'sites that collect and distribute essays and reports on the Web, either free or for a fee' (2001).

Many universities define piracy using online technology and sources as an academic misconduct or a form of e-cheating. The University of Western Ontario and Ryerson University both have clear policies and procedures for handling pirated passages when students plagiarize, referring to plagiarism or e-cheating as piracy of words and text (Bauer, 2003).

Based on the various definitions and terminology of e-cheating proposed in this section, it is suggested that they all define a certain type of behavior that is some form of **academic dishonesty** using ICT. From McCabe's definition of e-cheating as 'copy and paste' plagiarism (2001) to McMurtry's e-plagiarism (2001), Sterngold's digital-plagiarism (2004), Jones' cyber-plagiarism (2009), or even the use of 'online' plagiarism by Park (2003) to define what he termed cyber cheating, all these terms and definitions point to the behavior of students' to use the Internet and other ICTs to 'plagiarize' as academic dishonesty, or perform e-cheating. However, other definitions have suggested that e-plagiarism is not the only behavior that defines e-cheating, but that the use of technology during exams, falsifying data and so on also describe behaviors of e-cheating.

Using the previously suggested definitions of e-cheating, Table 2.1 proposes a list of 19 behaviors based on existing literature that define e-cheating:

Table 2-1: *Behaviors that define e-cheating*

1.	using ICTs to copy and paste another person's ideas, thoughts, images, photos, creativity, and words from online sources as one's own
2.	Using ICTs to copy another person's music, movie, or program from electronic sources as one's own
3.	using ICTs to copy and paste another person's words from another student's work with their acknowledgement
4.	using ICTs to copy and paste another person's words from another student's work without their acknowledgement
5.	using ICTs to allow other students to copy and paste one's own words
6.	using ICTs to buy ready-made essays or reports via websites that offer such services either free or for a (minimal) fee
7.	using ICTs to buy pre-prepared essays from past students
8.	using ICTs to write an essay or report for another student
9.	using ICTs to collude without prior permission with other students by emailing, texting, sharing documents online, sharing references, words between students especially in an individual assessment requirement
10.	using ICTs to access restricted websites, specially sites that are meant for instructors or examiners, to access questions before exams
11.	using ICTs to access restricted databases from instructors' or schools' computer systems to access questions before exams
12.	using ICTs to access other students' accounts to steal their work and use it for one's own gain
13.	using ICTs such as Bluetooth, smartphones and such to provide answers to other students during examinations
14.	using ICTs to gain answers from other students in or out of classrooms for questions during an examination
15.	using unauthorized ICTs such as graphical calculators during examinations to solve equations, sketch graphs for equations and more where clear instructions restrict such use of advanced calculators
16.	using ICTs to steal other students' user account details and passwords to access their work, research, printing privileges they may have paid for
17.	using ICTs to falsify medical documents to avail special consideration during exams or assessment submissions
18.	using ICTs to falsify data, images, figures, tables, graphs to make an essay or report seem worthwhile
19.	using ICTs to falsify identity of students to allow one student to take exam for another

For the purposes of this study, the working definition of e-cheating is:

> ***E-cheating (or electronic cheating) is defined as using some form of ICT to perform academic misconduct or dishonesty in or out of classrooms in order to gain unfair advantage.***

2.4.4 *Instances of e-cheating*

With the widespread use of ICTs in HE, e-cheating behaviors such as e-plagiarism are commonplace due to the availability of online databases, e-books, digital libraries and the ease of access to that information via e-book readers, tablets, PDAs, netbooks, slates, desktops and smartphones (Weinstein & Dobkin, 2002). Grunfeld (2012) discusses the impact of ICT on students and the frequency of e-plagiarism, stating that the advances have in fact increased HE students' ability to misuse the technologies and ultimately 'violate the academic integrity standards…blurring the once-clearer line between e-plagiarism and using public information' (Grunfield, 2012).

Studies have revealed that the act of e-cheating is on the rise among HE students (Ashworth, Bannister & Thome, 1997; McCabe & Trevino, 1997; Bushweller, 1999; Anderson, 2001; Braumoeller & Gaines, 2001; Fain & Bates, 2002). This is a major concern in HE because, according to the Center for Intellectual Property at University of Maryland, e-cheating stunts the learning process, rather than stimulating the students intellectually (CIP, 2003). This raises concerns over the worth of the HE degree and the quality of the students graduating with these degrees (CIP, 2003; Nonis & Swift, 2001).

2.4.5 *Curbing cheating and e-Cheating in HE*

Given the gravity and frequency of cheating and e-cheating, some studies have suggested a variety of strategies that some academic institutions apply to address academic dishonesty such as those discussed in previous sections of this chapter (Goosney & Duda, 2009).

One of the earlier studies by McCabe, Trevino & Butterfield (1999) discuss comprehensive suggestions by students on how cheating behavior can be managed inside the classroom through strategies that faculty can pursue. These include clearly communicating the expectations of the subject, teachers and about cheating behavior, establishing policies about ethical conduct, getting students engaged in these policies, supporting students by showing respect, being fair and trying to reduce pressure where possible. Some of the strategies put forward by the study are summarized in Table 2.2 below.

Table 2-2*: Managing cheating in the classroom: student perspective*
(Source: McCabe, Trevino and Butterfield (1999) as cited. in McCabe, et al. (2001), p.229)

Managing Cheating in the Classroom: The Student's Perspective	
Number	Factor
1	Clearly communicate expectations (eg. Regarding behavior that constitutes appropriate conduct and behavior that constitute cheating)
2	Establish and communicate cheating policies and encourage students to abide by those policies
3	Consider establishing a classroom honor code – one that places appropriate responsibilities and obligations on the student, not just to faculty member, to prevent cheating
4	Be supportive when dealing with students; this promotes respect, which students will reciprocate by not cheating
5	Be fair – develop fair and consistent grading policies and procedures; punish transgressions in a strict but fair and timely manner
6	When possible, reduce pressure by not grading on a strict curve
7	Focus on learning, not on grades
8	Encourage the development of good character
9	Provide deterrents to cheating (eg. Harsh penalties)
10	Remove opportunities to cheat (eg. Monitor tests, be sure there is ample space between test takers)
11	Assign interesting and nontrivial assignments
12	Replace incompetent or apathetic teaching assistants

Table 2-3*: Managing cheating in the classroom: for faculty*
(Source: McCabe and Pavela (1997) as cited in McCabe, Trevino, Butterfield (2001), p.230)

Managing Cheating in the Classroom: 10 Principles of Academic Integrity for Faculty	
Number	Principle
1	Affirm the importance of academic integrity
2	Foster a love of learning
3	Treat students as an end in themselves
4	Foster an environment of trust in the classroom
5	Encourage student responsibility for academic integrity
6	Clarify expectations for students
7	Develop fair and relevant forms of assessment
8	Reduce opportunities to engage in academic dishonesty
9	Challenge academic dishonesty when it occurs
10	Help define and support campus-wide academic integrity standards

McCabe and Pavela (1997) discuss suggestions identified by lecturers on how to manage cheating behavior. These principles include clarifying expectations regarding subject, trust, respect, policies, codes of conduct, being supportive of students and so on. A summary of these principles are illustrated in Table 2.3 above.

It is important to observe that both Tables 2.2 and 2.3 show that teachers and students have similar views on how to curb cheating among HE students. This may be considered essential for institutions that attempt to curb cheating through means such as implementing honor codes by understanding that teachers and students can work together to establish an ethical community (McCabe et al., 2001).

Similar to previous studies, other researchers have also suggested that regular orientation programs and workshops that inform students and lecturers about their rules and regulations, policies and punishments (Hutton, 2006) may help curb e-cheating behaviors. Studies also propose publishing student and faculty handbooks and syllabi with the same information (Kiehl, 2006). Other studies suggest using innovative assessment tools to minimize the instances of e-cheating (Born, 2003; McCabe & Trevino, 1993; Warren & Rosenthal, 2006; Cooper & Schwartz, 2007). Furthermore, studies propose that many universities seek to detect e-cheating in their students' submitted work by:

- using detection software such as Turnitin.com,
- expecting step-by-step explanations for research produced,
- turning to librarians and other literature for advice (Goosney & Duda, 2009).

However, researchers have re-stated that the most effective method of curbing and preventing e-plagiarism is to ensure HE students are instructed appropriately about the assessment, its expectations and the penalties of plagiarism (McLafferty & Foust, 2004, p. 186; Scanlon, 2003).

Some studies suggest that universities that regularly publicize instances of e-cheating among their students through news media, reporting number of cases per year and possible penalties posed may help increase awareness among HE students to work towards curbing such behavior (McCabe & Trevino, 1993; Bowers, 1964; McCabe et al., 2001). However, researchers have stated that although most of the detection, awareness and prevention policies and strategies have worked to reduce e-cheating, they seem to mostly be reactive reactions to e-cheating cases that have already taken place (Goosney & Duda, 2009) rather than being proactive in reducing it.

Proactive action is acting in advance to deal with an expected problem or difficulty whereas reactive action is responding to a particular incident or stimuli (Bindl & Parker, 2010). According to the definitions of proactive and reactive actions, detecting e-cheating behaviors and then imposing penalties can be seen as reactive actions because both detection of the behaviors and the subsequent penalties are responding to the dishonest behavior. Whereas, strategies such as implementing honor codes, developing handbooks, training and workshops to increase awareness among students may be defined as proactive actions.

The issue with reactive strategies, as proposed by some researchers, is that they seem to have adverse effects on student-teacher relationships. These tend to reduce the quality of education being imparted (Freedman, 2004; Zwagerman, 2008). This is because of the increased distance between teachers and students relationships; placing teachers in a more of a policing role than as those who facilitate learning (Freedman, 2004; Zwagerman, 2008).

Studies also believe that to have proactive strategies, academics need a model of the factors that influence HE students to e-cheat that will help understand why students e-cheat, thereby aiding in developing possible prevention methods before the actions actually take place.

It is worthwhile to note that the majority of the studies found in the literature focus on cheating behavior, rather than e-cheating behavior when it comes to why students might cheat or e-cheat. This gap in the studies is quite prominent and definitely needs addressing. The next section discusses the possible factors that do influence the likelihood of student cheating and e-cheating behaviors, factors that have not been considered previously, factor models that have been proposed and methods used by researchers to identify factors that influence the likelihood of cheating and ultimately e-cheating behaviors.

2.5 Factors that influence e-cheating among HE students

Given the frequency of cheating and e-cheating presented in Section 2.4, it is not surprising that many researchers have tried to identify the factors that lead to cheating or have developed conceptual models of cheating. However, there are relatively few studies that have identified the factors specifically associated with e-cheating. Such factors undoubtedly do exist and are either entirely new factors that lead to e-cheating per se or are previously identified factors associated with cheating but which have increased relevance in relation to e-cheating. An example of an entirely new factor would be the students' attitude towards piracy and how that may or may not influence the likelihood to e-cheat, while a factor that could have increased relevance to e-cheating would be peer pressure. The next sections discuss the literature on factors associated with academic dishonesty

2.6 A taxonomy of factors related specifically to cheating and e-cheating

The frequency of cheating among HE students has spurred researchers to investigate the factors that impact dishonest behavior among students in order to reduce it. However, the majority of studies discuss cheating rather than e-cheating. Therefore, this section proposes a taxonomy of the factors that influence the incidence/likelihood of cheating and to extend that taxonomy to cover the factors that also influence e-cheating.

Leming suggests that '[c]heating behavior is a complex psychological, social, and situational phenomenon' (1980, p. 86), a finding that has been echoed by many other researchers in later years (see McCabe & Trevino, 1993; McCabe & Trevino, 1997; Pulvers & Diekhoff, 1999; Jordan, 2001). Although Leming's study mentions psychological, situational and social factors, he primarily discusses the situational factors and suggests that perhaps there exists a strong correlation between situational factors and the likelihood of students engaging in cheating behaviors.

Haines et al. (1986) suggests that psychological characteristics can be classified as personality characteristics, and situational factors can be classified as social, contextual and/or demographic factors, thereby proposing only two classifications:

- psychological (personality) or
- situational (social/contextual/demographic).

It is important to note that although Haines et al. (1986) propose only two classifications, the classifications are quite broad such that the situational/social factors also include contextual factors and demographic factors, unlike Lemings' study which considered situational and social factors as separate and then looked only at situational factors. Haines et al. (1986) propose a strong correlation between situational characteristics and the likelihood of cheating, and between neutralization theory[1] (see Sykes & Matza, 1957), personality characteristics and cheating likelihood.

Whitley (1998) proposes a more in-depth classification of factors that influence cheating behavior in students as follows:

- Personality/psychological characteristics such as self-efficacy and morality among others
- Student characteristics (demographics characteristics, indicators of academic ability, academic beliefs, academic behavior, extracurricular activities)
- Situational factors (classroom environment and testing procedures)
- Attitudes toward cheating
- Non-categorized factors such as self-awareness and equity fairness

Whitley's classification of personality/psychological factors matches that of Haines et al.'s (1986), however; his classification of situational factors reflects Leming's (1980). Whitley (1998) also adds a classification to include student attitudes toward cheating which was not mentioned in the previous studies. Another difference proposed by Whitley classifies student characteristics as a category instead of calling it social factors. His definition of situational factors is limited to classroom environments and testing procedures, and student characteristics seem to combine factors previously proposed in the literature as social, demographic or contextual factors. Whitley (1998) also proposes a fifth classification for factors that, according to his study, do not fit into other categories. In this category, although he does not provide a justification, he includes factors such as self-awareness and equity fairness.

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[1] Neutralization theory states that persons justify a criminal act in order to exonerate themselves of the guilt and blame (Sykes & Matza, 1957, p. 664)

The literature defines self-awareness as a way to explore individual personalities, value and belief systems (Evolutionary Pathway, 2012; College of the Canyons, 2013). Equity fairness is defined as a quality of being impartial or reasonable (Downes, 2010). Both self-awareness and equity fairness can in fact be categorized as a personality characteristic, thus making Whitley's fifth classification appear redundant.

Bjorklund and Wenestam (1999) propose a different classification of factors, comprising two categories:

- External factors such as situational/contextual factors or
- Individual factors such as personal/demographic factors

However, Bjorklund and Wenestam's (1999) study includes demographic factors as part of personal factors because by their definition of personal factors they derived from an understanding of what they call individual factors versus other factors that are 'external' to the student (1999). This definition seems to be in contrast to all definitions of personal and demographic factors proposed by other researchers.

Before deciding on a classification of factors, it is important to define the various classifications proposed in the literature. Allport (1937) suggests that the study of personality characteristics is a branch of psychology and the Human Resources and Skills Development department in Canada defines 'personality characteristics …as basic factors that are unique to a person, and that may directly affect that person's regular capacity [to make decisions]' (HRSDC, 2011b).

Situational or contextual factors are those that depend on social circumstances (Fletcher, 1966) with the understanding that certain situations or external/contextual factors alter the principal guiding behavior or attitude of the person towards someone, something or some action (Edwards, 1967).

Attitude is defined by Fishbein (1973) as a learned tendency that makes a person respond in a favorable or unfavorable manner towards another person, thing, place or event; in this case cheating. Attitudinal factors are those that influence these tendencies.

Demographic factors are characteristics such as sex, age, education level, income level, marital status, occupation and religion (Heller, 2009).

Based on the above definitions, situational or contextual factors, attitudinal factors and demographic factors can be categorized as social factors (Shon, 2006). The taxonomy of factors that influence cheating in HE students can now be summarized and illustrated in Figure 2.5 below.

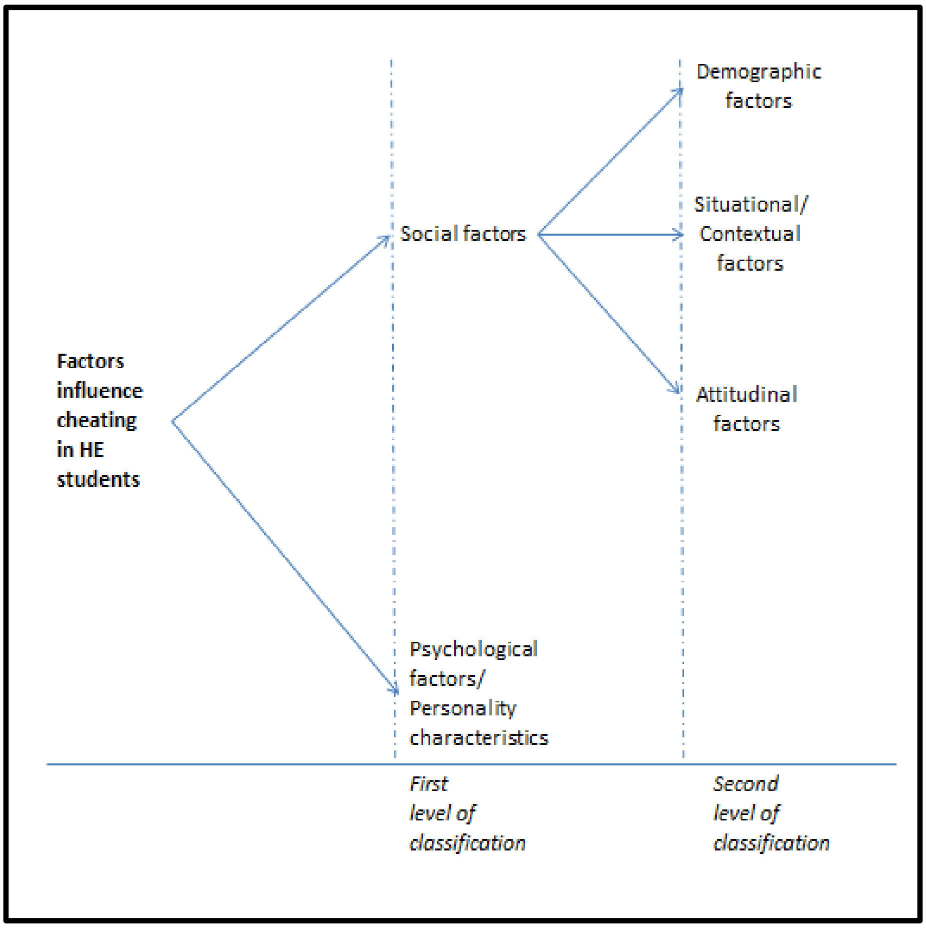

Figure 2-5*: Taxonomy of factors influencing the likelihood of cheating among HE students*

2.6.1 Taxonomy of factors that influence the likelihood of e-cheating among HE students

It is important to note here that the taxonomy proposed in the previous section indicates factors that impact the likelihood of cheating among HE students, not e-cheating per se. However, it is believed it was important to first establish a classification of factors of cheating based on existing literature to identify possible classifications of factors that may also impact the likelihood of e-cheating among HE students.

Student activities using ICTs are believed to be social in nature because the primary focus of student ICT use is communication, networking and sharing of information in terms of text, audio or video whether in their personal lives or academically (Passey et al., 2004; Ferscha et al., 2011). Furthermore, studies propose that ICTs themselves have evolved to become more engaging, thus enabling greater access by users to others through for example the Internet and text messaging (Ferscha et al., 2011). This has given rise to the concept of social computing which is the ‘collaborative and interactive aspect of online behavior’ (Rouse, 2010, p. 1). Social computing includes, but is not limited to, the use of blogs, social networking sites, instant messaging, online and multiplayer gaming, and is related to the concept of Web 2.0 (Rouse, 2010). Given the social nature of the use of ICTs, it is proposed that social factors described in the previous section such as demographic factors, contextual factors and even attitudinal factors need to be taken into consideration when studying impacts of possible factors on e-cheating.

As e-cheating has been defined as a form of academic dishonesty just as cheating has, some studies have suggested that students engaging in academic misconduct of any type often suffer from low self-esteem or come from a poor belief system, among other psychological problems. Thus, it is proposed that the psychological factors also be included in the taxonomy of factors that influence the likelihood of e-cheating.

It has been seen that there is a clear distinction between behaviors that define cheating and behaviors that define e-cheating. The use of ICTs by HE students has given rise to methods of cheating among students that did not exist outside of the digital world and have in fact been significantly enhanced by ICTs. However, none of the previously studied classifications of factors seem to have taken into consideration the impact of technology on cheating or e-cheating.

Based on this literature reviewed, it is suggested that ICT use among HE students has given rise to possible factors that influence the likelihood of e-cheating behavior. Factors such as attitude to or previous experience of plagiarism, technology advancement and increased online sources of research may all impact the likelihood of e-cheating but have not been considered under any classification in the past. Similarly, although studies suggest that piracy or digital piracy is academic misconduct and quite widespread among HE students, no literature has been found to actually propose a relationship between student piracy and student likelihood of other e-cheating behaviors.

Therefore, it is proposed that technological factors be added to the previously proposed taxonomy of factors that may impact the likelihood of e-cheating among HE students.

Therefore, the final taxonomy of factors is illustrated in the Figure 2.6 below:

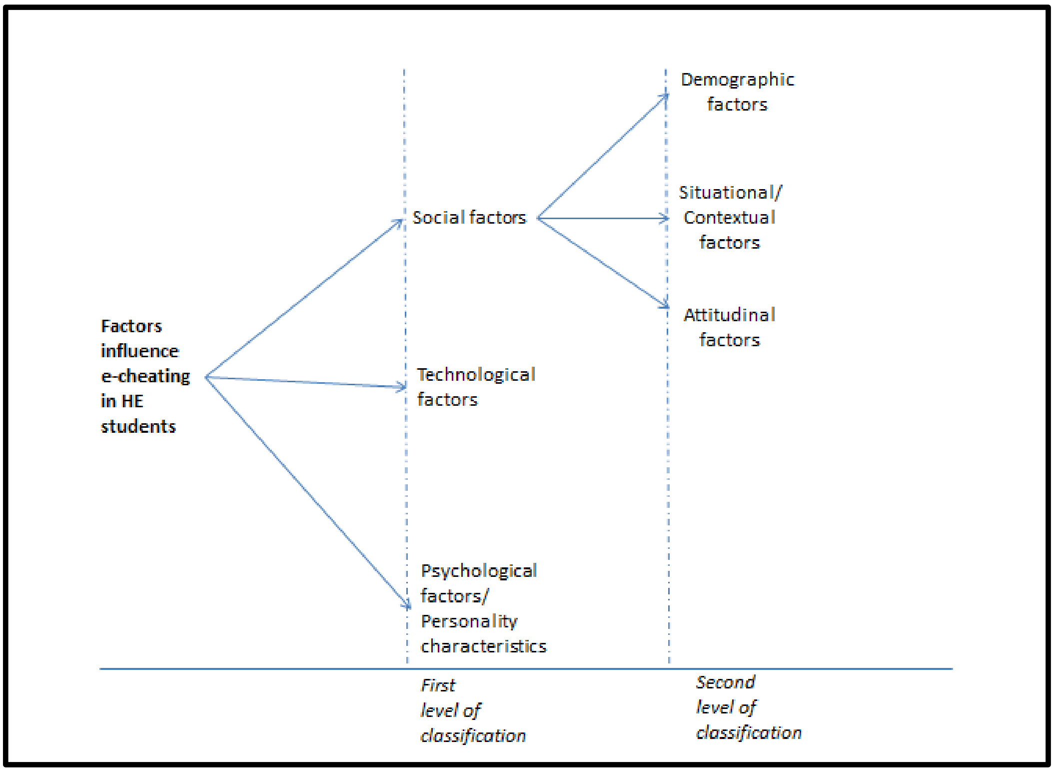

Figure 2-6*: Taxonomy of factors affecting the likelihood of e-cheating among HE students*

2.7 Identified factors that influence cheating among HE students

By referring to the above taxonomy and to the characteristics of the cheating and e-cheating described in Section 2.4, e-cheating may be considered as cheating mediated by technology. So, all factors that influence the likelihood of cheating will be considered in identifying factors that influence the likelihood of e-cheating occurring. Table 2.4 below is a summary of the major studies that propose factors that have been shown to have significant influence on the likelihood of cheating among HE students. The first column of the table describes the individual factors. The second column presents the rationale put forward by studies pertaining to these factors. The third column of the table shows the group of students, i.e. either high school (HS) students or

HE students who were the study's focus. The fourth column presents the sources and researchers who studied the factors and provided rationalizations. The last column shows any contradictory studies that suggest that the mentioned factor does not influence cheating likelihood among students (see also Whitley (1998) for meta-analysis of factors associated with cheating likelihood among college students).

Table 2-4*: Identified factors that influence cheating likelihood among students*

Factors	**Rationale**	**Focus**	**Sources**	**Contradictory studies**
Student attitudes towards cheating	Students differentiate and define academic dishonesty as unethical but not cheating. Some students claim ethical standards deter them from cheating. These may include personal morality. Anticipated embarrassment if caught deters students from engaging in cheating behaviors.	HE	Jordan, 2001; LaBeff et al., 1990; Bolin, 2004; Carpenter et al., 2006; Chapman et al., 2004; Graham, et al., 1994; Jensen et al., 2002; Jordan, 2001; Michaels & Miethe, 1989; Kidwell, Wozniak, & Laurel, 2003; Rakovski & Levy, 2007; Murdock, Miller & Kohlhardt, 2004; Murdock Miller & Kohlhardt, 2005;Stephens, 2004	Murdock and Anderman (2006) suggest that studies do not clearly state that honest and dishonest students actually differ in their moral judgment of cheating or pursuit of ethically attaining a degree
Neutralizing attitudes (Neutralization)	Students externalize blame onto others and therefore do not believe cheating is wrong or unethical. Studies suggest neutralization is widespread within specific context of online coursework.	HE	Haines et al., 1986; King et al., 2009; Molnar et al., 2008	
Pressure from parents	Parents pressurize students to obtain higher grades so they can apply to good universities and even get a scholarship at any cost which puts pressure on students to resort to any means to get the desired grades, including engaging in cheating.	HS & HE	McCabe, 2001; McCabe & Trevino, 1996; Callahan, 2004; Gross, 2003	
Pressure from school and corporate recruiters	Universities put pressure on students to obtain higher grades in order to pursue post-graduate degrees. Similarly, various organizations glorify high achievers and advertise vacancies only for high-achieving students which puts pressure on students to attain required grades to ensure they are employed once they graduate.	HE	McCabe &Trevino,1996	Carpenter et al. (2006, p. 182) suggest pressure to succeed has little effect on academic dishonesty
Difficulty of Subject	Students who feel the subjects being taught are difficult, resort to cheating to pass the subjects and maintain grades.	HS	McCabe ,2001; Perry et al., 1990; Smith, Ryan & Diggins1972	

Factors	Rationale	Focus	Sources	Contradictory studies
Student's attitude towards studying	Gresham (2002) suggests students who have 'business approach' to life may see time studying as a waste unless they gain something concrete.	HE	Gresham, 2002; Christensen-Hughes & McCabe, 2006	
Peer Pressure	Peers' behavior strongly influence students' engagement in cheating behavior because it is looked on as a learned behavior from observing their peers; Perceived to be normal behavior; Non-cheaters feel at a disadvantage	HS & HE	McCabe & Trevino, 1993, p. 533;McCabe, 2001; Szabo & Underwood, 2004; Gibbons, Mize & Rogers, 2002; Christensen-Huges & McCabe, 2006; Bowers, 1964; Beck & Ajzen, 1991; Bunn, Caudill & Gropper, 1992; DeVries & Ajzen, 1971; Enker, 1987; Genereux & McLeod, 1995; Liska, 1978; Sherrill et al., 1971; McCabe et al., 2002; Perreault, 2007; Rowe, 2004	
Teachers' attitude towards cheating	Teachers' attitude towards cheating is perceived as impacting students' outcome expectations mainly because teachers do not report cheating or because teachers do not care – so students engage in cheating. If the student caught is an athlete or liked, he/she is let go by teachers when caught cheating, or the teacher feels sorry for students therefore lets the students go when caught cheating. Existing honor codes influence teachers' response to student cheating: if existing honor codes influence teachers to take notice of cheating as an unethical behavior, teachers tend to report cheating cases which discourages cheating behavior among students.	HS & HE	Murdock et al., 2005; Singg et al., 2005; McCabe, 2001; McCabe, 2005; Nadelson, 2007; Davis & Ludvigson, 1995; Kerkvliet & Sigmund, 1999; Pulvers & Diekhoff, 1999; Saunders, 1993; Stearns, 2001; Keith-Spiegel et al., 1998; Jendrek, 1989; Schneider, 1999; Simon et al., 2003; Christensen-Huges & McCabe, 2006	McCabe (1993) suggests honor codes do not have any significant impact on teachers reporting student cheating cases
Teachers' understanding and acceptance of academic integrity policies	Students whose teachers do not know the policies or do not follow the policies tend to engage in cheating behavior	HE	McCabe & Trevino, 1993; McCabe & Trevino, 1997; McCabe et al., 2002; Sims, 1995; Livosky & Tauber, 1994; Pincus & Schmelkin, 2003; Roig & Ballew, 1992; Kelley & Bonner, 2005; Perreault, 2007; Walker, 2010	

Factors	Rationale	Focus	Sources	Contradictory studies
Prior cheating behavior		HE	Whitley, 1998; Sierles, Hendrickx & Circle, 1980; Sierles, Kushner & Krause, 1988; Sims, 1993; Ward & Tittle, 1993; Martin, Rao & Sloan, 2009	
Parents attitude towards cheating	Parents' attitude towards cheating sometimes encourage students to cheat when parents look the other way, or blindly defend their child when accused or parents do the homework for their child	HS	McCabe, 2001	
Peer attitude towards cheating	If peers tend to tolerate and encourage such behaviors, then so do students in the group	HE	Whitley, 1998	
Student attitude towards academic integrity	Student who are more inclined to report instances of cheating they witness are less likely to cheat	HE	Lim & See, 2001	
Family status e.g. education, income, occupation	Higher family status encourages higher commitment to academic honesty	HE	Bowers, 1964	
Extra-curricular activities such as athletics	Students who participate in no extracurricular activities report minimal instances of cheating whereas students who participate in extra-curricular activities report indulging in cheating; students on sports scholarship are more inclined to cheat	HS & HE	McCabe & Trevino, 1996; Bowers, 1964; Haines et al., 1986; Bowers, 1964, p. 86	McCabe (2001) suggests actual difference small to modest, as those surveyed may use this as an excuse to indulge in cheating themselves whereas Carpenter et al. (2006, p. 182) suggest external work commitment has little effect on academic dishonesty
Extra-curricular activities such as being members of Student societies and publications	Sororities/fraternities, political/cultural organizations, clubs and publications encourage cheating among HE students	HE	Bowers, 1964; Haines, et al., 1986; Merton, 1957; Cloward, 1959; Harp &Taietz, 1966; Stannard & Bowers, 1970; Bonjean &McGee, 1965; Baird, 1980; Kirkvliet, 1994	Baird (1980) suggests there is no strong relationship between extracurricular activities such as sorority/fraternity memberships and cheating
Extra-curricular activities such as Students holding jobs outside school	Studies state that due to pressure to juggle other commitments, time pressure may force students towards alternative shortcuts to help themselves	HS & HE	McCabe & Trevino, 1996; Christensen-Hughes & McCabe, 2006	

Factors	Rationale	Focus	Sources	Contradictory studies
Prior Academic Achievements	Students cheat because they want better grades (extrinsic outcomes) Students with low grades cheat because they supposedly have more to gain and less to lose Students in high-ability classes cheat more to appear as competent as their classmates	HS & HE	McCabe & Trevino, 1996; Bowers, 1964; Hetherington & Feldman, 1964; Baird, 1980; Newstead et al.,1996; Leming, 1980;Singhal, 1982; Antion & Michael, 1983; Haines et al., 1986; Michaels & Miethe, 1989; Lipson & McGavem, 1993a; Smith et al., 2002; Elliot, 1999; Middleton & Midgley, 1997	McCabe (2001), Brandes (1986), Who's Who among American High School Students (1999) suggest students who are high achievers also cheat while Leming (1978) suggests high-achieving students are also prone to cheating in low-threat/low-supervision conditions
Existence of honor codes or academic honesty environment within university.	Honor codes that clearly specify the punishments for being caught cheating increase student perception of risk involved in trying to cheat, and helps deter students from engaging in cheating behaviors	HE	Bowers, 1964; McCabe & Trevino, 1993; Gardner et al., 1988; Sierles et al., 1988; Prenshaw, Straughan & Albers-Miller, 2001; Cummings & Romano, 2002	1.1.1.1
Chances of detection	Likelihood of being caught, difficulty engaging in cheating due to stringent invigilation and carefully designed assessments deter students from engaging in cheating behavior	HE	Graham et al., 1994; Stephens, 2004; Hollinger & Lanza-Kaduce, 1996; Houston, 1976, 1983, 1986; McCabe et al., 2008; Lee, 2009; O'Rourke et al., 2009; Thomas & Bruin, 2012; Perreault, 2007	
Severity of penalty	Strict punishment deter students from engaging in cheating behavior	HE	McCabe, 2001; McCabe, Feghali & Abdallah, 2008	
Gender	Variation in childhood socialization process of boys and girls differentiate impact of social control on either gender so that boys cheat at almost twice the rate of girls	HE	Shaub, 1989; Sweeney, 1995; Cohen, Laurie & David, 1998; Brandes, 1986; Bowers, 1964; Tibbetts, 1997; Whitley, Nelson & Jones, 1999; Crown & Spiller, 1998; Hetherington & Feldman, 1964; Roskens & Dizney, 1966; Kelly & Worrell, 1978; Ward, 1986; Aiken, 1991; Davis et al., 1992; Hrabak et al., 2004; Iyer & Eastman, 2008; Brown & Emmett, 2001; Calabrese & Cochran, 1990; Schab, 1972; Singg et al., 2005	Whitley et al., 1999; McCabe, 2001; McCabe & Trevino, 1996; Baird, 1980; Haines et al., 1986; Ward & Beck, 1990; Lipson & McGavern, 1993b; Chapman et al., 2004; Jordan, 2001; Pino & Smith, 2003; Josephson, 2002. These studies claim similar rates of cheating for female and male students. Although girls have a greater tendency to follow rules, they see cheating as a means to compete with boys. Leming, 1980; Eastman, Iyer & Reisenwitz, 2008; Teodorescu & Andrei, 2009; Antion & Michael, 1983 have found that girls cheated more

Factors	Rationale	Focus	Sources	Contradictory studies
Technology Advancement, Increased Internet use, and accessibility	Rate of cheating higher in high school students because they are learning about plagiarism and proper techniques for citation. Instances lower among college students, they are less tempted either because the information is not quality or even if it is quality they feel their teachers may also have access to it.	HS & HE	McCabe et al., 2002; CIP, 2003; Perreault, 2007; Schmidt & Boncella, 2006; King & Case, 2007; Fletcher et al., 2007; Underwood & Szabo, 2003	McCabe et al. (2002) have pointed out that the study that pointed out impact of Internet among college students was conducted too early, so it did not capture actual scenario; and e-cheating may be higher in colleges which are not academically rigorous, so may not have anything to do with the use of Internet.
	Easy, effortless use of technology to cut and paste information from one document to another, paper-mills readily available online to sell or offer for free essays and reports and distorted assumption that everything on the web is part of public domain impact students' cheating	HE	Klein, 2011; Underwood & Szabo, 2003; Stephens, Young & Calabrese, 2007;Christensen-Hughes & McCabe, 2006; Goosney & Duda, 2009; Perreault, 2007; Apampa et al., 2010; Cordova & Thornhill, 2007; Ekstein, 2003; Fletched et al., 2007; Tanner & Piper, 2010; Underwood, 2006; Hasen & Huppert, 2005; Conradson & Hernandes-Ramos, 2004; Ma et al, 2007; Ma, Wan & Lu, 2008;Gresham, 2002; Kaltenbaugh, 2005	Vandehey, Diekhoff & LaBeff, (2007) and Brown and Emmett (2001) suggest studies do not show an increase in cheating over twenty years despite technological advances and use of Internet
Increased Online courses	Perception that it is easier to cheat in distance learning courses	HS & HE	Kennedy et al., 2000, p.311; Kelley & Bonner, 2005; Perreault, 2007	Smith, Ervin & Davy (2003, p.2) suggest that the emergence of online identity perhaps breaks down social barriers, increases communication and leads to less cheating while Grijalva et al. (2006) suggest cheating in an online class is no more likely than in a traditional classroom because the way online courses are designed reduces the need to cheat.

Factors	Rationale	Focus	Sources	Contradictory studies
Age	Abilities change with age as cognitive abilities develop making students more ethically aware as they grow older So, younger students cheat more than older students. Students in freshmen year cheat more than students in final year	HE	Finn & Frone, 2004; Newstead et al., 1996; Nonis & Swift, 2001; Rakovski & Levy, 2007; Vandehey et al., 2007; McCabe & Trevino, 1997; Kohlberg, 1973; Antion & Michael, 1983; Haines et al., 1986; Baird, 1980; Lipson & McGraven, 1993b; Graham et al., 1994; Diekhoff et al., 1996; Whitley et al., 1998; Coombe & Newman 1997; Antion & Michael, 1983; Bisping et al., 2008; Diekhoff et al., 1996; Faulkender, 1994; Zimny et al., 1996	Lipson & McGavern, 1993b; Hrabak et al., 2004; Teixeira & Rocha, 2010; Eastman et al., 2008; Tang & Zuo, 1997. All suggest students who are older cheat more than younger students
Subject majors	Depending on the majors, students in Business majors cheat more than other majors	HE	Caruana, Ramaseshan & Ewing, 2000; Clement, 2001; Smyth & Davis, 2004; Christine & James, 2008; Harris, 1989; Lyer & Eastman, 2006	Beltramini, Peterson & Kozmetsky (1984) contradict studies reporting business students
Subject levels (undergraduate vs. graduate level)	Undergraduate cheat more than graduate level	HE	Rakovski & Levy, 2007; Nazir et al., 2011	Zastrow, 1970; Christine & James, 2008 report no major difference between levels
Self-efficacy	Students who believe in their abilities try harder and put in more effort, therefore do not find the need to cheat High-achiever factor is cross-linked to self-efficacy factor such that students who score high believe they have capabilities to achieve their academic goals without resorting to cheating	HE	Murdock & Anderman, 2006; Pajares, 1996; Pintrich, 2003; Schunk, 1991; Bandura, 1986, 1977	Murdock and Anderman (2006) also stated that although self-efficacy may influence students to remain honest, other factors such as poor teaching, unclear tests or other environmental variables may cause the student to cheat. Furthermore, the study states that students may even develop a sense of self-efficacy for particular tasks by observing peers, and this could very well be observing peers successfully engage in cheating behaviors.

Based on the definitions of personality characteristics and social factors and the various studies presented in Table 2.4, the following taxonomy of categories and their respective factors are proposed:

1. **Psychological/ Personality factors**
    a. Self-efficacy
    b. Neutralization
2. **Demographic factors**
    a. Gender
    b. Age
    c. Subject majors
    d. Subject levels
3. **Attitudinal factors**
    c. Student's attitude towards cheating
    d. Student's attitude towards studying
    e. Student's attitude towards academic integrity
    f. Parents' attitude to cheating
    g. Teachers' understanding and acceptance of academic integrity policies
    h. Teachers' attitude towards cheating
    i. Peer's attitude towards cheating
4. **Contextual factors**
    j. Prior academic achievement
    k. Prior cheating behavior
    l. Family status
    m. Pressure from parents, schools, corporate recruiters to excel
    n. Extra-curricular activities such as athletics
    o. Extra-curricular activities such as students holding membership in societies, publications
    p. Extra-curricular activities such as students holding jobs
    q. Difficulty of subject
    r. Level of instructor detection
    s. Severity of penalties
    t. Peer pressure
    u. Existence of Honor codes

5. **Technological factors**
   v. ICT Advancement, use and accessibility
   w. Increased online courses

2.8 Existing cheating/e-cheating factor models

This section presents conceptual models of cheating factors proposed by key studies.

2.8.1 Murdock and Anderman (2006) Model

Based on their review of the existing literature, Murdock and Anderman (2006) propose an atypical conceptual model that is presented in Figure 2.7 below. According to Figure 2.7, Murdock and Anderman propose three questions:

- 'What is my purpose?'
- 'Can I do this?' and
- 'What are the costs?'.

For each of these questions, based on the analysis of their literature review, the study categorizes individual and contextual factors as shown in the figure below. Although Murdock and Anderman (2006) describe their initial factors as either individual or contextual, these factors are grouped into three boxes and it is unclear if each box shows a combination of both individual and contextual factors or if two of the three boxes contain one type of factor e.g. individual, and the remaining box contains the other type of factors e.g. contextual. They suggest that the factors are antecedents to the variable Propensity to Cheat. Propensity is defined in the literature as the natural tendency or likelihood towards a particular behavior, in this case to cheat. The factors can and are considered from this model to influence cheating likelihood; these are also already mentioned in Table 2.4.

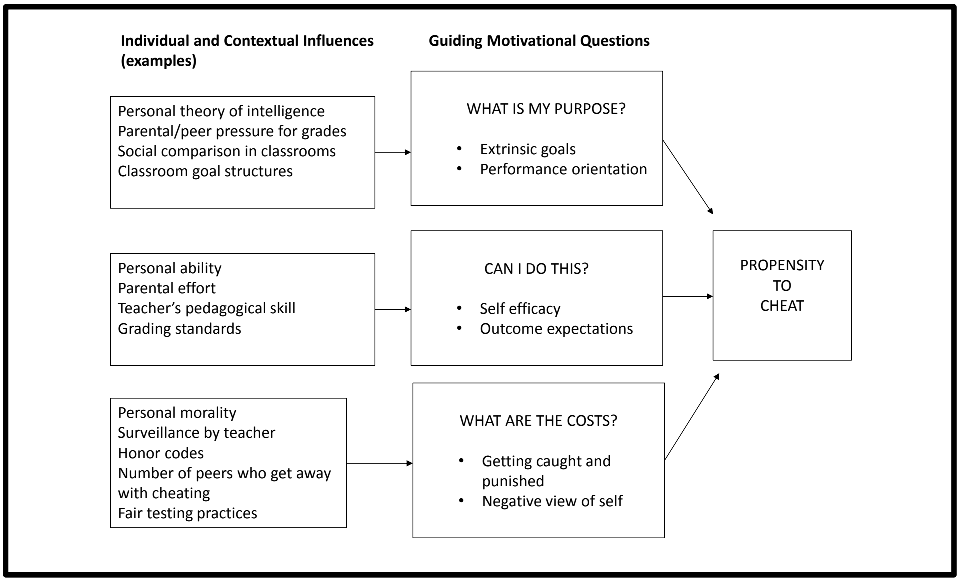

Figure 2-7*: Contextual model of factors by Murdock and Anderman (2006)*

2.8.2 Jurdi et al (2011) Model

A model presented by Jurdi, Hage & Chow (2011) categorizes factors that influence dishonest academic behavior among HE students into four categories, as shown in Figure 2.8. These are demographic factors, psychosocial factors, academic factors and situational factors. It is important to note here that although this study focuses on academic dishonesty and uses the term 'dishonest academic behavior', there is a clear conceptual similarity to the working definitions of cheating and e-cheating, that describe both cheating and e-cheating as any form of dishonest academic behavior. Jurdi et al. (2011) also focus on behaviors, rather than the likelihood of dishonest behaviors. It is observed that all the factors used in this study are identified in Table 2.4, using similar terms. This highlights that the two terms are similar; therefore, the factors from Jurdi et al.'s (2011) study can be used to also study the likelihood of cheating or e-cheating. It is important to note the limitations of this study, as it focuses only on Canadian universities and does not include any technological factors.

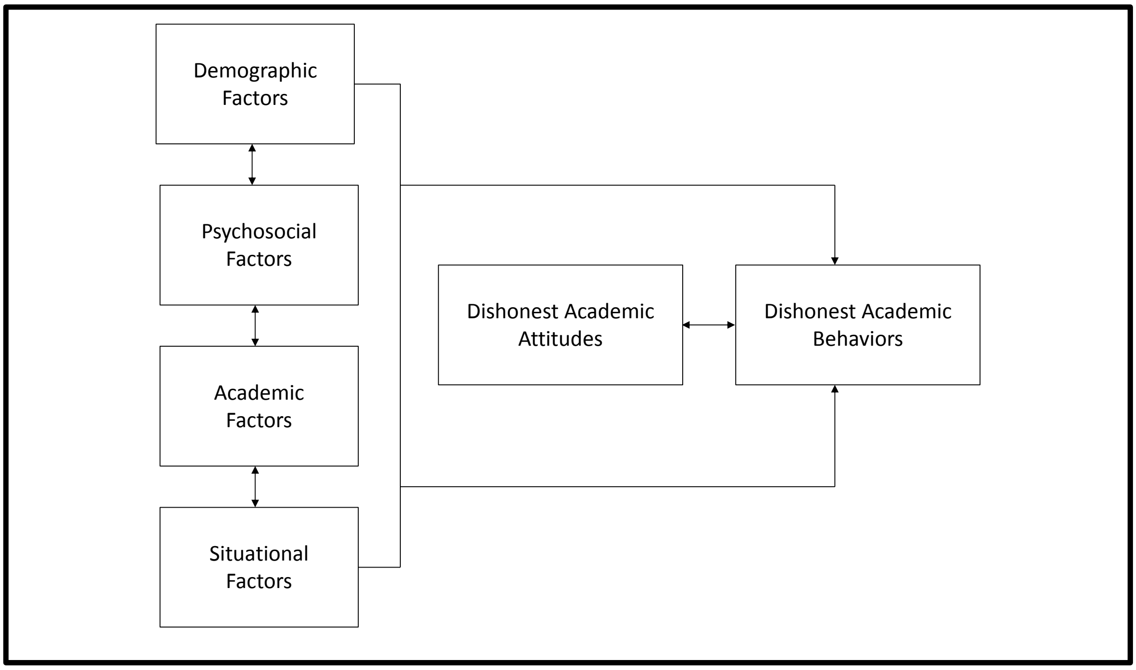

Figure 2-8*: Factor model by Jurdi et al. (2011)*

2.8.3 Sierra and Hyman (2008) Model

A study by Sierra and Hyman (2008) presents a factor model using transitive relationships of:

- magnitude of consequences ($Conseq_{MAG}$) that characterizes the morality of a situation adding to the perceived moral intensity of the situation; and
- personal moral philosophy (further defined as personal moral philosophies of idealism, Eth_{IDEAL}, and relativism, Eth_{REL}) that provide standards to judge acts, intentions and consequences

as antecedents of students' willingness to cheat as represented by factor $Cheat_{WIL}$ which they define as the likelihood that a student will choose to cheat. The authors suggest that students' intentions to cheat should decrease as the magnitude of the consequences of cheating increase or vis e versa.

The analysis of the results suggest that perceived moral intensity mediates the relationship between personal moral philosophy and students' willingness to cheat (Sierra & Hyman, 2008, p.11) as illustrated in figure 2.9 below.

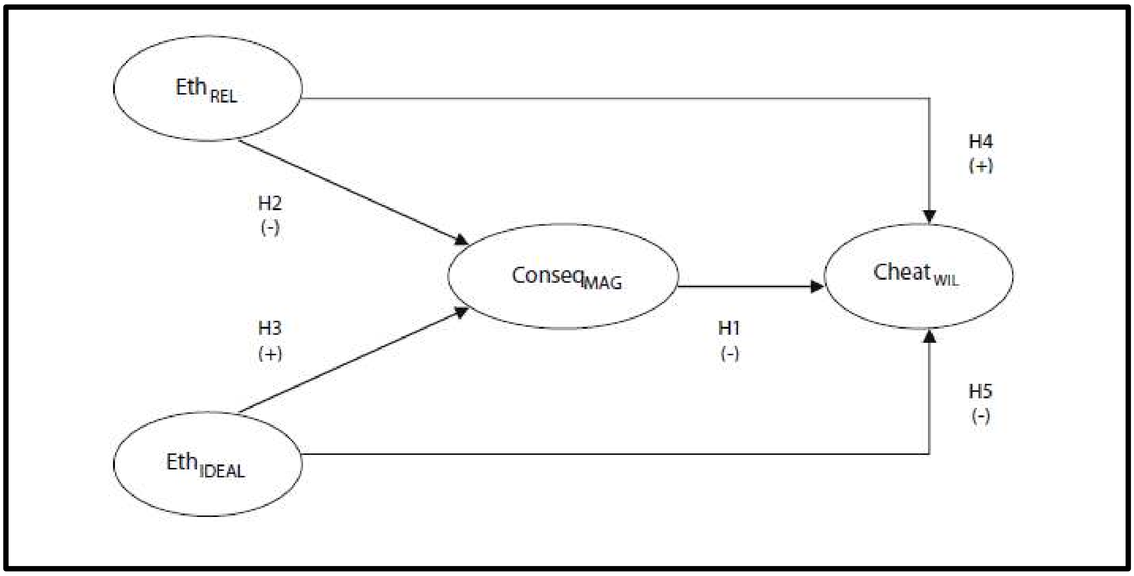

Figure 2-9*: Factor model by Sierra and Hyman (2008)*

This study primarily focuses on psychological factors and does not include any social, attitudinal or technological factors. Sierra and Hyman (2008) admit that the model could be made more comprehensive by including attitudinal and emotional measures that might explain additional variations in students' willingness to cheat; however, they have simply proposed a structural model with psychological factors. All factors mentioned in this model have been considered in Table 2.4.

2.8.4 Jalal-Karim (2013) Model

A study by Jalal-Karim (2013) proposes a conceptual model of factors influencing cheating among HE students as shown in Figure 2.10 below.

Although Jalal-Karim does not use any classification in this study, his factors can be classified as contextual or demographic factors. For instance, Gender, Class size and Class level are all demographic factors while Response to rules and regulations, Competitive pressure and Warning and deterrence are contextual factors. This study focuses on factors that encourage academic cheating, this is semantically and conceptually similar to influencing likelihood to cheating. Also, this study focuses on academic cheating, explicitly, while most other researchers assume that the focus is on academic cheating because of the context of their studies.

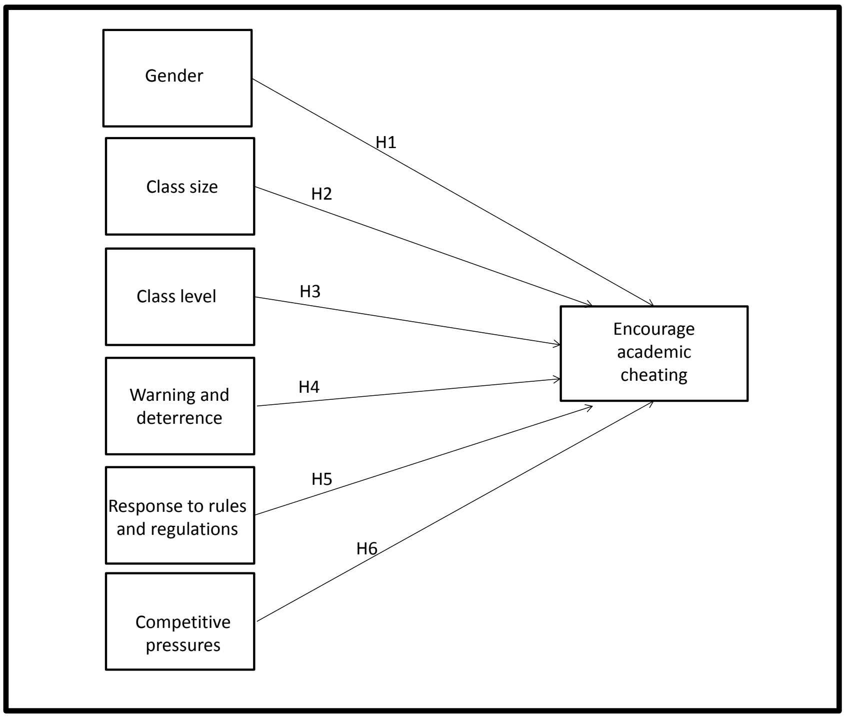

Figure 2-10*: Conceptual model of factors by Jalal-Karim (2013)*

It is important to note that this study does not include any technological factors, nor does it focus on e-cheating. However, all factors mentioned in Jalal-Karim's study have already been considered in Table 2.4, except for Class size. According to Jalal-Karim (2013), larger class sizes encourages cheating among students, therefore Class size will be added to a modified version of Table 2.4.

2.8.5 Whitley (1998) Model

A meta-analysis presented by Whitley (1998), as illustrated in Figure 2.11 and Figure 2.12 shows two models that focus on factors that influence cheating and intention to cheat. It focuses on students' intention to cheat which, according to the model, leads to actual cheating incidences. It is crucial to note here that intention has often been defined as one's apparent aim or likelihood to perform a particular behavior, in this case, cheating (Committee on Communication for Behavior Change in the 21st Century, 2002). Therefore, intent to cheat and likelihood to cheat may be considered conceptually similar to one another, and therefore the understanding that both intent to cheat and likelihood to cheat eventually lead to cheating.

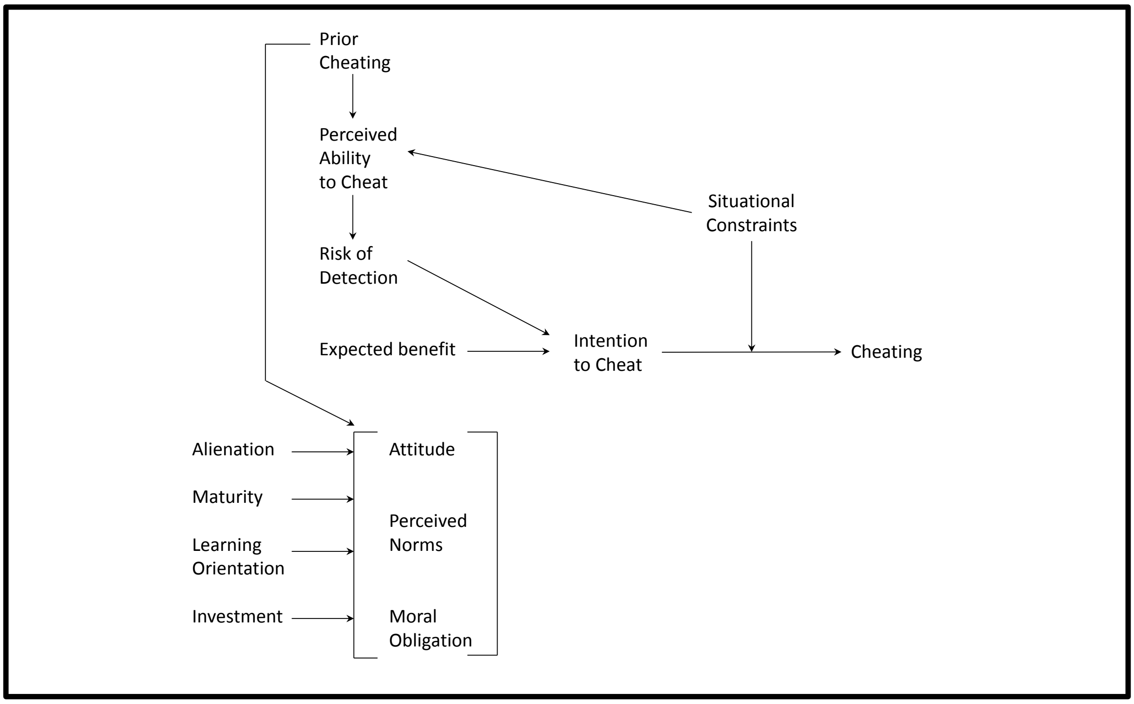

Figure 2-11: *Proximal Factor Model A by Whitley (1998)*

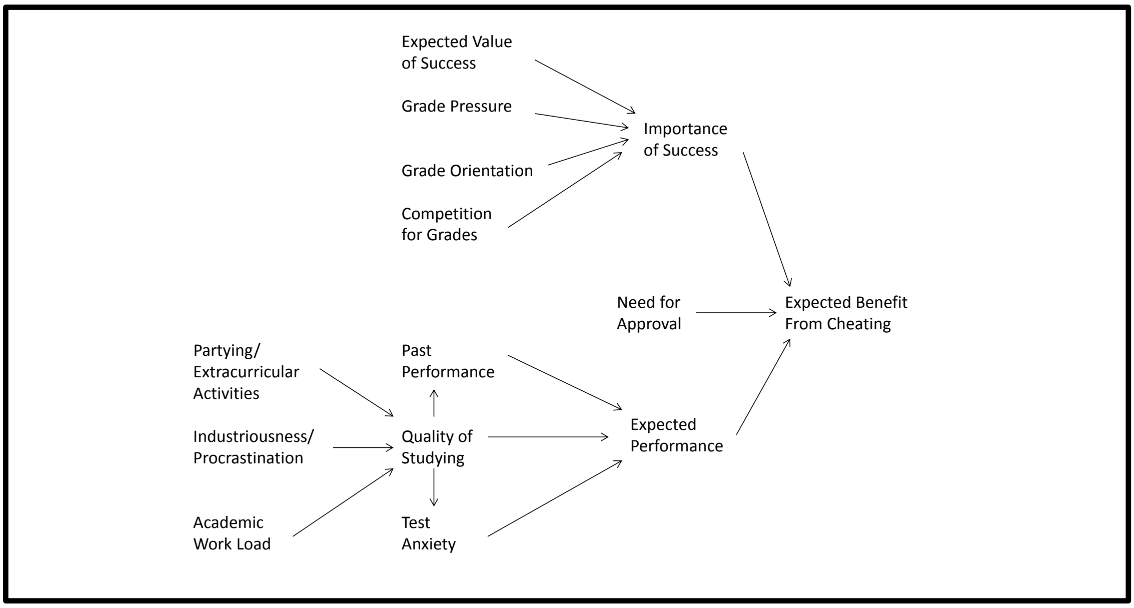

Figure 2-12: *Proximal Factor Model B by Whitley (1998)*

A similar understanding has been proposed by Seirra and Hymann (2008) and Ajzen (1991) that intention to cheat measures the likelihood to cheat which immediately antecede behaviors and are therefore good surrogates for actual cheating behaviors.

Whitley initially used five broad categories:

- Student characteristics (demographic characteristics, indicators of academic ability, academic beliefs, academic behavior, and extracurricular activities)

- Attitude towards cheating
- Personality variables
- Situational characteristics (classroom environment and testing procedures)
- Other categories

His classification has already been debated and certain categorizations rejected in detail in Section 2.6.

Although Whitley's (1998) study identifies more than 40 factors, his meta-analysis suggests that many of the factors studied by previous researchers did not in fact influence cheating likelihood. He bases his conclusion on four limitations found in previous studies:

- Almost all factors are correlational, so causal conclusions can be drawn only when there is experimental evidence
- Most factors examined by Whitley were included in only one or a few studies, so further studies were required to establish the factor(s) as possible antecedents to cheating likelihood
- Operational definitions of cheating used in various studies differed and probably gave rise to heterogeneity in effect sizes which means the actual population effect sizes could be divergent from the estimated ones in his study
- Whitely pointed out that although the factors were considered as independent of each other, it was always possible that some were in fact correlated with each other

(Whitley, 1998)

Whitely suggests a model for *proposed causes of cheating* (figure 2.11) and a model for *proposed causes of one of the proposed proximal causes* (figure 2.12). In his first model, he suggests that 'Intention to Cheat' is influenced by the following factors:

- Prior cheating
- Perceived Ability to cheat
- Risk of detection
- Expected Benefits

Based on the argument provided in Section 2.6, Prior cheating, Risk of detection and Expected benefits may be re-categorized as contextual factors, whereas perceived ability to cheat may be defined as attitudinal factor based on the taxonomy in Figure 2.6.

Although the model mentions situational factors as a construct that influences 'perceived ability to cheat', the model does not include the actual situational factors or characteristics. Also it may be of importance to note here that Whitley's model suggests that Situational factors influence Cheating directly, and not Intention to Cheat.

The model then goes on to elaborate on Prior cheating, suggesting that Attitude, Perceived Norms and Moral Obligations (APM) all influence Prior cheating, while Alienation, Maturity, Learning Orientation and Investment all impact APM. Whitley describes Maturity as a measurement of age and level of degree of study (e.g. first year, second year). Investment is taken to mean parents' and students' financial commitment (Whitley, 1998). Perceived norms have been defined as what students see as acceptable behavior, while Moral obligation has been defined as what students feel they should do (Whitley, 1998).

The second model proposed by Whitley (1998) in Figure 2.12 examines the antecedents of one factor from Figure 2.11, that is, Expected Benefits.

Whitely (1998) states that 'Test Anxiety' is negatively correlated with 'Expected Performance', which leads to 'Expected Benefit' from cheating and ultimately to 'Intention to Cheat' and actual Cheating. Conversely, 'Quality of Studying' is positively correlated with 'Expected Performance', which in turn leads initially to 'Intention to Cheat' and actual Cheating.

Moving down one level in the model, it can be seen that both ‘Academic Workload’ and ‘Parting/Extra-curricular Activities’ are negatively correlated with ‘Quality of Studying’ and so would probably lead to lower ‘Expected Performance’, ‘Intention to Cheat’ and actual Cheating.

Whitley’s (1998) model includes an apparently positively correlated factor at this lower level, namely, Industriousness, which one would assume would lead to improved ‘Quality of Study’, which would lead to higher ‘Expected Performance’ and hence to lower ‘Expected Benefit’ from cheating, lower ‘Intention to Cheat’ and so on. However, rather confusingly, Whitely combines Industriousness with its own opposite, Procrastination, a highly unusual and ambiguous inclusion in a conceptual model of this type.

It is not clear how Whitley has grouped the factors, but it seems he has used Expected Benefits as an example to demonstrate how the factors can be minimized. Another problem with the Whitley (1998) model is that the model seems incomplete. Although he has described five major categories in his study, in the Figure 2.12a model he has used only a few factors, possibly as a demonstration of how they could be placed into a factor-model. Moreover, although he says there are limitations to the review and the list of factors, he has not highlighted the factors that can or should be studied and which factors can and should be discarded. It is important to note that Whitley’s (1998) approach was in the form of a meta-analysis and does not actually test the models proposed. Finally, it is also observed that the models focus on cheating and not e-cheating and therefore has not considered any technological factors.

2.8.6 Powell (2012) Model

A study by Powell (2012) presents a factor model of students’ attitudes towards plagiarism, as shown in Figure 2.13 below. However, it is crucial to note that Powell’s model focuses on attitude towards plagiarism as opposed to this study’s focus of likelihood to cheat or e-cheat.

Unlike Powell’s (2012) study, this study is much broader and includes all academically dishonest behaviors, not just plagiarism. However, since plagiarism is considered a type of dishonest behavior, the factors that influence this behavior should be considered. Secondly, Powell’s study considers ‘attitude’ rather than likelihood.

However, as mentioned in Section 2.7, attitudinal factors are also being considered for this particular study, the factors studied by Powell will be considered as antecedents to the likelihood of students to cheat or e-cheat. Powell's study considers both personal and situational factors that act as antecedents to plagiarism among students, and all the factors mentioned have already been considered in Table 2.4, except for Defiance or Objection to the Task and Level of Satisfaction with course/teacher. Powell suggests that a student's attitude towards a particular task may influence his or her decision to cheat or not to cheat.

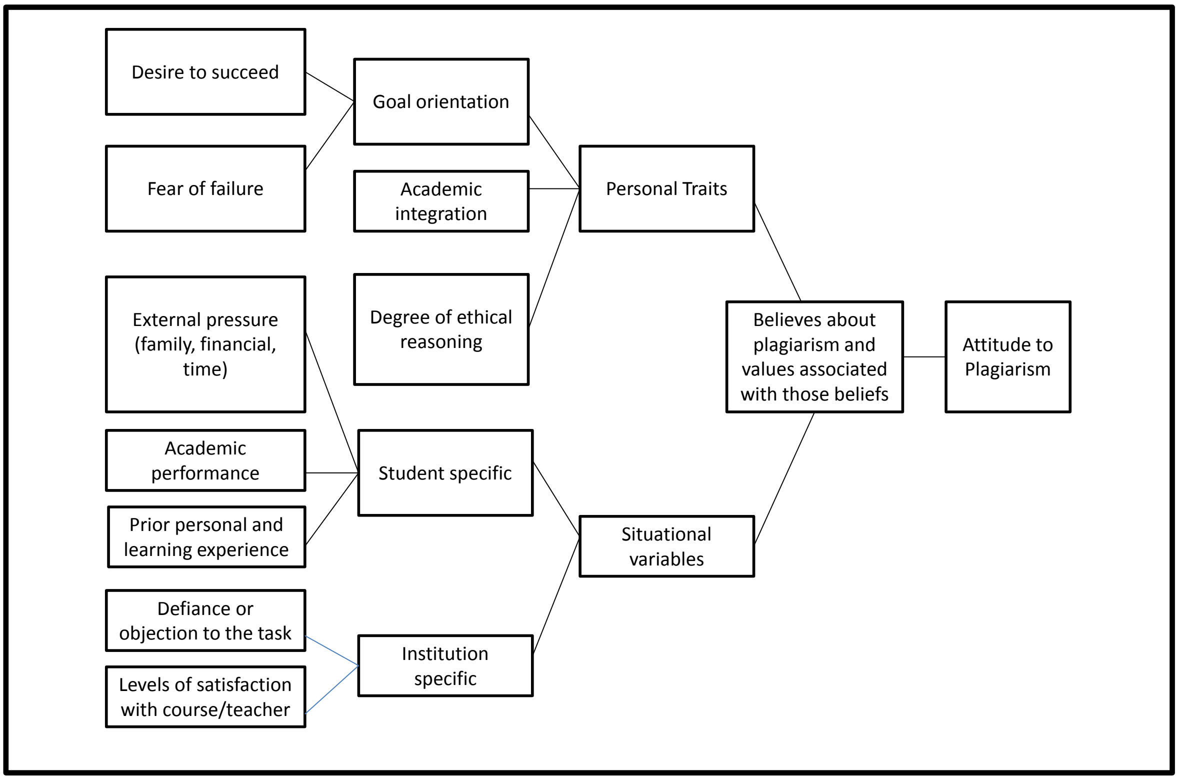

Figure 2-13: *Factor Model by Powell (2012)*

Powell also argues that, based on his study which yielded significant results, a student's level of satisfaction with the course or the teacher may also influence the student's likelihood to cheat. Therefore, both these factors, which can be categorized as attitudinal factors, will be included to the comprehensive list of factors to be considered for this study.

2.8.7 Smith et al. (2002) Model

In 2002 and 2009 Smith et al. conducted two studies, which proposed two slightly different conceptual models of what they call 'Likelihood of Cheating' or 'Cheating

Likelihood'. Each of these studies proposed an initial theoretical conceptual model and an accepted conceptual model, based on their empirical results and statistical analysis. This section will present the two models associated with the 2002 study while the next section will discuss the 2009 models.

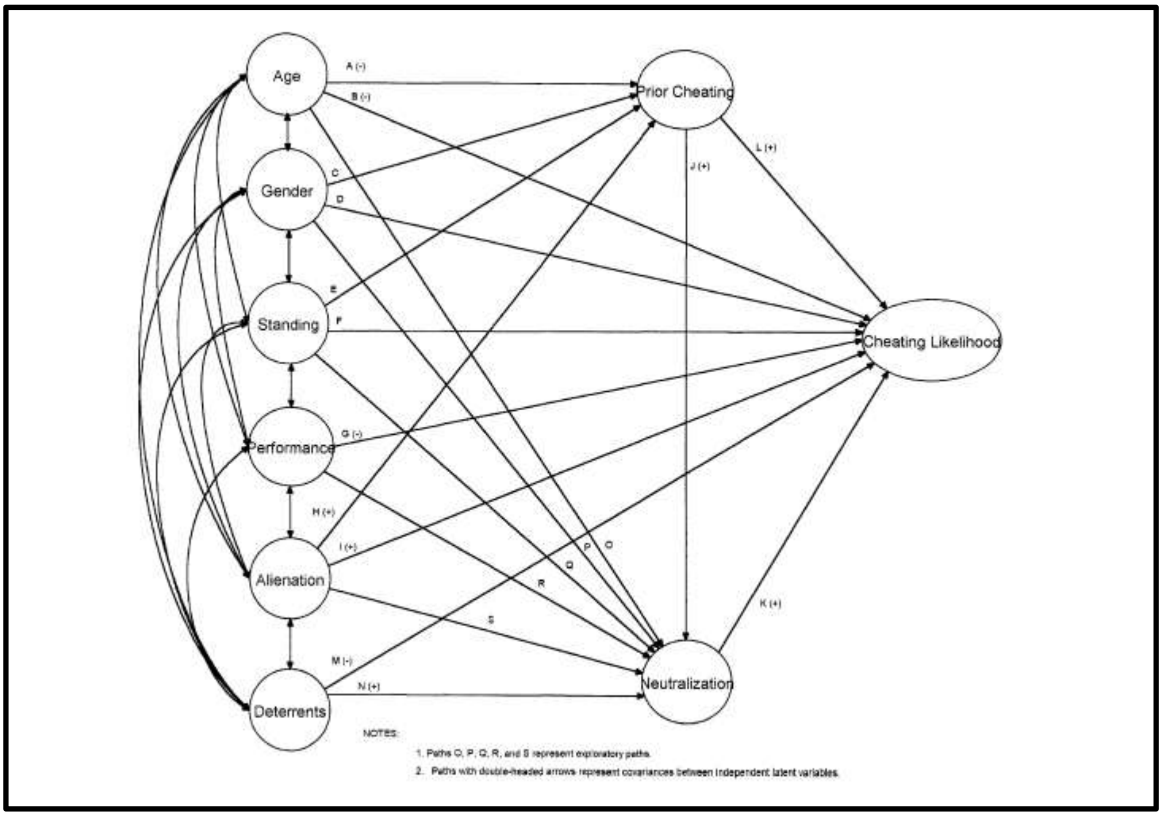

Figure 2-14*: Proposed Factor model by Smith et al. (2002)*

The initial conceptual model is shown in Figure 2.14 and the accepted model is shown in Figure 2.15. Smith et al. (2002) present a structural model for antecedents of the likelihood of cheating among only Accounting students. In this study, Smith et al. (2002) propose that accounting students must be held to a higher standard of integrity because of the expectations of their clients and by the profession itself. Smith et al. (2002) examine cheating likelihood among accounting majors and suggest that the results will help educators to deter cheating.

In their initial structural model shown in Figure 2.14 they examine demographic antecedents to and the likelihood of cheating, such as Age, Gender, Academic Standing and Academic Performance. Smith et al. (2002) also include the factors Deterrent, Alienation and the role of Neutralization as antecedents to Cheating Likelihood.

This initial model proposes that Academic Standing and Academic Performance are demographic factors whereas previous studies have classified these factors as contextual factors. Similarly, the study claims that Alienation and Neutralization are attitudinal factors.

However, much of the literature defines both Neutralization behavior and Alienation as psychological factors. As illustrated in Table 2.5 below, the word Alienation is used to 'refer to both a personal psychological state of mind and a type of social relationship' (Roberts, 1987, p. 346) and Neutralization is classified as personality/psychological factor (see Section 2.6 for details). The initial model does not classify Deterrents at all, but Deterrents have been classified as contextual factors in previous studies, as shown previously in Figure 2.6.

Table 2-5*: Definitions of Alienation as suggested in literature, adapted from Nair & Vohra (2009)*

Source	Description/Definitions of Alienation
Fromm (1955)	Mode of experience in which a person experiences himself as alien or estranged from himself (p. 20)
Seeman (1959, 1975)	Described in terms of powerlessness, meaninglessness, normlessness, social isolation and self-estrangement
Horowitz (1966)	Intense separation first from the objects of the world, second from people, and third from ideas about the world held by other people (p. 231)
Schacht (1970)	Dissociative state of the individual in relation to some other element in his or her environment
Miller (1975)	Objective state of isolation from others (p. 260)
Kanungo (1979)	Generalized cognitive (or belief) state of psychological separation from work insofar as work in perceived to lack the potentiality for satisfying one's salient needs and expectations (p. 131)
Hirschfeld & Field (2000)	Represents the extent to which a person is disengaged from the world of work (p. 790)

Smith et al.'s (2002) initial model proposes that initial factors such as Age, Gender, Academic Standing and Alienation influence an intermediate factor Prior Cheating that determines Cheating Likelihood among students. Previous studies have classified Prior Cheating as a contextual factor, at the same level as demographic factors (Whitley, 1998; Sierles et al., 1980; Sierles et al. 1988; Sims, 1993; Ward & Tittle, 1993; Martin et al., 2009). The initial model also suggests that initial factors such as Age, Gender, Performance, Standing, Alienation and Deterrents can all influence the intermediate factor Neutralization, which then influences Cheating Likelihood. It is important to note here that this initial model places Neutralization and Prior cheating at a level higher than the demographic, contextual and psychological/personality factors, which is quite different from the taxonomy of factors proposed in Figure 2.6. Although the Smith et al.'s (2002) study suggests that monitoring exams, announcing penalties, giving different exams to students and giving essay exams all act as Deterrents to Cheating Likelihood, the initial model does not show a breakdown of the factor 'Deterrents'.

The initial model suggests that all the factors mentioned also directly influence Cheating Likelihood, however, the empirical data and statistical analysis do not support this claim. Their research proposes that the statistically significant paths of all initial factors influence Cheating Likelihood through Prior Cheating and Neutralization, except for Deterrents, as illustrated in accepted model, shown in Figure 2.15 below.

This is a significantly different result found by Smith et al. (2002) as compared to prior studies by other researchers which have examined direct paths from demographic, contextual and personality/psychological factors to Cheating Likelihood and have also found them to be statistically significant (see Table 2.4; Whitely, 1998; Murdock & Anderman, 2006; Jurdi et al., 2011; Powell, 2012; Jalal-Karim, 2013). All the factors mentioned in this accepted model have already been included in Table 2.4, except for Alienation. As Smith et al.'s (2002) study demonstrates that Alienation has a direct influence on both Prior Cheating and Neutralization which in turn influence Cheating Likelihood; Alienation will be added as a personality/psychological factor to the table.

However, it is identified that Smith et al.'s (2002) study does not focus specifically on e-cheating and does not include any technological factors.

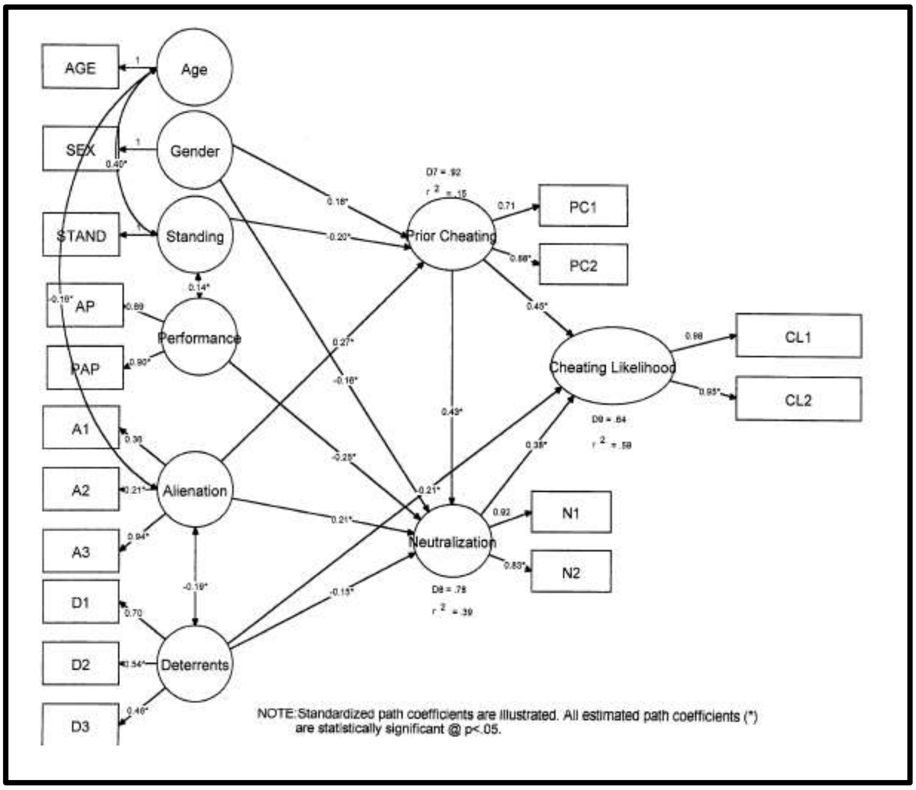

Figure 2-15: *Accepted Factor Model by Smith et al. (2002)*

2.8.8 Davy et al. (2007) Model

Before examining the Smith et al.'s (2009) study, it is important to examine a study by Davy et al. (2007) that also proposes a conceptual model for 'Likelihood of Cheating', which is a modified version of the Smith et al. (2002) conceptual model. The Davy et al. (2007) study focuses only on business students as in prior research business students have been shown to be more likely to cheat than other students (Rettinger & Jordan, 2005; McCabe & Trevino, 1995). The Davy et al. study examines the influence of attitudinal factors as opposed to demographic factors because they suggest that prior research on demographic factors has produced inconsistent results and those that have produced consistent results do not suggest intervention strategies to reduce cheating behaviors (Jordon, 2001). Davy et al. (2007) expand the 2002 Smith el al. model by examining motivation as a possible antecedent of 'Likelihood of Cheating'.

It is important to observe that Davy et al. classified Motivation, Alienation and Deterrents as attitudinal factors. However, previous studies have classified Deterrents as contextual factors, and Alienation as personality/psychological factor (Nair & Vohra, 2009). Motivation has been defined by researchers as:

- 'an internal state or condition that activates behaviour and gives it direction,
- desire or want that energizes and directs goal-oriented behavior
- influence of needs and desires on the intensity and direction of behavior'

(Huitt, 2011)

Although Motivation has been classified as a personality/psychological factor, many other types of factors can motivate students to cheat. Contextual factors such as Deterrents and Peer Pressure, attitudinal factors such as Parents' attitude to academic achievements, and psychological/personality factors such as Alienation can all motivate students, increasing their likelihood to cheat (Huitt, 2011).

Davy et al. suggest that extrinsic motivational factors such as Academic Gains (that has been defined as contextual factors) increase a student's likelihood to cheat while intrinsic factors such as Desire to learn (a personality/psychological factor) reduce the likelihood of students cheating. For this reason, Davy et al.'s (2007) proposed model in Figure 2.16 has raised Academic Performance as an intermediate factor to the initial factors, Extrinsic and Intrinsic motivation (IM) factors.

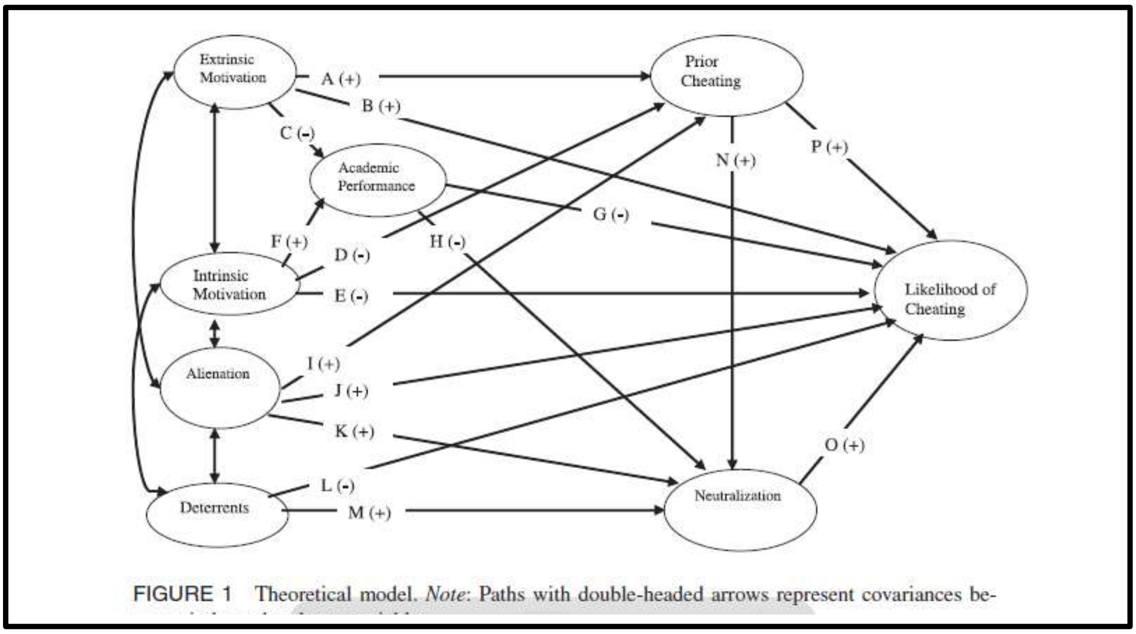

Figure 2-16*: Factor model by Davy et al. (2007)*

It is stated in this research that Academic Performance was classified as a demographic factor in Smith et al.'s (2002) study, although other studies have classified it as a contextual factor. More importantly, it is observed that although Davy et al. (2007) claim that their model does not consider any demographic factors; they have in fact included Academic Performance that has been defined as a demographic factor by Smith et al. (2002). Moreover, Davey et al.'s (2007) proposed model has raised that factor as an intermediate factor contrary to Smith et al. (2002).

Based on their empirical data, in Davy et al.'s (2007) accepted model, illustrated in Figure 2.17 below, Extrinsic and Intrinsic Motivation influence Prior Cheating, Intrinsic Motivation influences Academic Performance, while Academic Performance influences Prior Cheating.

Davy et al.'s (2007) accepted model also shows that there are no significant paths between initial factors and Neutralization; but that Prior Cheating significantly influences Neutralization and Likelihood to Cheat, and that Neutralization significantly influences Likelihood to Cheat (Figure 2.17). This finding is vastly different from that of Smith et al. (2002) where their results showed significant influence of Alienation and Deterrents on Neutralization and Prior Cheating (Figure 2.15). However, both Smith et al.'s (2002) and Davy et al.'s (2007) studies have shown that their models are statistically significant, thus establishing that many different models can be feasible in identifying factors that influence Cheating Likelihood.

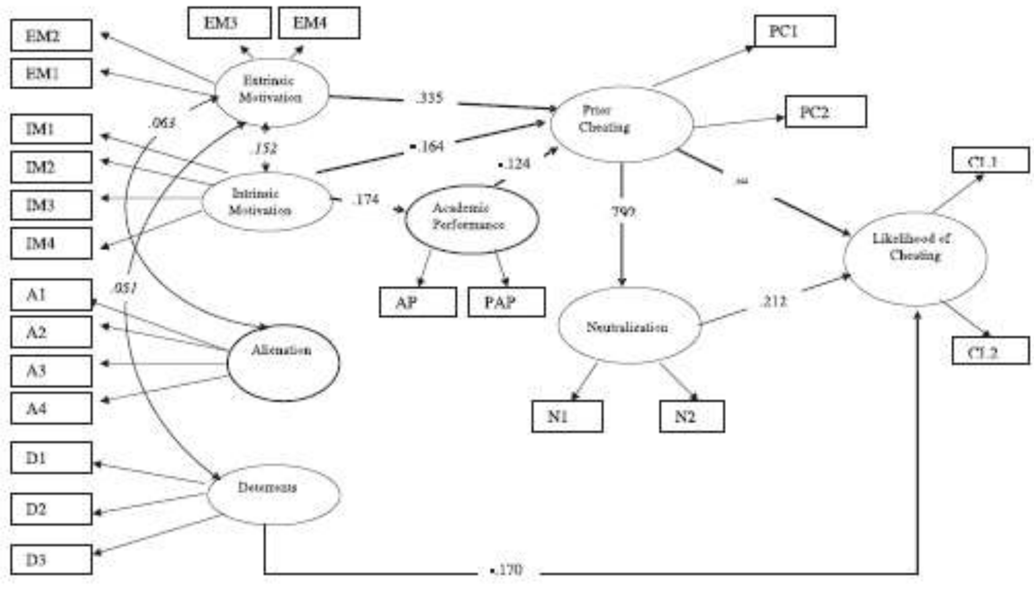

FIGURE 2 Accepted structural model. *Note.* All standardized path coefficients are statistically significant at $p < .05$, except the path from Neutralization to Likelihood of Cheating ($p < .1$). Italicized values represent statistically significant ($p < .05$) covariances among independent factors.

Figure 2-17*: Accepted structural model by Davy et al. (2007).*

It is important to note that Davy et al. (2007) do not focus specifically on e-cheating and have not included any technological factors. All the factors mentioned in their accepted model have already been included in Table 2.4, except for Alienation, which has been considered while examining Smith et al.'s (2002) model.

2.8.9 Smith et al. (2009) Factor Model

This section presents the initial and accepted models presented in Smith et al.'s (2009) study. The Smith et al. (2009) models differ from the previous Smith et al. (2002) models in many areas, but are similar to the Davy et al. (2007) models.

Firstly, in both Davey et al. (2007) and Smith et al. (2009) studies, the researchers propose structural models for antecedents of the 'Likelihood of Cheating' among business students because business students are more likely to cheat than students from other majors (Rettinger & Jordan, 2005; McCabe & Trevino, 1995). Secondly, neither study considers demographic factors because previous studies have yielded inconsistent results and have been of little use in terms of mitigating future cheating behaviors among students (Jordan, 2001). Thirdly, both studies consider Academic Performance which was previously classified by Smith et al. (2002) as a demographic factor. Finally, like Davy et al.'s (2007) model, Smith et al.'s 2009 model raise Academic Performance to an intermediate level, which is different from their first study in 2002.

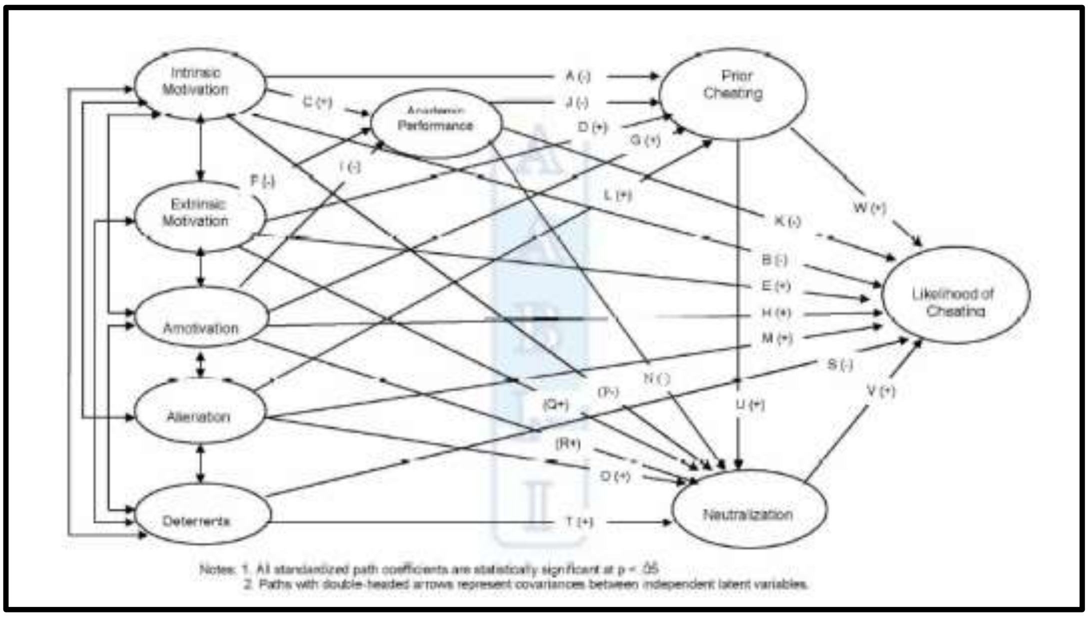

Figure 2-18*: Initial Factor model by Smith et al (2009)*

However, there are also significant differences between the two studies. Although both studies examine motivational factors, such as intrinsic and extrinsic motivation Smith et al. (2009) differ from Davy et al. (2007) because they also examine Amotivation as a possible factor influencing Prior Cheating and Neutralization, and Likelihood of Cheating. Smith et al. (2009) propose that motivation is a continuum with Amotivation on one end (with no motivation), moves toward Extrinsic Motivation and ends with Intrinsic motivation (Deci & Ryan, 2000). Another notable difference between the two models is that Smith et al. (2009) posit an increased number of interactions between the initial factors than Davey et al. (2007).

Smith et al. (2009) posited interactions between initial, second-level and third-level intermediary factors, except Extrinsic Motivation as illustrated in Figure 2.19 below:

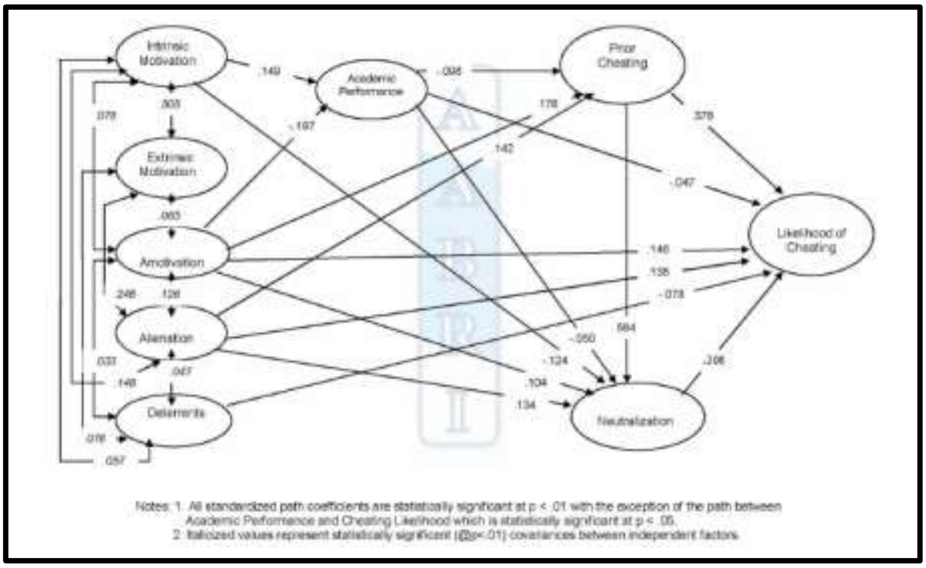

Figure 2-19*: Accepted model by Smith et al. (2009)*

This findings are significantly different from Davy et al. (2007), showing that Extrinsic Motivation has no influence, direct or indirect, on Likelihood of Cheating. Smith et al. (2009) do establish all the interactions between the other factors and Likelihood of Cheating as suggested by both Smith et al. (2002) and Davy et al. (2007), and go on to provide more interactions within the initial factors such as interaction between Intrinsic motivation (IM) and Alienation, between IM and Deterrents, and between IM and Amotivation.

It is noted that all factors used in Smith et al.'s (2009) model have already been included in Table 2.4. However, like the previous models, even this model does not focus on e-cheating and does not include any technological factors.

Despite quite significant differences in the variables used and in the complexity of the relationships involved, both the Smith et al. (2002), (2009) models and the Davy et al. model (2007) were found to be statistically significant and a comparison of these models suggest that the likelihood of cheating is still not fully modeled and that, potentially, other models could possibly be equally or even more effective in determining the likelihood of cheating.

2.9 Comprehensive list of factors identified

The preceding analysis of the conceptual models related to the likelihood of cheating has shown that, with four exceptions, all of the factors in the conceptual models had already been identified in Table 2.4. The exceptions i.e. the four factors which were not found in Table 2.4 were:

- Class-size, from Jalal-Karim's model (2013)
- Student attitude towards a particular task or assessment (Powell, 2012)
- Student attitude or satisfaction towards a course/teacher (Powell, 2012)
- Alienation, from Smith et al. (2002, 2009) and Davy et al. (2007)

Thus, the factors in Table 2.4 plus these four new factors appears to be a reasonably comprehensive set of factors influencing the likelihood of cheating. This extended set of potential factors, grouped according to the taxonomy proposed in Figure 2.6, is presented below in Table 2.6 along with the primary sources:

Table 2-6: *Modified list of factors*

Classification	Factors	Sources
Psychological/ personality factors	Neutralizing attitudes (Neutralization)	Haines et al., 1986; King et al., 2009; Molnar et al., 2008
	Self-efficacy	Murdock & Anderman, 2006; Pajares, 1996; Pintrich, 2003; Schunk, 1991; Bandura, 1986, 1977
	Alienation	**Smith et al., 2002; 2009; Davy et al., 2007**
Demographic factors	Gender	Shaub, 1989); Sweeney, 1995; Cohen et al., 1998; Brandes, 1986; Bowers, 1964; Tibbetts, 1997; Whitley et al., 1999; Crown & Spiller, 1998; Hetherington & Feldman, 1964; Roskens & Dizney, 1966; Kelly & Worrell, 1978; Ward, 1986; Aiken, 1991; Davis et al., 1992; Hrabak et al., 2004; Iyer & Eastman, 2008; Brown & Emmett, 2001; Calabrese & Cochran, 1990; Schab, 1972; Singg et al., 2005
	Age	Finn & Frone, 2004; Newstead et al., 1996; Nonis & Swift, 2001; Rakovski & Levy, 2007; Vandehey et al., 2007; McCabe & Trevino, 1997; Kohlberg, 1973; Antion & Michael, 1983; Haines et al., 1986; Baird, 1980; Lipson & McGraven, 1993b; Graham et al., 1994; Diekhoff et al., 1996; Whitley et al., 1998; Coombe & Newman 1997;

		Antion & Michael, 1983; Bisping et al., 2008; Diekhoff et al., 1996; Faulkender, 1994; Zimny et al., 1996
	Subject majors	Caruana et al., 2000; Clement, 2001; Smyth & Davis, 2004; Christine & James, 2008; Harris, 1989; Lyer & Eastman, 2006
	Subject levels	Rakovski & Levy, 2007; Nazir, 2011
	Class size	**Jalal-Karim, 2013**
Attitudinal factors	Student attitude towards cheating	Jordan, 2001; LaBeff et al., 1990; Bolin, 2004; Carpenter et al., 2006; Chapman et al., 2004; Graham, et al., 1994; Jensen et al., 2002; Jordan, 2001; Michaels & Miethe, 1989; Kidwell, Wozniak, & Laurel, 2003; Rakovski & Levy, 2007; Murdock, et al., 2004; Murdock et al., 2005;Stephens, 2004
	Student attitude towards studying	Gresham, 2002; Christensen-Hughes & McCabe, 2006
	Teachers' attitude towards cheating	Murdock et al., 2005; Singg et al., 2005; McCabe, 2001; McCabe, 2005; Nadelson, 2007; Davis & Ludvigson, 1995; Kerkvliet & Sigmund, 1999; Pulvers & Diekhoff, 1999; Saunders, 1993; Stearns, 2001; Keith-Spiegel et al., 1998; Jendrek, 1989; Schneider, 1999; Simon et al., 2003; Christensen-Huges & McCabe, 2006
	Teachers' understanding and acceptance of policies	McCabe & Trevino, 1993; McCabe & Trevino, 1997; McCabe et al., 2002; Sims, 1995; Livosky & Tauber, 1994; Pincus & Schmelkin, 2003; Roig & Ballew, 1992; Kelley & Bonner, 2005; Perreault, 2007; Walker, 2010
	Parents attitude towards cheating	McCabe, 2001
	Peer attitude towards cheating	Whitley, 1998
	Student attitude towards academic integrity	Lim & See, 2001
	Student attitude/level of satisfaction towards a course/teacher	**Powell, 2012**
	Student attitude towards a particular task or assessment	**Powell, 2012**
Contextual factors	Pressure from parents	McCabe, 2001; McCabe and Trevino, 1996

	Pressure from schools and corporate recruiters	McCabe and Trevino, 1996
	Difficulty of subjects	McCabe, 2001; Perry et al, 1990; Smith, et al,1972
	Peer Pressure	McCabe & Trevino, 1993, p. 533; McCabe, 2001; Szabo & Underwood, 2004; Gibbons et al., 2002; Christensen-Huges & McCabe, 2006; Bowers, 1964; Beck & Ajzen, 1991; Bunn et al., 1992; DeVries & Ajzen, 1971; Enker, 1987; Genereux & McLeod, 1995; Liska, 1978; Sherrill et al., 1971; McCabe et al., 2002; Perreault, 2007; Rowe, 2004
	Prior cheating behavior influence future cheating	Whitley, 1998; Sierles et al., 1980; Sierleset al., 1988; Sims, 1993; Ward & Tittle, 1993; Martin et al., 2009
	Prior Academic Achievements	McCabe & Trevino, 1996; Bowers, 1964; Hetherington & Feldman, 1964; Baird, 1980; Newstead et al.,1996; Leming, 1980; Singhal, 1982; Antion & Michael, 1983; Haines et al., 1986; Michaels & Miethe, 1989; Lipson & McGavem, 1993a; Smith et al., 2002; Elliot, 1999; Middleton & Midgley, 1997
	Family status eg. education, income, occupation	Bowers, 1964
	Extra-curricular activities	McCabe & Trevino, 1996; Bowers, 1964; Haines et al., 1986;Bowers, 1964, p. 86
	Extra-curricular activities such as membership in societies and publications	Bowers, 1964; Haines, et al., 1986; Merton, 1957; Cloward, 1959; Harp & Taietz, 1966; Stannard & Bowers, 1970; Bonjean & McGee, 1965; Baird, 1980; Kirkvliet, 1994
	Extra-curricular activities such as students holding jobs outside school	McCabe & Trevino, 1996; Christensen-Hughes & McCabe, 2006
	Existence of honor codes or academic honesty environment within university	Bowers, 1964; McCabe & Trevino, 1993; Gardner et al., 1988; Sierles et al., 1988; Prenshaw et al., 2001; Cummings & Romano, 2002
	Chances of detection	Graham et al., 1994; Stephens, 2004; Hollinger & Lanza-Kaduce, 1996; Houston, 1976, 1983, 1986; McCabe et al., 2008; Lee, 2009; O'Rourke et al., 2009; Thomas & Bruin, 2012; Perreault, 2007

	Severity of penalties	McCabe, 2001; McCabe et al., 2008
Technological factors	Technology Advancement, Increased Internet use, and accessibility	McCabe et al., 2002; CIP, 2003; Perreault, 2007; Schmidt & Boncella , 2006; King & Case, 2007; Fletcher et al., 2007; Underwood & Szabo, 2003; Klein, 2011; Underwood & Szabo, 2003; Stephens et al., 2007;Christensen-Hughes & McCabe, 2006; Goosney & Duda, 2009; Perreault, 2007; Apampa et al., 2010; Cordova & Thornhill, 2007; Ekstein, 2003; Fletcher et al., 2007; Tanner & Piper, 2010; Underwood, 2006; Hasen & Huppert, 2005; Conradson & Hernandes-Ramos, 2004; Ma et al, 2007, 2008;Gresham, 2002; Kaltenbaugh, 2005
	Increased Online courses	Kennedy et al., 2000, p.311; Kelley & Bonner, 2005; Perreault, 2007

It is worthwhile to note here that the factors Extra-curricular Activities such as Athletics, Extra-curricular Activities such as Student Membership in Societies, Clubs and Extra-curricular Activities such as Students holding Jobs are all considered as extra-curricular activities. Grove (2013) defines extra-curricular activities as those that fall outside the realm of normal academic curriculum in University, which is besides education and is performed by the students. These can be any activities that may include, but are not limited to, sports, jobs, associations, memberships, and politics. Given this understanding of Extracurricular activities, it will be assumed that all the three identified factors can be grouped under one factor title, **Extra-curricular Activities**.

Similarly, Pressures from Parents and Pressures from schools and corporations represent pressure from stakeholders, namely, parents, schools and corporations. According to Henderson and Mapp (2002), parents, corporations and schools are considered external because they are outside the student-body and do not make up the student community. This position is supported by Kaur (2013) and Feld (2011) who state that the range of external pressures students feel to excel academically comes from parents, schools and even competition to get better job offers. Therefore, these two factors will be combined to create a composite factor called **Pressures from external communities**.

With these two composites, a total of 31 possible factors have been identified.

2.10 Possible factors that should be considered

Table 2.6 presents a reasonably comprehensive list of factors identified in prior studies focusing on cheating in HE. However, these studies have focused on cheating, and not e-cheating. E-cheating is not a completely different form of academic dishonesty; it is cheating moderated through technology. Before the advent of digital information technologies, students used to use cheat-sheets during exams, or copied text from traditional text books to complete their essays. These same actions are still carried out by students, but now they use ICT to create cheat-sheets that can be made to look like the label of a water bottle, or simply copy and paste information from a variety of sources (including online) using their computers. With this understanding, and as it has been discussed in section 2.9, all factors presented in Table 2.6 will be assumed to apply to both traditional forms of cheating along with e-cheating.

As mentioned in section 2.10, there are technological factors that may not have been considered when studying factors influencing the likelihood of traditional cheating among HE students.

2.10.1 Student attitude to Software/movie/music piracy

Factors such as a student's attitude towards software/movie/music piracy, their parents' attitude towards such piracy and teachers' attitude towards such piracy have not been considered as possible antecedents to a students' likelihood to e-cheat. But, software/music/movie piracy is an act of copying another person's work without their acknowledgement (Jones, 2001). According to some researchers, this act in itself is similar to the act of plagiarism (Bauer, 2003; UNESCO, 2007) but has not been considered an academic act because it does not involve academic assessments, such as essays, reports and exams, being conducted in academic settings (McCabe & Trevino, 1997). However, it seems plausible that if a student's attitude towards plagiarism/cheating, their parents' attitude towards plagiarism/cheating, their peers' attitude towards plagiarism/cheating and their teachers' attitude towards plagiarism/cheating are considered to influence the student's likelihood to cheat or e-cheat, then a student's attitude towards piracy, their parent's attitude towards piracy, their peers' attitude towards piracy and their teacher's attitude towards piracy may also influence the student's decision to cheat or e-cheat. Therefore, attitudes of students and significant others towards software/movie/music piracy will be considered as factors.

2.10.2 Technological factors

A study by Khan (2012) has suggested that the use of ICTs by students has increased more than 200% between 2008 and 2011. The main reasons suggested in the study include the reduction in prices of devices, their size, user-friendly interfaces, the increased speed of access, and readily-available Wi-Fi (Khan, 2012). A study by Khan and Subramanian (2012) suggests that there has been an increase in online sources, e-books, databases by as much as 80% to 90% from 2008 to 2010. Factors such as ease-of-use of ICT, affordability of ICT, increased use and accessibility of ICT, increased online sources, ease of access to online sources and student attitude towards advances in ICT have in fact increased students' ability to misuse the technologies and 'violate the academic integrity standards' (Grunfield, 2012) and therefore should be examined as possible factors that influence the likelihood of e-cheating among students.

2.11 Comprehensive list of factors

Table 2.7 shows the previously identified factors from Table 2.6 and includes the following 11 new possible e-cheating factors:

- Student's attitude towards Software/Movie/Music (SMM) piracy
- Parents' attitude towards SMM piracy
- Teachers' attitude towards SMM piracy
- Peers' attitude towards SMM piracy
- Student's attitude towards Advances in ICT
- Increased ICT use
- Increased ICT accessibility
- Ease-of-use of ICT
- Affordability of ICT

- Increased online sources
- Ease of access to online sources

It is important to note here that based on the literature, the previously identified Technological factors, Technological Advancement, Increased Internet Use and Accessibility (TAIIUA) (see Table 2.4), can in fact be more clearly split into the following factors: Increased ICT use, Increased ICT accessibility, Ease of use of ICT, Affordability of ICT, Increased online sources, and Ease of access to online sources. This is because the original factor identified, in prior literature, is not a complete descriptive of the actual factors and does not capture the depth of the factor. For instance, the factor TAIIUA seems to capture three very different aspects of Technology, namely advancement, increased Internet use and accessibility under one name.

As this study is attempting to build a list that is proposed to be a comprehensive list of initial factors from the literature, it is crucial to identify all possible factors under the technology classification. According to literature in Section 2.10.2, advancement of technology, increased usage and accessibility are all notably separate factors that need to be looked at as individual initial factors and hence will be replaced by the above-mentioned proposed factors.

Table 2.7 below provides the final comprehensive list of 39 potential factors and their classifications:

Table 2-7*: Final comprehensive factors and classifications*

Personality/ Psychological factors	Self-efficacy
	Neutralization
	Alienation
Demographic factors	Gender
	Age
	Subject majors
	Subject levels
	Class size
Attitudinal factors	Student's attitude towards cheating
	Student's attitude towards studying
	Student's attitude towards academic integrity

	Parents' attitude to cheating
	Teachers' understanding and acceptance of academic integrity policy
	Teachers' attitude towards cheating
	Peer attitude towards cheating
	Student's attitude/level of satisfaction towards a course/teacher
	Student's attitude towards a particular task or assessment
	Student's attitude towards software/music/movie (SMM) piracy
	Parents' attitude towards SMM piracy
	Teachers' attitude towards SMM piracy
	Peers' attitude towards SMM piracy
	Student attitude towards Advances in ICT
Contextual factors	Prior academic achievement
	Prior cheating behavior
	Family status
	Pressure from external communities
	Extra-curricular activities
	Difficulty of subject
	Level of instructor detection
	Severity of penalties
	Peer pressure
	Existence of Honor codes
Technological factors	Increased ICT use
	Increased ICT accessibility
	Ease of use of ICT
	Affordability of ICT
	Increased online courses
	Increased online sources
	Ease of access to online sources

2.12 Finalizing the Intermediate Factors

Having identified a reasonably comprehensive set of factors, the 39 factors are all initial level factors and need to be grouped under the taxonomy and produce intermediate factors that will eventually be used to propose a conceptual model. Below, the factors in the literature are critically analyzed and synthesized into intermediate groups.

2.12.1 Classification: Psychological Factors

Bandura proposed a theory in the 1980s that suggested that human development is a life-long process, encompassing many different types and patterns of change, from psychosocial functioning to psychobiologic origins and experiential conditions that may be required to enhance and sustain them (Bandura, 1989a, 1989b). The theory favors a model of causality involving 'triadic reciprocal determinism' (Bandura, 1989a, 1989b). The model suggests that human function depends on their personal, behavioral and environmental influences (see Figure 2.20 below) that interact with and influence each other bi-directionally but not necessarily at the same strength (Bandura, 1989a, 1989b).

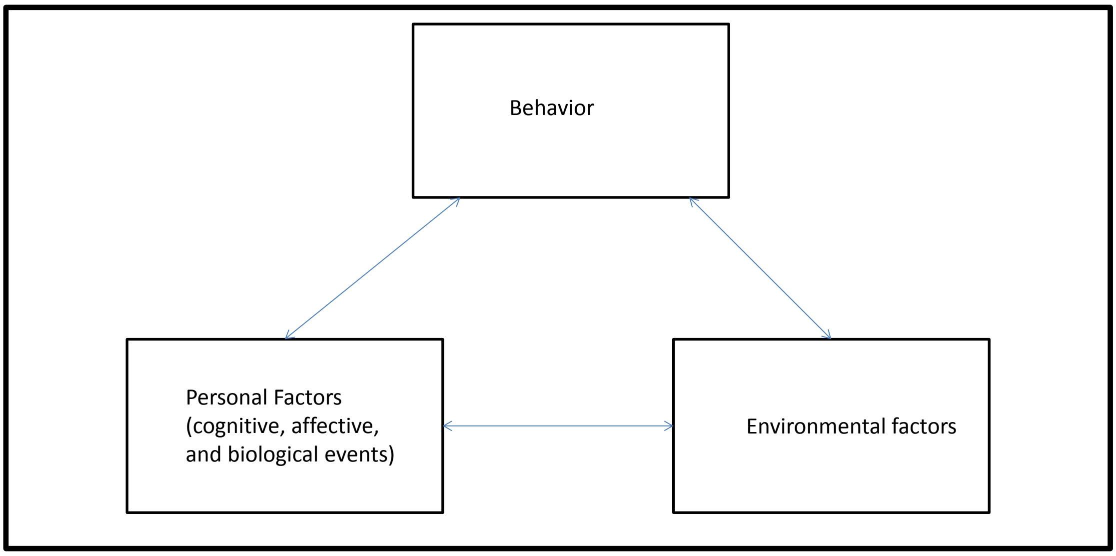

Figure 2-20*: Bandura's Social Cognitive Theory (1994)*

Bandura suggests in his theory that what people think believe, feel, expect, perceive, what goals they set or intentions they have all give direction to behavior, which manifest into extrinsic effects that determine their thoughts and emotions (Bandura, 1986; Neisser, 1976).

Similarly, what humans expect, believe, feel are influenced by social factors that in turn give direction to or activate emotional reactions and social persuasions (Bandura, 1986). Humans are also influenced by their social roles and status which, give direction to behavior and emotions. Finally, the theory also suggests that humans are influenced by their behavior which impacts their environment, which in turn further influence their behavior (Bandura, 1989a, 1989b). So 'through their actions, people create as well as select their environments' (Bandura, 1989a, p.5).

With this theory as the basis, the study will now review the factors Self Efficacy, Alienation and Neutralization.

2.12.1.1 Self -Efficacy

Bandura suggests that behavioral change in humans, especially when studying dysfunctional inhibitions and defensive behavior, are influenced by cognitive processes that include motivations derived from influences of goal setting and self-evaluative reactions (Bandura, 1977). Bandura defines this behavior as self-efficacy where he suggests that efficacy expectations are those that affirm a person's ability in him/herself, giving them the confidence that they can complete a task and produce outcomes by producing the required behavior (Bandura, 1977). Bandura further suggests that self-efficacy is a psychological factor which is the measure of belief in one's ability to complete a task which in turn acts as a determinant of how people think, behave and feel (bidirectional influence between behavior and cognitive events as illustrated in Figure 2.20) (Bandura, 1994).

2.12.1.2 Neutralization

Sykes and Matza (1957) suggest that people who behave in a dysfunctional manner or offend are not necessarily opposed to the values and norms, but temporarily disengage from the morality and perform the illegal act. This is called Neutralization behavior. Bandura (1977) states that typically, a person's behavior is influenced by self-regulation so that their behavior does not violate their internal moral standards. However, when the person repeatedly performs an act that is below his/her moral standards, the person can disengage from the moral control in order to neutralize their behavior (a psychological influence), thus re-defining their inner standards and justifying the act to themselves. So their behavior influences their beliefs that in turn further influence their behavior (Bandura, 1986, 1990, 1996).

Neutralization is classified as personality/psychological factor (see Section 2.6).

2.12.1.3 Alienation

Bandura suggests that influences of expectations that behaving in a certain way will produce certain benefits or avert future problems and difficulties impact behavioral change in humans, especially when studying dysfunctional inhibitions and defensive behavior, (Bandura, 1977). Typically, when a person perceives they are being isolated from a social group/world of work/self that they aspire to become or belong to, they try to modify their behavior to mirror what they believe will help them to belong (Elliott & Menard, 1996; Huizinga, 1995; Roitberg & Menard, 1995; Thornberry et al., 1993). This behavior is often defined as Alienation. According to the Social Cognitive Theory, when a person believes, feels or perceives him/herself alienated and behaves in a certain way to try to fit in, they are allowing their psychological process impact their behavior. As explained in Sections 2.8, the word Alienation is used to 'refer to both a personal psychological state of mind and a type of social relationship' (Roberts, 1987, p. 346)

Therefore, Self-efficacy, Neutralization and Alienation are classified as psychological factors associated with persons, in this case, students and can be grouped under the intermediary factor name **Student Personality Traits.**

2.12.2 Classification: Demographic Factors

- Gender and Age are two factors that define students' demographic factors. As has been explained in Section 2.6, demographic characteristics include factors such as age, gender, marital status, (Heller, 2009). So these two initial factors will be grouped as **Student Demographic Details**

- Subject Levels, Class size and Subject major are all higher education characteristics which can be defined as higher education statistical data of higher education institution (see Section 2.8), so will be grouped under **HE Details**

2.12.3 Classification: Attitudinal Factors

In Section 2.8 attitude has been defined as a learned tendency that makes a person respond in a favorable or unfavorable manner towards another person, thing, place or event, in this case cheating (Fishbein, 1973) and attitudinal factors are those that influence these tendencies.

- Parents' attitude towards cheating and Parents' attitude towards SMM Piracy are all factors that define attitudes of parents, so will be grouped as **Ethical attitudes of Parents**

- Teachers' attitude towards cheating, Teachers' understanding and acceptance of academic integrity policy, and Teachers' attitude towards SMM Piracy are factors that define teachers' ethical attitudes and will be grouped under **Ethical attitudes of Teachers**

- Peers' attitude towards cheating and Peers' attitude towards SMM piracy will be grouped as **Ethical attitudes of Peers**

- Students' attitude towards cheating, Students' attitude towards academic integrity, Students' attitude towards studying, Students' attitude towards a particular task or assessment, Students' attitude and level of satisfaction towards a course/teacher, Students' attitude towards SMM Piracy, Students' attitude towards Advancement in ICT will be grouped as the intermediate factor **Ethical attitudes of Students**.

2.12.4 Classification: Contextual Factors

- **Prior academic achievements** refer to any and all academic achievements in terms of students in terms of grades, ranking, awards and scholarships (McCabe & Trevino, 1996). As this initial factor is already a composite and cannot be categorized with any other contextual factor, it will remain as an initial factor.

- **Prior cheating behaviors** refer to students' previous cheating instances (Murdock & Anderman, 2006) and cannot be categorized with any other contextual factors, so will remain as an initial factor.

- Difficulty of subject is a factor that defines how difficult the subject offered at a university is according to the industry benchmark. This also depends on the university's policies in terms of quality and standards (McCabe, 2001). Another contextual factor, Existence of honor codes depends on university policies, whether the university has such rules and regulations or not and whether they maintain an honest environment or not (McCabe & Trevino, 1993). The Level of instructor detection and Severity of Penalty are factors that determine how aware the university's faculty is in terms of detecting e-cheating cases and what kind of punishments are in place of such instances (McCabe, 2001; McCabe et al., 2008). This can depend on the university's policies and anti-cheating characteristics which will determine students' likelihood of being caught, difficulty engaging in cheating due to stringent invigilation and carefully designed assessments, and strict punishment, all of which depend on university policies and anti-cheating characteristics (McCabe, 2001; McCabe et al., 2008). So, all these four factors will be grouped as **University policies and anti-cheating characteristics**

- **Extra-curricular activities** is already a composite factor that combines all non-academic activities, as explained in Section 2.7, and will remain as initial factor.

- Family status, Pressure from external communities, and Peer pressure are all factors that are outside of the student (or external to the student) and that may influence the students' likelihood to e-cheat. So, these factors will be grouped as **External Pressures.**

2.12.5 Classification: Technological Factors

As has been explained in Section 2.4.2 and 2.10, advances in ICT have given rise to increased ICT use and increased ICT accessibility, which have increased the ease-of-use of ICT, driving down prices, making ICTs more affordable, increasing online sources, making them easier to access and thereby also increasing the number of online courses offered (Khan, 2012; Khan & Subramanian, 2012). Therefore, the factors of Increased ICT use, Increased ICT accessibility, Ease-of-use of ICT, Affordability of ICT, Increased online courses, Increased online sources, Ease of access to online sources will all be grouped under one intermediate factor called **Advancements in ICT**.

2.12.6 Mapping the initial factors to intermediate factors and taxonomy

The Intermediate factors are mapped to the initial factors and their taxonomy in Table 2.8 below:

Table 2-8*: Mapping Classification of factors to Initial and Intermediate factors*

Taxonomic Group	**Intermediate factors**	**Initial Factors**
Psychology	**Student Personality Traits**	Self-efficacy
		Neutralization
		Alienation
Demographic	**Student Demographic Details**	Gender
		Age
	HE Details	Subject majors
		Subject levels
		Class size

Attitudinal	**Ethical Attitudes of Students**	Student's attitude towards cheating
		Student's attitude towards academic integrity
		Student's attitude towards studying
		Student's attitude towards a particular task or assessment
		Student's attitude/level of satisfaction towards a course/teacher
		Student's attitude towards software/music/movie (SMM) piracy
		Student attitude towards Advances in ICT
	Ethical attitudes of Peers	Peer attitude towards cheating
		Peers' attitude towards SMM piracy
	Ethical attitudes of Parents	Parents' attitude to cheating
		Parents' attitude towards SMM piracy
	Ethical attitudes of Teachers	Teachers' understanding and acceptance of academic integrity policy
		Teachers' attitude towards SMM piracy
		Teachers' attitude towards cheating
Contextual	**Prior academic achievement**	Prior academic achievement
	Extra-curricular activities	Extra-curricular activities (membership in clubs and associations, jobs)
	Prior cheating behavior	Prior cheating behavior
	University policies and anti-cheating characteristics	Difficulty of subject
		Existence of Honor codes
		Level of instructor detection
		Severity of penalties
	External Pressure	Family status
		Pressure from external community
		Peer pressure
Technology	**Advancements in ICT**	Increased ICT use
		Increased ICT accessibility
		Ease of use of ICT
		Affordability of ICT
		Increased online courses
		Increased online sources
		Ease of access to online sources

Therefore, the final list of **13 intermediate factors,** used in this study, will be as follows:

1. Student Personal Details
2. HE Details
3. Student Personality Traits
4. Ethical Attitudes of Parents
5. Ethical Attitudes of Teachers
6. Ethical Attitudes of Peers
7. Ethical Attitudes of Students
8. University Policies and Anti-Cheating Characteristics
9. Prior Academic Achievements

10. Prior Cheating
11. External Pressure
12. Extra-curricular activities
13. Advancement in ICT

2.13 Final list of factors to be included in the conceptual model

Before finalizing the list of factors to be considered in developing the conceptual model, it should be noted here that both Student Demographic Details and HE Details are categorical variables and so cannot be included in a conceptual model for e-cheating in HE. This is because both these factors take on limited and fixed number of possible values (Lacey, 2013). For instance, Gender can either be Male or Female (two possible values); whereas Subject level can be for example first year, second year, undergraduate or postgraduate, which are also fixed values For those factors that have numbers such as Age, Class size, the numbers are arbitrary and bear no significance beyond simply providing a label for the value because they exist on a nominal/ordinal scale (Lacey, 2013). This means they provide a logically separate concept that cannot necessarily be ordered or otherwise manipulated. Therefore, *they cannot be included in a conceptual model*.

After removing the two intermediate factors Student Personal Details and HE Details, the remaining intermediate factors to be considered for the process of developing the conceptual model are:

1. Student Personality Traits
2. Ethical Attitudes of Parents
3. Ethical Attitudes of Teachers
4. Ethical Attitudes of Peers
5. Ethical Attitudes of Students
6. University Policies and Anti-Cheating Characteristics
7. Prior Academic Achievements
8. Prior Cheating
9. External Pressure
10. Extra-curricular activities
11. Advancement in ICT

2.14 Objectives of the current research

The literature reviewed in this chapter has demonstrated that cheating has long been a problem in HE and that the development of ICT has exacerbated the situation greatly. The literature review has shown that previous research has identified a plethora of factors that might lead to cheating. However, few previous studies have identified the factors that may lead towards e-cheating. Moreover, several previous studies have developed models of the factors that lead to cheating but these models are often ad hoc and are often not based on an underlying theory. Despite the possible limitations of these models of cheating, the models themselves are often useful. However, there are few if any models in the literature for e-cheating.

Consequently, if academics and administrators are to effectively address the problem of e-cheating in HE, a conceptual model of e-cheating is an essential tool. The literature review has identified a reasonably comprehensive set of factors, which probably contribute to e-cheating in HE. However, this begs the questions of whether or not these factors can be incorporated into a meaningful conceptual model, and whether such a conceptual model would help explain e-cheating in practice.

The objective of the current research is to increase understanding of e-cheating among HE students by developing and validating a conceptual model of e-cheating. This objective can be furthered split into two main areas of interest as follows:

i) To develop such a conceptual model

ii) To validate that conceptual model in practice

The following chapter presents the methodology by which these objectives can be achieved.

CHAPTER 3: METHODOLOGY

Chapter Two presented a review of the literature, which confirmed the importance of the problem of e-cheating in Higher Education (HE) and has identified a set of reasonably comprehensive factors that may influence a student's likelihood to e-cheat. Consequently, to achieve the aim of this research, it is necessary to achieve the objectives of this study stated below through a chosen methodology:

i) To develop such a conceptual model

ii) To validate that conceptual model in practice.

3.1 Choosing a methodology for the study

For a particular study, researchers typically choose a methodology that they find best suits the study based on the context of the study or the overall approach to the research (OpenStax College, 2014, p. 36). Typically, methodologies can have one of three research paradigms as illustrated in Figure 3.1 below.

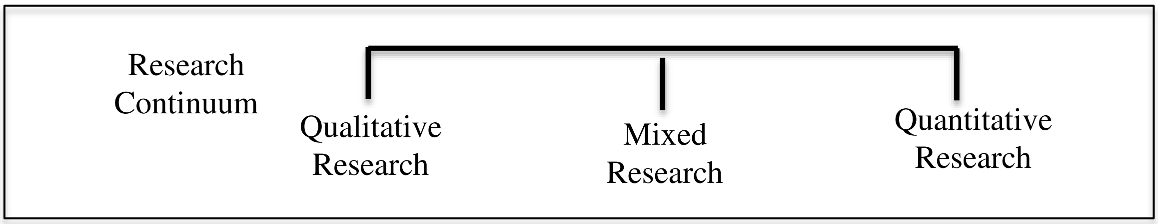

Figure 3-1*: Research Continuum*

Pure qualitative research is exploratory in nature and relies on the collection of qualitative or non-numerical data (such as words, pictures, etc.) that are then used to generate or construct knowledge, hypotheses and grounded theory from data collected during fieldwork (Johnson & Christensen, 2010). Purely quantitative research is confirmatory in nature and relies on the collection of quantitative or numerical data; the research then tests the hypotheses and theory with the collected data (Johnson & Christensen, 2010). Mixed research is both confirmatory and exploratory in nature, involves the mixing of the two pure forms, quantitative and qualitative methods and approaches (Campbell & Fiske, 1959; Glik et al., 1987; Steckler et al., 1992; Fielding & Fielding, 1986).

Research suggests that mixed method is used for the following purposes:

- ‘Triangulation, which seeks convergence, corroboration, correspondence of results from different methods.

- Complementarity that seeks elaboration, enhancement, illustration and clarification of the results from one method with the results from another method.

- Development, seeks to use the results from one method to help develop or inform the other method where development is broadly construed to include sampling and implementation as well as measurement decisions.

- Initiation, seeks the discovery of paradox and contradiction of new perspectives of frameworks, the recasting of questions or results from one method with questions or results from the other method.

- Expansion, seeks to extend the breath and range of inquiry by using different methods for different inquiry components.’

(Greene, Caracelli & Graham, 1989)

As the objectives of the study are to propose a conceptual model and then validate it, using a mixed approach will help achieve both these objectives. Researchers suggest that mixing and using different methodologies in one study can in fact compensate for any inherent limitations that may exist in the research methods (Anchin, 2008; Gelo, Braakmann & Benetka, 2008; Lonner, 2009), which can improve the quality of research (Johnson & Turner, 2003). According to Bartholomew & Brown (2012), carefully designed mixed methods can offer very important and valuable tools of investigation to researchers, particularly when studying a wide variety of psychological (Waszak & Sines, 2003), educational (Johnson & Onwuegbuzie, 2004), social (Hunter & Brewer, 2003) and even management factors (Curral & Towler, 2003) which makes it apt for this particular study.

For this study, the research will be conducted in two phases in order to achieve the objectives. Phase I will be qualitative in nature, using Interpretive Structural Modeling (ISM) to develop a conceptual model of the factors identified in the literature review, at this time the first objective of the research will be achieved. This is further defined and justified in section 3.2 below. In Phase 2 the model will be tested using quantitative methods such as Structural Equation Modeling (SEM). This is further discussed in section 3.3 below.

3.2 Phase I: Developing the conceptual model

In the physical sciences, the relationships between concepts are often quite simple. For instance, Newton's laws of motion and Einstein's famous $E=mc^2$ are very good examples of how even the most powerful physical phenomena are often but not always represented by simple relationships. These relatively simple systems are represented by one dependent variable which, is usually directly related to only a small number of independent (or driver) variables.

In the social sciences, this is rarely, if ever, the case. Systems involving multiple human stakeholders are always very complex. They may involve many independent variables (or factors, as they are often called), which influence the dependent variable. However, these independent variables may also influence one another. So a model of a complex social system which, has even three independent variables could have three relationships between the dependent and independent variables and three more unidirectional relationships between the independent variables themselves. Relationships between independent variables can also be bidirectional, in which case there could be six bidirectional relationships between the independent variables. This is a far more complex system than most physical systems, independent variables A, B C and one dependent variable D, with various relationships shown (illustrated in Figure 3.2 below).

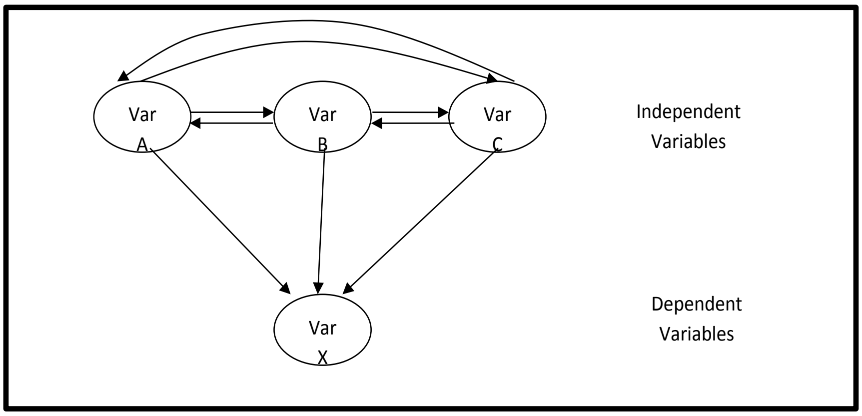

Figure 3-2*: Diagram showing relation between three independent and one dependent variable*

However, social systems can be even more complex. A specific independent variable may influence another independent variable, which in turn influences the dependent variable but the specific variable itself does not directly influence the independent variable. This gives rise to a hierarchy of interaction, usually represented as a set of levels. Independent variables which, directly influence the independent variable are said to be level-1 variables, while independent variables which only influence level-1 variables are said to be level-2 variables (Janes, 1988). Logically, there can be more than one level-2 variable. So, complex social problems often give rise to complex models such as one illustrated in figure 3.3 below.

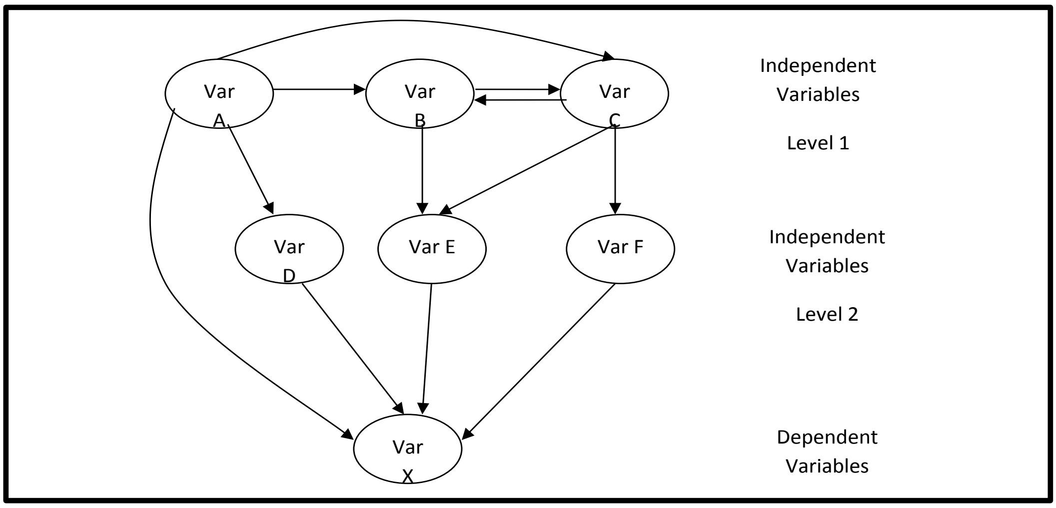

Figure 3-3*: Complex level diagrams*

The task of developing such a conceptual model involves two main steps:

i) identifying the independent variables or factors, and

ii) deciding how these factors are related to one another and to the independent variable.

The analysis of the literature presented in Chapter Two has identified 39 initial factors which would appear to significantly influence students' likelihood to e-cheat in HE. This analysis has also identified 11 intermediate factors, which can be included in a conceptual model. However, developing a conceptual model from even these 11 intermediate factors is quite daunting because there are so many possible ways in which the 11 intermediate factors could potentially interact.

The problem with a large set of intermediate factors is two-fold:

1. A model in which all 11 intermediate factors interact randomly is so complex as to be useless in practice

2. It is illogical to assume that all 11 factors do interact with one another. Logically, many of the factors will interact with some set of other factors, but not with other factors not in that set.

The issue is attempting to find a parsimonious set of interactions which reflect the real relationships between the intermediate factors.

According to research, there are mental limitations that an individual may encounter when attempting to deal with complexities (Warfield, 1976). Miller (1956) has suggested that the human recall span is limited to a region of seven (+/- 2) chunks of information. Simon (1974) has brought it further down to five chunks. So, if a complex system looks at only three variables, each of which may have a two-way relation with each other (with a total of six relationships), that may in fact be considered as nine chunks of information (Waller, 1982). According to literature, that is considered as exceeding the limit of the recall capacity of the human working memory.

This study has 11 intermediate factors that may be inter-related, that can give rise to a minimum of 22 relations, which makes a total of 33 ***chunks of information***. In principle, this is way above the human recall capacity and therefore quite useless in practice.

From an analysis of the literature review, it is observed that in research on cheating and e-cheating, there are few if any candidate theories that appear to be useful or appropriate that have been applied in previous studies. Those theories that have been used to explain cheating and e-cheating have taken only the social factors into account such as peer pressure and parental pressure. This research is unique in that it also adds technological factors. None of the theories that have been previously used in studies of cheating or e-cheating have appropriately addressed both the social and technological factors which have been identified in this study.

Most of the studies of cheating and e-cheating that have taken a theoretical approach have adopted either theories of personal behavior or theories of social or organizational behavior (e.g. theories that explain why an individual cheats or theories that explain the influence that social or organizational factors have on cheating). The current research is trying to combine both of these perspectives, therefore none of the previously used theories seem appropriate to use. Moreover, this research is unique in including the technological factors influencing e-cheating; none of the previously used theories are capable of dealing simultaneously with the personal, social and technological factors.

Consequently, the current research has taken a pragmatic approach to find another process for developing conceptual models of complex social systems. The method identified is Interpretive Structural Modeling (ISM).

The following sections give an overview to understanding ISM, why ISM is appropriate for the current research, describe the ISM process and how it was applied in this research to produce the hypothesis and construct the conceptual model.

3.2.1 Understanding Interpretive Structural Modeling (ISM) and why it is appropriate

Historically, it has been discussed that in any study, as the number of factors increases, the consideration of all possible relationships becomes difficult (Warfield, 1973; Warfield, 1974a; Lendaris, 1980). In the 1970s, Warfield developed Interpretive Structural Modeling (ISM) as a method for analyzing complex systems, in terms of factors and their relations (Janes, 1988). ISM has been defined as an interactive discovery process where factors that are related either directly or indirectly are structured into a systematic model (Warfield, 1974a; Sage, 1977).

Attri, Dev & Sharma (2013) explains the name of the method by stating that:

> *'this [method] is interpretive as the judgment of [a] group decides whether and how the different [factors] are related. It is structural on the basis of mutual relationships; an overall structure is extracted from [a] complex set of elements. It is a modeling technique, as the specific relationships and overall structure are portrayed in a directed graph or digraph*[2] *model. It helps to impose order and direction on the complexity of relationships among various elements of a system.'*

[2] Digraphs are short for directed graph where the points are called vertices or nodes and arrows called arcs from vertex to vertex (Tordas, 1999)

Attri et al. (2013) states that ISM is a 'computer-aided method for developing graphical representations' of a complex system which makes it significantly simple for the user because the user is not required to have advanced mathematical knowledge.

Lendaris (1980) explains that the ISM method reduces the complexity of analyzing the numerous relationships that can exist between multiple factors in a complex system by considering the relationships, one at a time in a pair-wise manner. This pair-wise comparison is carried out until there is enough information to construct a reachability matrix[3]. This is then converted into a triangular form that illustrates the multi-level, hierarchical form diagrammatically (*this process is explained in further detail in Section 3.2.3*). For the researcher, the model produced is communicated through words and digraphs; with the mathematical processes carried out by a computer program (Janes, 1988). ISM provides a directional framework for the analysis of complex problems and helps decision makers to understand a situation and to identify the factors involved (Attri et al., 2013).

Studies have shown that for complex problems in a variety of fields involving multiple factors that may be related directly or indirectly, the ISM method is successful in analyzing the relationships and identifying the 'driver' and 'dependent' factors and results in a conceptual diagram (Attri et al., 2013; Azevedo, Carvalho & Cruz-Machado, 2013). Previous examples of the domains where ISM has been used include:

- Aiding decision makers to identify relationships among specific factors which define a complex problem in supply chain, human resource management, and organizational behavior (Warfield, 1974b; Sage, 1977; Avezado et al., 2013);

- Developing a balanced scorecard for a organization used as a case study (Thakkar et al., 2007);

- Identifying and analyzing factors that may influence standards compliance in the food industry (Sagheer, Yadav & Deshmukh, 2009);

- Developing a model for the variables affecting the performance of an automobile service center and to study the interrelationship among the variables

[3] Reachability refers to the ability to get from one vertex to another in a digraph (Kase et al., 1989).

(Sharma & Garg, 2010); and

- Analyzing interrelationships among performance appraisal factors (Manoharan, Muralidharan & Deshmukh, 2010).

Not only has ISM been successfully used in the various domains cited above to identify relationships between the driver and dependent factors in highly complex systems, but researchers have also established that ISM's basic idea is to use experts' practical experience and knowledge to decompose a complex system into several factors. This can be used to construct a multilevel structural model (Azevedo et al., 2013) of the relationships between factors that define a problem (Azevedo et al., 2013). Consequently ISM can be used for any research that studies the relationships between factors in complex systems. In the context of this study,

- **the complex system is defined as**: trying to understand what factors influence the students' likelihood to e-cheat (***the dependent variable***);

- **the experts are**: instructors and HE institutions; and

- **the factors are**: the final list of 11 intermediate factors for the conceptual model (***independent variables***)

It is argued that for this study in which a model of the relationship between the various factors and students' likelihood to e-cheat is required, using ISM to develop such a model will be successful in attaining the first objective of the research.

3.2.2 Describing the ISM process

To develop a conceptual factor model using ISM, a number of steps have to be followed. These steps have been summarized and adapted from Avezedo et al. (2013) below:

Table 3-1*: Steps followed in developing an ISM model (adapted from Avezedo et al., 2013)*

No.	Steps
1	Identify relevant factors
2	Organize an ISM team
3	Develop a structural self-interaction matrix (SSIM)
4	Determine the reachability matrix
5	Decompose the reachability matrix into different levels
6	Develop the Conceptual Model

However, in the course of applying the steps to this study it has been identified that Azevedo et al. (2013) steps are incomplete. For instance, the first step suggests 'Identify the factors'. However, it does not clarify how these factors can be identified. As is the practice in research, relevant factors can be identified through rigorous literature review and then selecting the most appropriate factors for the study. Another example is the second step. This model states 'Organize an ISM team'. However, it does not explain the role of the team members in the ISM process, their contributions or their purpose. According to Attri et al. (2013), the ISM team is crucial to the development of the conceptual model because their expert opinions are used as basis for developing the structural self-interaction matrix, then the reachability matrix.

Based on Attri et al. (2013) proposed steps, and this study, the following table of steps is developed that is argued to be a more complete step-by-step ISM process:

Table 3-2*: Proposed steps to be followed in developing an ISM model (adapted from Attri et al., 2013)*

No.	Steps
1	Review the literature and identify factors related to the problem domain (researcher/facilitator)
2	Organize and brief an ISM team (researcher/facilitator)
3	Analyze the appropriateness of factors (ISM team)
4	Analyze the relationships between factors and Develop a structural self-interaction matrix (ISM team)
5	Determine the reachability matrix (modeler)
6	Decompose the reachability matrix into levels (modeler)
7	Produce a set of hypotheses (modeler)
8	Validate and finalize hypotheses (ISM team)
9	Develop all digraphs and a conceptual model (researcher)

Step 1: Reviewing the literature and identifying factors relevant to the problem (researcher/facilitator)

As it is necessary to identify clearly the particular issues that are to be explored using ISM, it is necessary to first review the existing literature and based on the literature identify factors that may or may not impact the problem.

Step 2: Organize and brief an ISM team (researcher/facilitator)

The team can potentially consist of four categories:

- Specialists (with content knowledge that is relevant to the topic)
- Stakeholders (who may be affected by outcome of research)
- Modelers (someone who knows the structuring system and can help work with the group to develop the model)
- Facilitator (who can implement a protocol and assist participants follow the developed protocol)

Warfield (1976) has suggested that there may also be overlap between the different categories of participants as illustrated in Figure 3.4, below.

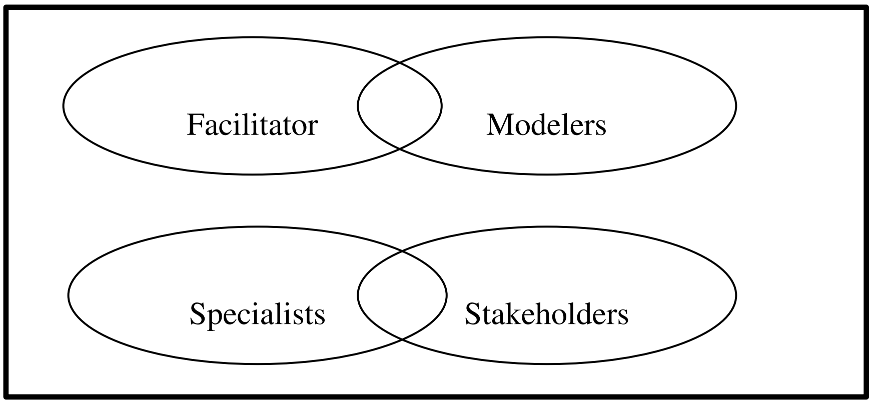

Figure 3-4*: Overlapping of categories of participants (cited in Janes, 1988)*

In Step 2, it becomes imperative to select experts and stakeholders who can provide sufficient opinion on the complex system.

Some ISM practitioners suggest that the team size should be restricted to a maximum of eight people, excluding the facilitator and the modeler (Janes, 1988; Attri et al., 2013).

Janes (1988) suggests that the larger the size of the team, the lower the quality of debate because the number of possible communications increases therefore reducing both participants' interest levels and their involvement in the process.
In this step, the facilitator selects the team, briefs them on the objectives of the study and the complexity of the factors identified, and then explains the ISM process before moving to Step 3.

Step 3: Analyze the appropriateness of factors (ISM team)

In this step, the ISM team uses a brainstorming process discussing the factors and their appropriateness, clarifying and editing their ideas and opinions, and voting to obtain an understanding of appropriateness of factors (Janes, 1988). This step is quite exhaustive and ensures all team members have a clear understanding of and opportunity to express their opinions on the factors.

Step 4: Develop the Structural Self-Interaction Matrix (SSIM) (modelers)

According to literature, in this step, a matrix is produced with the dependent and independent variables using the team's opinion. The researcher tries to identify the nature of the contextual relationship among the factors based on the team's feedback (Ravi, Shankar & Tiwari, 2005; Barve, Kanda & Shankar, 2007; Hasan, Shankar & Sarkis, 2007). Questions such as 'x leads to j', or 'x influences j' are used to identify the inter-relationships between the identified factors. According to Attri et al. (2013), it is not enough to identify a relationship between two factors, i and j. The associated direction of the relationship is also questioned. Four symbols are typically used to denote the direction of relation between two factors i and j:

- V= the first factor, i, influences the second factor, j;
- A= the second factor, j, influences first factor, i;
- O= no relationship exists between i and j;
- X=both factors x and j influence each other

Based on the contextual relationships, the Structural Self-Interaction Matrix (SSIM) is developed which is further discussed with the team and then finalized (Warfield, 1976).

The literature suggests that contextual relations developed using this method are also transitive[4], therefore when these relations are discussed with the ISM team, it is important to understand and establish the relations carefully (Janes, 1988).

Step 5: Determining the Reachability Matrix (modelers)

In Step 5, the SSIM is converted to an initial reachability matrix by substituting the four symbols VAOX in the following way:

- V is replaced by 1
- A is replaced by 0
- is replaced by 0
- X is replaced by 1

1* entries are included to incorporate transitivity to fill any gap while collecting the ISM team's feedback and then the final reachability matrix is obtained (Attri et al., 2013).

Step 6: Decompose the reachability matrix into different levels (modelers)

Once the final reachability matrix is obtained, for each factor, the next step is to derive a reachability set (consisting of the factor itself and the other factor that it may impact) and an antecedent set (consisting of the factor itself and the factor that may impact it). The intersection of these two sets for each factor is derived. The factors for which the reachability and interaction sets are the same are placed at the top level in the ISM hierarchy, that is, those factors that will not lead the other factors above their own level of hierarchy (Attri et al., 2013). Most often, the top level is occupied by the dependent variable because it will not lead to other independent variable above it. Once the top level factor is identified, it is removed from the list, and the process is repeated to find the factors in the next level, until the level of each factor is found. This process is called Level partitioning.

[4] A binary relation *R* over a set *S* is **transitive** if whenever an element *a* is related to an element *b*, and *b* is in turn related to an element *c*, then *a* is also related to *c*

Step 7: Produce a set of hypotheses (modelers)

After level partitioning, once the final reachability matrix is developed, the next step is to produce a set of hypotheses using words. Words are often used to develop linguistic models of an ISM structure that provide elaborate methods of representing and communicating the structure (Mihram, 1972). The modeler revisits the final reachability matrix and proposes a set of hypotheses based on the possible relations among the variables that are already proposed by the team.

Step 8: Validate various matrices and hypotheses (ISM Team)

The ISM team is presented with the list of hypotheses. They then check for inconsistencies, further brainstorming on the relations and checking the validity of the relations (now that the relations have been put down into words) is conducted and a final list of hypotheses is proposed.

Step 9: Develop all digraphs and a conceptual model (modeler and researcher)

In this step, based on the hypotheses proposed, in Step 8, the modeler will use digraphs to represent the relationships between the factors.

Warfield (1976) combined the use of words and diagrams to develop ISM, giving users easy means to represent the complexity of the models. Though the system may use mathematics, it could be hidden from the user in a computer program, and therefore not always visible.

In developing ISM, the directed graphs (digraphs) are often used to represent the complex structure using words and diagrams. According to Janes (1988), the vertices represent the problem being studied and the edges are directed which denote a specific relation between the factors. For example, in this study, if it is hypothesized that students' ethical attitude (1) has had or will have some influence on students' prior cheating behaviors (2) which will have some influence on students' likelihood to e-cheat (3), the digraph will look as illustrated below:

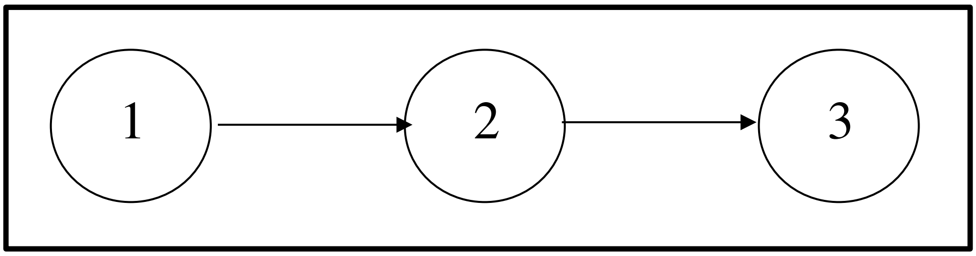

Figure 3-5*: Example of a digraph*

Once the digraphs are developed, these are then converted to produce a conceptual model. Based on these steps, a flow chart has been developed that highlight the main nine steps to developing an ISM in figure 3.6 below:

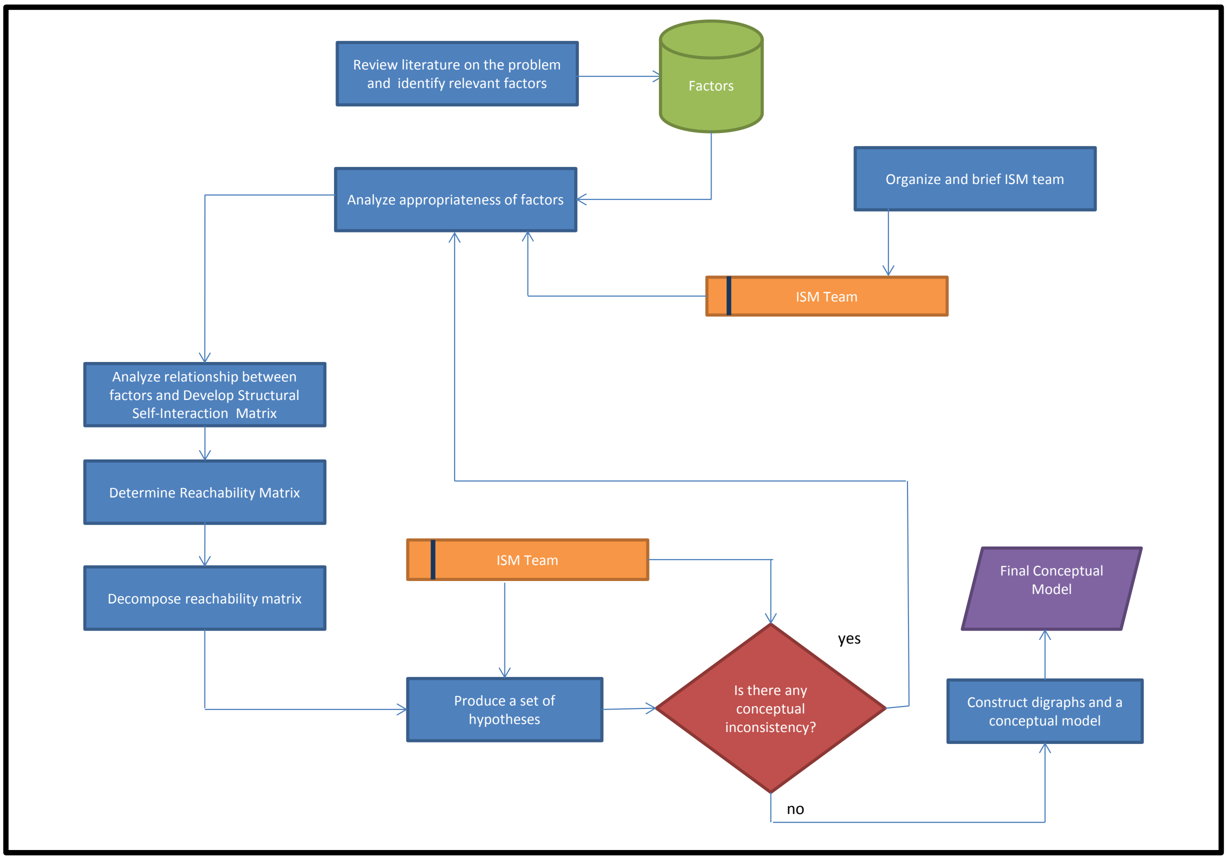

Figure 3-6*: Final flow chart for preparing ISM*

3.2.3 Applying ISM to the current research

The researcher followed the nine steps to apply ISM to the current research and develop the conceptual model.

Step 1: Review the literature and identify factors related to the problem domain

The literature review in Chapter 2 of this study has extensively presented a detailed review of the existing literature, defining the issue, identifying the factors and proposing the objectives of the study. This step has been carried out by the researcher.

Step 2: Organize and brief an ISM team

The literature has suggested that a maximum of eight people should be involved in the ISM process including the facilitator and a modeler (a recommendation followed in the current research). The researcher became the facilitator in setting up the ISM team and in conducting team activities. The researcher was also the primary modeler, although an additional modeler was included in the team because of their expertise in statistics, especially ISM (see Appendix A for details of the additional modeler).

Once the facilitator and modeler were finalized, the remaining team was chosen based on the members' job profiles, expertise, knowledge and experience in higher education and how they might be affected by the outcome of the research.

All the stakeholders chosen (listed below) had extensive experience teaching students and are familiar with concepts of cheating and e-cheating. On average undergraduate students were not able to identify the relationships between the factors. Consequently, some student representation was required (as stakeholders of HE) but at a level high enough to be able to participate in the analytical process required by the ISM method. So, the ratio of teachers to students as team members was 4:2, and even then the two students chosen had teaching experience. The ISM team members chosen were:

1. Expert 1 - former Associate Dean, Associate Professor. Expert 1 had over 20 years of experience teaching in HE, advising students in both undergraduate and postgraduate degree programs.

2. Expert 2 – retired Professor of Zoology. Expert 2 had over 25 years of experience teaching undergraduate, postgraduate and research students.

3. Expert 3 – Instructor. Expert 3 had three years' experience teaching undergraduate students. She had completed her postgraduate degree in MBA.

4. Expert 4 – Instructor. Expert 4 had two years teaching experience with undergraduate students after she completed her postgraduate degree.

5. Expert/Student 5 – former Instructor. Expert/Student 5 was a final year MBA student. Expert/Student 5 had four years of experience teaching undergraduate students and was a student himself.

6. Expert/Student 6 – Instructor and thesis student studying a Masters in Education. Expert/Student 6 had three years teaching experience and was a student himself.

These six stakeholders were sent letters via email inviting them to join the team. All six invitees agreed to join the team for this research, with the understanding that their views and opinions would be used for the sole purpose of the research and anonymity would be maintained. Each participant was contacted one month in advance. Once the participants agreed, they were sent the list of factors along with the objectives of the study two weeks prior to the first face-to-face meeting. The face-to-face round-table meeting lasted 3 hours, with breaks of 10 minutes every hour. This was followed by two other meetings that each lasted 3 hours with one 15 minute break during the meeting.

At the first meeting, each participant was greeted by the facilitator and the research assistant (modeler). Once all the participants had arrived, they were asked to introduce themselves to the rest of the team along with their background and interest in academia.

The facilitator then explained the objectives of the study and explained the ISM process to the team using Figure 3.6. Participants were shown the various steps involved and where the team's input was required.

The rules of round-table discussion were then explained as follows:

- The team was brought together for the sole purpose of discussing the interrelationships between the identified factors, their appropriateness to the study, and understanding the complexity of the problem.
- Each participant was asked to sign a consent and confidentiality agreement
- The group was informed that the discussions' minutes would be noted down for the sole purpose of developing a conceptual model using participant feedback.
- Every participant would be given a chance to voice their opinion at each round

of questioning.

- For each decision on relationships/appropriateness of factors, a majority of over 50% verbal voting including the facilitator and modeler would be accepted. In cases of tied decisions, the question would be revisited, reasons for differing votes explored, the question re-discussed and another round of voting carried out to achieve a majority voting decision.

Once all team members agreed that they were now aware of the project, its objectives and the purpose of the round-table and its rules; the round-table discussion began.

Step 3: Analyze the relationships between factors

The facilitator presented the table of 11 intermediate factors to the ISM team through the use of PowerPoint projection, so all team members could see the factors as shown in table 3.3 below:

Table 3-3*: Modified Final List of Intermediate Factors related to e-cheating*

Taxonomic Group	**Intermediate factors**	**Initial Factors**
Psychology	**Student Personality Traits**	Self-efficacy
		Neutralization
		Alienation
Attitudinal	**Ethical Attitudes of Students**	Student's attitude towards cheating
		Student's attitude towards academic integrity
		Student's attitude towards studying
		Student's attitude towards a particular task or assessment
		Student's attitude/level of satisfaction towards a course/teacher
		Student's attitude towards software/music/movie (SMM) piracy
		Student attitude towards Advances in ICT
	Ethical attitudes of Peers	Peer attitude towards cheating
		Peers' attitude towards SMM piracy
	Ethical attitudes of Parents	Parents' attitude to cheating
		Parents' attitude towards SMM piracy
	Ethical attitudes of Teachers	Teachers' understanding and acceptance of academic integrity policy
		Teachers' attitude towards SMM piracy
		Teachers' attitude towards cheating
Contextual	**Prior academic achievement**	Prior academic achievement
	Extra-curricular activities	Extra-curricular activities (membership in clubs and associations, jobs)
	Prior cheating behavior	Prior cheating behavior
	University policies and anti-cheating	Difficulty of subject
		Existence of Honor codes

	characteristics	Level of instructor detection
		Severity of penalties
	External Pressure	Family status
		Pressure from external community
		Peer pressure
Technology	**Advancements in ICT**	Increased ICT use
		Increased ICT accessibility
		Ease of use of ICT
		Affordability of ICT
		Increased online courses
		Increased online sources
		Ease of access to online sources

For each intermediate factor, the facilitator explained the initial factors that were grouped; the synthesis process used to group those initial factors, and defined the factors according to the literature review. In practice, not all of the initial factors needed to be explained to the team. For instance, factors such as Self-Efficacy, Alienation, Neutralization, and Prior Cheating had to be defined for the team, whereas, factors such as Peer Pressure were deemed self-explanatory by both the team and the facilitator.

Following this review of the factors, the facilitator asked if the 11 intermediate factors were appropriate for the purposes of this study. 10 of the 11 factors were deemed to be appropriate by the majority of the team as shown below:

Table 3-4*: List of intermediate factors and their corresponding appropriateness support percentage by ISM team*

Factor	% Support
Ethical Attitudes of Parents	87.5%
Ethical Attitudes of Teachers	75%
Ethical Attitudes of Peers	100%
Ethical Attitudes of Students	100%
University Policies and Anti-Cheating Characteristics	87.5%
Prior Academic Achievements	75%
Prior Cheating	75%
External Pressure	62.5%
Extra-curricular activities	75%
Advancement in ICT	87.5%

The 11th factor, Student Personality Traits, was deemed to be appropriate by only 50%. This factor was made up of three initial factors (Self-Efficacy, Neutralization and Alienation). The team debated the appropriateness of this particular factor for 45 minutes. Four participants suggested that the intermediate factor could not be used as a single factor because each of its composite factors could have a different impact on the dependent variable. However, the other four participants took the contrary position and argued that Student Personality Trait could be treated as a single factor. As per the rules, the factor was re-visited and the initial factors discussed in detail and a second round of voting conducted. With a tie once again, the facilitator decided to include the factor in the matrix, on the understanding that further testing would be carried out to establish the appropriateness of this factor.

Step 4*: *Analyze the relationships between factors and develop Structural Self Interaction Matrix (SSIM)

Having confirmed the suitability of the factors, the next goal of the round-table discussion was to determine which factors influenced other factors and the direction of that influence. Each of the eight team members agreed that the intermediate factors had contextual relations. For instance, Ethical Attitude of Parents was believed to influence Ethical Attitude of Students which, in turn was believed to influence Students' Likelihood to e-cheat. Similarly, Extra-Curricular Activity was only believed to influence a Students' Likelihood to E-cheat, but was not believed to influence any other factor, nor to be influenced by any other factor.

The outcome of this process was a Structural Self Interaction Matrix (SSIM) also referred to as Sij, as described in more detail below.

A Structural Self Interaction Matrix (Sij) is a two-dimensional grid with all of the factors to be analyzed presented along both the horizontal or 'i' axis and the vertical or 'j' axis. A blank matrix is shown in Table 3.5:

Table 3-5*: Blank Matrix*

	Factors Influencing E-Cheating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	Prior academic achievements	x											
2	Prior Cheating behavior		x										
3	University policy and anti-cheating			x									
4	Extra-Curricular Activities				x								
5	External Pressure					x							
6	Advancement in ICT						x						
7	Ethical Attitude of Students							x					
8	Student Personality Traits								x				
9	Ethical Attitude of Teachers									x			
10	Ethical Attitude of Parents										x		
11	Ethical Attitude of peers											x	
12	Students' Likelihood to e-cheat												x

x= as all factors must logically influence themselves, all diagonal matrix positions will have an X, which means factors i and j influence each other.

The blank matrix (Table 3.5) was developed by the modeler and then displayed to the ISM team. Participants were asked to decide if there was a relationship between the factors on the i axis to those on the j axis. Based on the ISM team's feedback, consensus was reached on the direction of the relation between any combination of factors i and j, using the structural self-interaction matrix symbols:

- V= the first factor, i, influences the second factor, j;
- A= the second factor, j, influences first factor, i;
- O= no relationship exists between i and j;
- X=both factors i and j influence each other

So, for instance, if Prior Academic Achievements (PAA) was discussed with the ISM team, given that all diagonal factors led to themselves, using the matrix above, they would be asked to voice their judgment on:

- Would Prior Academic Achievement (PAA) influence Prior Cheating Behaviour (PCB) or vice versa? If the group decided there was no relation between the two factors in either direction, then an O would be placed into the position (2, 1).
- Would Prior Academic Achievement (PAA) influence University Policies and Anti-cheating (UPAC) or vice versa? If the group decided yes, PAA influenced UPAC, then a V would be placed in the position (9, 1); if the group decided UPAC impacts PAA, then an A would be placed in the position (9, 1); or if the group decided both the factors impacted each other, then an X would be placed in position (9, 1).

According to Balasubramanian (2012), the total number of pair-wise combination addressed in the focus group session for developing Sij was calculated using the formula:

Sij =(N*(N-1)/2)

where N = the number of factors. In this study, number of pair-wise combination addressed was 66, since there were 12 factors (i.e. N=12) including the dependent variable, Students' Likelihood to e-cheat.

The initial SSIM matrix is shown in Table 3.6 below.

Table 3-6*: SSIM (Sij)*

	Factors Influencing E-Cheating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	Prior academic achievements	X	O	O	O	A	O	O	A	O	O	O	V
2	Prior Cheating behaviour		X	A	O	A	A	X	A	O	A	A	V
3	University policy and anti-cheating			X	O	O	O	V	O	V	O	O	V
4	Extra-Curricular Activities				X	O	O	O	O	O	O	O	V
5	External Pressure					X	O	V	O	O	O	O	V
6	Advancement in ICT						X	V	O	V	O	O	V
7	Ethical Attitude of Students							X	A	X	A	A	V
8	Student Personality Traits								X	O	O	O	V
9	Ethical Attitude of Teachers									X	O	O	V
10	Ethical Attitude of Parents										X	O	V
11	Ethical Attitude of Peers											X	V
12	Students' Likelihood to e-cheat												X

The ISM team was adjourned for the day at this point with an invitation to re-join after one week at the same place, same time, under the same conditions and following the same set of rules of conduct, to discuss and finalize the hypotheses before developing the conceptual model.

Step 5: Determine the Reachability Matrix (Rij)

Once the SSIM was developed, the next step was for the modeler and researcher to develop a Reachability matrix Rij. The first step in doing this was to convert Sij into a binary matrix called the Initial Reachability matrix (IRij) by substituting *V, A, O, X* with a *1* or a *0* using the following criteria:

- If the value *(i, j)* in Sij is *V*, then *(i, j)* value in IRij becomes *1* and (*j, i)* becomes *0.*
- If the value *(i, j)* in Sij is *A*, then *(i, j)* value in IRij becomes *0* and *(j, i)* becomes *1*.
- If the value *(i, j)* in Sij is *O*, then *(i, j)* element in IRij becomes *0* and *(j, i)* becomes *0*.
- If the value *(i, j)* in Sij is *X*, then *(i, j)* element in IRij becomes *1* and *(j, i)* becomes *1*.

The IRij matrix is given in Table 3.7 below.

Table 3-7*: Initial Reachability Matrix*

	Factors Influencing E-Cheating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	Prior academic achievements	1	0	0	0	0	0	0	0	0	0	0	1
2	Prior Cheating behavior	0	1	0	0	0	0	1	0	0	0	0	1
3	University policy and anti-cheating	0	1	1	0	0	0	1	0	1	0	0	1
4	Extra-Curricular Activities	0	0	0	1	0	0	0	0	0	0	0	1
5	External Pressure	1	1	0	0	1	0	1	0	0	0	0	1
6	Advancement in ICT	0	1	0	0	0	1	1	0	1	0	0	1
7	Ethical Attitude of Students	0	1	0	0	0	0	1	0	1	0	0	1
8	Student Personality Traits	1	1	0	0	0	0	1	1	0	0	0	1
9	Ethical Attitude of Teachers	0	0	0	0	0	0	1	0	1	0	0	1
10	Ethical Attitude of Parents	0	1	0	0	0	0	1	0	0	1	0	1
11	Ethical Attitude of peers	0	1	0	0	0	0	1	0	0	0	1	1
12	Students' Likelihood to e-cheat	0	0	0	0	0	0	0	0	0	0	0	1

The final reachability matrix (FRij) was obtained by applying the transitivity rule, an assumption made in ISM, which stated that, if factor ‘i’ is related to ‘j’ and if ‘j’ was related to ‘k’, then ‘i’ was necessarily related to ‘k’ (Azevedo et al., 2013). To see an example of this, it was first noted that in Table 3.6, position (2,9) contained a zero because Prior Cheating Behavior (column 2) was not related to Ethical Attitudes of Students (row 9). Similarly, there was a zero in position (9,2) because Ethical Attitudes of Teachers (column 9) was not related to Prior Cheating Behavior (row 2). If the Sij in Table 3.5 was inspected, it could be seen that Prior Cheating Behavior (PCB) was related to Ethical Attitude of Students (EAS) as indicated by an ‘X’ in position (7,2). This meant PCB influenced EAS, and EAS influenced PCB. This was then reflected by the ‘1’ in position (7,2) in the IRij (Table 3.6). Similarly, the Sij showed that EAS was related to Ethical Attitudes of Teachers (EAT) as indicated by the ‘X’ in position (7,9). Therefore, using the transitivity rule, it could be stated that if PCB was related to EAS which in turn was related to EAT, then PCB was related to EAT. Consequently, the zeroes in positions (2,9) and (9,2) in the IRij would be changed to ‘1’ in the corresponding positions in the FRij as shown in Table 3.8.

Table 3-8*: Final Reachability Matrix*

	Factors Influencing E-Cheating	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	Prior academic achievements	1	0	0	0	0	0	0	0	0	0	0	1
2	Prior Cheating behavior	0	1	0	0	0	0	1	0	**1***	0	0	1
3	University policy and anti-cheating	0	1	1	0	0	0	1	0	1	0	0	1
4	Extra-Curricular Activities	0	0	0	1	0	0	0	0	0	0	0	1
5	External Pressure	1	1	0	0	1	0	1	0	0	0	0	1
6	Advancement in ICT	0	1	0	0	0	1	1	0	1	0	0	1
7	Ethical Attitude of Students	0	1	0	0	0	0	1	0	1	0	0	1
8	Student Personality Traits	1	1	0	0	0	0	1	1	0	0	0	1
9	Ethical Attitude of Teachers	0	**1***	0	0	0	0	1	0	1	0	0	1
10	Ethical Attitude of Parents	0	1	0	0	0	0	1	0	0	1	0	1
11	Ethical Attitude of peers	0	1	0	0	0	0	1	0	0	0	1	1
12	Students’ Likelihood to e-cheat	0	0	0	0	0	0	0	0	0	0	0	1

Any positions in the FRij which became a '1' because of the application of the transitivity rule were marked with an asterisk (*).

Step 6: Decompose the reachability matrix into levels: Level Partitioning of Final Reachability Matrix

The next step in the ISM method is called 'Level Partitioning', which determines how 'close' each factor is to the dependent variable, Students' Likelihood to e-Cheat (L2C). Based on literature provided previously, L2C could be defined as being a Level 1 factor. Factors that directly influenced L2C would be described as Level 2 factors, while factors which indirectly influenced L2C via a Level 2 factor would be described as Level 3, an example of the three levels shown in the Figure 3.7, below.

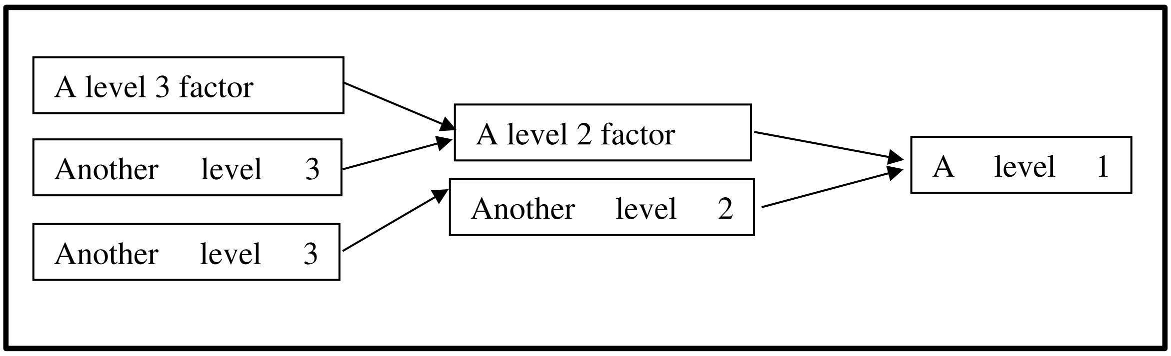

Figure 3-7*: Levels for factors*

The first step in Level Partitioning was to extract a reachability set R (Si) for each factor in FRij. R (Si) consisted of the factor itself and any other factors it may have influenced. This set of factors was denoted by a '1' in the row corresponding to the factor in question. For example, in the FRij above, it could be seen that the factor Prior Academic Achievement (PAA), had a '1' in matrix position (1,1), i.e. it influenced itself (PAA). It also had a '1' in position (1,12), indicating that it influenced the dependent variable L2C. These '1's indicated that PAA influenced itself and L2C, or to put it another way, PAA and L2C were 'reachable' from PAA. So, in practice R (Si) was the set of factors indicated by a '1' in the column corresponding to the factor under consideration. Applying this understanding to the factor Prior Cheating Behavior (PCB) in FRij, it could be seen that there were four 1's, indicating that four factors could be reached from PCB, and so the R (Si) for PCB is {2, 7, 9, 12}.

The next step was to extract an antecedent set A (Si) for each factor in FRij. A (Si) consisted of the factor itself and any other factors which influenced it. This set of factors was denoted by a ‘1’ in the column corresponding to the factor in question. For example, in the FRij above, it could be seen that PAA had ‘1’s in the positions (1,1), (5,1) and (8,1). These ‘1’s indicated that PAA was influenced by itself, by External Pressure (EP) and Student Personality Traits (SPT); or put another way, PAA, EP and SPT were ‘antecedents’ of PAA. So, in practice A (Si) was the set of factors indicated by a ‘1’ in the column corresponding to the factor under consideration. Looking at another example, for PCB in FRij, there were eight ‘1’s, indicating that eight factors were antecedents of PCB, and so the A (Si) for PCB was {2, 3, 5, 6, 7, 8, 9, 10, 11}.

The next step was to determine the intersection of A (Si) and R (Si) for all factors. For example, the R (Si) for PCB was {2, 7, 9, 12} and the A(Si) for PCB was {2, 3, 5, 6, 7, 8, 9, 10, 11}, and the intersection of the two sets could be found as follows:

$$\mathbf{R\ (Si)\ \cap\ A\ (Si)}$$
$$\mathbf{= \{2,7, 9, 12\}\ \cap\ \{2, 3, 5, 6, 7, 8, 9, 10, 11\}}$$
$$\mathbf{= \{2, 7, 9\}}$$

Any factor which met the condition R (Si) ∩ A (Si) = R (Si) i.e. the Reachability Set and the Intersection set were identical, was placed on the top level of the ISM hierarchy. For example, in the first iteration of this process, shown in Table 3.9, the intersection of R(Si) and A(Si) was only identical to the R(Si) for Likelihood to e-Cheat (L2C). This showed that L2C was the only factor at Level 1 and so it was the only dependent variable in this study.

After identifying the Level 1 factor, it was removed from R(Si), A(Si) and their intersection sets, as shown in Table 3.10. Factors which now satisfied the condition R (Si) ∩ A (Si) = R (Si) would be Level 2 factors. This process identified Prior Academic Achievements (PAA), Prior Cheating Behavior (PCB), Extra-curricular Activities (ECA), Ethical Attitudes of Students (EAS) and Ethical Attitudes of Teachers (EAT) as Level 2 factors. As in the first iteration, these factors were removed from the sets, resulting in Table 3.10. All the remaining factors in Table 3.10 met the condition that R (Si) ∩ A (Si) = R (Si) , so all those factors were Level 3 factors, and the process was complete. The first, second and third iterations and the final level partitioning of the factors are given below in Tables 3.9, 3.10, 3.11 and 3.12 respectively.

Table 3-9*: First iteration of factors*

Factors Influencing E-Cheating	**Reachability Set R (Si)**	**Antecedent Set A (Si)**	**Intersection**	**Level**
Prior academic achievements	1,12	1,5,8	1	
Prior Cheating behavior	2,7,9,12	2,3,5,6,7,8,9,10,11	2,7,9	
University policy and anti-cheating	2,3,7,9,12	3	3	
Extra-Curricular Activities	4,12	4	4	
External Pressure	1,2,5,7,12	5	5	
Advancement in ICT	2,6,7,9,12	6	6	
Ethical Attitude of Students	2,7,9,12	2,3,5,6,7,8,9,10,11	2,7,9	
Student Personality Traits	1,2,7,8,12	8	**8**	
Ethical Attitude of Teachers	2,7,9,12	2,3,6,7,9	2,7,9	
Ethical Attitude of Parents	2,7,10,12	10	10	
Ethical Attitude of peers	2,7,11,12	11	11	
Students' Likelihood to e-cheat	12	1,2,3,4,5,6,7,8,9,10,11,12	12	**1st Level**

Table 3-10*: Second iteration of factors*

Factors Influencing E-Cheating	**Reachability Set R (Si)**	**Antecedent Set A (Si)**	**Intersection**	**Level**
Prior academic achievements	1	1,5,8	1	**2nd level**
Prior Cheating behavior	2,7,9	2,3,5,6,7,8,9,10,11	2,7,9	**2nd level**
University policy and anti-cheating	2,3,7,9	3	3	
Extra-Curricular Activities	4	4	4	**2nd level**
External Pressure	1,2,5,7	5	5	
Advancement in ICT	2,6,7,9	6	6	
Ethical Attitude of Students	2,7,9	2,3,5,6,7,8,9,10,11	2,7,9	**2nd level**
Student Personality Traits	1,2,7,8	8	**8**	
Ethical Attitude of Teachers	2,7,9	2,3,6,7,9	2,7,9	**2nd level**
Ethical Attitude of Parents	2,7,10	10	10	
Ethical Attitude of peers	2,7,11	11	11	

Table 3-11*: Third iteration of factors*

Factors Influencing E-Cheating	Reachability Set R (Si)	Antecedent Set A (Si)	Intersection	Level
University policy and anti-cheating	3	3	3	**3rd level**
External Pressure	5	5	5	**3rd level**
Advancement in ICT	6	6	6	**3rd level**
Student Personality Traits	8	8	**8**	**3rd level**
Ethical Attitude of Parents	10	10	10	**3rd level**
Ethical Attitude of peers	11	11	11	**3rd level**

Table 3-12*: Final level partitioning of factors*

Factors Influencing E-Cheating	Level
Prior academic achievements	**2nd level**
Prior Cheating behavior	**2nd level**
University policy and anti-cheating	**3rd level**
Extra-Curricular Activities	**2nd level**
External Pressure	**3rd level**
Advancement in ICT	**3rd level**
Ethical Attitude of Students	**2nd level**
Student Personality Traits	**3rd level**
Ethical Attitude of Teachers	**2nd level**
Ethical Attitude of Parents	**3rd level**
Ethical Attitude of peers	**3rd level**
Students' Likelihood to e-cheat	**1st Level**

3.2.4 *Produce a set of hypotheses*

Based on the final reachability matrix and level partitioning, the modeler and researcher came up with the following 24 hypotheses:

Within 1st level

No relations between factors on this level as it contains only one factor (L2C)

Between 1st and 2nd level

1. Prior academic achievement has a positive influence on Students' Likelihood to e-cheat
2. Prior cheating behavior has a positive influence on Students' Likelihood to e-cheat
3. Ethical attitude of students has a negative influence on Students' Likelihood to e-cheat
4. Ethical attitude of teachers has a negative influence on Students' Likelihood to e-cheat
5. Extracurricular activities has a positive influence on Students' Likelihood to e-cheat

Within 2nd level

6. Ethical attitude of teachers has a negative influence on prior cheating behavior.
7. Prior cheating has a negative influence ethical attitude of students.
8. Ethical attitude of teachers has a positive influence on ethical attitude of students.

Between 2nd and 3rd level

9. University policy and anti-cheating has a negative influence on prior cheating behavior.
10. University policy and anti-cheating has a positive influence on the ethical attitude of students.
11. University policy and anti-cheating has a positive influence on the ethical attitude of teachers
12. External pressure has a positive influence on the Prior Cheating Behavior
13. External pressure has a positive influence on the Prior Academic Behavior
14. External pressure has an influence on the ethical attitude of students
15. Advancement in ICT has a positive influence on the Prior Cheating Behavior

16. Advancement in ICT has a negative influence on the Ethical Attitude of Students
17. Advancement in ICT has a negative influence on the Ethical Attitude of Teachers
18. Student personality traits has a positive influence on Prior Academic Achievements
19. Student personality trait has a negative influence on Prior Cheating Behavior
20. Students' personality traits has a positive influence on Student Ethical Attitudes
21. Ethical attitude of parents has a negative influence on Prior cheating behavior
22. Ethical attitude of parents has a positive influence on the Ethical Attitude of Students
23. Ethical attitude of peers have a negative influence on prior cheating behavior
24. Ethical attitude of peers has a positive influence on the Ethical Attitude of Students

Within 3rd level

No relations between factors in this level.

3.2.5 *Validate and finalize hypotheses*

Literature suggests that in order to finalize the hypotheses, it is important to remove any indirect links between factors (Pfohl, Gallus & Thomas, 2011; Talib, Rahman & Qureshi, 2011; Attri et al., 2013; Kahrarian, 2014). To make this decision and finalize the list of hypotheses, the focus group conducted a second face to face round table, as explained previously. Of the 24 proposed hypotheses, the team rejected the following:

Within 2nd level

- *Ethical Attitude of Teachers influences Prior Cheating Behavior*. The ISM team unanimously agreed that this factor referred to teachers teaching students at their current institution, and therefore would not have had any influence on a student's prior cheating which could have occurred in their school life prior to joining the university. The team's decision to reject this hypothesis was quite logical because they had initially decided that 'EAT did not influence PCB'. It should be noted that, this relationship had been introduced by the application of the transitivity rule when generating the FRij, shown in Table 3.8.

Between 2nd and 3rd level

- *University Policy and Anti-Cheating has an influence on Prior Cheating Behavior*. Although the ISM team initially agreed that Prior Cheating Behavior would not influence University Policy and Anti-Cheating but the University Policy and Anti-Cheating would influence Prior Cheating Behavior, the majority of the ISM team judged that University Policy and Anti-Cheating referred to a student's current university; whereas Prior Cheating Behavior possibly could have taken place in the student's school, or prior educational institution. The ISM team also suggested at this point that students, being students, would not consider any cheating behaviour during their enrolment in the current institution and would therefore refer to previous school or institution. Then the University Policy and Anti-Cheating could not have any influence on a student's Prior Cheating Behavior.
- *External Pressure has an influence on the Ethical Attitude of Students.* The ISM team revisited their earlier judgment on the relationship between these two factors. At that time, the group had decided that the relation would be an X, which meant that the factors would influence one another. However, in revisiting the literature and further discussing the initial factors for each of these two intermediate factors, the group decided that the relation between External Pressure (EP) and Ethical Attitude of Students (EAS) was in fact that of transitivity, because EP impacts Prior Cheating Behavior which then impacts EAS. The group decided that because EP is a composite of family status, and pressure from external community and peers, these pressures could have influenced students to cheat/e-cheat in the past and that would influence their attitude towards e-cheating and therefore increase their likelihood to e-cheat. The team decided unanimously that there is no direct influence between External Pressure and the Ethical Attitude of Students.
- *Ethical Attitude of Parents (EAP) has an influence on Prior Cheating Behavior (PCB)*. Although the ISM team had at first agreed that EAP would influence PCB, when the group revisited the relations, they decided that the influence was in fact not direct, but rather an indirect relationship. The group decided that EAP would influence Student's Ethical Attitude (SEA) which would influence PCB, making it a transitive relationship. The ISM team argued that EAP would most

definitely influence students' understanding of what is ethical and unethical, which in turn may have led to a student's engaging in such dishonest behavior in the past. So this hypothesis was rejected.

- *Ethical Attitude of Peers has an influence on Prior Cheating Behavior.* The ISM team revisited their earlier judgment on the relationship between these two factors and decided that the 'peers' implied in this factor most probably refer to peers that the students currently have and would therefore not have had any influence on what students had done previously, i.e. on Prior Cheating Behaviour, possibly in previous schools or institutions.

The final list of hypotheses proposed is as follows:

H1: University policy and anti-cheating has a positive influence on the Ethical Attitude of Students.

H2: University policy and anti-cheating has a positive influence on the Ethical Attitude of Teachers

H3: External pressure has a positive influence on the Prior Cheating Behavior

H4: External pressure has a positive influence on the Prior Academic Achievements

H5: Advancement in ICT has a positive influence on the Prior Cheating Behavior

H6: Advancement in ICT has a negative influence on the Ethical Attitude of Students

H7: Advancement in ICT has a negative influence on the Ethical Attitude of Teachers

H8: Ethical attitude of parents has a positive influence on the Ethical Attitude of Students

H9: Ethical attitude of peers has a positive influence on the Ethical Attitude of Students

H10: Prior academic achievement has a positive influence on Students' Likelihood to e-cheat

H11: Prior cheating behavior has a positive influence on Students' Likelihood to e-cheat

H12: Ethical attitude of students has a negative influence on Students' Likelihood to e-cheat

H13: Ethical attitude of teachers has a negative influence on Students' Likelihood to e-cheat

H14: Extracurricular activities has a positive influence on Students' Likelihood to e-cheat

H15: Ethical attitude of teachers has a positive influence on the Ethical Attitude of Students

H16: Prior cheating behavior has a negative influence on the Ethical Attitude of Students

H17: Student personality traits has a positive influence on Prior Academic Achievements

H18: Student personality trait has a negative influence on Prior Cheating Behavior

H19: Students' personality traits has a positive influence on Student Ethical Attitudes

The ISM team meeting was adjourned with the invitation to meet a final time a week later to finalize the conceptual model.

3.2.6 *Develop all digraphs and a conceptual model*

Based on the hypotheses proposed, the final conceptual model was constructed by the researcher and modeler as illustrated in Figure 3.8 by using statements instead of variable nodes. *For convenience, the first level was placed on the right, second level in the middle and the third level on the left.*

The ISM team was brought back for a final round of meeting. The final conceptual model was presented to the ISM team and they unanimously agreed that there were no conceptual inconsistencies and therefore accepted Figure 3.8 as the conceptual model to be validated.

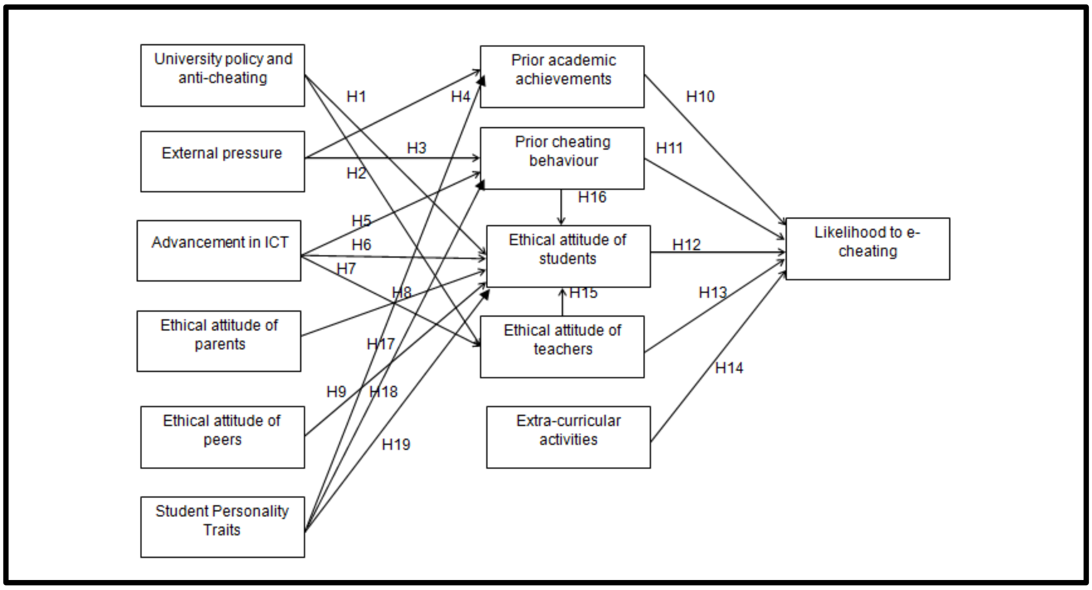

Figure 3-8*: Conceptual Model to be validated*

3.3 Phase II: Validating the Conceptual Model

Having described the development of the conceptual model in Section 3.1, the next objective of this research is to validate that conceptual model. To do this, a set of empirical data needs to be collected and statistically analyzed to see if the model explains the empirical data. The validation of conceptual models is widely presented in the literature and comprises five basic steps:

1. Choose a survey method.
2. Select a suitable sample
3. Develop the survey instrument
4. Collect data
5. Analyze the data

The following sub-sections describe how each of these steps was carried out in the current research.

3.3.1 Choosing a survey method

Surveys are non-experimental, descriptive research methods and are useful for studies that cannot directly observe a phenomenon; such as students' likelihood to e-cheat.

According to Babbie (1973), surveys can be used to assess attitudes and characteristics. Crossman states:

> *'surveys are commonly used tool[s] in sociological research, whether in the form of a questionnaire, interview, or telephone poll. Surveys make it possible to ask specific questions about a large number of topics and then perform sophisticated analyses to find patterns and relationships among variables'*
>
> (Crossman, 2013, p.1)

The type of survey that best suited the purpose of this study was a cross-sectional survey because these were typically used to gather information about a population to determine the relationship between factors (Basha & Harter, 1980), such as in this case of testing a conceptual model.

The survey method chosen for the current research was that of a questionnaire. Questionnaires were specifically used in this study because questionnaires could easily be distributed to large groups of respondents, they were cheap and did not require effort to collect the responses. The answers collected were standardized and easy to compile and analyze (Crossman, 2013).

This study needed to depend on the students' responses which were best recorded using scales such as Likert scales (Key, 1997). According to research, Likert scales tap into the cognitive and affective components of attitudes and helped to measure opinions (McLeod, 2008; Bowling 1997; Burns & Grove, 1997).

A Likert scale, a psychometric scale that was typically used to represent a person's attitude to something on a scale sometimes of 1 – 5, with

1. = Strongly Disagree,
2. = Disagree,
3. = Neutral,
4. = Agree,
5. = Strongly Agree,

recording either positive or negative responses to a statement was used (Allen & Seaman, 2007).

3.3.2 Selecting a Suitable Sample

Basha and Harter (1980) stated that 'a population is any set of persons or objects that possesses at least one common characteristic'. If the population size was quite large, as it was in the current research, then a sample of the population was selected to provide the data necessary to validate the conceptual model. In the process of selecting a sample for this study, a set of 5 steps, adapted from Daniel (2012) and Zikmund et al. (2010) was followed and explained in sub-sections, 3.3.2.1 to 3.3.2.5.

3.3.2.1 Deciding on the target population

Based on the literature review in Chapter 2 the target population for this study was HE students.

3.3.2.2 Deciding on a census or sampling

A report by Maslen (2012) in the University World News stated that the population of HE students was approximately 131,000,000. Since it was impossible to collect data from the all HE student population from all over the world, a census method was rejected. Typically, a survey is carried out on a sample of a large population. A sample of the population, that mirrors the characteristics of the population, was therefore chosen for the study.

3.3.2.3 Describing the desired sample

Based on the description of the population, the sample chosen had to be HE students who would be a mix of nationalities, religions, and cultures in order to reduce any bias. The sample chosen had to have had exposure to a variety of experiences of honor codes, cheating penalties, detection rates and external pressures. The sample had to also have access to sufficiently high level of technology and should be aware of advances in ICT, so that it was possible that

(i) they had prior experience of e-cheating; and

(ii) had access to mechanisms that support e-cheating.

These characteristics are illustrated in the figure below:

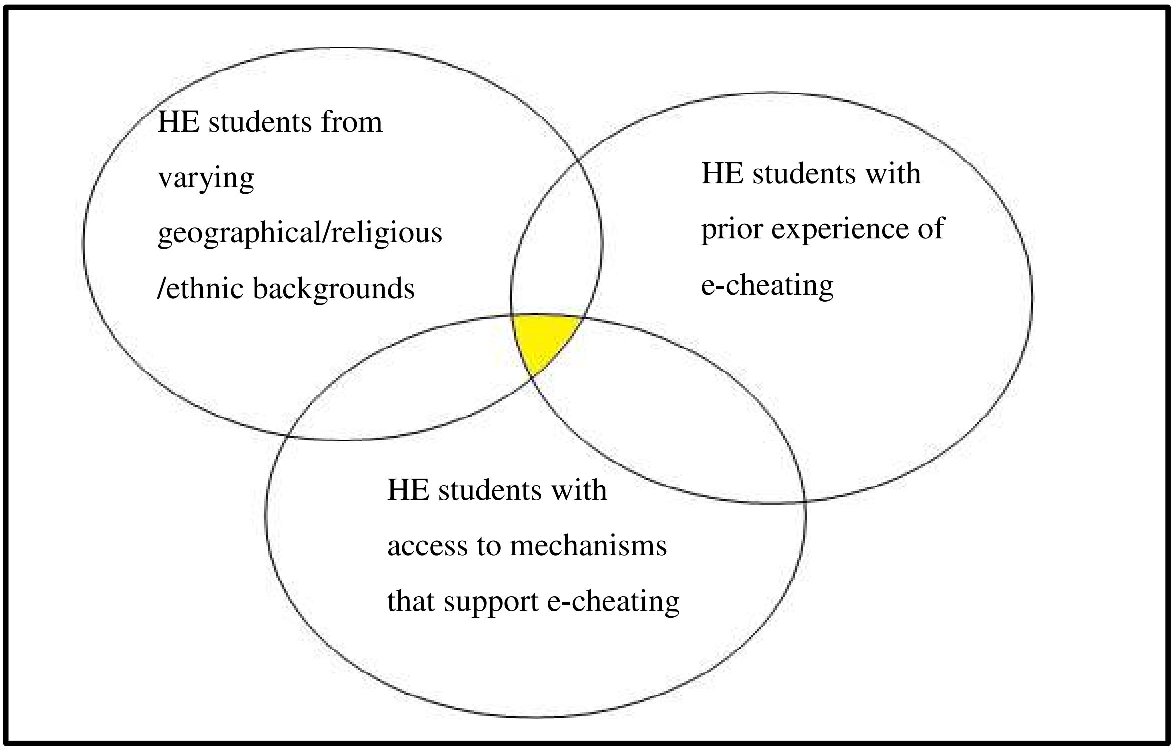

Figure 3-9*: Preferred characteristics of the target population*

The yellow center section in the Venn diagram illustrated in figure 3.9 above represented the sample of the respondents required for this study.

3.3.2.4 Choosing a suitable sample

The proposed sample was drawn from students studying at the University of Wollongong in Dubai, United Arab Emirates. The following sections justify this decision.

3.3.2.4.1 Dubai, UAE

The United Arab Emirates (UAE) is an Arab country, located in the Southern part of the Arabian Peninsula (see Figure 3.10 below).

Figure 3-10:*Google Map location of UAE*

The country is a federation of seven emirates (states):

- Abu Dhabi
- Dubai
- Sharjah
- Umm a-Quawain
- Ras al Khaima
- Ajman
- Fujairah

The country was established in 1971 and has developed quickly, with the majority of its income coming from oil exports, international trading, tourism, travel and, more recently, education.

The sample chosen was HE students at University of Wollongong in Dubai (UOWD) which is located in the metropolitan city of Dubai (Figure 3.11), the host city for Expo2020[5] and the largest state in the UAE.

Figure 3-11*: Google Map location showing Dubai*

According to the Department of Economic Development in Dubai,

> 'With a diverse, multicultural population, Dubai offers its residents, students and businesses a unique environment, enriched with the cultures of more than 190 nationalities and a quality of life and work unrivalled in the Middle East. It is a bustling metropolis with a combination of Emirati heritage, Arabic vitality, Western spontaneity and Asian ambition.
>
> With an indigenous population of just 170,000, the number of Dubai expatriate residents now stands at more than two million, thanks to its lifestyle appeal, education opportunities and investment incentives.'

(Dubai FDI, 2013)

The above statistics suggest that over 90% of the city's population is expatriates who represent nearly 200 nationalities. Dubai is considered a multicultural city that has

[5] "The Great Exhibition, held in London in 1851, inaugurated World Expos as the hallmark events of a world aspiring to strengthen its connections, celebrate its cultural diversity and marvel at its technological wonders. Each World Expo is a catalyst for economic, cultural and social transformation and generates important legacies for the host city and nation. For instance, Shanghai 2010 World Expo helped transform a heavily industrial city-centre area into a thriving cultural and commercial district while also bringing its theme "Better City, Better Life" to the attention of 73 million people. The bid to host the 2020 World Expo that Dubai, UAE won in 2013 themed "Connecting Minds, Creating the Future" will be the first Expo to be hosted in the Middle East-North Africa region and promises to be a platform for connectivity to help pioneer new partnerships for growth and sustainability for the future" (Source: Expo202 Dubai, 2014)

shown tremendous tolerance towards different religions, sects and nationalities and boasts a record of non–violence between sectarian interests since its independence in 1971 (Maceda, 2013; Hellyer, 2013).

With the increase in population of expatriates in the city, the education sector has also grown. The city provides comprehensive education to all male and female students from early-childhood education through to university studies. It houses 1,186 public and private schools with 796,836 students, with schools using syllabi from countries such as: USA, UK, Switzerland, India, Pakistan, Iran, Bangladesh, Germany, and France.

> '80-90% of the school graduates who complete their secondary education enrol in a higher education institution in the UAE or travel abroad to study. There are both government tertiary-level institutions and a rapidly increasing range of private institutions, including branches of internationally renowned higher education institutions that are present in Dubai, making it a very attractive place to study, not only for students from within the city, but also for thousands of students from neighboring countries'
>
> (UAE Interact, 2013)

According to the Dubai Government, Dubai has the highest number of international branch campuses in the world (KHDA, 2012). It has the 'largest and most diverse group of faculty members and transnational students…that offers the potential for a unique student experience like any other university across the globe' (KHDA, 2012). The city has two designated free-zones for education, named: Dubai International Academic City and Dubai Knowledge Village. The free-zones house the higher education campuses which offer a wide range of programs for students including vocational diplomas and higher diplomas, and degrees at associate, bachelor, master and doctoral levels (KHDA, 2012). Dubai currently has more than 43000 HE students from over 100 different countries, some schooled within Dubai and some commencing their studies as international students.

Dubai is also known for its success stories in business, international trade, travel and tourism. The developments within the city demonstrate the advancement in areas such as technology, infrastructure, architecture, travel and tourism.

According to Rosenthal, the city has also developed and implemented a comprehensive framework for the adoption of ICT in business and government (2009). Dubai Smart Government is an example of Dubai's initiatives to incorporate ICT into the city's business and government structure. It was launched in 2000 as e-Government and has transformed over the last decade to provide numerous online government services to the people of Dubai (Dubai Smart Government Department, 2013).

The United Nations Department of Economic and Social Affairs (UNDESA) ranked Dubai, UAE 32nd in the E-readiness index out of 192 countries (United Nations, 2008). It was also ranked second in E-readiness in the MENA (Middle East) region and a regional leader in the Web Measurement Index (United Nations, 2008).

ICT advancement has also penetrated the education sector in the UAE with universities and their students using the latest technologies in and out of classrooms (Khan, 2010). Dubai also has HE institutions that offer degrees to its students online such as the Hamdan Bin Mohammed e-Univeristy and Dubai E-College. The Rashid al Maktoum Intelligent Education Initiative, which was launched in 2012, at a cost of One billion Dirhams, aims to create new learning environment for schools with touchpads being distributed to students, along with access to a high-speed 4G network (UAE Interact, 2013). Alongside the government institutions, private schools and universities have also implemented blended learning within their classrooms and curricula to enhance student interaction with technology and to bring the education standards provided to students to world standard (UAE Interact, 2013).

Revisiting the desired characteristics of the sample in Figure 3.8, it could be seen that Dubai as a city:

1. had a diversity of people, from nearly 200 countries, coming from different religions and ethnic backgrounds

2. had opportunity for varying education options for students from within the city and from outside to get exposure to international standards of education, that could include varying levels of exposure to honour codes, cheating

3. had opportunity for varying levels of exposure to technology and awareness towards advancement in ICT

3.3.2.4.2 University of Wollongong in Dubai

The current study was carried out at the University of Wollongong in Dubai (UOWD), located in the Dubai Knowledge Village free-zone. The university has been operating in the UAE for over 20 years and has gained considerable recognition and reputation for the high quality of education it offers. With over 4000 students currently enrolled in various degree programs at the university, UOWD provides a multi-cultural environment with great diversity, hosting students from over 100 countries. The age of the student population of the university ranges from 16 – 50+ and there is a 40-60 ratio of males to female students that study at the campus. Students at the university are enrolled as both international students and local students, with local students having graduated high school from the 1000’s of schools in the UAE.

Although UOWD is 20 years old, it is a campus of the University of Wollongong in Australia (UOW) which was established in 1975. Over its 39-year history, UOW has grown in reputation to become one of the top 2% of universities in the world, as confirmed by QS World University Rankings 2013 (UOWD, 2013).

UOWD offers degrees at both undergraduate and postgraduate level. In subject areas including: finance and accounting; business and management; and engineering and information sciences. UOWD works closely with UOW to offer degrees that are interchangeable between the two campuses. To do this, UOWD offers subjects that are on offer at UOW and often moderated for quality by UOW which is registered with the Tertiary Education Quality and Standards Agency (TEQSA). UOWD has also inherited most of UOW’s standards of teaching and governance, including policies on assessments and examinations, plagiarism and cheating and student codes of behavior, to ensure it maintains international standards.

UOWD is also accredited by the Dubai’s Ministry of Higher Education and Scientific Research which has a Commission for Academic Accreditation (CAA) that conducts a program of licensure and accreditation of each academic program offered by institutions, as per international standards (UOWD, 2013; CAA, 2011).

To offer world-class education, UOWD has tried to keep up-to-date with technological advances in academia. It collaborated with Dell in 2011 to introduce virtualized desktop environments which allow both staff and students to enjoy a virtual lab environment across the campus from any device at any time (UOWD, 2013). The University has also introduced learning management systems such as WebCT Vista, Black Board and now Moodle which faculty and students use for different subjects to perform tasks such as: communicate; share files and information;, involvement in discussions; online debates; access to e-books and access to lecture notes. The university also offers Apps that allow students to access lecture schedules, select tutorials online (UOWD, 2013).

UOWD has an advanced degree program in Engineering and Information Sciences. At the undergraduate level the following degrees are offered:

- Bachelor of Computer Science
- Bachelor of Computer Science in Digital Systems Security
- Bachelor of Information Technology in Management Information Systems
- Bachelor of Computer Science in Multimedia and Game Development
- Bachelor of Engineering

At the postgraduate level the following degrees are offered:

- Master of Engineering Management
- Master of Information Technology Management

In these degrees students to develop software, apps and devices, some of which have won competitions such as Software Trade Shows, Microsoft Imagine Cups and GITEX Competitions. UOWD's perseverance to increase student exposure to technology also encourages its non-IT students to develop apps for which they get recognized by the government, industry and media. Among the most notable are a group of three students, two of whom are Business students, who have developed a mobile app that helps people fight obesity for which they won the second place at the Microsoft Imagine Cup UAE (DubaiCityGuide, 2013). A second example is a group of two business students who developed an innovative app to make metro travel easy for people in the city; this app has been recognized by the Roads and Transport Authority in Dubai (Gulf News, 2013). Research has also suggested that the use of technology by students at UOWD has increased by 200% over the last five years (Khan & Subramanian, 2012; Khan, 2012).

Finally, revisiting the desired characteristics of the sample for this study, it could be seen that the UOWD was an HE institution that:

- had HE students from varying geographical/religious/ethnic backgrounds
- had HE students who have come from varying educational backgrounds that had exposed them to differing levels of honor codes and penalties
- had HE students with varying levels of exposure to technology and awareness towards advancement in ICT.

As UOWD and the city where it resides are definitely young, it is believed that the university is still comparable to universities in other parts of the world that have been established hundreds of years ago mostly because the city has developed at a very fast pace, competing with cities such as New York, London and Sydney to establish itself as culturally diverse, tolerant, technologically advanced city; and the university has maintained its close ties with the other campus and adhered to international standards to ensure it does instill competitive international graduate values in its students.

Although the study focuses on one University in one city, it is believed the students of UOWD mirror desired characteristics of the target population of this study, which is HE students, making it suitable for this study.

3.3.2.5 Choosing a sample size

Sloven's Formula, adapted from Gomez (2013), was used to determine the required **sample size** of the students. The formula used was:

$$\mathbf{n = N / (1 + Ne^2)}\ \textbf{where}$$

n = sample size
N = population size
e = margin of error

Ellen (2014) has stated that when a sample is taken from a population, a formula must be used to take into account the margin of error and confidence level. Further, research contends that when very little is known of how a population will behave (such as in the case of this study polling HE students to get their opinions on factors and students' likelihood to e-cheat), except its size, Sloven's formula is used (Ellen, 2014; Kavai, 2014; Tanty & Rahayu, 2014; Abun & Cajindos, 2012). This formula allows the researcher to sample the desired population with a desired degree of accuracy (Ellen, 2014). Sloven's formula was formulated by Slovin in 1960 to determine the sample size particularly when there was uncertainty of population's behavior (Isip, 2014) and is deemed appropriate to determine the sample size.

The total student number at UOWD was approximately 4000. But, the total number of HE students worldwide was 131,000,000 (Maslen, 2012). Using a margin of error of 0.05 and an incremental example of population sizes, the following table was constructed using the Sloven's formula to estimate the appropriate sample size:

Table 3-13*: Calculating Sample Size*

Population (N)	Margin of Error (e)	e^2	$1 + N e^2$	Sample size (n)
4,000	0.05	0.0025	11	363.6364
40,000	0.05	0.0025	101	396.0396
400,000	0.05	0.0025	1001	399.6004
4,000,000	0.05	0.0025	10001	399.96
40,000,000	0.05	0.0025	100001	399.996
131,000,000	0.05	0.0025	327501	399.9988

UOWD

World HE Student Population

It could be seen from the above that as the population size grew the sample size did not change drastically. For example, the change in a population from 400,000 to 4,000,000 students resulted in an increase in sample size of only 0.36 of a student. Considering the population estimate provided by Maslen (2012) of the current population size of HE students world-wide, the sample size proposed was 400 students.

3.3.3 Developing a Survey Instrument

The survey method chosen for the current research, as explained in Section 3.3.1 was a questionnaire which, had items on a Likert Scale.

Although some researchers claim that Likert scales may be subject to distortion due to Central Tendency Bias[6], Acquiescence Bias[7] or Social Desirability Bias[8], designing a scale that has a balanced keying i.e. equal number of positive and negative statements can alleviate the bias. Key (1997) suggests developing at least two questions for every factor to help achieve balance, this was done in the developed survey. Also, according to Paulhus (1984), anonymity on self-administered surveys helps reduce social or desirability pressure. The instruments developed for this study were anonymous to ensure maximum reduction in bias when using the Likert scale.

3.3.3.1 Sub headings and wording items

The questionnaire developed for the study was divided into ten sections. According to Boyd and Westfall (1956/1972), while designing questionnaires, it helps to remember the target respondents, and so dividing the questionnaire into sections helps ensure respondents are clear on the topics of interest and focus of the study. Dividing the questionnaire also it helps with the analysis of the data collected.

Table 3.14 below maps the questionnaire items to the initial factors and sections:

Table 3-14*: Survey item wordings and code*

Sections	**Survey Item**	**Initial Factors**	**Item Code**
Student Personal Details			
1	Gender	Gender	
2	Age group	Age	
Higher Education Details			
3	Subject major (area of study)	Subject major	

[6] Central Tendency Bias – when respondents avoid using extreme response categories (Bacal, 2013)

[7] Acquiescence Bias - when respondents agree with the statements as presented (Watson (1992)

[8] Social Desirability Bias – when respondents try to portray themselves in a favourable light (Thompson and Phua, 2005)

4	Degree level	Subject level	
5	Average class size	Class size	
6	In the lectures that I attend, a typical class size would be:	Class size	
Academic Achievements and performance			
7	Until now, my academic achievement has usually been below average	Prior academic achievements	PAA_1
8	So far in my degree, my academic performance has typically been below that of my classmates	Prior academic achievements	PAA_2
9	I don't expect to do as well in assessment tasks as my peers	Self-efficacy	SPT_1
10	I have trouble completing assessment tasks at the required level	Self-efficacy	SPT_2
My Cheating behavior			
11	I have cheated on an assignment, quiz, or a test	Prior cheating behavior	PC_1
12	In the past there are times when I have cheated.	Prior cheating behavior	PC_2
13	My peers expect me to help them cheat	Peer pressure	EP_11
14	I feel that other people expect me to cheat	Peer pressure	EP_12
15	In order to be a part of their group, my friends expect me to cheat or help them cheat	Alienation	SPT_3
16	I would cheat or help friends cheat to ensure I was accepted	Alienation	SPT_4
My university and degree			
17	People who are caught cheating at my university are severely punished	severity of penalty	UPAC_1
18	Punishments for cheating at my university are usually quite severe	severity of penalty	UPAC_5

19	My teachers and invigilators are very vigilant in detecting any form of cheating in assignments/tests/quizzes	level of instructor detection	UPAC_2
20	Lecturers and tutors usually catch people who cheat	level of instructor detection	UPAC_6
21	The subjects in my degree are generally quite difficult	difficulty of subject	UPAC_3
22	I find the subjects in my degree quite hard.	difficulty of subject	UPAC_7
23	My university has an Honor code which defines what appropriate behaviour is	existence of honor codes	UPAC_4
24	Students at my university are expected to follow the university's Honor code	existence of honor codes	UPAC_8
My extra-curricular activities			
25	I have no time to study because of my involvement with extra-curricular activities	Extra-curricular activities	ECA_1
26	I have no time to complete assignments because of my involvement with extra-curricular activities	Extra-curricular activities	ECA_2
Pressure from others			
27	People would generally consider my family to be of high status	Family status	EP_1
28	My family would be perceived as being well off	Family status	EP_6
29	My family expects me to perform well academically	Parents' pressure	EP_2
30	I feel pressured by my family to do well academically	Parents' pressure	EP_7
31	My school/university expects me to perform well academically	School pressure	EP_3
32	My teachers and lecturers expect me to do well in my academic studies	School pressure	EP_8
33	Academic performance is important to current or future employers	corporate pressure	EP_4

34	My current or future employer would expect me to have good grades	corporate pressure	EP_9
35	My peers expect me to perform well academically	peer pressure	EP_5
36	I feel pressure from my friends and peers to do well at university	peer pressure	EP_10
Information Communication technology			
37	Electronic/digital devices (e.g. computers, smart phones, laptops, tablets, etc) are more widely used by my classmates than by our predecessors	Increased ICT use	ICT_1
38	My classmates use a wider range of electronic/digital devices (e.g. computers, smart phones, laptops, tablets, etc) than previous university students did.	Increased ICT use	ICT_8
39	In recent years, electronic/digital devices have become widely available to do university work	increased accessibility of ICT	ICT_2
40	Most people like me now have access to appropriate electronic/digital devices	increased accessibility of ICT	ICT_9
41	There are a lot more online courses at my university than there were in previous years	Increased online courses	ICT_3
42	Online courses are now widely available	Increased online courses	ICT_10
43	There are a lot more online sources on the Internet than there were in previous years	Increased online sources	ICT_4
44	People like me now have access to many online sources of information	Increased online sources	ICT_11
45	Online sources are very easy to access from my electronic/digital device	Ease of access to online sources	ICT_5
46	It's easy to find and access information online	Ease of access to online sources	ICT_12
47	I think it easy to use the latest technology (such as tablet, smart phones, etc)	Ease of use of ICT	ICT_6

48	The latest technology (such as tablet, smart phones, etc) is quite easy to use	Ease of use of ICT	ICT_13
49	I like the latest technology (such as tablet, smart phones, etc) because they are so affordable	Affordability of ICT	ICT_7
50	I can afford the latest technology is (such as tablet, smart phones, etc)	Affordability of ICT	ICT_14
What I believe			
51	It is wrong to cheat even if an assessment task is unreasonably difficult	Students' attitude towards a particular task or assessment	SEA_1
52	Cheating is unacceptable even in a very difficult assignment or exam	Students' attitude towards a particular task or assessment	SEA_8
53	My university degree is only important if I get something out of it	Students' attitude towards studying	SEA_2
54	Studying at university is a waste of time unless I get a real benefit from it	Students' attitude towards studying	SEA_9
55	It is wrong to cheat even if the teacher is not very good	Students' attitude/level of satisfaction towards teacher	SEA_3
56	It is wrong to cheat even if the instructor does not grade fairly	Students' attitude/level of satisfaction towards teacher	SEA_10
57	It is wrong to cheat even if the course material seemed useless	Students' attitude/level of satisfaction towards course	SEA_4
58	Even if you don't enjoy a course, you shouldn't cheat in it	Students' attitude/level of satisfaction towards course	SEA_11
59	It is wrong to cheat no matter what the circumstances	Students' attitude towards cheating	SEA_5
60	Cheating is always wrong, no matter what the circumstances	Students' attitude towards cheating	SEA_12
61	I like the latest advances in technology (such as tablet, smart phones, etc)	Students' attitude towards advances in ICT	SEA_6
62	The latest ICT (such as smart phones, tablet etc.) are important and useful developments	Students' attitude towards advances in ICT	SEA_13
63	It is wrong to pirate movies/music/software	Students' attitude towards SMM Piracy	SEA_7

64	Pirating software/music/software is wrong	Students' attitude towards SMM Piracy	SEA_14
65	It's alright to cheat depending on the circumstances	Neutralization	SPT_5
66	I would cheat if I had a good reason for doing so	Neutralization	SPT_6
67	If another student is seen to be cheating, he or she should be reported	Students' attitude towards academic integrity	SEA_15
68	It is my responsibility to prevent or report cheating	Students' attitude towards academic integrity	SEA_16
Would I cheat?			
69	I would cheat in an assessment task	Student's likelihood to cheat	SLC_1
70	Under the right circumstances, I would cheat in an exam, quiz or assignment	Student's likelihood to cheat	SLC_2
71	I will probably cheat in exams, quizzes or assignments in the future	Student's likelihood to cheat	SLC_3
My teachers and their attitudes towards ethics and e-cheating			
72	Teachers at my university understand and enforce academic integrity	Teachers' understanding and acceptance of academic integrity	TEA_1
73	My lecturers and tutors know how to deal appropriately with cheating and they do so	Teachers' understanding and acceptance of academic integrity	TEA_2
	It is clear that my teachers feel it is wrong to:		
74	Hand in someone else’s writing as one’s own	Teacher's attitude towards cheating	TEA_3
75	Use the Internet to copy text into an assignment	Teacher's attitude towards cheating	TEA_4
76	Cheat in quiz/assignments/tests	Teacher's attitude towards cheating	TEA_5
77	Use pirated software/music/movies	Teachers' attitude towards SMM Piracy	TEA_6
78	Pirate or distribute software/movies/music	Teachers' attitude towards SMM Piracy	TEA_7

My parents and their attitude towards ethics and e-cheating			
	It is clear that my parents feel it is wrong to:		
79	Hand in someone else's writing as one's own	Parents' attitude towards cheating	PEA_1
80	Use the Internet to copy text	Parents' attitude towards cheating	PEA_2
81	Purchase essays/reports from online sources	Parents' attitude towards cheating	PEA_3
82	Cheat in quiz/assignments/tests	Parents' attitude towards cheating	PEA_4
83	Use electronic/digital devices without authorization during tests/quizzes	Parents' attitude towards cheating	PEA_5
84	Use pirated software/music/movies	Parents' attitude towards SMM piracy	PEA_6
85	Pirate or distribute software/movies/music	Parents' attitude towards SMM piracy	PEA_7
My friends and their attitude towards ethics and e-cheating			
	It is clear that my peers feel it is wrong to:		
86	Hand in someone else's writing as one's own	Peers' attitude towards cheating	PeeEA_1
87	Use the Internet to copy text	Peers' attitude towards cheating	PeeEA_2
88	Purchase essays/reports from online sources	Peers' attitude towards cheating	PeeEA_3
89	Cheat in quiz/assignments/tests	Peers' attitude towards cheating	PeeEA_4
90	Use electronic/digital devices without authorization during tests/quizzes	Peers' attitude towards cheating	PeeEA_5
91	Use pirated software/music/movies	Peers' attitude towards SMM piracy	PeeEA_6
92	Pirate or distribute software/movies/music	Peers' attitude towards SMM piracy	PeeEA_7

As seen in Table 3.14 above, there were at least two statements for every initial factor, but worded differently to ensure that they captured accurate responses from the students and reduced bias. For instance, the statements ‘People would generally consider my family to be of high status’ and ‘My family would be perceived as being well off’ both aimed to test students’ perception of family status. But the way the two statements were worded helped to verify that students were in fact giving an answer that was consistent. When testing parents’ attitude towards e-cheating and ethics, a number of different scenarios were used that included:

It is clear that [teacher/parent/peer] feel it is wrong to:

- Hand in someone else’s writing as one’s own
- Use the Internet to copy text
- Purchase essays/reports from online sources
- Cheat in quiz/assignments/tests
- Use electronic/digital devices without authorization during tests/quizzes
- Use pirated software/music/movies
- Pirate or distribute software/movies/music

This is because each of the statements actually covered a different aspect of cheating/e-cheating. The same number of statements was used for peers. For teachers, five of these statements was used, except ‘purchase essays/reports from online sources’ and ‘use electronic/digital devices without authorization during tests’ because it was assumed that teachers as representatives of the universities would be responsible for ensuring such acts did not take place. These two areas were, however, covered in two separate statements to respondents when testing them about their teachers, namely:

- Teachers at my university understand and enforce academic integrity
- My lecturers and tutors know how to deal appropriately with cheating and they do so

Also the factor, Students Likelihood to e-cheat, the dependent variable in the conceptual model, had three items (shown below) to ensure students answer the questions consistently:

- I would cheat in an assessment task
- Under the right circumstances, I would cheat in an a exam, quiz or assignment
- I will probably cheat in exams, quizzes or assignments in the future

3.3.3.2 Final Survey Instrument

In the survey instrument the statements have been arranged so that no two items related to the same factor follow one another (Bhattacharjee, 2012). This was done to minimize the likelihood that students' responses to the first item about a factor would overly influence their responses to a consecutive item about the same factor. Having separated items about the same factor, it was then possible to compare the responses for different items about the same factor during the analysis of the data.

3.3.3.2.1 Piloting the instrument

Survey instruments are typically tested for validity to try and detect if it measures what it is supposed to measure (Burton & Mazerolle, 2011; McLeod, 2013). Kelley, Clark & Brown (2003) have suggested that piloting a survey tool is necessary as it allows researchers to identify if the respondents understand the questions and instructions and if the meaning of the questions is the same for all respondents.

To finalize the survey instrument, a content validity was performed by requesting the ISM team back to the meeting room to gain their feedback on the items in the survey. A quick rating system using voting was used to get the experts to rate the survey instrument. The items included (adapted from McLeod, 2013):

1. the test is extremely suitable for to this research
2. the test is very suitable for this research;
3. the test is adequate
4. the test is inadequate
5. the test is irrelevant and therefore unsuitable

Unanimous decision to accept the survey instrument (Point 1) was acknowledged at this point, thereby asserting that the instrument was found to pass the content validity test by experts.

Furthermore, a face-validity test was carried out by requesting 40 students to attempt the survey and then provide their feedback.

Face-validity is an estimate of the degree to which a measure is clearly and without bias tapping the item it is trying to assess (Bornstein, 2004; Burton & Mazerolle, 2011, Cronbach, 1971).

40 students were selected ensuring they represented the various degree programs, age groups, gender proportion, ethnic background and level of degree. Connelly (2008) suggested that a pilot test size should be about 10% of the sample size projected. This has been further supported by Treece & Treece (1982) and Isaac & Michael (1995). As the suggested sample size is 400, 10% of 400 = 40. Therefore, 40 students were selected for the face validity test. Using a similar voting system used for the experts, the students were asked to first fill in the survey and then vote on what they thought of the survey instrument on 5-points. 38 out of 40 students (95%) found the test to be extremely suitable and the remaining two students found it to be very suitable. The students agreed that the instrument was obvious and that the purpose of the survey was apparent, thus making the survey instrument valid.

With minor grammatical changes, and based on the content and face validity[9], the instrument was finalized as shown in Appendix B.

3.3.3.3 Ethics Clearance

Once the survey tool and the appropriate Participant Information and Consent forms (see Appendix C) were developed, an Ethics clearance was sought and granted from UOW Ethics Committee under the reference HE11/300 (see Appendix D). Approval to contact students at UOWD was also sought and granted (see Appendix E).

[9] Data compilation and validity to be carried out during Analysis

3.3.4 Collecting Data

The survey was developed in two formats: online and paper-based. The online version was hosted on the Qualtrics Online Website, which can collect data anonymously and easily. The survey can be found at the following link:

https://uowdoie.az1.qualtrics.com/SE/?SID=SV_1SM4Zu0a1929DHD

Prior researchers have suggested that online surveying has advantages (Dommeyer et al., 2004; Salmon, Deasy & Garrigan, 2004; Watt et al., 2002) over other formats, some of which include reduction in data entry and evaluation times (Watt et al., 2002), and avoiding the need to administer surveys in class (Dommeyer et al., 2004). Another key advantage to using online surveys is that respondents are more confident that they will be de-identified and their anonymity preserved (Dommeyer et al., 2004).

However, Nulty (2008) suggests that 'online surveys are much less likely to achieve responses as high as surveys administered on paper' (p 302). For this reason, the survey was administered both online and paper-based to capture the maximum number of responses.

To ensure anonymity and reduce bias, independent research assistants were hired who signed the pre-approved Consent and Confidentiality Form (see Appendix F), and then approached various classes and requested students to fill in the questionnaires either online or in hard copy. As the research assistants were independent of the University, they did not know the students and vice versa. The surveys were handed out to all students in approved classrooms. Students had the option to decide whether they wanted to participate in the study or not. This made the sample self-selected because each student in a class was entirely free to choose if they would complete the survey or not (Bhattacharjee, 2012). Although this introduced a slight bias because students who responded may have had strong opinions about the topic, this selection bias could not be controlled in self-selection surveys. However, as UOWD had been considered in Section 3.3.2 as a suitable sample because it was a typical university with normal levels of technology use and no special circumstances that would make it a biased sample, it is believed the margin of bias was reduced and the responses are valid (for further details, please see Section 3.3.2). For instance, if UOWD had been a religious university, or a university run by some other religious group, it is possible that the responses would be biased because the university may demand higher ethical standards than a secular university. Or, if the university was a military academy, the results might be biased because a military institution might demand obedience to rules and have extreme penalties for breaches of discipline. If the university was in a developing country with low technology adoption, it would also have potential for a biased sample considering the focus on e-cheating. However, Section 3.3.2 established that UOWD was a suitable sample because it mirrored the characteristics of the target population, therefore the bias was rejected.

A total of 1000 copies were made and sent out to different classrooms. 654 printed surveys were collected and these were entered by the research assistants and doubled checked by the researcher for accuracy and ensure correct data entry into the Qualtrics system. An additional 60 surveys were completed online, making a total of 714 surveys, well above the required 400 as mentioned in Section 3.3.2.4.3.

3.3.5 Method of Analysis

As mentioned at the beginning of this chapter, the current research used a multi-method approach, carried out in two phases. The first phase was qualitative, using ISM to develop the conceptual factor model. The second phase, the quantitative phase, is to analyze and validate the conceptual model using Structural Equation Modeling (SEM) and other analysis tools.

3.3.5.1 Method to test reliability of research instrument

Before any data is analyzed, it is imperative that the research instrument's reliability is evaluated.

Most often, for behavioral and social science studies, the information gathered involves the use of Likert-type scales (Gliem & Gliem, 2003), as is the case with the current study. Literature suggests that validity (the extent to which the instrument measures what the researcher wants to measure) and reliability (the ability of the instrument to be consistent) are fundamental elements in the evaluation of a measurement instrument such as a questionnaire (Tavakol, Mohagheghi & Dennick, 2008; Tavakol & Dennick, 2011), which is the approach used in this study. One of the most accepted and objective reliability statistics is the Cronbach's alpha (Cronbach, 1951), an index of reliability that is associated with the 'variation accounted for by the true score of the underlying construct' [10] (Ahuja, 2007). The Alpha coefficient is expressed as a number between 0 and 1 and it is suggested that the higher the score calculated, the more reliable the scale is (Santos, 1999). The value increases as the correlations between the items increase and it is argued that this can be used to determine the internal consistency of the instrument in order to gauge its reliability (Santos, 1999).

The software that is used will be SPSS as it is easy-to-use, readily available and has a pre-defined function to carry out the test (Leard Statistics, 2013).

3.3.5.2 Method to test the appropriateness and retention of factors

According to the literature, factor analysis is a multivariate[11] statistical technique that is commonly used in psychology and education (Hogarty et al., 2005; Pett, Lackey & Sullivan, 2003). It is the name given to a group of statistical procedures that may be used to analyze interrelationships between many factors and to explain these factors in terms of their common underlying dimensions (Hair et al., 1998). Factor analysis is commonly used to:

- Detect and assess unidimensionality of theoretical construct (grouping of initial factors into intermediate factors – ***the purpose of use in this study***)
- Reduce the number of factors
- Examine structures or relationships between factors
- Evaluate construct validity of a scale, test or instrument
- Develop simple analysis and interpretation
- Develop theoretical constructs
- Prove/disprove proposed theories

[10] Construct is the hypothetical variable that is being measured (Hatcher 1994)

[11] Multivariate means involving two or more variable quantities

- Address multicollinearity[12] (two or more factors that are correlated)

(Williams, Brown & Onsman, 2010)

In simple terms, factor analysis helps to determine what initial factors group or go together.

Hair et al. (1998) suggest that factor analysis can be used for exploratory or confirmatory purpose. **Exploratory Factor Analysis (EFA)** tries to determine the underlying structure of a relatively large set of factors whereas **confirmatory factor analysis** tries to determine if the number of factors and grouping of indicators on them conform to what is expected on the basis of pre-established theory (Hair et al., 1998).

The first step to analysis is to run an Exploratory Factor Analysis (EFA) to test the appropriateness of and retention of all the factors. This method tests the appropriateness of all the initial factors and how they are grouped onto the intermediate factors. This step is particularly important for the Student Personality Trait (SPT). In the first round of meetings, the ISM team had disagreed on the appropriateness of the intermediate factor SPT because half the group stated that initial factors such as Self Efficacy, Alienation and Neutralization cannot possibly influence the dependent variable in the same way. Their reasoning was that Alienation and Neutralization behavior would positively influence the student's likelihood to e-cheat whereas Self Efficacy would negatively influence the student's likelihood to e-cheat. Although two rounds of voting took place, a consensus could not be reached on whether to retain the intermediate factor or split it up into its initial factors. So the group decided to keep SPT in the development of the conceptual model and test its appropriateness at a later stage.

EFA is used because it is an orderly simplification of interrelated measures and has been used in the past to explore the possible structure of observed factors without imposing any preconceived structure on the outcomes (Child, 1990). Furthermore, Suhr (2006) proposes that EFA's goals are to:

- Help determine the number of latent constructs (intermediate factors) underlying a set of items (initial factors) – ***which is the reason for using EFA in this study***

[12] Multicollinearity is a statistical phenomenon in which one variable can be linearly predicted from the others with a degree of accuracy

- Provide a means of explaining variation among items (initial factors) using newly created factors (when developing theories)

- Define the content of meaning of factors

(Suhr, 2006)

Therefore, given all these justifications, it is concluded that EFA is the best method to test the appropriateness of all the factors in the final conceptual model, particularly of SPT.

3.3.5.2.1 Steps to conducting EFA

According to Rajamanickam (2001), factor analysis starts with a correlation matrix in which the inter-correlations between the studied factors are presented. The researcher reduces the dimensionality of the matrix by looking for factors that highly correlate with other factors, identifying an underlying intermediate factor (Field, 2000). These intermediate factors are typically placed along the y-axis of the matrix against which the initial factor can be plotted on the x-axis (Field, 2000) resulting in factor scores[13] and factor loadings[14]. Factor scores are typically used to carry out multiple regression analysis while factor loadings are used in determining 'substantive importance of a particular [initial factor] to an intermediate factor' (Field, 2000).

To develop a correlation matrix, a researcher can follow the Five-Step Exploratory Factor Analysis Protocol (Williams et al., 2010):

1. Is data suitable for EFA?
2. How will factors be extracted?
3. What criteria will assist in determining factor extraction?
4. Selection of rotational method
5. Interpretation and labeling

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[13] Factor scores are the "scores of a subject on a factor" (Rietveld and Van Hout, 1993)

[14] Factor loadings are the correlation of the initial factors with an intermediate factor (Rietveld and Van Hout, 1993)

Step 1: Is the data suitable for factor analysis?

Sample size is considered to be important in conducting EFA. According to Tabachnick & Fidell (2007), at least 300 respondents are needed, whereas a earlier study by Comrey and Lee (1992) suggest that 300 is considered good, 500 is considered very good and greater than 1000 is considered excellent . While Comrey and Lee's suggestion was made early in the literature, it has been cited by many other researchers such as MacCallum & Austin (2000), Pett et al. (2003) and Thompson (2004), who have all conducted EFA in their studies.

As mentioned earlier in Section 3.2.4, approximately 700 responses were collected using the survey instrument. Therefore, the sample size was considered to be suitable for using EFA.

Before proceeding with the next steps, it is important to note that literature suggests that several tests be used to assess the suitability of the data collected for EFA (Williams et al., 2010). The tests that will be carried out are as follows:

- Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy – this measure tests whether the correlations among the factors are small (Kaiser, 1970; Kaiser , 1974). In other words, KMO measures the sampling adequacy on an index ranging from 0 to 1, with 0.50 considered suitable for factor analysis (Hair et al., 1995; Tabachnick & Fidell, 2007).

- Bartlett's Test of Sphericity – this test relates to the significance of the study and hence shows the validity and suitability of the responses collected to the problem (Bartlett, 1950). This is a statistical test that provides statistical probability that the 'correlation matrix has significant correlations among at least some of the variables' (Hair et al., 1998), thus determining the appropriateness of factor analysis. For the EFA to be significant, the test must be less than 0.05 (Hair et al., 1995; Tabachnick & Fidell, 2007).

Step 2: How will the factors be extracted?

According to Williams et al. (2010), factor analysis tries to find common factors by extracting factors. The technique of factor extraction tries to take out as much of the common variance as possible in the first factor, then the next, then the next, in a rotation until no common variance remains (Suhr, 2006). 'The process of manipulating the frames of reference axes is known as rotation' (Suhr, 2006). Child (1990) explains that rotation applied to the reference axes means turning the axes about the origin until alternative positions have been reached. The aim of rotation is to simplify the factor structure (Costello & Osborne, 2005). There are many ways to extract factors such as Principal Components Analysis, Principal Axis Factoring and Alpha Factoring. The method used for this study is Maximum Likelihood (ML), which maximizes the likelihood that a function is a common approach to estimating the parameters. According to Fabrigar et al. (1999) it is the 'best choice because it allows for the computation of a wide range of indexes of the goodness of fit of the model [and] permits statistical significance testing of factor loadings and correlations among factors and the computation of confidence intervals' (p 277).

Step 3: What criteria will assist in determining factor extraction?

Williams et al. (2010) state that the aim of data extraction is to reduce the large number of initial factors into intermediate factors. This process allows for determining the number of factors to extract by keeping the factors that actually account for the most variance in data (Suhr, 2006). To simplify the factor solutions and produce scale unidimensionality, there are a number of criteria available such as Kaiser's Criteria, Scree Test and so on (Hair et al., 1995). For the purpose of this study, the criteria used is Kaiser's Criteria (eigenvalue >1 rule) (Kaiser, 1960); this criteria is used as it is the best known and the most utilized approach (Fabrigar et al., 1999; Nunnally, 1978). According to the Kaiser Criteria; only the factors that have eigenvalues greater than one (1) are retained for interpretation.

Following these analyses, a best-fit solution or final number of factors is presented in Chapter 4.

Step 4: Selection of Rotational Method

Another consideration when deciding on the total number of factors is to decide how initial factors relate to intermediate factors. Williams et al. (2010) suggest that because rotation maximizes high item loadings, it produces an interpretable and simplified solution. There are two common rotational techniques: orthogonal rotation and oblique rotation, each with their own methods such as Varimax and Promax respectively. For this study, the oblique rotation/Promax is used because it produces factors that are correlated (Williams et al., 2010). Research also suggests that oblique rotation produces more accurate results for research in human behavior or when the data does not meet prior assumptions (Costello and Osborne, 2005) – as is the case in this study. This is a study into human behavior and it is dealing with a factor SPT that does not seem to meet the focus group's prior assumptions. Once the rotational method is implemented, the result is examined to check for items that do not load, or are unable to be assigned to a factor and therefore need to be discarded. For instance, decisions on loading the factor or not might depend on:

- an item loading on several factors
- an item not loading on any factor
- an item does not conceptually fit any factor structure

Step 5: Interpretation

At this stage, based on the factor loading, decisions are made to which initial factors are attributed to which intermediate factors and whether their given names are appropriate or not. Research suggests that at least two or more initial factors must load on to an intermediate factor so that it can be given a meaningful interpretation (Henson and Roberts, 2006; Isaac and Michael, 1997). In the current study, as the grouping of initial factors into intermediate factors has already been established, the purpose of this step is to verify the groupings of initial factors into intermediate factors.

EFA was carried out using SPSS which has a pre-programmed function that conducts EFA.

3.3.5.3 Structural Equation Modeling (SEM)

Studies suggest that research that uses ISM to develop conceptual models, such as the students' likelihood to e-cheat, cannot prove the accuracy of the results by the method itself (Chang, 2010). Structural Equation Modeling (SEM) is suggested as a method of testing the hypotheses of causality among the set of the variables, or factors, so that SEM can examine the model fit of the ISM (Jharkharia and Shankar, 2005; Eswarlal, Dey & Shankar, 2011; Grzybowska, 2012).

This section describes SEM, why it is appropriate for this study and its process of application.

3.3.5.3.1 Understanding this method and why it is appropriate

What is SEM? Structural Equation Modeling (SEM) has been defined by Rigdon (1998) as a 'methodology for representing, estimating, and testing a theoretical network of (mostly) linear relations between variables'. Lei and Wu (207) define SEM as a 'general term that has been used to describe a large number of statistical models used to evaluate the validity of substantive theories with data'.

Hoyle (1995) argues that SEM as a comprehensive statistical approach that is used to test hypotheses about relations between measured and latent variables. This is an important advantage of using SEM over other testing methods (Lei & Wu, 2007). MacCallum and Austin (2000) also propose a similar understanding of SEM as a confirmatory method that is used to test hypothesized patterns of both directional and non-directional relations between observed and unobserved variables.

Wuensch (2009) defines SEM as a causal modeling or analysis of covariance structure. It represents an extension of General Linear Modeling (GLM) techniques, such as ANOVA and multiple regression analysis (Lei & Wu, 2007). Kline (1998) and Wuensch (2009) suggest that SEM is a combination of factor analysis and multiple regression and that special cases of SEM include confirmatory factor analysis and path analysis which are described briefly below.

Path analysis (PA) is an extension of multiple regression in which structural relations among the observed variables are modeled (Teo, Tsai & Yang, 2013).

Figure 3.12 below shows a sample path analysis model:

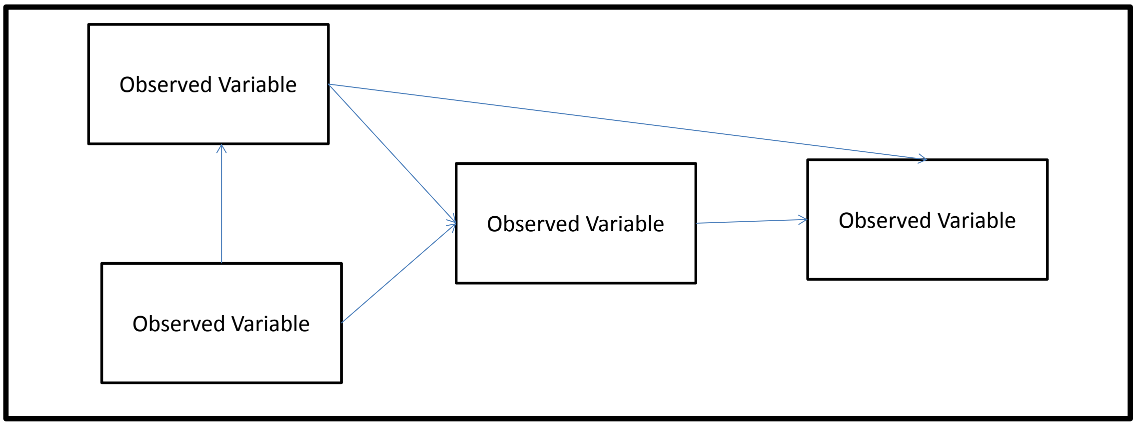

Figure 3-12: *Path Analysis Model*

In the context of the current research, the factor External Pressure has a direct impact on Prior Academic Achievements which, in turn, is hypothesized to affect Students' Likelihood to e-cheat. In this situation, Prior Academic Achievements is a mediator between External Pressure and Students' Likelihood to e-cheat because it is the source variable for Students' Likelihood to e-cheat and the result variable for External Pressure.

Confirmatory factor analysis (CFA) models are commonly used to test patterns of relationships between variables (Teo et al., 2013). CFA differs from EFA 'in that factor structures are hypothesized a priori and verified empirically rather than derived from the data' (Lei & Wu, 2007, p 34). CFA evaluates measurement models in SEM. Unobserved latent variables (such as the intermediate factors in this study) cannot be measured directly but are rather indicated by the responses to the observed variables (Teo et al., 2013). Figure 3.13 below shows an example of a CFA model:

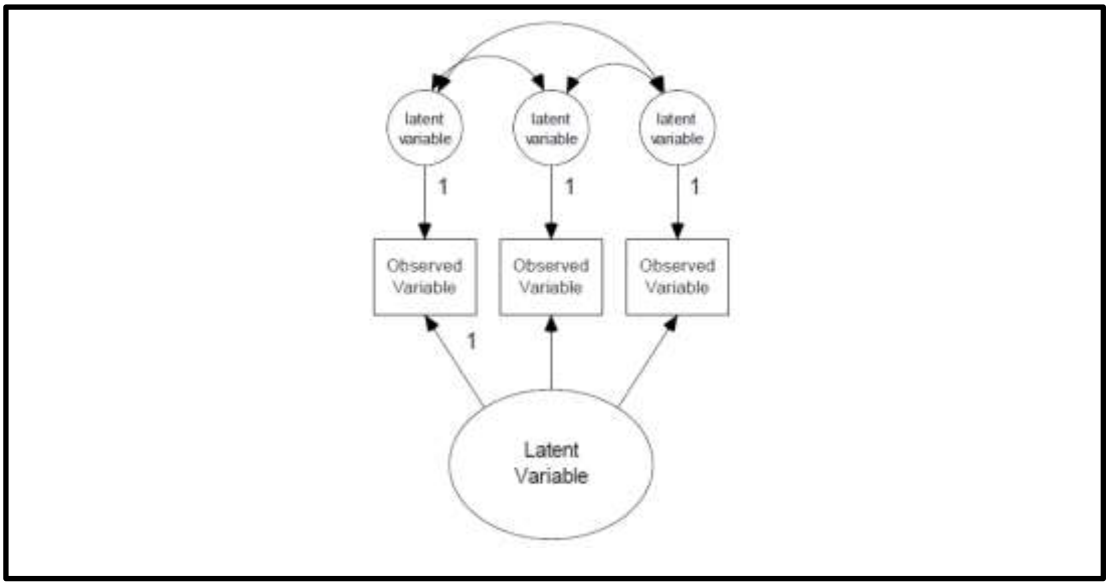

Figure 3-13:*Confirmatory Factor Analysis (CFA) Model (adapted from Teo et al, 2013)*

Why SEM? SEM has been widely used to analyze relationships among variables in marketing, customer research, construction and even quality assurance (Bollen, 1989; Bagozzi & Heatherton, 1994; Meyer & Collier, 2001; Datta, 2003; Molenaar, Washington & Dickmann, 2000; Mohamed, 2002, 2003). Studies also indicate that SEM is popularly used in the social sciences when the focus is on abstract psychological factors such as 'intelligence' or even 'attitude towards something' (Rigdon, 1998; Fox, 2002). Researchers have used SEM to analyze data in studies that have particularly looked at student behavior where researchers have used SEM to test a causal relationship model describing and quantifying the factors against a dependent variable such as student likelihood to cheat (Park, 2009; Simkin & McLeod, 2009; Farkas & Orosz, 2012).

Although the literature suggests that a correlation between factors can in fact be calculated using Pearson correlation, researchers state that the drawback to that method is that it does not allow developing statements about the cause-and-effect relationship between factors (Stewart & Mohamed, 2004). In addition, Sekaran (2004) suggests that when there are many factors that influence each other and the problem occurs in a chain-like fashion, it becomes imperative to identify the factors associated with the problem, rather than just establishing a singular cause-and-effect relation. So, it is suggested that the **structural model should be tested using SEM because it allows**

concurrent testing of hypothesized relations for the whole model (Meyer & Collier, 2001; Ahuja, 2007).

Furthermore, the literature suggests that research in the social or behavioral sciences increasingly employs multilevel, multivariate research designs where the lower-order units (initial factors) are clustered within the higher-order units (intermediate factors) (Ryu, 2014). Multilevel modeling then becomes imperative in analyzing multilevel data because:

1. often the observations from the lower-level units do not meet the independence assumption as they are assumed to be homogenous; and
2. a relationship between variables in one level does not necessarily generalize to another level (Gilthorpe & Cunningham, 2000; Ryu, 2014).

In such cases, multilevel modeling takes the dependency into account in the first instance and provides adjustments for the standard errors leading to accepted statistical inferences and, in the second instance, allows researchers to test the relationships between variables in all levels in the model (Ryu, 2014). Studies suggest that SEM is in fact an accepted framework for analyzing such multivariate data (Joreskog, 1978; Bentler, 1980) because 'latent variable models can be specified to estimate the relationships between latent constructs and observed indicators, and a set of linear relationships with more than one dependent variable can be estimated simultaneously' (Ryu, 2014, p. 2). Therefore, with the theoretical development of SEM and the development of software packages, the use of SEM in such fields as behavioral and social sciences in becoming increasingly appropriate and accepted method of analysis.

In choosing between PA and CFA, according to Suhr (2006), PA is used to test models and the relationships among the observed variables, while CFA is used to test models of relationships between the observed variables and unobserved or latent variables (such as in the case of this study). Furthermore, Hershberger (2003) suggests that CFA is a good tool to use when accounting for measurement error in modeling relationships between latent variables and when describing the assumed relationships between measured variables, measured and latent variables and between latent variables. According to Lei and Wu (2007), the goal of using CFA is to determine whether the hypothesized model is consistent with the data collected, also known as the model-data fit.

3.3.5.3.2 Describing the SEM Process

To test the proposed conceptual model using SEM, the current research used the following steps, adapted from Suhr (2006), Kline (2005), Schumacker and Lomax (2004; 2010) and Lei & Wu (2007).

Step 1: Model Specification.

Based on an extensive literature review, the researchers' knowledge of the field and ISM team's discussions, factors are identified and then the relations among the factors are identified. These are then represented as models which are often both conceptualized and presented graphically (Lei & Wu, 2007). The researcher then clearly states the hypothesized relationships between factors.

***Step 2: Data Collection/Classification and Model Identification*.**

Lie and Wu (2007) and In'nami and Koizumi (2013) suggest that model identification is concerned with determining if a unique value for each factor can be derived, which factor's value is unknown using a variance/covariance matrix of observed variables that are known. If all the factors are determined with just enough information, this type of model is called just-identified; if there is more than enough information, the type is called over-identified; and if there isn't enough information, it is called under-identified model (Suhr, 2006). Typically, models need to be over-identified in order to be estimated and to test the hypotheses (Davis, 1993; Reilly & O'Brien, 1996; Rigdon, 1995).

It is also important to note that when a 'model involves feedback or reciprocal relations or correlated residuals, it is said to be non-recursive; otherwise the model is recursive' (Lei & Wu, 2007, p. 42). This distinction between recursive and no-recursive models is important for both step 2 (model identification) and step 3 (model estimation).

For this process model specification and identification typically precede data collection (Teo et al., 2013).

Items that need to be considered before proceeding to the next step include sample size, multicollinearity and missing data as discussed below:

- ***Sample size*** is an important issue in SEM. SEM is a large sample technique

(Bowen & Guo, 2012). To ensure unbiased parameter estimates and an accurate model-fit; larger the model, larger the sample size needs to be. So it is suggested that data collection should come after the model is specified so that the sample size can be determined a priori (Lei & Wu, 2007). Although there are no clear rules or recommendations on the required sample size to obtain a reliable solution and parameter estimates in SEM (Shammout, 2008), maximum likelihood estimation[15] is a common estimation procedure used in SEM, and literature suggests that that the minimum sample size that will ensure the appropriate use of the maximum likelihood estimation is approximately 200, or 5-20 times the number of parameters to be estimated (Kline, 2005; Lei & Wu, 2007). Furthermore, researchers such as Bentler and Chou (1987) have argued that the ratio should be 5:1, whereas Hair et al. (2003) suggested as small as 50 found to provide valid results, or a recommended minimum sample size of 100-150 to ensure the stable maximum likelihood estimation solution, or even a range of 150 – 400 to estimates in SEM with latent variables that can lead to a degree of confidence about such statistics (Holmes-Smith, 2000).. Hoelter's critical sample size, N, is often used as a standard size that is expected to get a good fit, significant at the stated level of significance (Hoetler, 1983). This sample size is found in most SEM software such as AMOS (that will be discussed in the next section).

- ***Multicollinearity*** is a situation where measured variables are too highly related. If this happens, the results are biased when some statistical tests are conducted. According to Kline (2005), the usual practice is to compute the bivariate correlations for all measured variables; and if any pair with a correlations higher than r = 0.85 is found, one of the two variables needs to be excluded from further analysis.

- The literature suggests that randomly ***missing data*** is not uncommon and can easily be handled through special maximum likelihood estimation methods offered by SEM software which uses all available data (Kline, 2005; Lei & Wu, 2007).

[15] Maximum Likelihood Estimation: a method of estimating the parameters of a statistical model

***Step 3: Model Estimation*.**

In this step, the goal of estimation is to find a parameter such that the implied variance/covariance matrix is as close as possible to the observed variance/covariance matrix (Hancock & Mueller, 2006; Loehlin, 2004; Schumacker & Lomax, 2004).

According to literature, a specified model has fixed and free parameters that are to be estimated from the data (Mueller & Hancock, 2008; Lei & Wu, 2007). The scale of a latent variable is said to be arbitrary and has to be set either as standardized by fixing its variance to 1 or fixing the factor loadings so the latent variable can take the scale of one of its indicators (Lei & Wu, 2007). On the other hand, 'free parameters are estimated from the data' (Suhr, 2006). Degrees of freedom are the difference between the number of data points and the number of parameters to be estimated (In'nami & Koizumi (2013). If the degrees of freedom are positive (more than 1), the models are identified, otherwise, the model is unidentified, unless it is zero, then it is identified but cannot be evaluated.

Literature suggests that based on the factors such as data collinearity and sample size, there are many different methods available for model estimation. However, the most widely used method is maximum likelihood that is the default function in many SEM programs (In'nami & Koizumi, 2013, Teo et al., 2013). The reason for the popularity of this method is its robustness under a variety of conditions that produce parameter estimates that are unbiased, consistent and efficient (Bollen, 1989; In'nami & Koizumi, 2013).

Studies suggest that model estimation can fail to converge (Rigdon, 1998; Ahuja, 2007; Park, 2009). If this happens, the SEM software stops the estimation process, giving an error message (Lei & Wu, 2007). The estimation of a model can also provide solutions that may be improper in which case the estimates are not interpretable (Lei & Wu, 2007).

Step 4: Model Evaluation.

Once the model is estimated, the next step is to check how well the implied model is supported by the collected data, i.e. should the hypothesized model be retained or rejected by testing how well the model fits the data. This is a statistical hypothesis-testing problem, with the null hypothesis being that 'the model under consideration fits the data' (Lei & Wu, 2007, p36).

Typically, a statistically non-significant chi-square value is used to indicate a good fit (In'nami & Koizumi, 2013). The desired result of the test is to get statistical non-significance which implies that the proposed model cannot be rejected and hence can be considered correct (In'nami & Koizumi, 2013). However, chi-square test changes with the sample size. So literature suggests that model evaluation should be carried out using various types of fit indices in order to manage the sample size sensitivity problem (Kline, 2011; Ullman, 2007, Hoyle, 1995; Martens, 2005). Byrne (2006), Kline (2011), Kelloway (1998), Mueller and Hancock (2004) and Schumacker and Lomax (2004) all suggest classifications of fit indices that are explained below. The recommended levels for each index explained are provided in Table 3.15.

- Absolute Fit – to measure how well the specified model reproduces data. The main index is chi-square which tests for the extent of misspecification and magnitude of discrepancy between the sample and the fitted covariance matrix (Hu & Bentler, 1999). If it is significant, then the model does not fit the sample data, so a p-value that is not significant is desired (Teo et al., 2013). However, as chi-square cannot be used by itself as an indicator (as it tends to be greater when the number of observed variables increases), other indices are used such as Goodness-of-fit index (GFI) and Adjusted goodness-of-fit index (AGFI). Goodness-of-fit assesses the relative amount of observed variances/covariance that is explained by the model. Although there are no known sampling distributions, researchers propose GFI value greater than 0.90 as an indicative of a satisfactory model fit (Cheung & Rensvold, 2002). Another study has suggested a value greater than 0.95 (In'nami & Koizumi, 2013). However, research suggests that widely considered values above 0.90 are commonly accepted as adequate (Baumgartner & Homburg, 1996) An adjusted goodness-of-fit takes into account the degrees of model complexity and adjusts the goodness-of-fit by ratio of degrees of freedom that are used in the model to the total degrees of freedom (Teo et al., 2013). It is believed that the standardized root mean square residual (SRMR) is a good indication of the extent of error resulting from the estimation of the specified model. The amount of error illustrates how accurate the model is, so lower standardized mean square residual value (less than 0.05) represents a better model fit (Teo et al., 2013). The root mean square error (RMSEA) of approximation corrects the tendency of the chi-square to reject models with large number of variables. ‘A lower root mean square error of approximation value (less than 0.05) also indicates a good model fit and is usually reported with a confidence level of 95% level to account for sampling errors associated with the estimated [root mean square error of approximation]’ (Teo et al., 2013).

- Comparative Fit – to compare the improvement of the model to null model. Examples include Comparative Fit Index (CFI) that indicates the relative lack of fit of a model versus the null model (In’nami & Kozimu, 2013). Typically, it is normal and the value varies from 0 to 1 (a higher value indicates a better fit).

- Parsimonious Fit – assesses the discrepancy between the observed and implied covariance matrix, taking into consideration the complexity of the model (In’nami & Kozimu, 2013). A model with a few estimated parameters gets a good parsimony fit (PR) because although adding parameters improves for of the model, it does not improve vastly enough to justify the added complexity. The indices are computed using the parsimony ratio by calculating ratio of degrees of freedom used by model to the total degrees of freedom (Marsh, Balla & McDonald, 1988). Typically, parsimony comparative fit index (PCFI) which simply adjusts the comparative fit index using the parsimony ration is used for this fit.

Table 3-15*: Model fit recommended levels (adapted from Teo et al, 2013; Hooper, Coughan & Mullen, 2008)*

Fit Index	Recommended level	Reference
Chi-squared	Non-significant	Hair et al (2006)
CFI	>0.90	Hu and Bentler (1999)
GFI	0 (no fit) - 1(perfect fit)	Schumaker & Lomax (2004)
AGFI	0 (no fit) - 1(perfect fit)	Schumaker & Lomax (2004)
SRMR	< 0.08	Hu & Bentler (1999)
RMSEA	< 0.06 reasonable <0.05 close good fit	Hair et al (2006) Browne & Cudeck (1993)
PCFI	No recommended threshold levels Possible to obtain parsimony fit indices within the .50 region	Mulaik et al. (1989)

Before checking the model fit, the studies suggest that a check for ***outliers*** is imperative (In'nami & Koizumi, 2013; Teo et al., 2013). Outliers are observations that lie far away from other values in the sample (NIST/SEMATECH, 2012). Barnett and Lewis (1995) define outliers as observations that appear outside the remaining dataset and are hence deemed inconsistent. Multivariate outliers are observations that are not consistent with the correlational structure of the data and can be detected using the Mahalanobis's distance square (Franklin et al., 2000). Mahalanobis distance 'uses estimates of the location and scatter to identify values that are far away from the main cloud of data' (Franklin et al., 2000, p. 697). Mahalanobis's d-squared test follows a chi-squared distribution with degrees of freedom equal to number of observed variables (In'nami & Koizumi, 2013). Here, the observations should be arranged according to the size of the statistics; so those exceeding the critical value of the chi-square given degree of freedom are judged as outliers; e.g. A p value less than 0.001 (In'nami & Koizumi, 2013).

Step 5: Model Modification.

If it is found that the fit of the model is not good, then the hypotheses are adjusted and the model is retested. Sometimes, this step is called re-specification (Schumacker & Lomax, 2004; Teo et al., 2013). In this step, parameters are either added or removed to improve the model fit. Other changes can include changing the parameter from free to fixed or vice versa. However, literature cautions that any changes made must be carefully adjusted and supported by theory, otherwise there is a risk of making a Type 1 error[16] (Teo et al., 2013). It is suggested that computer software such as AMOS assists researchers in the process of model modification by computing the modification indices (MI) for each parameter which report the changes in the chi-squared value after the adjustments (Teo et al., 2013). Below are the simple steps to modify a model that have been adapted from Teo et al. (2013):

1. Examine estimates for regression coefficient and specified covariance. Ratio of coefficient to standard error = z test significance with $p < 0.05$.

2. Adjust co-variances or path coefficients to make better model fit.

---

[16] Type 1 error is the wrong/incorrect rejection of a true null hypothesis.

3. Re-run model to test adequacy of fit. The new model is now subset of previous one, called a nested model. A Chi-squared test is carried out to ensure no important data is lost with degrees of freedom of the test equal to number of adjusted paths.

4. Use modification indices from AMOS program. The value of a given index is the amount the value of the chi squared test decreases of the respective parameter is freed. At each step, a parameter is freed producing the largest improvement in the fit and the cycle is continued till an adequate fit is achieved.

(Teo et al, 2013)

Studies suggest that rather than data-driven changes, modifications should be considered based on multiple alternative models a priori that may be empirically equivalent (In'nami & Koizumi, 2013; Joreskog, 1993) before making substantial claims and finalizing results.

All the steps to analyzing the model using SEM are illustrated in the flow chart below:

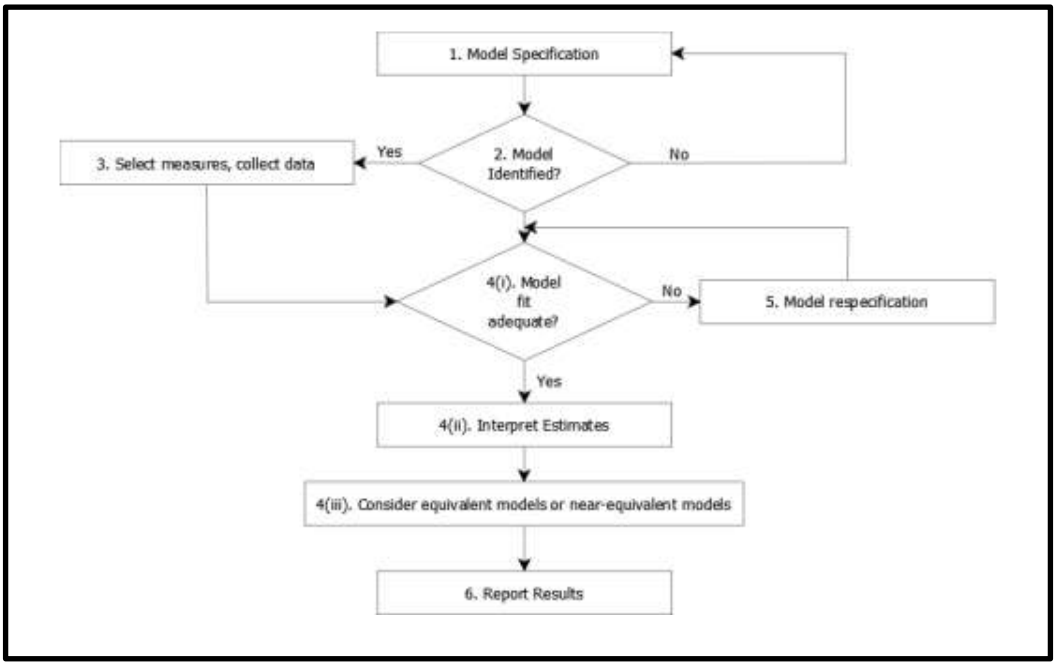

Figure 3-14*: Flowchart showing the basic steps of SEM (adapted from PIE Tutor, 2014)*

As has been mentioned in the previous section, AMOS (analysis of moment structure) that is distributed with SPSS Version 19 will be used to run SEM analysis on the model and data collected for this study (SPSS, 2006; Bowen & Guo, 2011).

The next chapter presents the results of the analysis methods explained in this chapter.

CHAPTER 4: RESULTS AND ANALYSIS

4.1 Introduction

This chapter outlines the analysis is performed on the data collected based on the analysis tools explained in Chapter Three. Initially the respondents' profile is discussed stating why they are a suitable sample for the study as previously outlined. Following this discussion, Exploratory Factor Analysis (EFA) is presented to test appropriateness and retention of all factors used in the model. Structural Equation Modeling (SEM) is conducted to test the accepted conceptual model from the expert panel. Finally, Path Analysis and Hypotheses Testing are conducted.

4.2 Respondents' Profile

As discussed in Chapter Three, a total of 1000 copies of the survey instrument were sent out to different classrooms. 654 printed and completed surveys were received and then entered, by research assistants, into the Qualtrics online survey system. An additional 60 surveys were completed online, making a total of 714 completed surveys being received. Of 714 responses collected, 62 responses were removed due to either missing information or those responses which were deemed unusable during the time of data entry as the responses seemed to be rather automatic, rather than thought-out. In these 62 responses, some respondents marked all 'Strongly Agree' columns for every single question, or left answers blank which suggested either unwillingness or inability to answer some questions or not able to complete the answers on time (Karanja, Zaveri & Ahmed, 2013). Furthermore, some of the responses rejected only had Section I Personal details filled in while some hadn't completed the survey either because they came in late to the classroom or chose not to continue. Some respondents produced automatic responses by simply ticking one chosen column for all items, such as all 'Strongly Agree' or all 'Strongly Disagree' – typically the first response column or the last; these questionnaires were also rejected. Research suggests that students often tend not to return a survey, answer automatically or just simply do not fill in surveys because:

- nearly 50% of them received 2 or more unsolicited surveys
- students felt over-surveyed and annoyed
- survey was not of interest to students

- survey seemed too complicated or required too much time/effort to complete
- other surveys provided some kind of incentives

(Ohme, Isaacs & Trusheim, 2005)

Standard practice suggests a 66% response rate (Ohme et al., 2005), which is close to the overall response rate of this study that stands at 65.2% (652 out of 1000). Love and Smith (2003) and Liberatore, Pollack-Johnson & Smith (2001), stated that a response rate above 30% was considered statistically viable and satisfactory. Although existence of missing or incomplete responses may be regarded as a threat to the validity of the study due to possible bias in collection process (MacKenzie and Podsakoff, 2012), as the size of responses that were rejected was 62 out of 714, i.e. 8.68% of the total responses collected, therefore rejecting these responses would not affect the validity of the overall data collected (O'Rourke, 2003). A total of 652 completed responses were collected out of 1000, so the total response rate was 65.2% for the survey, well above the accepted level and therefore considered statistically viable and satisfactory, therefore this rate was accepted.

Out of the suitable 652 responses, 52% were male, while 48% were female. Figure 4.1 shows the distribution of respondents with respect to gender. Studies of the gender distribution across universities globally among member nations of OECD by Vincent-Lancrin (2008) found that the gender ratio stands at about 46-54 percent (male to female) worldwide; Borzelleca (2012)'s study of universities across North America found 43.5-56.4 ratio (male to female); and the Annual Report on Dubai Private Education Landscape 2013/2014 published by Knowledge and Human Development Authority (KHDA) of Government of Dubai found 57-43 ratio (male to female). On average, the gender distribution across these studies indicates that a range of a distribution difference of 2-4 points is considered to be an even distribution; therefore the even distribution found in this study was considered to be true representation of the population (ICEF, 2013).

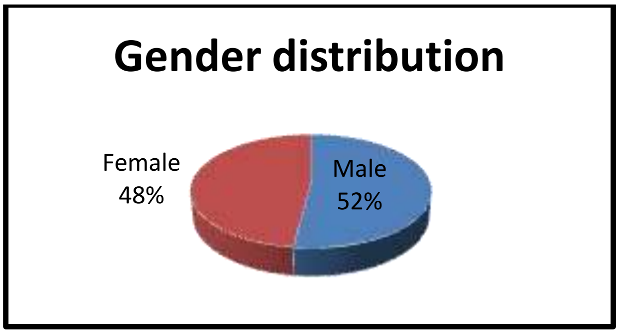

Figure 4-1*: Distribution of respondents with respect to gender*

The age group of the respondents was collected through the second question of the survey. Based on the data collected, 60% of the respondents were aged between 18 – 20, 8% were less than 18 years of age, 20% were 21-22 years of age and the remaining were older with 2% older than 25. The ICEF report suggested that average age group worldwide in higher education ranges from 19-22 (ICEF, 2013). Therefore, this distribution was considered to be a true representation of the total population. Figure 4.2 shows the distribution of respondents with respect to their age.

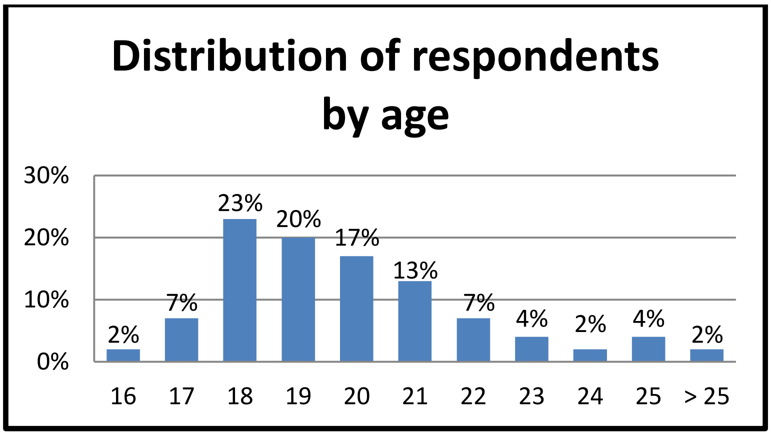

Figure 4-2*: Distribution of respondents with respect to age*

The third question in the survey asked about the respondents' area of study. Figure 4.3 shows the distribution of respondents with respect to their area of study. According to the data collected, 45% of the respondents were studying Business, 22% were in Accounts/Finance, 17% were from Computer Studies and 9% chose 'Others' where they specified areas such as Marketing, Management Information Systems, Commerce and Human Resources. The ratios mirror that of studies done on worldwide student enrollments which suggest higher enrollments of students then technology and computer sciences (Kingkade, 2013)

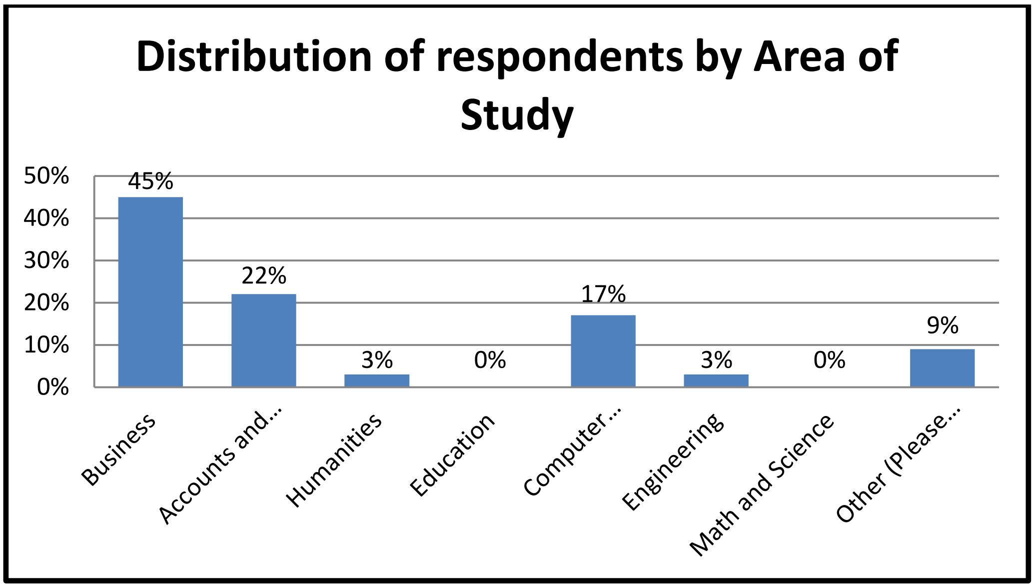

Figure 4-3*: Distribution of respondents with respect to age*

The majority of the respondents was first or second year students with 38% and 30% respectively as shown in Figure 4.4 below. Groupings were completed in four categories: first year, second year, third year and fourth year and above.

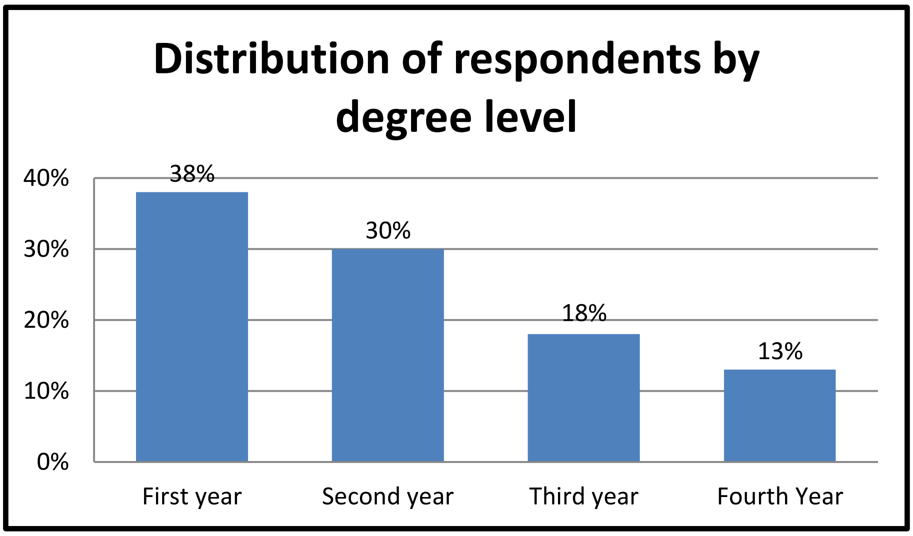

Figure 4-4*: Distribution of respondents with respect to degree level*

The average lecture class size was in the range of 21-40 students (36% of the respondents) which was also consistent with the typical class size of subjects that students attended with 35% between 21-40, only 5% of classes were over 100 for both, as shown in Figure 4.5 below. The statistics are close to the worldwide class-size statistics where average class sizes are usually 56 or fewer in universities (Bandiera, Larcinese & Rasul, 2010).

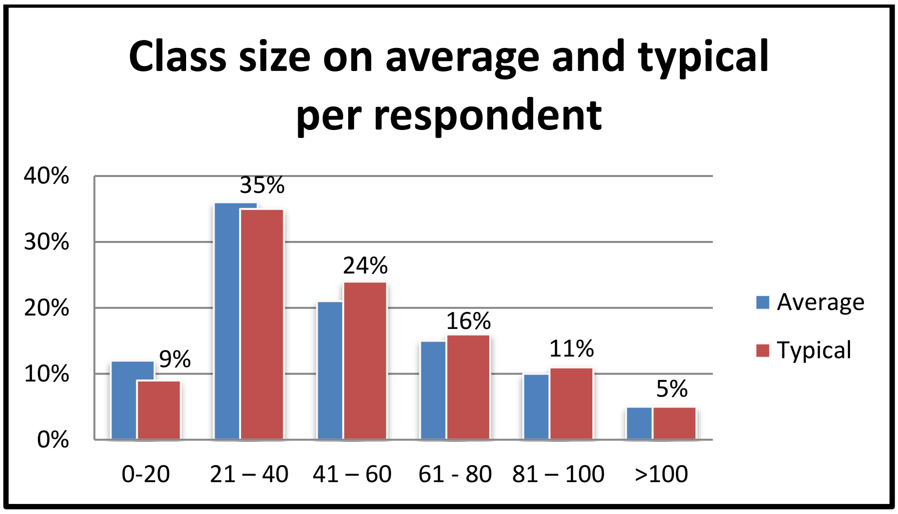

Figure 4-5*: Distribution of respondents with respect to average class size and typical class size of lectures attended*

In this section, the respondents' profile was discussed in order to state why they proved to be a suitable sample for the study as previously outlined. In the next section, Exploratory Factor Analysis (EFA) is presented to test appropriateness and retention of all factors used in the model.

4.3 EFA to test appropriateness and retention of all factors

EFA was used to test the appropriateness and retention of all the factors using the five steps explained in Chapter 3, Section 3.2.4.2.2. The data was already accepted as suitable for using EFA in Chapter 3, Section 3.2.4.2.2. The KMO measure and the Bartlett's test of Sphericity were used as explained in Chapter 3, Section 3.2.4.2.2. As shown in Table 4.1, all factors that had an eigenvalue greater than one (1) were retained for interpretation using the KMO and Bartlett's. Promax rotation was used to extract the factors for this analysis. A detailed representation of the analysis is provided in the Appendix G for further clarification. A summary of EFA results are presented in Table 4.2 below.

Table 4-1*: KMO and Bartlett's Test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.922
Bartlett's Test of Sphericity	Approx. Chi-Square	34867.194
	df	3486
	Sig.	.000

Table 4-2 : *Overall results of EFA*

Pattern Matrix[a]	Factor													
	1 (ICT)	2 (PEA)	3 (SEA)	4 (PeeEA)	5 (EP)	6 (UPAC)	7 (SLC)	8 (PAA)	9 (PC)	10 (ECA)	11 (Alie)	12 (TEA)	13 (SeE)	14 (Neu)
PAA_1								**.857**						
PAA_2								**.924**						
PC_1									**.585**					
PC_2									**.691**					
UPAC_1						**.777**								
UPAC_2						**.889**								
UPAC_3														
UPAC_4						**.689**								
UPAC_5						**.744**								
UPAC_6						**.665**								
UPAC_7														
UPAC_8						**.629**								

	1 (ICT)	2 (PEA)	3 (SEA)	4 (PeeEA)	5 (EP)	6 (UPAC)	7 (SLC)	8 (PAA)	9 (PC)	10 (ECA)	11 (Alie)	12 (TEA)	13 (SeE)	14 (Neu)
ECA_1										**.888**				
ECA_2										**.970**				
EP_1					**.546**									
EP_2					**.534**									
EP_3					**.706**									
EP_4					**.519**									
EP_5					**.722**									
EP_6					**.662**									
EP_7					**.524**									
EP_8					**.633**									
EP_9					**.676**									
EP_10														
EP_11														
EP_12														
ICT_1	**.695**													

	1 (ICT)	2 (PEA)	3 (SEA)	4 (PeeEA)	5 (EP)	6 (UPAC)	7 (SLC)	8 (PAA)	9 (PC)	10 (ECA)	11 (Alie)	12 (TEA)	13 (SeE)	14 (Neu)
ICT_2	**.789**													
ICT_3	**.633**													
ICT_4	**.816**													
ICT_5	**.859**													
ICT_6	**.775**													
ICT_7	**.700**													
ICT_8	**.818**													
ICT_9	**.777**													
ICT_10	**.846**													
ICT_11	**.867**													
ICT_12	**.768**													
ICT_13	**.813**													
ICT_14	**.569**													
SEA_1			**.725**											
SEA_2														
SEA_3			**.816**											

	1 (ICT)	2 (PEA)	3 (SEA)	4 (PeeEA)	5 (EP)	6 (UPAC)	7 (SLC)	8 (PAA)	9 (PC)	10 (ECA)	11 (Alie)	12 (TEA)	13 (SeE)	14 (Neu)
SEA_4			**.759**											
SEA_5			**.657**											
SEA_6														
SEA_7			**.541**											
SEA_8			**.680**											
SEA_9														
SEA_10			**.785**											
SEA_11			**.835**											
SEA_12			**.853**											
SEA_13														
SEA_14														
SEA_15			**.606**											
SEA_16			**.557**											
SLC_1							**.857**							
SLC_2							**.914**							
SLC_3							**.944**							

	1 (ICT)	2 (PEA)	3 (SEA)	4 (PeeEA)	5 (EP)	6 (UPAC)	7 (SLC)	8 (PAA)	9 (PC)	10 (ECA)	11 (Alie)	12 (TEA)	13 (SeE)	14 (Neu)
TEA_1														
TEA_2														
TEA_3														
TEA_4														
TEA_5												**.505**		
TEA_6												**.905**		
TEA_7												**.918**		
PEA_1		**.960**												
PEA_2		**.919**												
PEA_3		**.961**												
PEA_4		**.967**												
PEA_5		**.970**												
PEA_6		**.593**												
PEA_7		**.593**												
PeeEA_1				**.817**										

	1 (ICT)	2 (PEA)	3 (SEA)	4 (PeeEA)	5 (EP)	6 (UPAC)	7 (SLC)	8 (PAA)	9 (PC)	10 (ECA)	11 (Alie)	12 (TEA)	13 (SeE)	14 (Neu)
PeeEA_2				**.882**										
PeeEA_3				**.874**										
PeeEA_4				**.878**										
PeeEA_5				**.824**										
PeeEA_6				**.808**										
PeeEA_7				**.794**										
Neu_1														**.798**
Neu_2														**.807**
SeE_1													**.597**	
SeE_2													**.632**	
Alie_1											**.888**			
Alie_2											**.649**			

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

Note: Loading less than 0.5 is not displayed.

Based on the EFA results as shown in Table 4.2, the Student Personality Traits (SPT) did not load as an individual factor, but rather as the three separate initial factors, Alienation (Alie), Self-Efficacy (SeE) and Neutralization (Neu), thus rejecting the following hypotheses:

- H17: Student personality traits has a positive influence on Prior Academic Achievements
- H18: Student personality trait has a negative influence on Prior Cheating Behavior
- H19: Students personality traits has a positive influence on Student Ethical Attitudes

This further supported the discussion by the ISM team members as explained in Chapter 3, Section 3.1.3.3, where the ISM team was split between keeping the SPT as a single factor or as three separate initial factors. The argument supported the EFA findings that Neutralization, Alienation and Self-Efficacy would impact the Students' Likelihood to e-Cheat separately.

Based on the EFA results, three new hypotheses were proposed as follows:

- H17: Alienation has a positive influence on students' likelihood to e-cheating
- H18: Self-efficacy has a negative influence on students' likelihood to e-cheating
- H19: Neutralization has a positive influence on students' likelihood to e-cheating

The updated list of hypotheses to be tested were:

- H1: University policy and anti-cheating has a positive influence on the Ethical Attitude of Students.
- H2: University policy and anti-cheating has a positive influence on the Ethical Attitude of Teachers
- H3: External pressure has a positive influence on the Prior Cheating Behavior
- H4: External pressure has a positive influence on the Prior Academic Achievements
- H5: Advancement in ICT has a positive influence on the Prior Cheating Behavior

- H6: Advancement in ICT has a negative influence on the Ethical Attitude of Students
- H7: Advancement in ICT has a negative influence on the Ethical Attitude of Teachers
- H8: Ethical attitude of parents has a positive influence on the Ethical Attitude of Students
- H9: Ethical attitude of peers has a positive influence on the Ethical Attitude of Students
- H10: Prior academic achievement has a positive influence on Students' likelihood to e-cheat
- H11: Prior cheating behavior has a positive influence on Students' likelihood to e-cheat
- H12: Ethical attitude of students has a negative influence on Students' Likelihood to e-cheat
- H13: Ethical attitude of teachers has a negative influence on Students' Likelihood to e-cheat
- H14: Extracurricular activities has a positive influence on Students' Likelihood to e-cheat
- H15: Ethical attitude of teachers has a positive influence on the Ethical Attitude of Students
- H16: Prior cheating behavior has a negative influence on the Ethical Attitude of Students
- H17: Alienation has a positive influence on students' likelihood to e-cheating
- H18: Self-efficacy has a negative influence on students' likelihood to e-cheating
- H19: Neutralization has a positive influence on students' likelihood to e-cheating

The updated conceptual model is shown below in Figure 4.6.

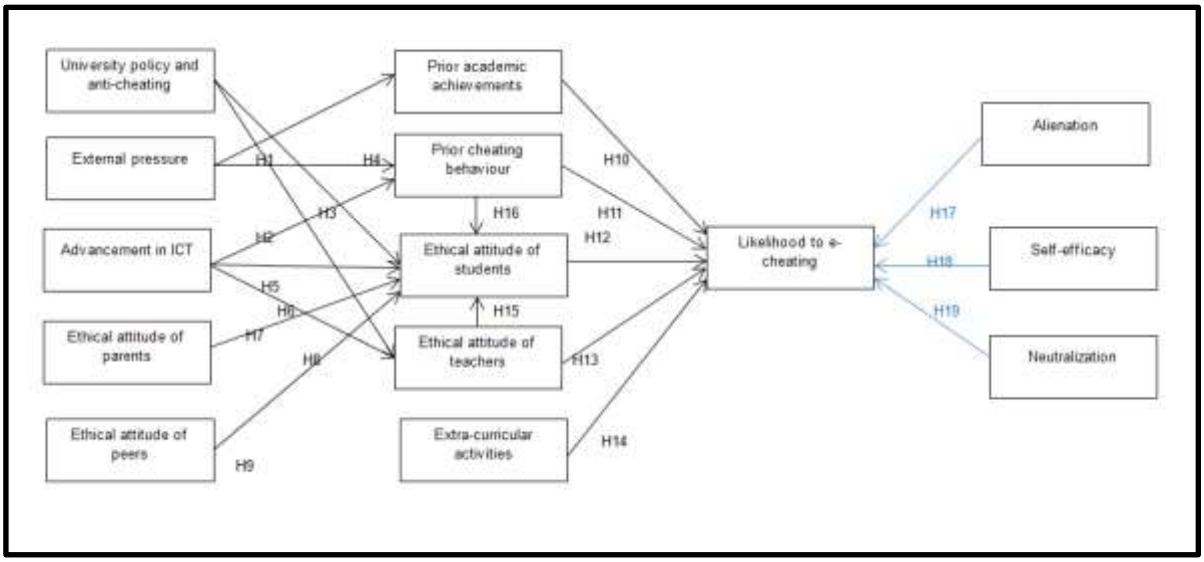

Figure 4-6*: Final Accepted Conceptual Model*

In this study, EFA was conducted to explore factors that lacked consensus in the literature (in this case, the Student Personality Traits and whether the constructs loaded onto it or as separate factor loadings for Self Efficacy, Alienation and Neutralization). CFA is performed after EFA to have a better measurement of the construct validity. This may give rise to a difference in the results from EFA and CFA on the sample, but with the assertion that it allows a rigorous assessment of the instrument properties (Hair et al., 2006). The EFA and CFA results were very similar with minor exceptions (that have been highlighted in Table 4.2 in yellow) that did not load to the respective factors during EFA. This is mainly due to the fact that there is a tendency for cross-loading to occur when EFA is run (Matsunaga, 2010). During Confirmatory Factor Analysis (CFA), the loading of these items were confirmed as CFA does not allow cross-loading.

4.3.1 Common Method Test

Common method variance (CMV) bias is a problem that "affects questionnaire-based studies in different disciplines across social and information science" (Gorrell et al., 2011, p2). Research states that if majority of the variance is explained by a single factor, then there exists a bias, CMV (Podsakoff, MacKenzie & Lee, 2003).

To test the CMV bias, the Harman-single factor test was used. This test is widely accepted and used to check whether or not most of the variance is explained by a single factor (Podsakoff et al., 2003; Rego et al., 2007; Woszczynski and Whitman, 2004; Chi et al., 2004; Chungtai, 2008; Darnall, Jolley & Handfield, 2008; Thacker and Wayne, 1995; Carr and Muthusamy, 2008). If majority of the variance was explained by a single factor, then the test would assert a CMV bias. During the EFA, the Harman-single factor test was performed, where the number of factors extracted was constrained to 1 (Podsakoff et al., 2003). The results are provided in the table 4.3 below. The results indicate that the constrained one factor solution only explained 23.9% of the variance. Furthermore, the unconstrained EFA shows 14 factors explaining 70% of the variance[17] demonstrating that there was no CMV bias.

Table 4-3: *Harman-single factor test results*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16.731	23.902	23.902	16.731	23.902	23.902
2	6.672	9.532	33.434			
3	4.731	6.758	40.192			
4	3.331	4.758	44.950			
5	2.721	3.887	48.837			
6	2.526	3.609	52.446			
7	1.909	2.727	55.173			
8	1.824	2.606	57.779			
9	1.663	2.376	60.155			
10	1.499	2.141	62.296			
11	1.336	1.908	64.204			
12	1.245	1.778	65.983			
13	1.144	1.634	67.617			
14	1.100	1.572	69.189			
15	1.024	1.463	70.652			
16	.920	1.314	71.966			
17	.878	1.254	73.220			
18	.776	1.109	74.329			
19	.753	1.076	75.404			
20	.725	1.036	76.440			
21	.683	.976	77.416			

[17] Total variance explained in Appendix G

22	.642	.917	78.333			
23	.634	.906	79.238			
24	.627	.896	80.134			
25	.604	.863	80.997			
26	.568	.811	81.808			
27	.559	.799	82.607			
28	.547	.781	83.388			
29	.517	.739	84.127			
30	.505	.721	84.848			
31	.485	.694	85.541			
32	.477	.681	86.222			
33	.465	.665	86.887			
34	.456	.651	87.538			
35	.437	.624	88.162			
36	.399	.570	88.732			
37	.395	.564	89.296			
38	.388	.555	89.851			
39	.382	.545	90.396			
40	.368	.526	90.922			
41	.359	.513	91.435			
42	.343	.489	91.925			
43	.334	.477	92.401			
44	.326	.466	92.867			
45	.308	.440	93.307			
46	.304	.434	93.742			
47	.294	.420	94.161			
48	.280	.401	94.562			
49	.271	.387	94.949			
50	.269	.384	95.333			
51	.252	.360	95.694			
52	.232	.332	96.026			
53	.226	.323	96.348			
54	.216	.308	96.656			
55	.207	.295	96.952			
56	.195	.279	97.231			
57	.194	.277	97.508			
58	.183	.262	97.770			
59	.175	.251	98.020			
60	.169	.242	98.262			
61	.167	.238	98.501			
62	.154	.220	98.720			
63	.148	.211	98.932			
64	.135	.193	99.125			

65	.130	.185	99.310			
66	.122	.174	99.484			
67	.107	.153	99.637			
68	.106	.152	99.789			
69	.083	.118	99.907			
70	.065	.093	100.000			

Extraction Method: Principal Component Analysis.

4.4 SEM Analysis and Results

As explained in Chapter 3, Structural Equation Modeling (SEM) which is a combination of Confirmatory Factor Analysis (CFA) and Path Analysis (PA) was used to test the accepted conceptual model represented in Figure 4.6 and the final 19 hypotheses (having rejected the three SPT hypotheses and adding the three separate hypotheses for Alienation, Self-Efficacy and Neutralization). The following steps explain the results of the SEM analysis on the collected data:

Step 1: Model Specification

The model to be used for this run has been provided in Figure 4.6, constructed based on literature review and ISM process, and finalized after using EFA to test for appropriateness and retention.

Step 2: Data Collection/Classification and Model Identification

Data was collected for all the factors prior to Chapter 4 using the survey instrument and methodology explained in Chapter 3.

- *Sample size:* as explained in Chapter 3, it was established that a sample size of 200 or 5-20 times the number of items should be used (Kline, 2005; Lei & Wu, 2007). Furthermore, Kline contented that although the minimum sample size should be no less than 200, it is preferable that the minimum size be 400 or 5-10 times the number of parameters – whichever is larger (2005). For this study, a total of 1000 respondents were targeted, of whom 714 completed the surveys, of which 62 surveys were rejected due to either missing information or those responses which were deemed unusable during the time of data entry. The response rate was therefore well above the desired target of 30% response rate, and about 6.5 times the number of items and therefore statistically viable and unbiased (as explained in Section 3.3.5.3.2).

- *Multicollinearity:* as explained in Chapter 3, based on bivariate correlations, none of the variable pairs measured < 0.85 and therefore none of the variables were rejected (Bowen & Guo, 2012).

- *Missing data*: to handle missing data, SPSS software has two options: (1) List-wise deletion of missing data (2) Replacing missing data with the mean; both of these methods are considered valid and viable statistical methods of handling missing data (Kline, 2005; Lei & Wu, 2007). In this study, to handle the missing data, the second option was used to replace the missing data with the mean.

- As per the run, the data was classified as ***identified*** as all factors were determined using the collected data (Reilly & O'Brien, 1996; Suhr, 2006). The model was also found to be ***recursive*** as it did not involve any feedback or reciprocal relations (Lei & Wu, 2007).

- The grouping of each variable (observed variable) on to the intermediate factors (unobserved or latent variables) was tested using the factor loading of the observed variables on to the corresponding latent constructs. The strength and significance of the path coefficients was used to test the hypotheses. Overall model fit and related fit measures were conducted to ensure model fit of the conceptual model. Further convergent validity and reliability analysis was also measured.

Step 3: Model Estimation

- The scale of the latent variable was arbitrary and was set as **standardized** by **fixing** its variance to '1' for each of the items.

- Degrees of freedom was found to be positive (> 1) and the model was identified.

Step 4: Model Evaluation

SPSS AMOS 21 software package provided model fit indices measures to measure model fit. Table 4.3 shows the results of the model evaluation tests:

Table 4-4: *Model fit levels*

Fit Indices	Obtained	Ideal	Comments
Chi-square statistic (CMIN/DF)	2.307	<3	Reasonably good fit
Comparative Fit Index (CFI)	0.902	>0.90	Good fit
Goodness of fit (GFI)	0.905	0 (no fit) to 1 perfect fit	Reasonable fit
Adjusted goodness of fit (AGFI)	0.888	0 (no fit) to 1 perfect fit	Reasonable fit
Root mean square error of approximation (RMSEA)	0.047	<0.05	Ideal Fit
Parsimonious Comparative fit index (PCFI)	0.857	>0.50	Marginally reasonable fit
SRMR	0.07	<0.08	Reasonable fit

- Absolute Fit indices. The chi-square statistic was found to be 2.307. Literature suggests that a value less than 5 is acceptable and less than 3 is good (Marsh & Hocevar, 1985). So, this suggested that the chi-squared value of 2.307 for this study was good and acceptable (Kline, 1998). Other tests, such as Goodness of fit (GFI) and Adjusted Goodness of fit (AGFI) values were 0.905 and 0.888 respectively, which ideally should be close to 1. Hence, GFI and AGFI indicated a decent fit (Schumacher & Lomax, 1996; Sobolewski & Doran, 1996). Other valuable fit index, the Root Mean Square Error of Approximation (RMSEA), was 0.047. The recommended value for this fit statistic was below 0.05 (Schumacher & Lomax, 1996; Neilands & Choi, 2002). Hence, RMSEA statistic supported a good model fit.

- The comparative fit was 0.902 which was greater than the desired 0.90 and hence acceptable (Kline, 1998 and Neilands & Choi, 2002).

- The parsimonious fit was 0.857 which was ideal as per the desired value of > 0.50, so it was considered to be a decent marginal fit.

- The SRMR fit was 0.07 which was as per the desired value < 0.08, so considered to be a reasonable fit.

Overall, with different fit indices the model represented a good fit. In the test for outliers, Mahalanobis d-squared statistic identified 50 observations which were farthest from the centroid (AMOS produces a list of top observations ranked in order of their Mahalanobis squared-distances from the centroid of data set), and these observations were removed.

Step 5: Model Modification

The objective of the initial run was to ensure the entire factors loaded as per the suggested grouping in the final conceptual model (Figure 4.6).

Based on the initial run, the latent variable self-efficacy was removed from the model as this was the only factor causing serious model fit issues. Alongside, the corresponding hypothesis **H18: Self-efficacy has a negative influence on students' likelihood to e-cheating**, reducing the overall number of hypotheses to 18.

In addition, any factor loading of < 0.5 (Kline, 1998) was removed before the second run. As discussed above, the discrepancies in the actual data were corrected by identifying the outliers using Mahalanobis d-squared statistic, to find the observation which was the farthest from the centroid. Although the sample was reduced by 50, inaccurate responses were removed and the remaining 602 samples now represented accurate and meaningful observations.

The factor loading of observed variables into the latent constructs in the initial run are given in the Table 4.4 below. The variables in the shaded cells were removed from the analysis as the loadings were < 0.5.

Table 4-5*: Confirmatory Factor Loadings in the initial run*

Unobserved Variable (Latent Variable)		**Observed Variable**	**Factor loadings**	**Comments**
Prior Academic Achievements	**PAA_1**	**Until now, my academic achievement has usually been below average**	**0.851**	
	PAA_2	**So far in my degree, my academic performance has typically been below that of my classmates**	**0.828**	
Prior Cheating	**PC_1**	**I have cheated on an assignment, quiz, or a test**	**0.874**	

	PC_2	In the past there are times when I have cheated	0.659	
University policies and anti-cheating	UPAC_1	People who are caught cheating at my university are severely punished	0.710	
	UPAC_2	My teachers and invigilators are very vigilant in detecting any form of cheating in assignments/tests/quizzes	0.766	
	UPAC_3	The subjects in my degree are generally quite difficult	0.429	Removed
	UPAC_4	My university has an Honor code which defines what appropriate behavior is	0.699	
	UPAC_5	Punishments for cheating at my university are usually quite severe	0.724	
	UPAC_6	A second item might be: Lecturers and tutors usually catch people who cheat	0.654	
	UPAC_7	I find the subjects in my degree quite hard.	0.347	Removed
	UPAC_8	Students at my university are expected to follow the university's Honor code	0.711	
Extra-curricular activities	ECA_1	I have no time to study because of my involvement with extra-curricular activities	0.977	
	ECA_2	I have no time to complete assignments because of my involvement with extra-curricular activities	0.803	
External Pressure	EP_1	People would generally consider my family to be of high status	0.436	Removed
	EP_2	My family expects me to perform well academically	0.699	
	EP_3	My school/university expects me to perform well academically	0.787	
	EP_4	Academic performance is important to current or future employers	0.653	
	EP_5	My peers expect me to perform well	0.709	

		academically		
	EP_6	**My family would be perceived as being well off**	**0.551**	
	EP_7	**I feel pressured by my family to do well academically**	**0.386**	**Removed**
	EP_8	**My teachers and lecturers expect me to do well in my academic studies**	**0.655**	
	EP_9	**My current or future employer would expect me to have good grades**	**0.686**	
	EP_10	**I feel pressure from my friends and peers to do well at university**	**0.378**	**Removed**
	EP_11	**My Peers expect me to help them cheat**	**0.235**	**Removed**
	EP_12	**I feel that other people expect me to cheat**	**0.348**	**Removed**
Advances in ICT	**ICT_1**	**Electronic/digital devices are more widely used by my classmates than by our predecessors**	**0.686**	
	ICT_2	**In recent years, electronic/digital devices have become widely available to do university work**	**0.810**	
	ICT_3	**There are a lot more online courses at my university than there were in previous years**	**0.519**	
	ICT_4	**There are a lot more online sources on the Internet than there were in previous years**	**0.769**	
	ICT_5	**Online sources are very easy to access from my electronic/digital devices**	**0.795**	
	ICT_6	**I think it easy to use the latest technology (such as tablet, smart phones, etc.)**	**0.785**	
	ICT_7	**I like the latest technology (such as tablet, smart phones, etc.) because they are so affordable**	**0.572**	

	ICT_8	My classmates use a wide range of electronic/digital devices	0.699	
	ICT_9	Most people like me now have access to appropriate electronic/digital devices	0.711	
	ICT_10	Online courses are now widely available	0.724	
	ICT_11	People like me now have access to many online sources of information	0.795	
	ICT_12	It's easy to find and access information online	0.731	
	ICT_13	The latest technology (such as tablets, smart phones, etc.) is quite easy to use	0.781	
	ICT_14	I can afford the latest technology (such as tablets, smart phones, etc)	0.515	
Student Ethical Attitude	SEA_1	It is wrong to cheat even if an assessment task is unreasonably difficult	0.738	
	SEA_2	My university degree is only important if I get something out of it	0.298	Removed
	SEA_3	It is wrong to cheat even if the teacher is not very good	0.730	
	SEA_4	It is wrong to cheat even if the course material seemed useless	0.763	
	SEA_5	It is wrong to cheat no matter what the circumstances	0.739	
	SEA_6	I like the latest advances in technology (such as tablet, smart phones, etc)	0.496	
	SEA_7	It is wrong to pirate movies/music/software	0.451	Removed
	SEA_8	Cheating is unacceptable even in a very difficult assignment or exam	0.626	
	SEA_9	Studying at university is a waste of time unless I get a real benefit from it	0.202	Removed
	SEA_10	It is wrong to cheat even if the instructor does not grade fairly	0.701	

	SEA_11	Even if you don't enjoy a course, you shouldn't cheat in it	0.747	
	SEA_12	Cheating is always wrong, no matter what the circumstances	0.738	
	SEA_13	The latest ICT are important and useful developments	0.478	Removed
	SEA_14	Pirating software/music/software is wrong	0.328	Removed
	SEA_15	If another student is seen to be cheating, he or she should be reported	0.434	Removed
	SEA_16	It is my responsibility to prevent or report cheating	0.306	Removed
Students' Likelihood to Cheat	SLC_1	I would cheat in an assessment task	0.802	
	SLC_2	Under the right circumstances, I would cheat in an exam, quiz or assignment	0.896	
	SLC_3	I will probably cheat in exams, quizzes or assignments in the future	0.897	
Teachers ethical attitudes	TEA_1	Teachers at my university understand and enforce academic integrity	0.426	Removed
	TEA_2	My lecturers and tutors know how to deal appropriately with cheating and they do so	0.362	Removed
	TEA_3	Hand in someone else's writing as one's own	0.770	
	TEA_4	Use the Internet to copy text into an assignment	0.864	
	TEA_5	Cheat in quizzes/assignments/tests	0.908	
	TEA_6	Use pirated software/music/movies	0.789	
	TEA_7	Pirate or distribute software/movies/music	0.794	
Parents ethical attitudes	PEA_1	It is / clear that my parents feel it is wrong to:-Hand in someone else's writing as one's own	0.898	

	PEA_2	**It is / clear that my parents feel it is wrong to:- Use the Internet to copy text into an assignment**	**0.887**	
	PEA_3	**It is / clear that my parents feel it is wrong to:- Purchase essays/reports from online sources**	**0.887**	
	PEA_4	**It is / clear that my parents feel it is wrong to:-Cheat in quizzes/assignments/tests**	**0.874**	
	PEA_5	**It is / clear that my parents feel it is wrong to:-Use electronic/digital devices without authorization during tests/quizzes**	**0.890**	
	PEA_6	**It is / clear that my parents feel it is wrong to:-Use pirated software/music/movies**	**0.664**	
	PEA_7	**It is / clear that my parents feel it is wrong to:- Pirate or distribute software/movies/music**	**0.682**	
Peer's ethical attitude	**PeeEA_1**	**It is / clear that my peers feel it is wrong to:-86. Hand in someone else's writing as one's own**	**0.865**	
	PeeEA_2	**It is / clear that my peers feel it is wrong to:-87. Use the Internet to copy text into an assignment**	**0.902**	
	PeeEA_3	**It is / clear that my peers feel it is wrong to:-88. Purchase essays/reports from online sources**	**0.879**	
	PeeEA_4	**It is / clear that my peers feel it is wrong to:-89. Cheat in quizzes/assignments/tests**	**0.882**	
	PeeEA_5	**It is / clear that my peers feel it is wrong to:-. Use electronic/digital devices without authorization during tests/quizzes**	**0.860**	

	PeeEA_6	It is / clear that my peers feel it is wrong to:-91. Use pirated software/music/movies	0.751	
	PeeEA_7	It is / clear that my peers feel it is wrong to:-92. Pirate or distribute software/movies/music	0.727	
Neutralization	Neu_1	It's alright to cheat depending on the circumstances	0.550	
	Neu_2	I would cheat if I had a good reason for doing so	0.984	
Self-Efficacy	SeE_1	I don't expect to do as well in assessment tasks as my peers	Model fit issue	Removed
	SeE_2	I have trouble completing assessment tasks at the required level		
Alienation	Alie_1	In order to be part of the group, my friends expect me to cheat or help them cheat	0.727	
	Alie_2	I would cheat of help friends cheat to ensure I was accepted	0.895	

The second run of the modified model was executed. The standardized factor loadings were significantly related to their underlying constructs. The average variance extracted (AVE) and reliability of the constructs using Cronbach's alpha obtained are provided in the Table 4.5 below.

Table 4-6*: Confirmatory Factor loadings, AVE and Construct Reliability from Second Run (final run)*

Unobserved Variable (Latent Variable)	Observed Variable	Factor loadings	Average Variance Extracted (AVE)	Construct Reliability
PAA	PAA_1	0.849	0.70	0.85
	PAA_2	0.831		
PC	PC_1	0.875	0.60	0.76
	PC_2	0.658		

UPAC	**UPAC_1**	**0.727**	**0.51**	**0.88**
	UPAC_2	**0.772**		
	UPAC_4	**0.692**		
	UPAC_5	**0.725**		
	UPAC_6	**0.647**		
	UPAC_8	**0.709**		
ECA	**ECA_1**	**0.985**	**0.80**	**0.90**
	ECA_2	**0.796**		
EP	**EP_2**	**0.699**	**0.53**	**0.88**
	EP_3	**0.832**		
	EP_4	**0.728**		
	EP_5	**0.705**		
	EP_6	**0.509**		
	EP_8	**0.633**		
	EP_9	**0.665**		
ICT	**ICT_1**	**0.663**	**0.50**	**0.95**
	ICT_2	**0.800**		
	ICT_3	**0.530**		
	ICT_4	**0.773**		
	ICT_5	**0.801**		
	ICT_6	**0.777**		
	ICT_7	**0.576**		
	ICT_8	**0.702**		
	ICT_9	**0.696**		
	ICT_10	**0.728**		
	ICT_11	**0.779**		
	ICT_12	**0.723**		
	ICT_13	**0.772**		
	ICT_14	**0.520**		

SEA	SEA_1	0.732	0.52	0.93
	SEA_3	0.683		
	SEA_4	0.744		
	SEA_5	0.721		
	SEA_6	0.704		
	SEA_8	0.761		
	SEA_10	0.749		
	SEA_11	0.506		
	SEA_12	0.618		
SLC	SLC_1	0.802	0.75	0.94
	SLC_2	0.895		
	SLC_3	0.898		
TEA	TEA_3	0.788	0.62	0.91
	TEA_4	0.878		
	TEA_5	0.927		
	TEA_6	0.730		
	TEA_7	0.750		
PEA	PEA_1	0.879	0.68	0.96
	PEA_2	0.859		
	PEA_3	0.890		
	PEA_4	0.888		
	PEA_5	0.902		
	PEA_6	0.641		
	PEA_7	0.659		
PeeEA	PeeEA_1	0.843	0.70	0.96
	PeeEA_2	0.878		
	PeeEA_3	0.881		
	PeeEA_4	0.898		
	PeeEA_5	0.871		

	PeeEA_6	**0.742**		
	PeeEA_7	**0.704**		
Neu	**Neu_1**	**0.549**	**0.64**	**0.75**
	Neu_2	**0.985**		
Alie	**Alie_1**	**0.723**	**0.67**	**0.82**
	Alie_2	**0.899**		

The table shows that all the factor loadings < 0.5 (Nunnally & Bernstein, 1994) and AVE was above the cut off of 0.5 (Fornell & Larcker, 1981) and hence the model displayed **convergent validity**. Reliability analysis showed all the Cronbach's alpha values were all above the suggested 0.7 value (Nunnally & Bernstein, 1994) and reliability of all the constructs was > 0.7.

4.4.1 Common Method Test

To further asses CMV bias, Harman-single factor test was applied while performing CFA (Podsakoff et al., 2003). The model fit indices:
CMIN/DF = 8.10;
CFI = 0.42;
GFI = 0.36;
AGFI = 0.39;
RMSEA = 0.128; and
SRMR = 0.18
Showed a poor model fit, suggesting that the possibility of common method variance bias in the survey was very low (Podsakoff et al., 2003). This low CMV bias could be attributed to the efforts of the researcher to reduce the respondents' need to provide socially desirable answers by informing them that the survey was conducted anonymously and could not be traced back to individual respondents.

4.5 Path Analysis and Hypotheses Testing

The next stage of the analysis was to identify the strength and significance of the paths mentioned in the model. Each path represented a direct relationship between the unobserved variables. The final conceptual model had 19 paths that need to be tested.

The Table 4.6 shows the standardized path coefficients and its significance level. According to Kline (1998), standardized coefficients with:

- absolute value < 0.10 represents small effect,
- values around 0.30 represents medium effect and
- values > 0.50 represents large effect.

Other studies have suggested that an absolute value around or greater than 0.3 can be considered as an acceptable correlation (Hopkins, 2002; Lambert & Durand, 1975).

Table 4-7*: Path coefficients and hypotheses test results*

Hypothesis	Path (from-to)	Coefficients	Significance	Hypotheses test results
H1	UPAC--> SEA	0.220	***	Highly significant, supported
H2	UPAC--> TEA	0.255	***	Highly significant, supported
H3	EP--> PC	-0.079	0.098	Non-significant, not supported
H4	EP--> PAA	-0.120	0.014**	Significant, supported
H5	ICT--> PC	-0.024	0.607	Non-significant, not supported
H6	ICT--> SEA	0.253	***	Highly significant, but not supported (contrary to the stated hypothesis)
H7	ICT--> TEA	0.249	***	Highly significant, but not supported (contrary to the stated hypothesis)
H8	PEA--> SEA	0.238	***	Highly significant, supported
H9	PeeEA--> SEA	0.095	0.015**	Significant, supported (but weak link)
H10	PAA--> SLC	0.112	***	Highly significant, supported
H11	PC--> SLC	0.321	***	Highly significant, supported
H12	SEA--> SLC	-0.264	***	Highly significant, supported
H13	TEA--> SLC	0.047	0.232	Non-significant, not supported
H14	ECA--> SLC	0.095	0.039**	Significant, supported (but weak link)

Hypothesis	Path (from-to)	Coefficients	Significance	Hypotheses test results
H15	TEA--> SEA	0.111	0.01**	Significant, supported
H16	PC--> SEA	-0.305	***	Highly significant, supported
H17	ALIE--> SLC	0.168	***	Highly significant, supported
H18	Removed from the analysis			
H19	NEU--> SLC	0.240	***	Highly significant, supported

*****p<.0001, **p<.05**

The results showed that H1, H2, H8, H10, H11, H12, H16, H17, H19 were all highly significant at $p < 0.0001$. Among these, H11 and H16 had path coefficient greater than 0.30 which represented a greater effect compared to the other path coefficients. Similarly H4, H14, H9, H15 were significant at $p < 0.05$, although the path coefficients were weak and represented small effect. However, hypotheses H3, H5, H13 were rejected as the links were non-significant. Interestingly, hypotheses H6 and H7 were significant, but the associations were contrary to the stated hypotheses. Hence, H6 and H7 were rejected.

The conceptual model with results of hypotheses testing is given in Figure 4.7 and 4.8 below. Solid lines and thin lines indicate hypotheses that are accepted. A solid line indicates significant paths with reasonable effect and a thin line represents significant paths with small effect. Dashed lines indicate hypotheses that are rejected. In total, out of the 18 valid hypotheses tested, 13 were accepted and five were rejected.

4.6 Summary

The questionnaire survey data analysis discussed in this chapter tested the conceptual model that was proposed in Chapter 3 by testing the appropriateness and validation of the factors proposed using EFA, the interrelationship between the factors using SEM and then testing the proposed hypotheses using path analysis and hypotheses testing. Data analysis helped in removing latent constructs that did not load onto observed variables, and helped in determining the factors that did influence students' likelihood to e-cheating in HE. It further led to identifying three initial factors as observed variables while rejecting one completely. The data analysis also contributed to the validation of the conceptual model by accepting 13 hypotheses and rejecting five.

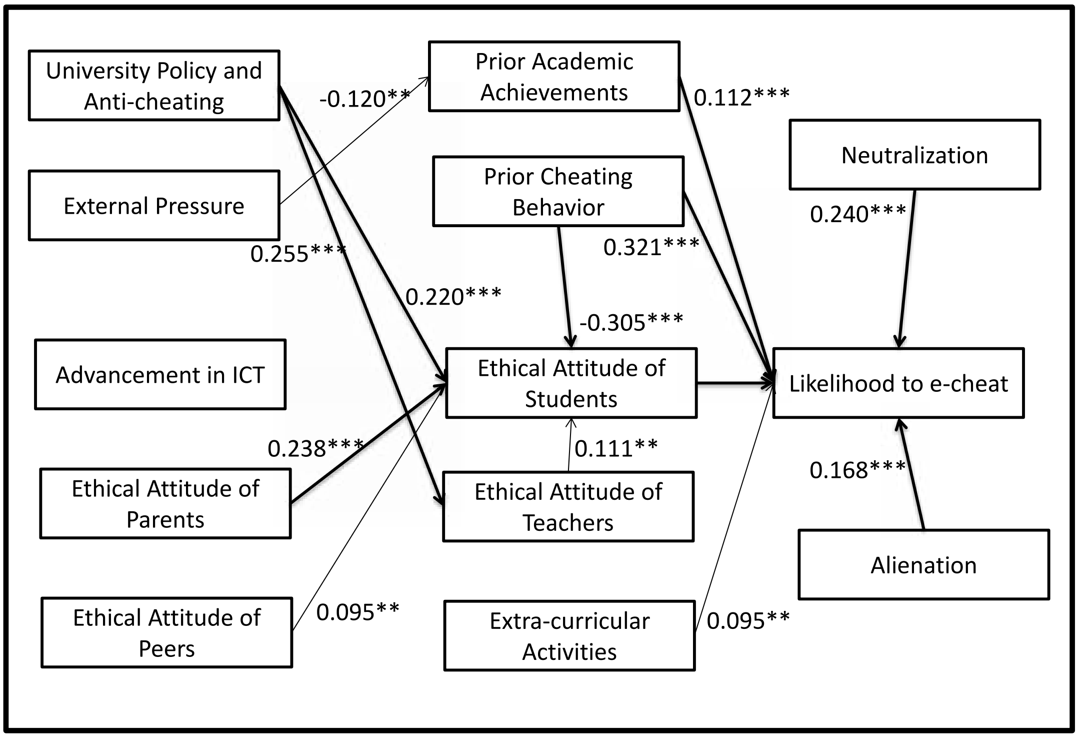

Figure 4-7*: Conceptual Model with accepted results*

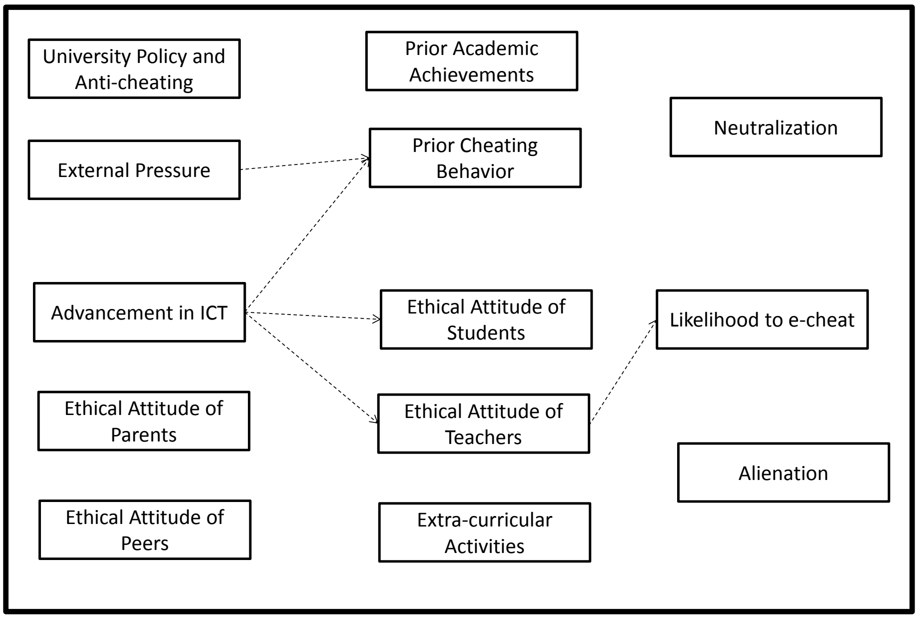

Figure 4-8*: Conceptual Model with rejected results*

CHAPTER 5: DISCUSSION

Chapter Four presented the results of this study. This chapter, Chapter 5: Discussion, summarizes the results and identifies conclusions that can be drawn. Before reviewing the results of the study, this chapter will first revisit the objectives.

5.1 Revisiting the research objectives

The objective of the current research has been to increase understanding of e-cheating among higher education (HE) students by developing and validating a conceptual model of e-cheating. This objective was furthered split into two main areas of interest as follows:

iii) To develop such a conceptual model

iv) To validate that conceptual model in practice

5.2 Revisiting the methodologies

To develop the conceptual model, based on an extensive literature and a review of existing gaps in the previous studies, a total of 39 initial factors were initially listed in Chapter 2 these were grouped into 13 intermediate factors based on further analysis of literature as shown in Table 5.1 below (see Chapter 2, Section 2.12 for further detail).

Table 5-1*: Revisiting the intermediate factors*

1. Student Personality Traits
2. Student Demographic Details
3. HE Details
4. Ethical Attitudes of Students
5. Ethical attitudes of Peers
6. Ethical attitudes of Parents
7. Ethical attitudes of Teachers
8. Prior academic achievement
9. Extra-curricular activities
10. Prior cheating behavior
11. University policies and anti-cheating characteristics
12. External Pressure
13. Advancements in ICT

To develop a conceptual model, of these 13 intermediate factors, Student Demographic Details (Student Personal Details) and HE Details were removed from the final list of intermediate factors as they were considered to be categorical variables (see Chapter 2, Section 2.13 for more detail), bringing down the total intermediate factors to 11.

To develop a factor model and test it, a multi-methodological approach was adopted and carried out in two phases.

5.2.1 Methodology Phase One

In phase one, Interpretive Structural Modeling (ISM) was used to develop the conceptual model of the factors identified. In Chapter 3, Section 3.2.1, ISM has been described as a process of using judgment of a group of experts and stakeholders on the relationships between the factors to build a digraph model (Attri et al., 2013). Nine steps were used to develop the conceptual model (see Chapter 3, Section 3.2.3 for further detail). 19 hypotheses were accepted by the ISM team, after following the ISM process (see Chapter 3, Section 3.2.3.7 for further detail. The final conceptual model was developed with no conceptual inconsistencies and with unanimous agreement of the ISM team (with the exception of the Student Personality Trait (SPT)) (Chapter 3, Section 3.1.3. for more detail), as presented in Figure 5.2.

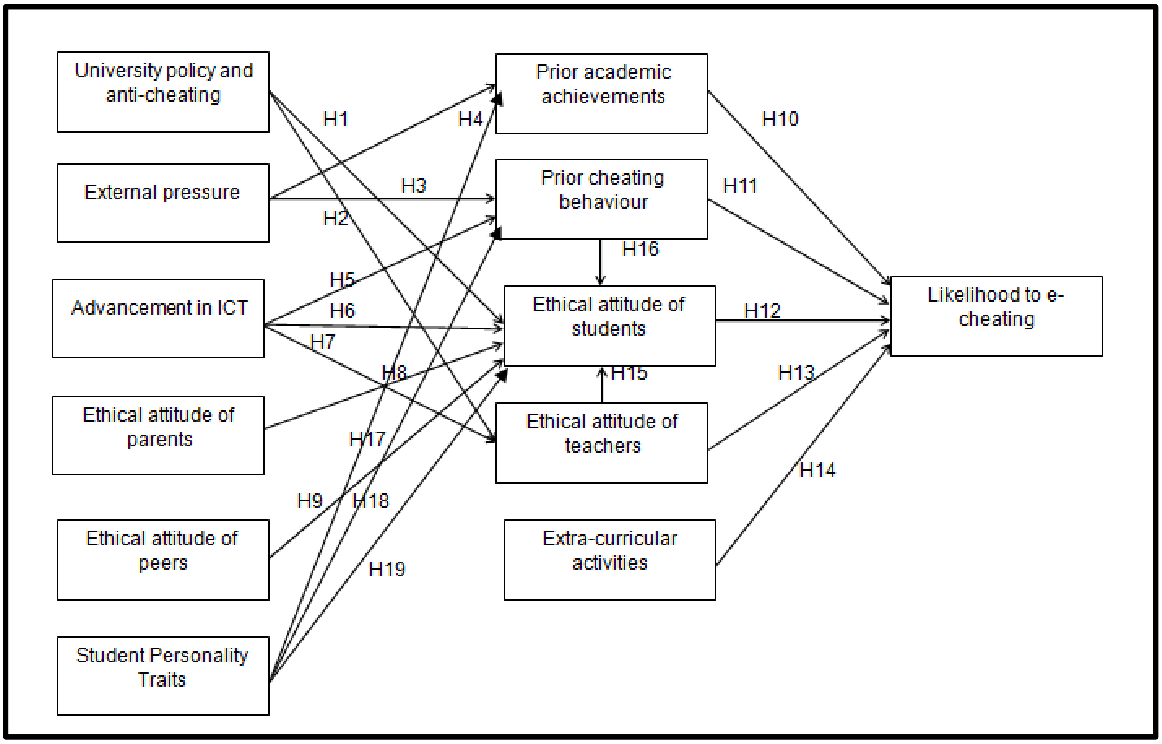

Figure 5-1*: Conceptual model revisited*

5.2.2 Methodology Phase Two

The second part of the objective of this study was to validate the proposed conceptual model. As explained in Chapter 3, Section 3.3, to validate the model, a set of empirical data was needed to be collected and statistically analyzed. This was completed through a five step process (see Chapter 3, Section 3.3 for further detail):

1. Choosing a survey model – *cross-sectional survey method, using questionnaires that had items on a 5-point Likert scale to collect students' responses (see Chapter 3, Section 3.3.1 for further detail)*
2. Selecting a suitable sample – *HE students consisting of a mix of nationalities, religions, cultures and free from bias to fit as illustrated in the Venn diagram below, Figure 5.3.*

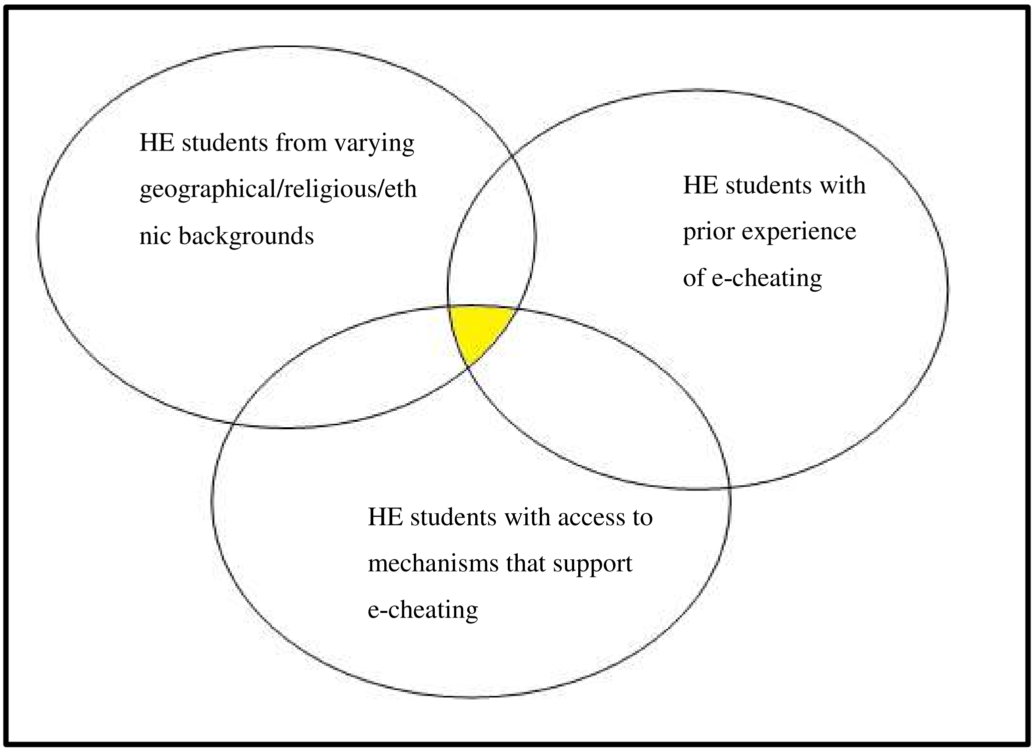

Figure 5-2*: Venn diagram of preferred characteristics of target population revisited*

The sample that was ultimately used in the study was drawn from the student population at the University of Wollongong in Dubai in the United Arab Emirates as they represented the target population. (see Chapter 3, Section 3.3.2 for further detail).

3. Developing the survey instrument – *a survey instrument was developed based on the initial and intermediate factors (Appendix B)*

4. Collecting data – *after receiving an Ethics clearance from the UOW Ethics Committee (Appendix C), the survey instrument was used to collect data from approximately 600 respondents in Chapter 3, Section 3.3.2.*
5. Analyzing data – *as explained in Chapter 3, Section 3.3.4, to analyze the collected data, the research instrument's reliability was tested using the Cronbach's alpha. Then the suitability of the data collected was tested using KMO measure and Bartlett's test of Sphericity; then Exploratory Factor Analysis (EFA) was used to test the appropriateness and retention of factors. Finally, Structural Equation Modeling (SEM) was used to test the hypotheses and examine the model fit of the ISM.*

5.3 Summary of the results

As explained in Chapter 3, Section 3.3.4, both paper and online surveys were used to capture the maximum number of responses possible. A total of 714 responses were collected, of which 62 were rejected as incomplete or invalid (as explained in Chapter 4, Section 4.2) giving a 65.2% response rate which was deemed statistically viable (see Chapter 4, Section 4.2 for further detail)

The Student Personal Details and HE Details collected from respondents all supported the claim that the sample chosen was a true representation of the target population (see Chapter 4, Section 4.1 for further detail).

5.3.1 EFA results summary

The EFA rotated matrix (see Table 4.2) grouped all the survey items that loaded onto the intermediate factors with extraction values > 0.5 and eigenvalue > 1, accepting all factors except for Student Personality Traits (SPT) which did not load at all as an intermediate factor.

5.3.2 SEM results summary

SEM analysis resulted in accepting the response rate as viable and unbiased, accepting all the variables based on a multicollinearity test and correcting the discrepancies by identifying the outliers using Mahalanobis d-squared statistics (which reduced the sample by 50, bringing the response rate down to about 60%).

The data was classified as identified, the model was recursive, the scale of latent variable was standardized to ‘1’, degree of freedom was > 1 and the model was identified. All the model fit levels showed reasonably good fit (see Table 4.3). Factor appropriateness was tested through the use of CFA; this rejected some items (see Section 5.4.2.1 for further detail). Based on the initial run, the latent variable SeE was removed from the model along with the corresponding hypothesis H18 (see Section 5.4.2.2 for further detail). The second run of the modified model found standardized factor loadings as significant and the model displayed convergent validity.

Overall, the final conceptual model was modified and accepted, while based on the path analysis and hypotheses testing of 19 paths and 18 hypotheses, five hypotheses were rejected, all other hypotheses were accepted (see Section 5.5 for further detail).

5.4 Changes to the conceptual model

Analysis of results contributed to some changes to the conceptual model that was accepted in Chapter 3. These changes are discussed in detail below.

5.4.1 EFA results that contribute to changing the conceptual model

EFA results loaded the following items with a value < 0.5 and an eigenvalue < 1 (see Table 4.2):

- UPAC_3 – ‘The subjects in my degree are generally quite difficult’. This item was meant to capture student responses towards difficulty of subject. Similarly, UPAC_7 – ‘I find the subjects in my degree quite hard’ was meant to capture response towards difficulty of subject. Neither of the two items loaded for difficulty of subject as they both had values < 0.5.
- EP_10-‘I feel pressure from my friends and peers to do well at university’, EP_11- ‘My peers expect me to help them cheat’ and EP_12-‘I feel that other people expect me to cheat’ did not load for peer pressure with a value > 0.5. However, EP_5 –‘My peers expect me to perform well academically’ loaded with a value of 0.722 for peer pressure.
- SEA_6- ‘I like the latest advances in technology (such as tablet, smart phones, etc)’ and SEA_13 - ‘The latest ICT (such as smart phones, tablet etc.) are important and useful developments’. These items were supposed to capture

response for students' attitude towards advances in ICT. But neither loaded onto the factor.

- SEA_9 – 'Studying at university is a waste of time unless I get a real benefit from it' and SEA_2-'My university degree is only important if I get something out of it' did not load for students' attitude towards studying.
- SEA_14-'Pirating software/music/software is wrong' failed to load onto students' attitude towards SMM Piracy. But, SEA_7 – 'It is wrong to pirate movies/music/software' loaded with a high value of 0.541.
- TEA_1- 'Teachers at my university understand and enforce academic integrity' and TEA_2- 'My lecturers and tutors know how to deal appropriately with cheating and they do so', did not load onto teachers' understanding and acceptance of academic integrity.
- TEA_3- 'It is clear that my teachers feel it is wrong to hand in someone else' did not load on to teachers' attitude towards cheating. However, TEA_5- 'It is clear that my teachers feel it is wrong to cheat in quiz/assignments/tests' loaded onto teachers' attitude towards cheating with value of 0.505.

Although some of the items loaded with a value < 0.5 as explained above, all other items loaded to their respective factors except SPT therefore supporting the initial synthesis and grouping of initial factors.

During the ISM process, the ISM team was unable to reach a unanimous decision regarding the appropriateness of the factor SPT (see Chapter 3, Section 3.2.3). Only 50% of the team deemed the SPT as appropriate while the other 50% rejected it. It was decided at the time to leave SPT as an intermediate factor and later revisit it to test the retention and appropriateness using EFA.

Although the KMO and Bartlett's determined that the data and sampling were adequate (see Table 4.1), as illustrated by the EFA results (see Table 4.2), the SPT did not load as an intermediate factor; however, Alie, SeE and Neu loaded as separate factors with extraction values of:

- Alie_1 = 0.88, Alie_2 = 0.649
- SeE_1 = 0.597, SeE_2 = 0.632

- Neu_1 = 0.798, Neu_2 = 0.807

and eigenvalue > 1. These results support the 50% ISM team's judgment that the three psychological factors should load separately.

The literature states that people, who are motivated to achieve socially or professionally acceptable goals or general acceptability, often do so by adopting and mirroring behavior of the social group or profession they aspire to belong to (Carrington & Conley, 1977). This would suggest that as the feeling of alienation (Alie) increases in students, they would be more likely to e-cheat.

The literature also argues that people, who indulge in dysfunctional behavior such as e-cheating, utilize neutralization (Neu) to justify their immoral behavior and keep their own actions in line with their internal moral standards (McCarthy & Stewart, 1998). This would suggest that as student's neutralization feeling increases, they are more likely to e-cheat.

In contrast, Bandura (1977) argues that self-efficacy (SeE) influences a person's choice of behavioral settings. If a person is unsure of a situation because they think it exceeds their coping skills, they will avoid such situations whereas if they feel confident and judge themselves capable of handling the situation successfully, they will be readily involved in such situations (Bandura, 1977). This would suggest that a student who has a higher level of self-efficacy will be less likely to e-cheat because they feel more confident with their subjects, assessments and marks.

These conclusions support the EFA finding that although all three factors Alie, Neu and SeE are psychological factors, they influence the dependent variable, SLC differently and hence cannot be grouped as one intermediate factor. Based on the above findings, three hypotheses were rejected:

- H17: Student personality traits has a positive influence on Prior Academic Achievements
- H18: Student personality trait has a negative influence on Prior Cheating Behavior
- H19: Students personality traits has a positive influence on Student Ethical Attitudes

Three new hypotheses were proposed for this study as follows:

- H17: Alienation has a positive influence on students' likelihood to e-cheating
- H18: Self-efficacy has a negative influence on students' likelihood to e-cheating
- H19: Neutralization has a positive influence on students' likelihood to e-cheating

Due to a change in the hypotheses, an updated conceptual model was accepted as illustrated in Figure 5.3 below.

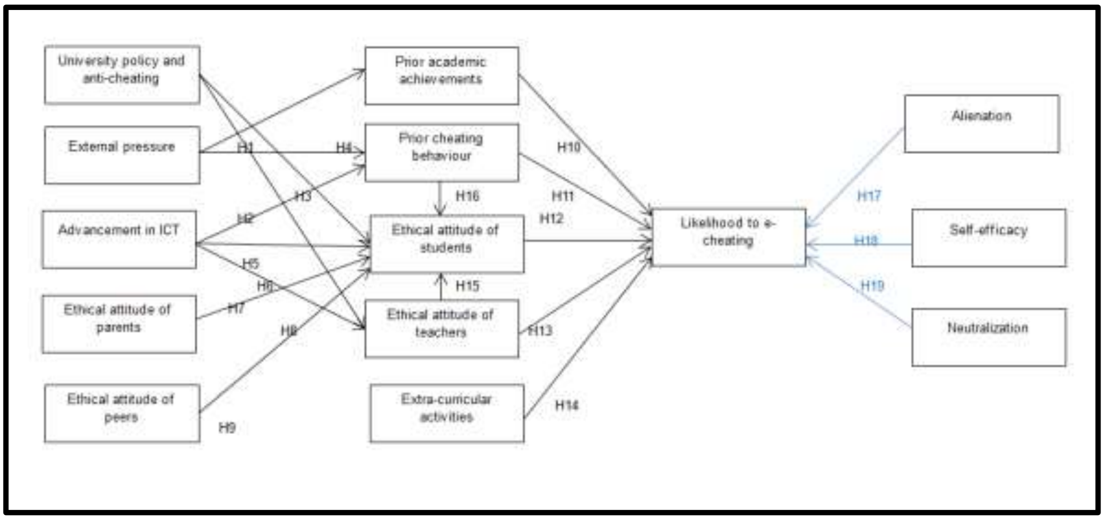

Figure 5-3*: Final Accepted Conceptual Model re-visited*

5.4.2 SEM results contributing to changes in the conceptual model

CFA was used to test the accepted conceptual model. Section 5.4.2.1 and 5.4.2.2 discuss the CFA results. Using CFA, the factor loadings < 0.5 were removed after the initial run, reducing the sample by 50. This made the initial pool a more manageable size by trimming the items that did not emerge as expected (Matsunaga, 2010).

5.4.2.1 *Removal of items due to CFA results*

The SEM initial run loaded all factors of observed variables into the latent construct UPAC as shown in Table 4.4, except the following:

- UPAC_3 – 'The subjects in my degree are generally quite difficult'
- UPAC_7 – 'I find the subjects in my degree quite hard'

Although UPAC as an intermediate factor has been accepted, the initial factor Difficulty of Subject (DoS) was removed since the factor loading of both the items that should have captured the responses for DoS, i.e. UPAC_3 and UPAC_7 failed to load onto UPAC, as shown in Figure 5.4, below.

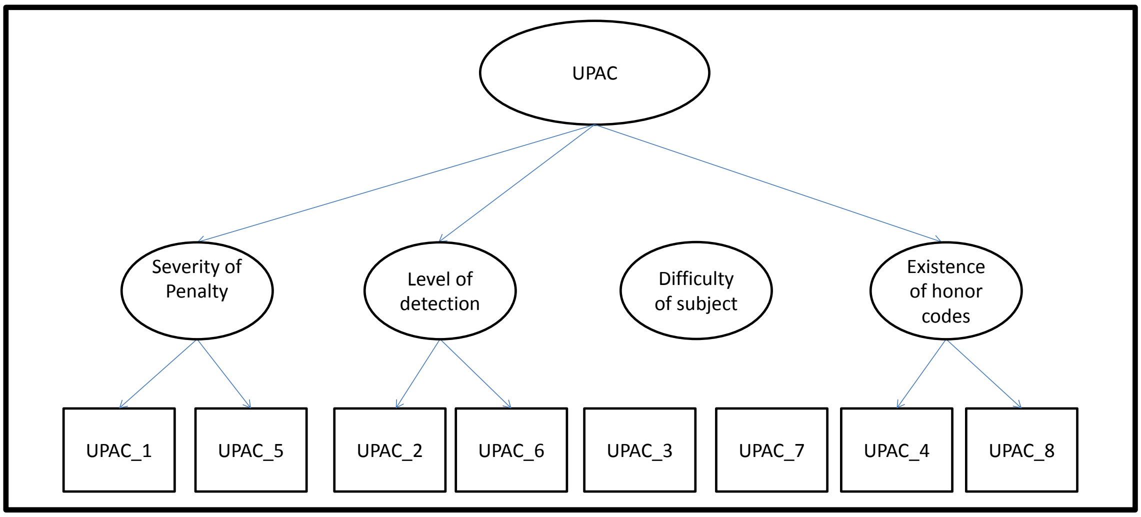

Figure 5-4*: Conceptual representation of CFA results for UPAC. Note: Ovals represent unobserved latent factors, whereas rectangles represent observed items. Arrows represent factor loadings.*

The SEM initial run loaded all factors of observed variables into the latent construct EP as shown in Table 4.4, except the following:

- EP_1 – 'People would generally consider my family to be of high status'
- EP_7 – 'I feel pressured by my family to do well academically'
- EP_10 – 'I feel pressure from my friends and peers to do well at university'
- EP_11 – 'My Peers expect me to help them cheat'
- EP_12 – 'I feel that other people expect me to cheat'

EP as an intermediate factor has been previously accepted, as were all the initial factors Corporate Pressure, Family Status, Parents' pressure, School pressure and Peer pressure. However, a few of the observed constructs, i.e. EP_1, EP_7, EP_10, EP_11 and EP_12 were removed as they failed to load onto UPAC (see figure 5.5 below).

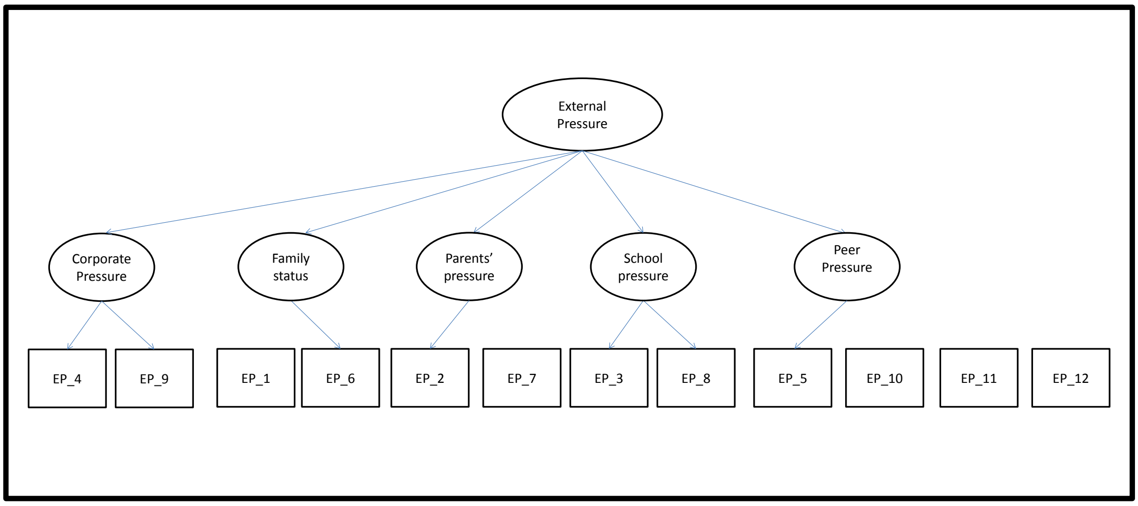

Figure 5-5*: Conceptual representation of CFA results for EP. Note: Ovals represent unobserved latent factors, whereas rectangles represent observed items. Arrows represent factor loadings.*

The SEM initial run loaded all factors of observed variables into the latent construct SEA as shown in Table 4.4, except the following:

- SEA_2 – 'My university degree is only important if I get something out of it'
- SEA_6 – 'I like the latest advances in technology (such as tablet, smart phones, etc)'
- SEA_7 – 'It is wrong to pirate movies/music/software'
- SEA_9 – 'Studying at university is a waste of time unless I get a real
- benefit from it'
- SEA_13 – 'The latest ICT are important and useful developments'
- SEA_14 – 'Pirating software/music/software is wrong'
- SEA_15 – 'If another student is seen to be cheating, he or she should be reported'
- SEA_16 – 'It is my responsibility to prevent or report cheating'

SEA was accepted as an intermediate factor. However, the initial factors Student attitude towards SMM Piracy, Student attitude towards studying, Student attitude towards Advances in ICT and Student attitude towards Academic Integrity as the observed constructs SEA_7, SEA_14, SEA_2, SEA_9, SEA_6, SEA_13, SEA_15 and SEA_16 failed to load with a value >0.5 as illustrated in Figure 5.6.

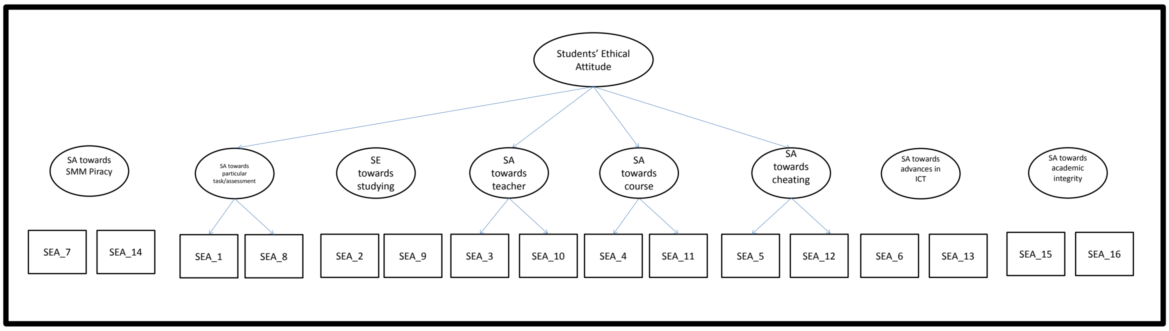

Figure 5-6*: Conceptual representation of CFA results for EP. Note: Ovals represent unobserved latent factors, whereas rectangles represent observed items. Arrows represent factor loadings.*

The SEM initial run loaded all factors of observed variables into the latent construct TEA as shown in Table 4.4, except the following:

- TEA_1 – 'Teachers at my university understand and enforce academic integrity'
- TEA_2 – 'My lecturers and tutors know how to deal appropriately with cheating and they do so'

TEA was accepted as an intermediate factor. Initial factors Teachers' attitude towards cheating and Teachers' attitude towards SMM Piracy were also accepted. However, initial factor Teachers' understanding and acceptance of Academic Integrity was rejected as the observed constructs TEA_1 And TEA_2 failed to load with a value > 0.5 as illustrated in Figure 5.7 below.

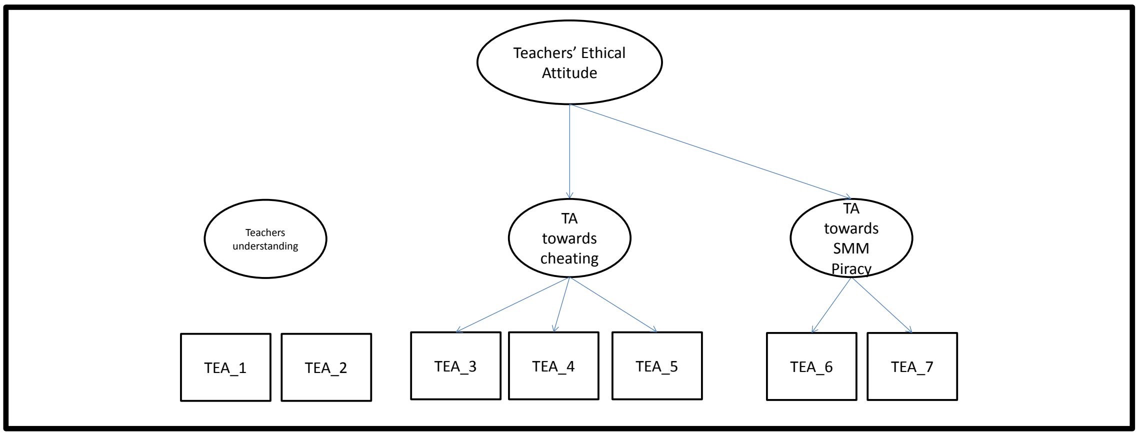

Figure 5-7*: Conceptual representation of CFA results for TEA. Note: Ovals represent unobserved latent factors, whereas rectangles represent observed items. Arrows represent factor loadings.*

According to the CFA results, all intermediate latent factors were accepted, except for Self-Efficacy, which is discussed in the next section.

5.4.2.2 *Removal of Self-Efficacy factor*

Bandura (2006) stated that 'scales of perceived self-efficacy must be tailored to the particular domain of functioning that is the object of interest' (p. 310). So, to capture student response for self-efficacy, two items were developed:

- SeE_1 – 'I don't expect to do as well in assessment tasks as my peers'
- SeE_2 – 'I have trouble completing assessment tasks at the required level'

Self-efficacy is a psychological factor and was first grouped along with Alienation and Neutralization as the intermediate factor SPT in this study. However, EFA results showed that it loaded as an independent factor, as discussed in Section 5.4.1.1.

CFA results showed that both the observed constructs SeE_1 and SeE_2 caused model fit issue and therefore, needed to be removed. As these two observed constructs were used to measure the latent variable Self-Efficacy, this result suggested the factor Self-Efficacy would be removed. The hypothesis:

H18: Self-efficacy has a negative influence on students' likelihood to e-cheating

was also removed, thus bringing down the total number of hypotheses and paths to 18. After the items were removed, a second run of the modified model was executed (see Table 4.5). All the factor loadings in this run were significantly loaded to their constructs. The AVE was > 0.5 and displayed convergent validity. Cronbach's alpha values were > 0.7 establishing reliability of the model.

5.5 Hypotheses test results and interpretation

In this section the proposed hypotheses are revisited and then the results of the path coefficients and hypotheses tests discussed.

The discussion of the hypotheses testing results will begin with the intermediate factor Ethical attitude of students (SEA). This is because as results show in Figure 4.8, Ethical attitude of students is central to a lot of other factors and plays a significant role in understanding the relationship between other factors and the dependent factor Students'

Likelihood to e-cheat (SLC). For this reason, the dependent factor, SLC will also be initially discussed below.

Students' likelihood to e-cheat (SLC) was the dependent factor. Responses for SLC were captured in the Part VII of the survey instrument using three items on a 5-point Likert scale (see Appendix B).

All three observed constructs loaded onto the latent variable with very high factor loading values and were retained.

Ethical attitude of students (SEA) as an intermediate factor was a composite of eight initial factors Students attitude towards a particular task or assessment, Students attitude towards studying, Students' attitude/level of satisfaction towards teacher, Students' attitude/level of satisfaction towards course, Students' attitude towards cheating, Students' attitude towards academic integrity, Students' attitude towards advances in ICT and Students' attitude towards SMM Piracy. Part VI of the survey instrument included 16 items on a 5-point Likert scale to capture responses for this factor (see Appendix B).

Of the eight initial factors, four were accepted, and four were rejected as the observed constructs were removed since these did not load with a value > 0.5 (see Section 5.4.2 for further detail). The four rejected factors were: Students' attitude towards SMM Piracy, Students' attitude towards studying, Students attitude towards advances in ICT and Students' attitude towards academic integrity. The hypothesis was drawn for this intermediate factor. This was:

H12: Ethical attitude of students has a negative influence on Students' Likelihood to e-cheat

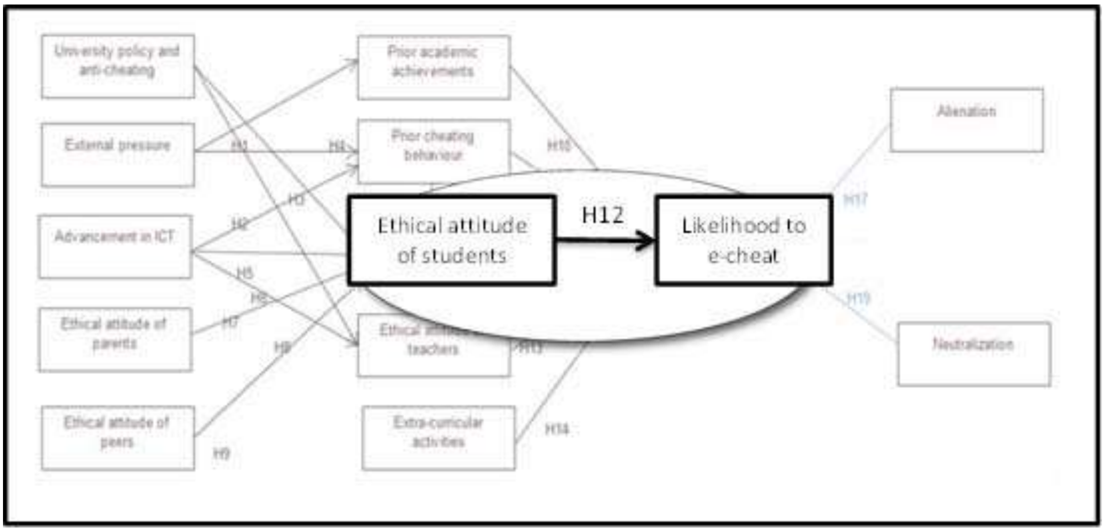

Figure 5-8: *H12*

The findings suggest that H12 was highly significant at p < 0.0001 and coefficient -0.264, that is > 0.10, and was therefore accepted. This supports the theory that SEA has a negative influence on Students' likelihood to e-cheat; this means higher the ethical attitude of students, less likely they are to e-cheat. In prior literature, Jordan (2001) suggested that student attitudes influenced student cheating behavior. Similar findings were reported by Whitley (1998), LaBeff et al. (1990), Bolin (2004), Chapman et al. (2004), Kidwell, Wozniak & Laurel(2003), Murdock et al. (2004) and Stephens (2004) who all argued that students viewed academic dishonesty as unethical and that their ethical standards deterred them from cheating. However, Murdock and Anderman (2006) suggested that previous studies did not clearly prove that honest and dishonest students actually differed in their moral judgment of cheating or pursuit of ethically attaining a degree. This is primarily because most of the previous studies reported the relationship between students' ethical attitude to possible likelihood to cheat with other factors, such as stakes of performance failure, obtaining grades (Sheard et al., 2003; Bruggeman & Hart, 1996; Corcoran & Rotter, 1987; Malinkowski & Smith, 1985) or being caught and embarrassed (Corcoran & Rotter, 1987; Stephens, 2004) Therefore the conclusions did not necessarily prove a direct influence of students' attitude on students' likelihood to cheat but rather a mix of influences of different factors on students' likelihood to cheat (Murdock and Anderman, 2006).

It is argued that this study's findings suggest statistically that students' ethical behavior negatively influences students' likelihood to e-cheat, using path coefficient and hypothesis testing that showed a statistically significant relation. The intermediate factor SEA was used to solely capture response to SEA and its possible influence on SLC (as proposed by ISM team in Chapter 3, Section 3.2.4 and tested using SEM in Chapter 4, Section 4.4). With high factor loadings for observed constructs such as:

- ‘It is wrong to cheat no matter what the circumstances’
- ‘It is wrong to cheat even if the teacher is not very good’
- ‘It is wrong to cheat even if an assessment task is unreasonably difficult’
- ‘Cheating is unacceptable even in a very difficult assignment or exam’

that loaded onto SEA (see Section 5.2.2 for details), it is believed that this study has established a significant relation between students’ ethical attitudes on their likelihood to e-cheat, such that with higher ethical attitudes, students are less likely to e-cheat. This result is strongly supported by a qualitative study conducted by McCabe et al. (1999) where the researchers suggested that lack of character and lack of personal integrity significantly influenced students’ likelihood to cheat, hence supporting the finding of this study and accepting H12.

5.5.1 Teachers’ ethical attitude (H13 and H15)

Teachers’ ethical attitude (TEA) as an intermediate factor was a composite of three initial factors Teachers’ understanding and acceptance of academic integrity, Teachers’ Attitude towards Cheating and Peers’ Attitude towards SMM Piracy. Part VIII of the survey instrument included seven items on a 5-point Likert scale to capture responses for this factor (see Appendix B).

Of the three initial factors, Teachers’ understanding and acceptance of academic integrity was removed after the CFA results showed that the observed constructs did not load onto the latent variable with a value > 0.5 (see Section 5.4.2 for further detail). The two hypotheses proposed for TEA were:

H13: Ethical attitude of teachers has a negative influence on Students’ Likelihood to e-cheat

and

H15: Ethical attitude of teachers has a positive influence on the Ethical Attitude of Students

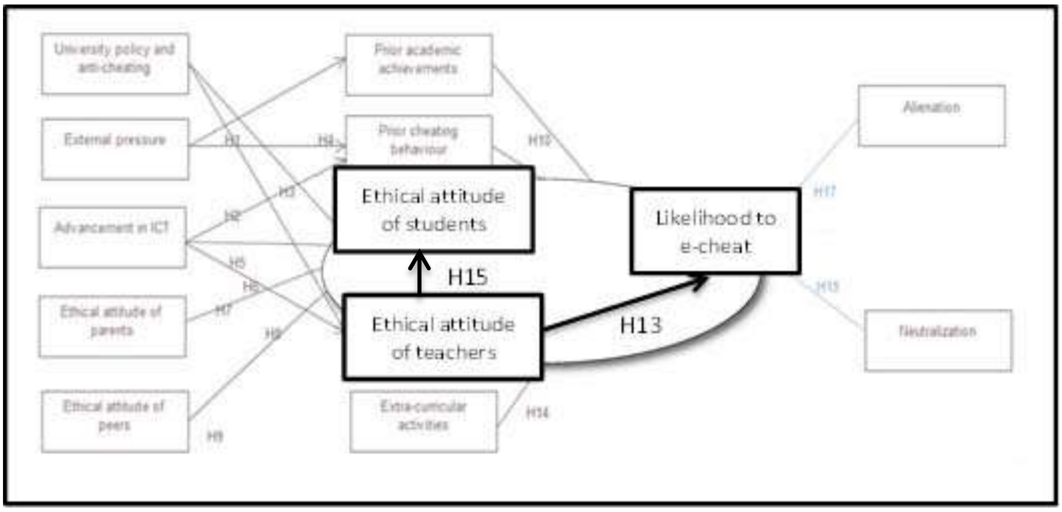

Figure 5-9*: H13 and H15*

As before all of the hypotheses were tested using path coefficient and hypothesis testing.
Hypothesis H13 was not supported as it was not significant with a weak coefficient at 0.047 and therefore rejected. This meant that the Ethical attitudes of teachers did not have an influence on the Students' likelihood to e-cheat.

On the other hand, H15 was accepted with significant influence at $p < 0.05$ and a path coefficient = 0.111 which was > 0.10 representing a small effect, but nonetheless statistically significant. This meant that the Ethical attitudes of teachers had a positive influence on the Ethical attitudes of students.

This finding is interesting because as discussed in Section 5.5.1, the Ethical attitude of students negatively influences Students' likelihood to e-cheat. With the study rejecting H13, but accepting H15 the results show an indirect influence of TEA on SLC. Although students' likelihood to e-cheat was not directly influenced by their teachers' ethical attitudes, the students' ethical attitudes were positively influenced by their teachers' ethical attitudes, and students' ethical attitudes negatively influenced their likelihood to e-cheat.

This is a significant finding as many studies suggest a direct influence of teachers' attitude on students' likelihood to cheat (Beale, Brown & Finley-Hervey, 2009; McCabe, Trevino & Butterfield, 2001; Davis et al., 1992; Baird, 1980; Murdock et al., 2005; Singg et al., 2005; Nadelson, 2007; Davis & Ludvigson, 1995; Simon et al., 2003). Some of these studies have suggested that teachers' attitude towards cheating is often perceived as influencing students' likelihood to cheat because teachers do not report cheating, because they do not care or simply look the other way (Murdock et al., 2005; Anderman et al., 1998).

Other researchers have suggested when teachers showed favoritism towards some students or felt sorry for them, that this attitude gave other students the unspoken permission to cheat (Christensen-Hughes & McCabe, 2006; Taylor, 1999).

However, this study's findings show a statistically significant influence of teachers' ethical attitude to students' ethical attitude which in turn influences the students' likelihood to e-cheat. Bjorklund and Wenestam (1999) also suggested that while most previous studies claimed that teachers' attitude directly influenced students' likelihood to cheat, their results showed a more indirect relation between the two factors. In their study, Bjorklund and Wenestam (1999) suggested that teachers' behavior and attitudes directly influenced students' personal attitudes that ultimately dictated what they would or would not do. This was primarily because teachers' ethical attitudes influenced their own action when they came across cheating, which in turn influenced the students' attitude towards cheating (Bjorklund and Wenestam, 1999). Keith-Spiegel et al. (1998) suggested that teachers' attitude towards cheating generally dictated whether they underestimated the problem or not and whether they acted on it or not and that in turn influenced students' ethical attitudes.

Galloway (2012) suggested that students who faced teachers centered on academic achievement regardless of how students achieved them, students tended to mould their ways of thinking because they thought their teachers valued results over hard work (Galloway, 2012) and hence justified e-cheating behaviors. Prohaska (2013) and Davis and Ludvigson (1995) supported this argument stating that increase in cheating likelihood among students was strongly influenced by a decrease in teachers' standards within the classroom because teachers stopped caring about learning and more about grades which, gave students the impression that there was no real benefit in honesty and hard work. These studies support the findings of this study that in fact teachers' ethical attitudes positively influence students' ethical attitude but does not directly influence students' likelihood to e-cheat, thus accepting H15 and rejecting H13.

5.5.2 Parents' ethical attitude (H8)

Parents' ethical attitude (PEA) as an intermediate factor was a composite of two initial factors Parents' Attitude towards Cheating and Parents' Attitude towards SMM Piracy. Part IX of the survey instrument included seven items on a 5-point Likert scale to capture responses for this factor (see Appendix B).

Both the initial factors were accepted, as all the observed constructs loaded with a value > 0.5 onto the latent variables in the first run of the CFA (see Section 5.2.2 for further detail). The hypothesis that was drawn for this intermediate factor was:

H8: Ethical attitude of parents has a positive influence on the Ethical Attitude of Students

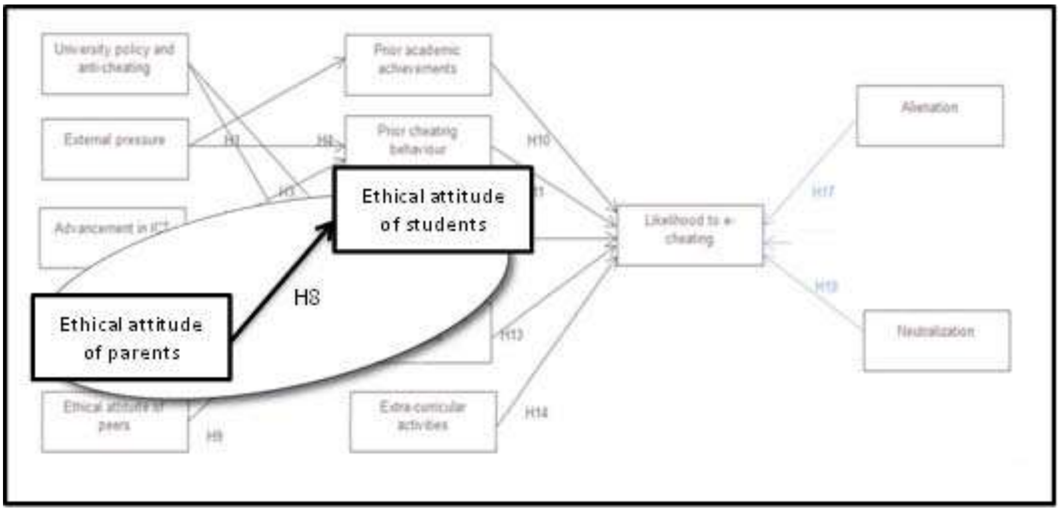

Figure 5-10*: H8*

Hypothesis H8 was tested through path coefficient and hypothesis testing and was found to be highly significant at $p < 0.0001$ (coefficient 0.249), which was > 0.1 and therefore accepted. This means that parents' ethical attitudes had a positive influence on students' ethical attitudes. This means if parents behaved ethically, then their children would be more likely to behave ethically. This finding is supported by Westacott's

(2008) study that found that students often looked for shortcuts to better grades because the shortcuts were supported by their parents, who students viewed as ethical. Sykes (2010) suggested that students' attitudes about academic dishonesty could be results of 'communication, intended or unintended, from parents…' (p. 15). Mackey, Arnold & Pratt (2001) found that behaviors of parents had a profound impact on students' development and behavior choices. Studies have also associated parents' attitude, awareness and monitoring of student behavior with lower rates of unethical behavior in students thus showing strong significant influence of parental attitudes on students' behavior choice (Hayes, Hudson & Matthews, 2003; Laird et al., 2008), thus supporting the finding of this study to accept H8.

5.5.3 Peers' ethical attitude (H9)

Peers' ethical attitude (PeeEA) as an intermediate factor was a composite of two initial factors Peers' Attitude towards Cheating and Peers' Attitude towards SMM Piracy. Part X of the survey instrument included seven items on a 5-point Likert scale to capture responses for this factor (see Appendix B).

Both the initial factors were accepted, as all the observed constructs loaded with a value > 0.5 onto the latent variables in the first run of CFA (see Section 5.4.2 for further detail). The hypothesis that was drawn for this intermediate factor was:

H9: Ethical attitude of peers has a positive influence on the Ethical Attitude of Students

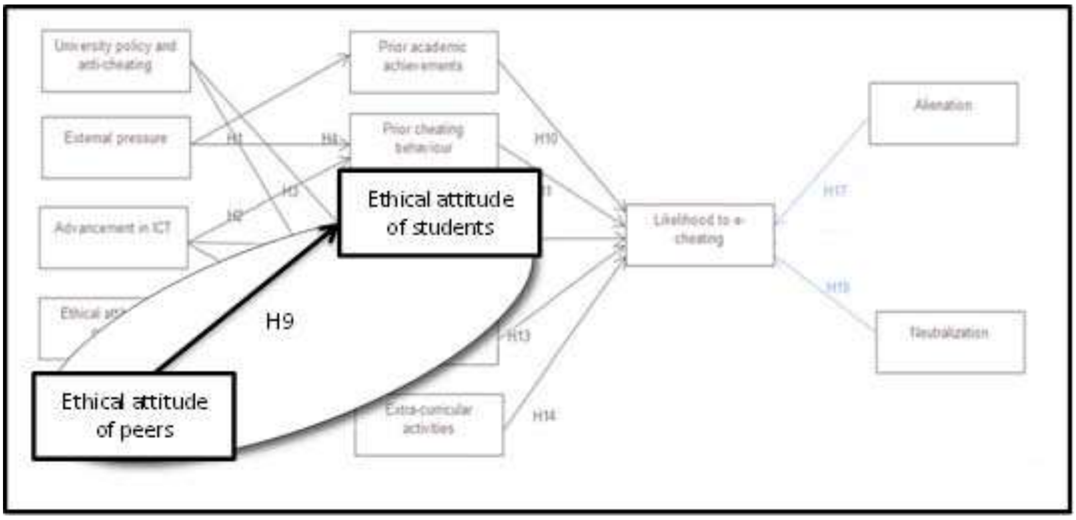

Figure 5-11*: H9*

Hypothesis H9 was tested through path coefficient and hypothesis testing and was found to be significant at $p < 0.05$, therefore supported. Although the link was weak because of low path coefficient (value 0.095), it still suggests that Peers' Ethical Attitudes had a positive influence on Students' Ethical Attitudes. Thus, if peers behaved ethically, then students would be more likely to behave ethically in their studies. Jordan (2001) suggested that perceptions of peer attitudes and behavior significantly influenced students wanting to engage in cheating. This finding is supported by Whitley (1998), Carpenter et al. (2006), Murdock and Anderman (2006), and Bjorklund and, Wenestam (1999) who suggested that any behavior that was looked on as learned behavior could be learned from observing peers and ultimately perceived as normal behavior, thus shaping a student's ethical attitudes. Studies have suggested that peer attitudes and behaviors do influence one another (Graham et al., 1994; McCabe et al., 1999; Saulsbury et al., 2011). In fact, research has consistently demonstrated the importance of peer attitude and behavior and the impact on students (Caldwell, 2010; Engler, Landau & Epstein, 2008; Pulvers & Diekhoff, 1999), further supporting the findings of this study to accept H9.

5.5.4 University policy and anti-cheating (H1 and H2)

University Policy and Anti-Cheating (UPAC) as an intermediate factor was a composite of the initial factors Severity of Penalty, Level of Detection, Difficulty of Subject, and Existence of Honor Codes. Part III of the survey instrument included eight items on a 5-point Likert scale to capture responses for this factor (see Appendix B).

Of the four initial factors, Difficulty of Subjects was removed after CFA results showed that the observed constructs did not load onto the latent variable with a value > 0.5 (see Section 5.4.2 for further detail). The two hypotheses proposed for UPAC were:

H1: University policy and anti-cheating has a positive influence on the Ethical Attitude of Students

and

H2: University policy and anti-cheating has a positive influence on the Ethical Attitude of Teachers

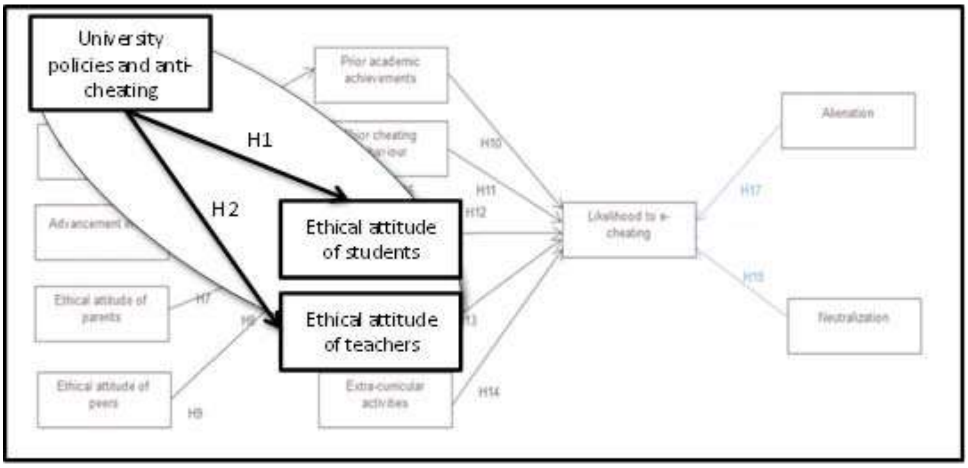

Figure 5-12*: H1 and H2*

Both of these hypotheses were highly significant at $p < 0.0001$ (coefficient 0.220), that was > 0.10, and therefore were accepted. This supports the theory that University Policy on Anti-Cheating has a positive influence on the Ethical Attitude of Students and Teachers. This result is supported by previous studies such as Bowers (1964), McCabe and Trevino (1993), Gardner et al. (1998), McCabe et al. (2008) (see Table 2.4 for further detail).

McCabe (1993), Nuss (1984) and Singhal (1982) all suggested that when academic dishonesty was treated lightly by the faculty, for example they looked the other way, students who otherwise would not be dishonest, convinced themselves that they could not afford to be disadvantaged by other students who were cheating and getting away with it. Thus, influencing their ethical attitudes.

McCabe and Trevino's (1997) study highlighted that students' perceived the severity of penalties for cheating significantly influenced their ethical attitudes. Both, McCabe and Trevino (1993) and Bowers (1964) demonstrated the influence of the existence of honor codes in universities on both teachers' and students' attitude towards cheating. McCabe and Trevino (1993) emphasized that this influence was not only of having honor codes, but actually implementing them on campus that significantly increased students' and teachers' ethical attitudes. Bowers (1964) placed emphasis on the 'powerful influence of institutional context on student decisions to cheat' (cited in McCabe et al., 2001). Faculty responses to cheating, sanction threats and honor codes were all shown to have significant influence on students' ethical attitudes in Canning (1956), Jendrek, (1989), Michaels and Miethe (1989) and Tittle & Rowe (1973). McCabe et al. (2001) extensive study has reflected similar findings for universities with no honor codes or lack of stringent policies where more than half the faculty surveyed reported they were more likely to look the other way or give a simple warning, and students were more likely to take this as an unspoken approval to cheat. LoSchivo and Shatz (2001) also reported statistically significant influence on students and teachers who signed honor codes on their attitude towards e-cheating than those who did not.

It is accepted that if the Level of Detection and Severity of Penalty are high in the presence of Honor Codes, these have a positive influence on both Teachers' and Students' Ethical Attitudes.

5.5.5 Prior academic achievement (H10)

Prior academic achievement (PAA) was based on a student's prior academic achievements in terms of grades, ranking, awards and scholarships (McCabe and Trevino, 1996). As this initial factor was already a composite and could not be categorized with any other contextual factor, it remained as an initial factor. Part II of the survey instrument included two items on a 5-point Likert scale to capture responses for this factor (see Appendix).

The initial factor was accepted, as all the observed constructs loaded with high values > 0.5 onto the latent variables in the first run of CFA (see Section 5.4.2 for further details). *It is important to note here that as the survey items were worded in the reverse, the hypothesis that was drawn for this factor given below in fact suggested that 'prior academic achievement' implied below average performance by students which has a positive influence on Students' Likelihood to e-cheat.*

H10: Prior academic achievement has a positive influence on Students' Likelihood to e-cheat

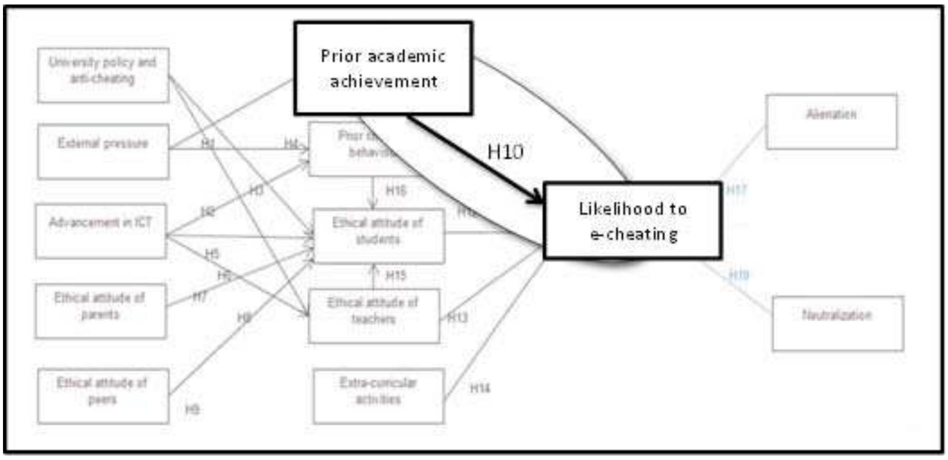

Figure 5-13*: H10*

Hypothesis H10 was tested through path coefficient and hypothesis testing and was found to be highly significant at $p < 0.0001$ (coefficient 0.112), which was > 0.1 and therefore accepted. This means that students who felt they had not performed well in their previous studies were more likely to e-cheat. It is interesting to note that although the relationship between prior academic achievement and students' likelihood to cheat has been studied extensively, researchers have seldom agreed upon the true relationship.

A handful of researchers have suggested that students who were high achievers in the past were likely to cheat. Murdock and Anderman (2006) described this as the extrinsically motivated students who were focused on goals and performance rather than mastery (i.e. focused on understanding). Leming (1978) also suggested a significant correlation between high-achieving students and their likelihood to cheat. McCabe (2001) and Brandes (1986) supported this finding suggesting that students who were high achievers in the past were likely to cheat to keep up their grades as they felt a grade-pressure since they were grade-oriented, seeing grades as their ultimate purpose (Harding, Finelli & Carpenter, 2006).

But, the majority of studies have consistently suggested that high prior academic achievements are negatively correlated with student cheating (Haines et al., 1986; Newstead et al., 1996; Diekhoff et al., 1996; Genereux & McLeod, 1995; McCabe & Trevino, 1996; Bowers, 1964), with results showing highly significant findings to support this conclusion. Other studies also suggested that students with low grades were more likely to cheat to get better grades (Hetherington & Feldman, 1964; Leming, 190; Michaels & Miethe, 1989; Smith et al., 2002).

Researchers such as Covington and Mueller (2001) stated that 'human beings always anticipate some payoff for their actions, intrinsically driven or not' (p. 162), suggesting that although students may have performed well due to extrinsic goals such as grades, the reward received would ultimately help develop confidence in the students and intrinsically motivate them to become high achievers and academically honest (Lin & McKeachie, 1999). Contradictory to Murdock and Anderman (2006)'s claim, it would seem that even extrinsically motivated students who performed well previously would most probably become confident in their ability to do well and be therefore less likely to cheat as opposed to students who performed below average. This study's findings suggest a statistically highly significant positive influence of prior academic achievement (or lack of it) to student's likelihood to e-cheating, it suggests that the worse a student's prior academic achievements, the more likely they would be to e-cheat, thus accepting H10.

5.5.6 Prior cheating behavior (H11 and H16)

Prior cheating behavior (PC) referred to students' previous cheating instances (Murdock and Andeman, 2006) and could not be categorized with any other contextual factors, so remained as initial factor. Part II of the survey instrument included two items on a 5-point Likert scale to capture responses for this factor (see Appendix B).

The initial factor was accepted, as all the observed constructs loaded with high values > 0.5 onto the latent variables in the first run of CFA (see Section 5.4.2 for further detail). The two hypotheses drawn for this factor were:

H11: Prior cheating behavior has a positive influence on Students' Likelihood to e-cheat

and

H16: Prior cheating behavior has a negative influence on the Ethical Attitude of Students

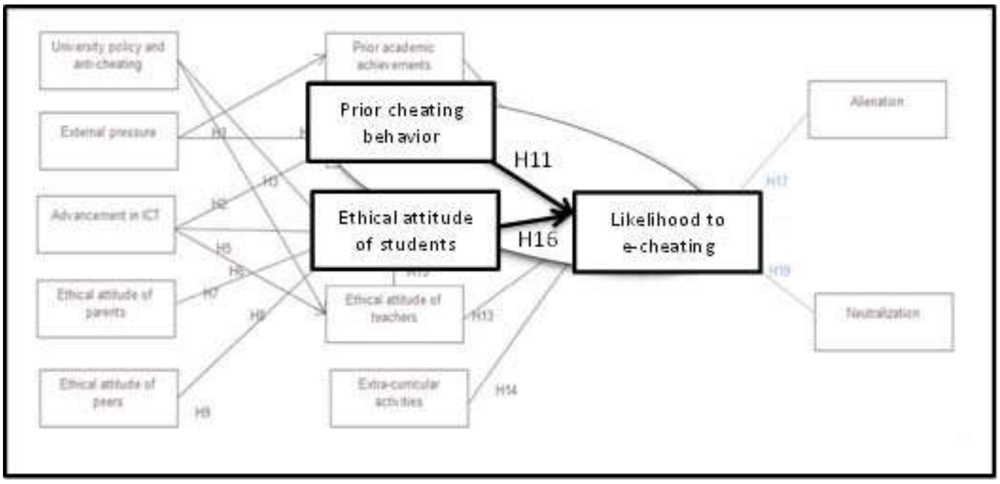

Figure 5-14*: H11 and H16*

The hypotheses H11 and H16 were tested through path coefficient and hypothesis testing and were both found to be highly significant at $p < 0.0001$ and greater effect as path coefficient values 0.321 and -0.305 (respectively) which were > 0.30, higher than any other findings and therefore accepted.

This means that if students had cheated in the past, they were likely to e-cheat (H11). This finding has previously been supported by Whitley (1998), Sierles et al., (1980), Sims, (1993) and Davis and Ludvigson (1995) who all suggested that students who cheated during their university-level studies had cheated earlier in their studies, thus proposing a significant influence of prior cheating behavior on students' likelihood to e-cheat. Bowers (1964) study found that 64% of the students who cheated in school also cheated in HE, thus supporting this significant influence. Carpenter et al. (2006), Baldwin and Daugherty (1996) and Harding et al. (2004b; 2006) all suggested a similar significance between students who cheated in high school and their likelihood to cheat in HE.

The hypothesis testing results also suggest that if students had cheated in the past, this would influence their ethical attitude (H16). McCabe et al. (2012) have suggested that the student attitude towards cheating is influenced by prior cheating behaviors. Shon (2006) study also supported this finding stating that students who admitted to cheating in the past, often admitted that they would rely on their prior deviant knowledge to justify cheating again, thus showing significant influence of prior cheating behavior on students' ethical attitudes.

As has also been discussed in Section 5.5.1, SEA negatively influences SLC; so if students cheated previously, then they would have a more favorable attitude towards e-cheating, thus increasing the likelihood that they would e-cheat again, hence accepting both H11 and H16.

5.5.7 External pressure (H3 and H4)

External Pressure (EP) as an intermediate factor was a composite of six initial factors Peer Pressure, Family Status, Parents' Pressure, School Pressure and Corporate Pressure. Part IV of the survey instrument included 12 items on a 5-point Likert scale to capture responses for this factor (see Appendix B).

All six initial factors were accepted, however a few observed constructs were removed as these did not load with a value > 0.5 (see Section 5.4.2 for further detail). The two hypotheses that were drawn from this intermediate factor were:

H3: External pressure has a positive influence on the Prior Cheating Behavior

and

H4: External pressure has a positive influence on the Prior Academic Achievements

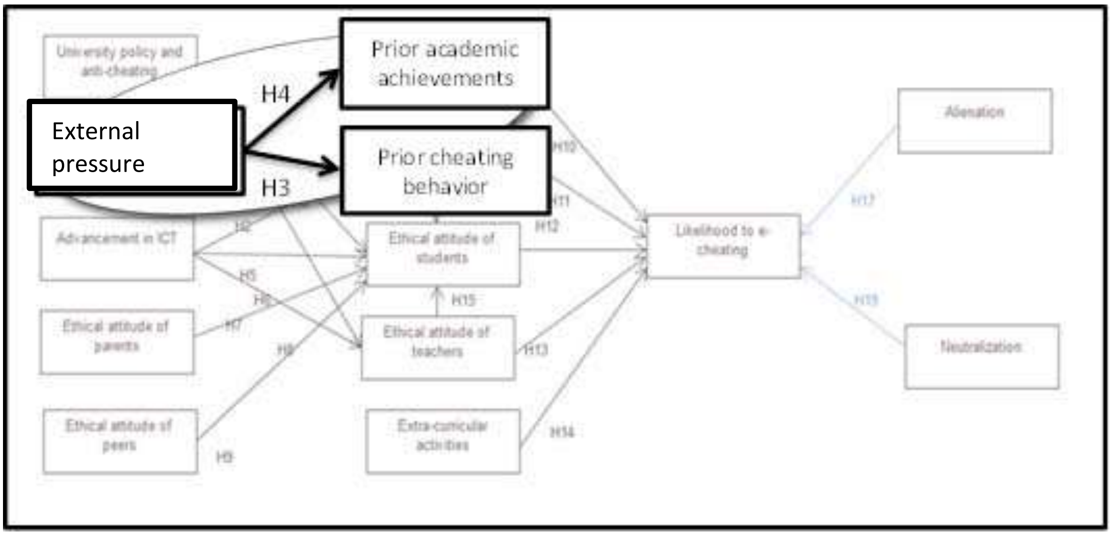

Figure 5-15*: H3 and H4*

Hypothesis H3 was rejected as it was not significant at $p < 0.05$ and had a coefficient -0.079. This meant that External Pressure did not have a positive influence on Prior Cheating Behavior. Students did not believe that their family status, peer, parent, school or corporate pressure influenced their cheating behaviors in the past. Although this result is contrary to studies such as McCabe (2001), McCabe and Trevino (1996), and Szabo and Underwood (2004); others such as Murdock and Anderman (2006) and Sykes (2010) that all suggested that external pressure had significant influence on prior cheating in HE students.

The findings in this study are however supported by Carpenter et al. (2006) and Simkin and McLeod (2009) who suggest that external pressure has no significant influence on prior academic dishonesty. McCabe et al. (2001) suggested that most students joining HE, who did have some experience with e-cheating or cheating in high school or at least knowledge of cheating by their peers, expected the experience in HE to be different from high school and therefore held onto the belief that cheating or e-cheating in HE was academic dishonesty. So, when asked in self-reporting surveys, it is possible they may not have recognised HS experience as prior cheating and therefore would not report it as such. This attitude could also explain why H3 was rejected. If students did not recognise academic dishonesty in HS or earlier years in HE as cheating or e-cheating, they would not report feeling pressured to cheat in prior years, thus rejecting H3.

However, hypothesis H4 was found to be significant at $p < 0.05$, and accepted with a coefficient -0.120 making it weakly significant, thus having a small influence. Students thought external pressure had a small positive influence on their prior academic achievements. This finding is supported by studies by McCabe and Trevino (1993, 1996), McCabe (2001) Christensen-Huges and McCabe (2006) and Bowers (1964) (see Table 2.4 for further detail) that suggest that although students do not think that external pressure influenced their prior cheating behaviors, they do believe that external pressure influenced their prior academic achievements. Rediehs (2000) suggested that when students felt this pressure from external factors to do well in their studies, they were increasingly worried about their grades, and the more they worried the poorer they performed, thus resorting to more devious means to achieve the grades they thought others expected of them.

Studies indicate that students do not always perceive parents, peers or other external pressures as pressures because they feel confident in their own abilities, and do not necessarily see it as pressure but rather as expectations (Ablard, Hoffhines & Mills, 1996). It is possible that students felt they may have been fulfilling expectations when trying hard to achieve good grades but not necessarily been pressured to cheat. Taylor, Pogrebin & Dodge (2002) and Westacott (2008) suggested that students who felt pressure from parents, peers and schools to perform well on assessments, may get the perception that the 'end justified the means' and so they may have cheated not because of the pressure but because they had to 'perform well'. Newstead et al. (1995) and Maramark and Maline (1993) both found external pressures had significant influence on students getting lower grades in the past as students admitted that they had felt pressure sometime in their previous academic experiences from sources including parents, awareness of other fellow students' grades, their need to get into higher education or even to get good jobs to do better and that *led* them to cheat as a direct consequence of their wish to get better grades, therefore justifying the rejection of H3 while the acceptance of H4.

5.5.8 Extra-curricular activities (H14)

Extra-curricular activities (ECA) were defined as any activities that fell outside the realm of a normal academic curriculum in HE (Grove, 2013). This can include athletics, membership in societies, publications, and holding a job. As the initial factor was already a composite and could not be grouped with any other factors, it remained as an initial factor. Part IV of the survey instrument included two items on a 5-point Likert scale to capture responses for this factor (see Appendix B).

The initial factor was accepted, as all the observed constructs loaded with high values > 0.5 onto the latent variables in the first run of CFA (see Section 5.4.2 for details). The hypothesis proposed for ECA was:

H14: Extracurricular activities has a positive influence on Students' Likelihood to e-cheat

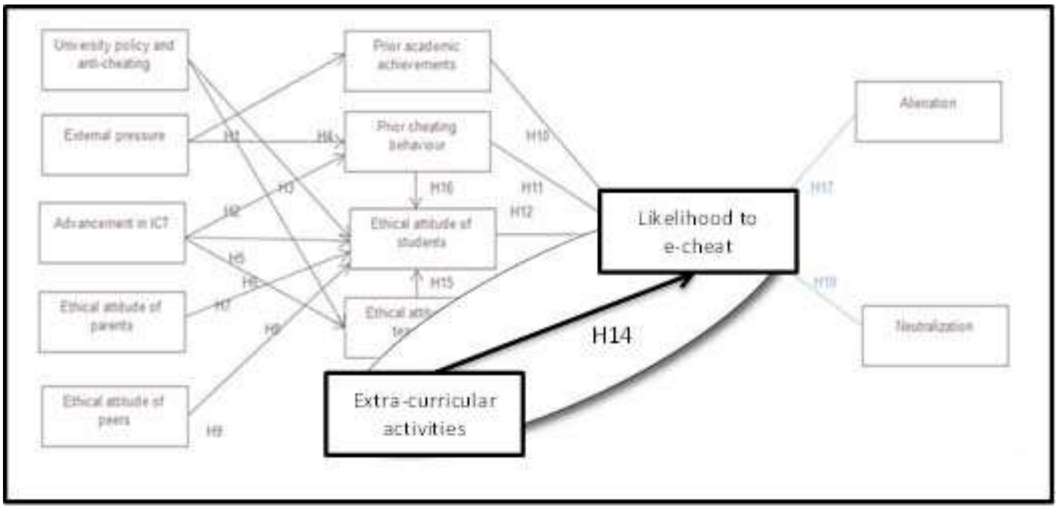

Figure 5-16*: H14*

The hypothesis was tested through path coefficient and hypothesis testing. Hypothesis H14 was accepted as it was significant at $p < 0.05$ with a coefficient of -0.079. This meant that ECA had a small but positive influence on SLC. This finding is similar to McCabe and Trevino (1996), Cloward (1959), Bonjean and McGee (1965), Christensen-Hughes and McCabe (2006), Kirkvliet (1994) and Haines et al. (1986) who all suggested that students who participated in extra-curricular activities did report to cheating.

Bowers (1964) reported that 68% of the students involved in extra-curricular activities reported they would cheat whereas 79% of the students who did not participate in any extra-curricular activities reported minimal or no instance of cheating. However, as this study's findings show that the influence exists but is weak, this finding is supported by McCabe (2001) and Baird (1980) study that suggested that the actual difference between students who participated in extra-curricular activities and who did not and their likelihood to cheat was small to modest, stating that those surveyed could have used this as an excuse to cheat. This finding also supported the work of Carpenter et al. (2006) who suggested that external commitments had little effect on academic dishonesty, thus supporting the findings of this study.

5.5.9 Alienation (H17)

Alienation (Alie) as an initial psychological factor was originally grouped into the intermediate factor Student Personality Trait (SPT). Part VI of the survey instrument had two items on a 5-point Likert scale to capture responses for this factor (see Appendix B).

During the EFA, these two constructs did not load onto SPT, but rather loaded as Alie, thus accepting it as an initial factor. For this factor, the one hypothesis proposed was:

H17: Alienation has a positive influence on students' likelihood to e-cheating

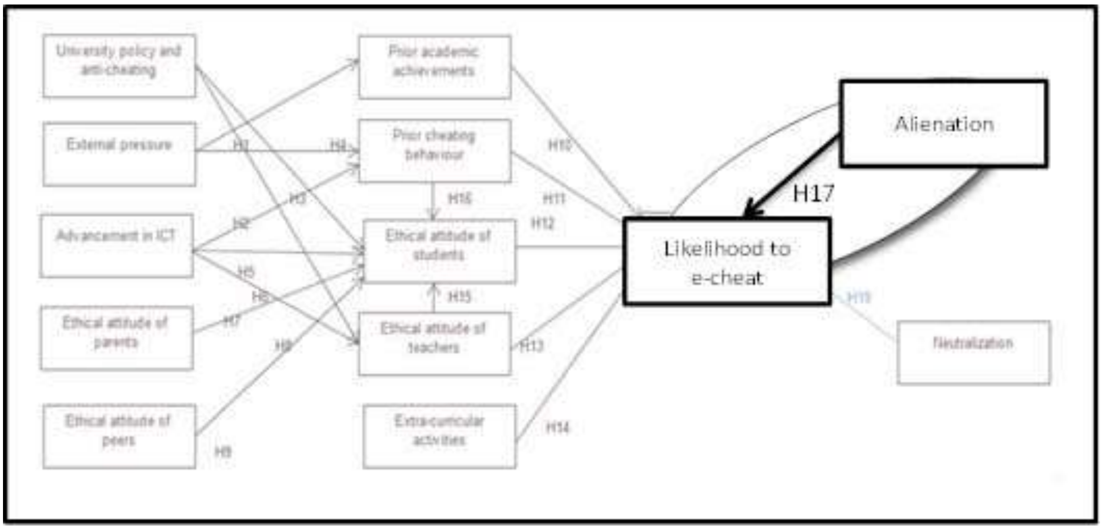

Figure 5-17*: H17*

The hypothesis was tested through path coefficient and hypothesis testing. Hypothesis H17 was accepted as it was significant at $p < 0.0001$ and a coefficient -0.168 (i.e. > 0.1). This meant that Alie had a positive influence on SLC, that is, the more a student felt alienated from his/her peers, teachers or academic environment, the more likely they would be to e-cheat.

This finding is in contrast to studies like Smith et al. (2002) who suggested that alienation influenced prior cheating and neutralization which determined cheating likelihood among students; and Davy et al. (2007) who suggested that there existed a covariance between alienation and extrinsic motivations (e.g. grades) which influences students' likelihood to cheat. However, Whitley (1998), Smith et al. (2009), Sieman (2009), Calabrese and Cochran (1990), McCabe et al. (2001), McCabe and Trevino (1996), Ashworth et al. (1997), Saulsbury et al. (2011), Finn and Frone (2004), Murdock et al. (2004), Smith et al. (2003) have all suggested that alienation positively influenced students' likelihood to cheat primarily because when students felt the psychological estrangement from their peers or teachers or the school culture with feelings of isolation or even powerlessness (Seeman, 1991), they would tend to turn towards deviant behavior such as cheating to try to achieve a feeling of belonging, thus accepting the hypothesis H17 and its significance.

5.5.10 Neutralization (H19)

Neutralization (Neu) as an initial psychological factor was originally grouped into the intermediate factor Student Personality Trait (SPT). Part VI of the survey instrument had two items on a 5-point Likert scale to capture responses for this factor (see Appendix B).

During the EFA, these two constructs did not load onto SPT, but rather loaded as Neu, thus accepting it as an initial factor. For this factor, the one hypothesis proposed was:

H19: Neutralization has a positive influence on students' likelihood to e-cheating

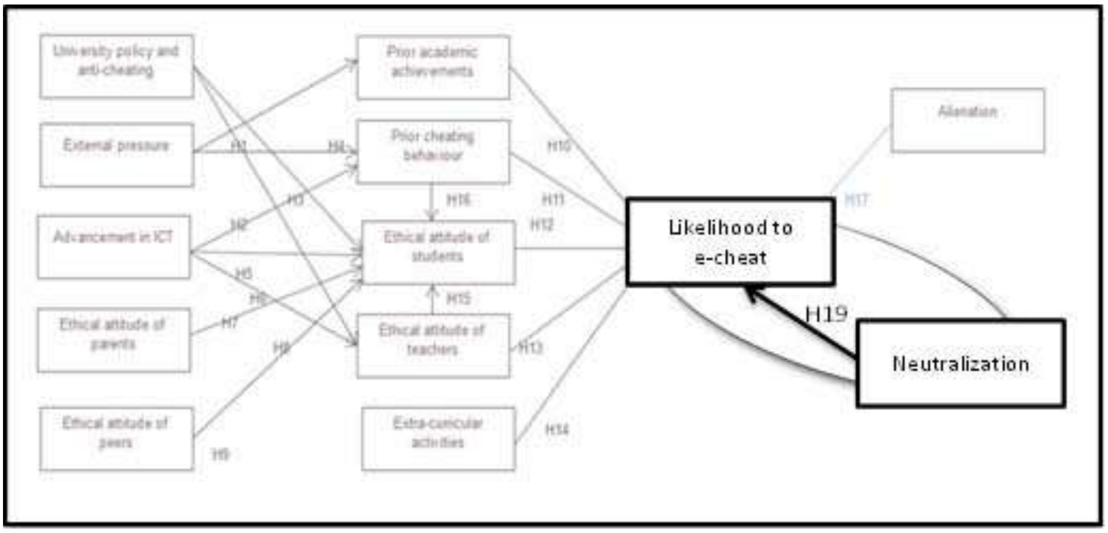

Figure 5-18*: H19*

The hypothesis was tested through path coefficient and hypothesis testing. The hypothesis H19 was accepted as it was significant at $p < 0.0001$ and a coefficient -0.240 (i.e. > 0.1). This meant that students, who externalized blame onto others (Sykes and Matza, 1957) were more likely to e-cheat. A finding that is robustly accepted and supported by Haines et al. (1986), King et al. (2009), Molnar et al. (2008), Smith et al. (2002, 2009), Davy et al. (2007), Nonis and Swift (1998), Murdock and Anderman (2006), Rettinger and Kramer (2009), Diekhoff et al. (1996), Newstead et al. (1996), Pulvers and Diekhoff (1999), McCabe (1992), Carpenter et al. (2006), Whitley (1998), and Jordan (2001) who all suggested that students often rationalized and justified their cheating behaviors to deflect self-disapproval or disapproval of others, thereby eliminating a sense of guilt from their actions.

5.5.11 Advancement in ICT (H5, H6 and H7)

Advancement in ICT (ICT) an intermediate factor was a composite of seven initial factors, Increased ICT use Increased accessibility of ICT, Increased Online Courses, Increased online sources, Ease of access to online sources, Ease of use of ICT and Affordability of ICT. Part V of the survey instrument had 14 items that captured responses for ICT (see Appendix B).

The intermediate factor was accepted with all its initial factors, as all the observed constructs loaded with high values > 0.5 onto the latent variables in the first run of CFA (see Section 5.4.2 for further detail). The three hypotheses proposed for ICT were:

H5: Advancement in ICT has a positive influence on the Prior Cheating Behavior
and
H6: Advancement in ICT has a negative influence on the Ethical Attitude of Students
and
H7: Advancement in ICT has a negative influence on the Ethical Attitude of Teachers

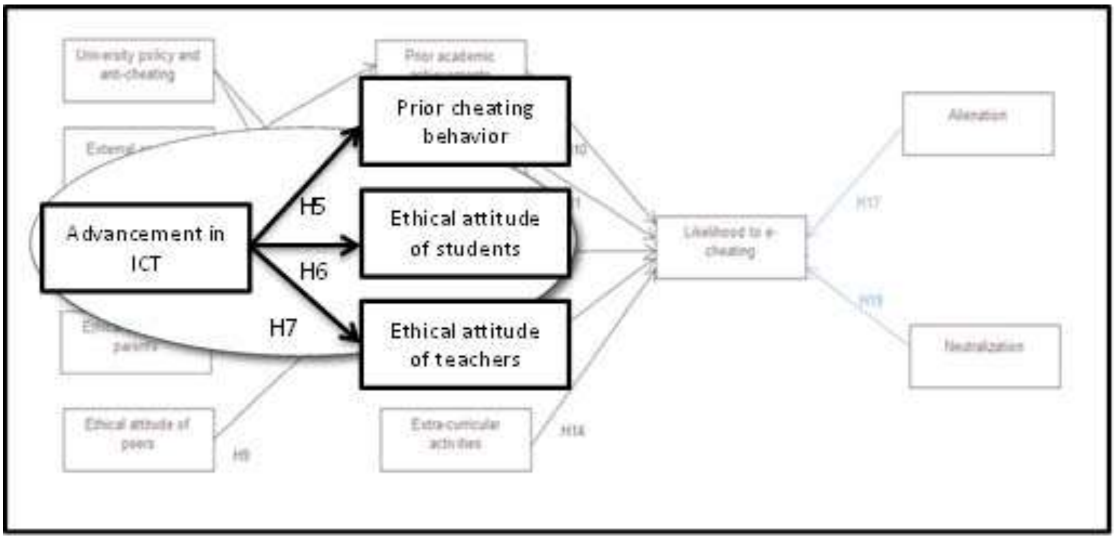

Figure 5-19*: H5, H6 and H7*

All the hypotheses were tested through path coefficient and hypothesis testing.

The hypothesis H5 was not significant and therefore rejected. This meant that advancement in ICT did not have a positive influence on students' prior cheating behavior. This is an interesting finding of the study as previous studies had suggested that e-cheating was on the rise (Bushweller, 1999; McCabe & Trevino, 1997; Ashworth et al., 1997; Chapman et al, 2004; Grijalva, Nowell & Kerkvliet, 2006), and that students in HE did agree that they had used illegitimate means of technology to improve grades in their education (Smith et al., 2001; McCabe, 1992; Davis et al., 1992; Hawley, 1984). However, this study's finding is actually supported by Keilman (2012) who suggested that technology has put power of knowledge into the grasp of students such that ***now*** students are finding new ways to cheat ***than in the past***. Similarly, Khan and Balasubramanian (2012) stated that HE students cheated more now than in prior years due to readily available technology, supporting the findings of this study that indeed advancement in ICT did not influence students' prior cheating behavior, rejecting H5.

It could be argued that students did not have access to such technology in the past compared to now when cheating and therefore did not associate prior cheating with the technologies they use today. This finding may make more sense when the rate of increase in technology is considered. Khan (2012) suggested that the technology use among HE students jumped 200% from 2008 to 2011, so students participating in this study would probably not associate technology advancement that they may have experienced in the last couple of years with prior cheating, therefore giving rise to the non-significance of the proposed relation between ICT and PC.

The most surprising findings of this study were the results of the hypotheses testing and path analysis for H6 and H7. As the results show, both H6 and H7 were found to be highly significant at $p < 0.0001$ and path coefficient values at 0.253 and 0.249 respectively; but neither was supported as the results were contrary to the stated hypotheses, therefore possibly accepting the null hypotheses:

$H6_o$: Advances in ICT has positive or no influence on Students' ethical attitude
and
$H7_o$: Advances in ICT has positive or no influence on Teachers' ethical attitude

These are rather unexpected findings from this study as this means that advances in ICT either have *positive* or *no influence* on Students' and Teachers' ethical attitudes. In

Chapter 2 Figure 2.5, McCabe and Trevino (1996) suggested that the frequency of cheating recorded overtime showed rises and falls, and that especially after the year 2000, the rate of cheating reported had in fact dipped. Khadaroo (2012) suggested that this up and down in cheating instances could be based on:

- how students defined cheating,
- the academic society's rejection of some behaviors as cheating, and/or
- the increased use of technology to curb cheating

ICT may have made students more ethical or wary of being caught. Where cheating could have decreased because of such reasons, these reasons could also influence students' and teachers' attitudes positively or have no influence at all. Let's take for instance, Carnevale's (1999) study that suggested that though advancements in technology offered students new and efficient ways to e-cheat, the same *technologies also offered teachers new tools to identify such e-cheating cases*, thereby curbing them. As Khadaroo (2012) suggested, this would *make students more ethical or wary of being caught*, therefore suggesting a possible positive influence of advancement in ICT on students' ethical attitudes.

Heberling (2002) offered an optimistic perspective on the influence of advancement in ICTs on students and teachers that the advancement also made it hard to cheat online as well as easier to detect, thus positing a positive influence of advancement in ICT on students' and teachers' attitudes. Surprisingly, Chapman et al. (2004) suggested that while 92% of students admitted they think they or their peers would cheat given the advancement in ICT, only 2% actually admitted to having worked in collaboration with at least one other student using technology in a way that was prohibited, proposing that technology may in fact have had *no influence* on students' ethical attitudes, and hence their reduced likelihood to e-cheat; rejecting the H6 and H7, but accepting $H6_o$ and $H7_o$.

5.6 Implications of the findings

The path analysis and hypotheses testing of the 18 paths in this study have produced observations (see figure 5.22 for the supported model which will henceforth be called the **Khan's Factor Model**) that have interesting implications for academics, institutions, education ministries, students and other stake holders in HE.

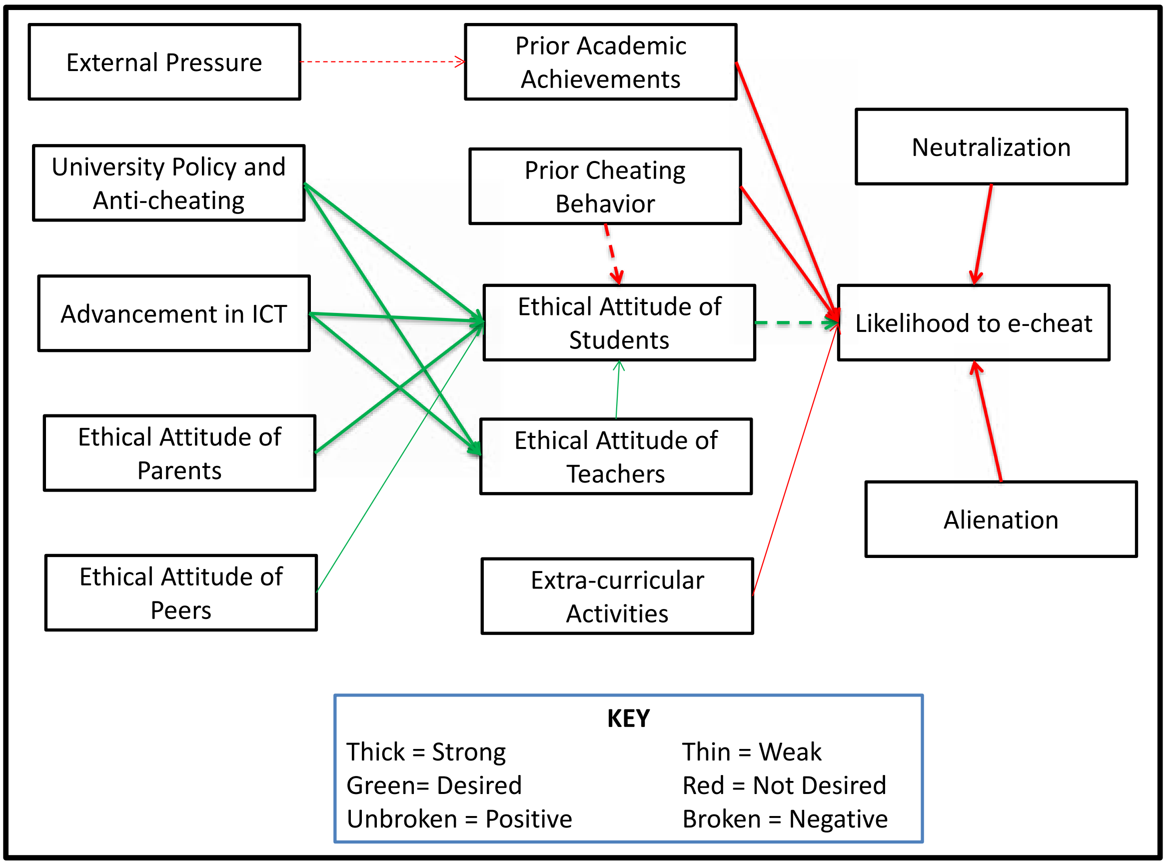

Figure 5-20: ***Khan's Factor Model***

*5.6.1 **Implication One:** Looking closely at schools, and school students*

This study has found that while external pressure had no significant influence on prior cheating behaviors of students (H3), it did have a positive weak influence on students' prior academic achievements (H4) which meant that the more pressure they felt, the poorer they performed. Therefore, external pressures such as pressures from parents, peers, schools or even corporations significantly influenced students' academic achievements but not their prior cheating behaviors. As stated by McCabe (2001), Carpenter et al. (2006) and Simkin and McLeod (2009), it is possible that students in HE did not recognize cheating or e-cheating behavior in HS or in early HE as academic dishonesty. In an extensive study of middle and high schools, Johnson (1999) found that

50% of the students reported stealing in the 12 months prior to the study and seven out of 10 cheated on an exam, displaying tolerance towards dishonesty in schools. But as students progressed towards graduation, their attitudes began to change (Sims, 1995). Colby and Sullivan (2009) suggested that one primary reason for cheating could be because schools, teachers and administrations focused on and often promoted incentive-driven, extrinsic interests (better grades, better chances at universities and jobs), rather than focusing on the intrinsic development (sense of purpose and meaning in the work) of the students, thus creating pressure to perform well.

As per this study's finding, students recognized that external pressure produced lower grades in their prior academics because students categorized pressure from parents, peers, schools or corporations as pressure as expectations that were put on them by these external entities to do better (Ablard et al., 1996; Newstead et al., 1995; Maramark & Maline, 1993). When students saw pressure as expectation, they still felt the pressure to achieve at unrealistic levels to satisfy such expectations, ultimately becoming ill-prepared for HE with less creativity, poorer grades and less ethics (see Ashbrook, 2010).

Interestingly, the students surveyed in this study also felt that there was a strong positive influence between their prior academic achievements and their likelihood to e-cheat in HE (H10), which meant that the worse their past academic performances, the more likely they were to e-cheat in HE. This finding can be directly related to the rejection of H3 and acceptance of H4 because students who had felt external pressure to perform well in the past, did resort to unethical means to try to improve their grades in the past without labelling it to be so (Murdock and Anderman, 2006). At the same time, because these students had performed poorly due to external pressure in the past, there was a strong likelihood that they would e-cheat to continue to try to achieve the academic standards because they had felt the expectations to perform well (Leming, 1978; McCabe & Brandes, 1986).

Surprisingly, although students did not feel that external pressure had any influence on their prior cheating behaviors, this study did record a strong influence of their prior cheating behavior on the students' likelihood to e-cheat (at $p < 0.0001$); if they had cheated in the past, there was a higher probability that they would cheat again (H11). Though students did not necessarily see their prior cheating behavior as dishonesty

(McCabe, 2001), this study shows that if they had cheated in the past, they would do so again. *This finding may suggest an area for future research to understand the possible correlation between external pressure, prior cheating, prior academic achievements and students' likelihood to e-cheat, given school students' understanding of external pressure and prior cheating.*

A serious implication of this study's findings (H3, H4, H10 and H11) could be that if students were likely to e-cheat because they had performed poorly in the past, and they performed poorly in the past because they felt pressured to fulfill the expectations of the external stakeholders which could have led to unethical behavior to achieve their goals, but they did not recognize the external pressure of such prior dishonest behaviors because they did not consider their prior acts as unethical behavior, *it may be worthwhile to research into school students' ethical attitudes and e-cheating behaviors, which could very well be the foundation for such behaviors in HE.*

5.6.2 ***Implication Two:*** *Student cheating behavior prior to HE*

This study found that the Ethical attitude of students had a strong negative influence on students' likelihood to e-cheat (H12). With this understanding, *it is then important to identify any factor that positively increases a student's ethical attitude. This is very important and arguably the most important finding so far in this study because these identified factors are desired and should be researched, their influence studied in order to help academics, policy makers and HE institutions curb e-cheating.*

It is important to note here that the findings of this study imply that prior cheating behavior has a very strong negative influence on students' ethical attitudes (H16). This implies that if students had cheated in the past, this would lower their ethical attitudes. If this happened, then lowered ethical attitudes in students would possibly increase their likelihood to e-cheat. *So it becomes imperative that research be conducted to first understand students' perception of prior cheating, what factors influence prior cheating, so that such cases can be reduced.*

5.6.3 Implication Three: *Understanding parents' ethical attitudes*

It has been found that the Ethical attitude of parents has a stronger influence (H8) on students' ethical attitudes than their Peers' (H9) or Teachers' (H15). This is an important finding as it is contrary to some prior research that stated that peer attitude had the strongest influence on students' ethical attitude (McCabe et al., 1999; Graham et al., 1994; Newcomb & Wilson, 1966, Jordan, 2001). The implications of this finding are positive. While teachers' ethical attitudes and peers' ethical attitudes do influence students' ethical attitudes positively, it is the parents ethical attitudes influence students the most. This means that how parents think and behave has tremendous impact on their children and can in fact be used to predict disruptive behavioral problems in children (Frick, 1994; Webster-Stratton, 1997; 1998). If parents believe that learning is the most important outcome of going to school instead of grades; if parents encourage their children to complete their own work at reachable goals; if parents reinforce that dishonesty in any form is wrong and should not be encouraged; it is possible that students will also develop a strong sense of integrity and intrinsic interests that will ultimately help reduce their likelihood to e-cheat.

As has been mentioned above, any factor that increases students' ethical attitudes, must be encouraged, so it may be worthwhile to research into parents' actual ethical behaviors, specially towards academics, achievements and integrity and encourage such positive attitudes in parents so that they may influence students attitudes against academic dishonesty.

*5.6.4 **Implication Four:** Looking at what alienates students*

This study found that Extra-curricular activities (H14), Alienation (H17) and Neutralization (H19) all had positive influence on students' likelihood to e-cheat. The findings also suggest that Alienation and Neutralization had stronger positive influence on students' likelihood to e-cheat than extra-curricular activities. When students feel alienated from their peers, teachers or schools, they lack a sense of belonging (Mau, 1992; Adler, 1939; Bronfenbrenner, 1986). Johnson (2005) and Frosh (1991) suggested that students who were largely removed from content being taught or found themselves in a university that focused on measurable performance indicators and standardized competencies, were more likely to feel alienated. This sense of social estrangement can often lead students towards negative behaviors (Mau, 1992). This study's findings suggest a strong influence of feelings of alienation among students to their likelihood to e-cheat.

Students often use neutralization to justify an unethical act to rid themselves of the guilt (Sykes & Matza, 1957). Weimer (2010) suggests that students often blame others or other external sources as some examples of neutralization behaviors that students show that allow them to cheat. Students sometimes develop such behaviors when they are extrinsically motivated, or have ineffective and inefficient teachers who are more focused on grades than learning, and often look the other way when dishonest behavior takes place on campus (Weimer, 2010; Rettinger & Kramer, 2009).

The study has also found that students who engage in extra-curricular activities such as athletics, jobs, and society memberships, are more likely to e-cheat than students who do not engage in extra-curricular activities (Bowers, 1964; McCabe & Trevino, 1996). This would suggest that students who participate in activities other than academics and studies, such as joining basketball or swim teams, or becoming involved in the campus newspapers, debate teams or belong to clubs are unable to manage time to study or complete work and hence resort to e-cheating to fulfil academic requirements (Jensen et al., 2002). Jensen et al. (2002) have also suggested that in such cases, students often resort to neutralize their cheating behavior because they blame the workload for the necessity to cheat.

This study's findings imply that alienation and neutralization have a strong positive influence on students' likelihood to e-cheat, and that students display both alienation and/or neutralization behaviors in HE atmospheres that foster extrinsic goals, are less student-centered, do not have or follow codes of ethics against dishonest behaviors and those students who may be engaged in extra-curricular activities. *So, it is worthwhile to research further into alienation and neutralization, what causes these attitudes to grow in students and possibly encourage student-centered, intrinsic goal-oriented attitudes in teachers using strong policies and codes of conducts (McCabe, 2001).*

*5.6.5 **Implication Six:** Strengthening university codes of conduct and policies*

A key finding of this study was that University policy and anti-cheating had a strong positive influence on Ethical attitudes of students (H1) and Ethical attitudes of teachers (H2). This implied that if HE institutions had honor codes and codes of conduct that clearly defined academic dishonesty, and that teachers had to follow, enhancing their ethical attitudes and leading to high levels of detection and severity of penalty of dishonest behavior by them, students would also develop a strong sense of ethical attitudes (Bowers, 1964). This finding has been largely supported by researchers in the past, particularly McCabe (2001), McCabe and Trevino (1993) and McCabe (1993). It may be crucial to point out here that although this study was conducted on a single university-setting, most of the prior studies that have concluded similar findings were conducted across multiple campuses (McCabe, 1993; Bowers, 1964). This is a desired factor because the findings imply that if university policy and anti-cheating increases, it positively influences students' ethical attitudes, which will negatively influence students' likelihood to e-cheat. *So, it is a strong implication of this study that HE institutions should adopt strong policies and anti-cheating codes that should be implemented by teachers and respected by students in order to help reduce students' likelihood to e-cheat.*

*5.6.6 **Implication Seven:** Strong codes of conduct and policies can outweigh odds*

The most interesting and unexpected finding of this study, is that of a possibility that Advancements in ICT either had a positive or no influence on Ethical attitudes of students ($H6_o$) or on Ethical attitude of teachers ($H7_o$). These findings have very interesting implications.

While the study found that advancement in ICT did not have an influence on prior cheating behavior (H5), it did find that the influence of advancement in ICT on students' and teachers' ethical attitudes was highly significant, but contrary to the stated hypotheses. This meant that, with the advancement in ICT, there seemed either to be a positive or no impact on students' and teachers' ethical attitudes. Increased use of technology to curb cheating was cited by Khadaroo (2012) as one of the reasons why self-reporting of cheating cases would decrease, rather than increase, due to influence on students' ethical attitudes. This is an interesting finding because most previous studies that have looked at cases of dishonesty using technology, such as plagiarism (Ramzan et al., 2012; Jones, 2009; McCabe, 2001; Sterngold, 2004), have stated that the advancement of ICT seems to have increased students' cheating cases, thus implying a negative influence on their ethical attitudes (Grunfeld, 2012; Ashworth et al., 1997; McCabe & Trevino, 1997).

However, Carnevale (1999) had suggested that the advancement in technologies that students use to e-cheat with could also be used by teachers to identify such cases. Akkcay (2008) suggested that as teachers are responsible for the development of students, they need to be good role models. As the Ethical attitude of teachers influences Ethical attitude of students, being good role models involves impartiality, fairness, justice, integrity, commitment and the pursuit of truth (Bodi, 1998). Adequate university policies and codes of conduct that guide teachers and develop their understanding of how to use technology can develop in teachers a good sense of academic honesty and these characteristics of being good role models (Berson Bersn & Ralston, 1999; Simpson, 2004). This encourages teachers to incorporate more advanced technologies into their curricula with confidence, which in turn allows them to find new and better ways to enhance student understanding of ethical issues with technology use (Bennett, 2005). Johnson (1999b) suggested that with the growing influence of technological advances on teachers' ethical attitude and university management, even students have begun to understand that teachers and universities are able to catch students breaking rules and codes of conduct, which helps enhance their ethical attitudes. *Hence it is worthwhile to note that universities that have strong codes of conduct that are followed by their teachers, even advancements in technology can only enhance the teachers and students ethical attitudes if at all, but not hinder it.*

5.6.7 ***Overall Implication***

It is possible that, as demonstrated by this study, the students surveyed definitely felt that the university policy and anti-cheating attitudes and codes of conduct in their university played a significantly positive role in developing the students' and teachers' ethical attitude, that this has played a crucial role in demonstrating how advances in technology have been approached by teachers and management, how these advancements in technologies have impacted the teachers and how they may have in fact had either a positive or no impact on students and teachers, rather than having a negative influence, as was originally hypothesized. Fang (2010) stated that '[w]hen a culture of integrity [in a university] grows, academic dishonesty drops, even when ubiquitous campus technology seems to make cheating easy' (p.7).

Perhaps this is the most important implication of this study because it suggests that although advancement in technology may make e-cheating easier for students, even if students feel pressure from external sources, even if students had cheated in the past, tried to neutralize their behaviors or felt alienated from their peers, teachers or university, if parents have a strong sense of integrity and if the university's policies, *codes of conduct and practices are intrinsic, if the honesty and integrity are a part of the university' culture, and the teachers take student dishonesty very seriously and offenses are strictly dealt with, it perhaps becomes easy to combat student dishonesty and reduce students' likelihood to e-cheat.*

5.7 Khan's Factor Model Contribution to Existing Literature

It is believed that in the process of developing and validating a factor model for e-cheating among students, this research has also contributed to the body of existing literature. The following table shows a comparison of the existing models identified in Chapter with the Khan's Factor Model.

Table 31 implies that Khan's Model that has been developed and validated in this study seems to be a comprehensive significant model that can indeed be used by researchers and academics alike in order to understand factors that influence students' likelihood to e-cheat in higher education.

Table 5-2: *Khan's Factor Model comparison with existing models*

Model	**Year**	**No. of categories of factors**	**Limitation of categories**	**Dependent Variable**	**Target Population**	**Considers technological factors**	**Considers comprehensive list of factors**	**Model Validated through recognised statistical testing and analyses methods**
Khan's Model	2014	13	No perceived limitation: proposes taxonomy of comprehensive factors not previously found in literature	Likelihood to e-cheat	HE students	✓	✓	✓
Murdock and Anderman Model (2006)	2006	3	Categorized into three questions with unclear distinction	Propensity to cheat	HE and HS students	×	×	×

			between individual and contextual influences					
Jurdi et al Model (2011)	2011	4	No perceived limitation	Dishonest Academic Behavior	Canadian HE students	✗	✗	✓
Sierra and Hyman Model (2008)	2008	2	Focuses only of psychological factors	Willingness to Cheat	HE students	✗	✗	✓
Jalal-Karim Model (2013)	2013	0	No categories proposed	Encourage Academic Cheating	HE students	✗	✗	✓
Whitley Model-a(1998)	1998	5	Situation factors limited to classroom and testing; Student Characteristics combines social, demographic or contextual factors; Fifth category 'Do not fit' includes Self Awareness which is considered as personality characteristics in literature; Not used all categories	Cheating	HE students	✗	✓	✗
Whitley Model-b(1998)	1998	3	Combines Industriousness with opposite Procrastination making categorization ambiguous	Expected Benefit from Cheating	HE students	✗	✓	✗
Powell Model	2012	2	Only considers two categories:	Attitude to Plagiarism	HE students	✗	✗	✗

(2012)			personal and situational					
Smith et al Model (2002)	2002	4	Proposes Academic Standing as demographic whereas literature suggests contextual factors; Claims Alienation and Neutralization as attitudinal whereas literature suggests psychological	Cheating Likelihood	HE Accounting Students	×	×	✓
Davy et al Model (2007)	2007	3	Does not test demographic factors; Categorizes Motivation as attitudinal factor whereas literature suggests Psychological factor	Likelihood of Cheating	HE Business Students	×	×	✓
Smith et al Model (2009)	2009	3	Does not test demographic factors, however includes Academic Performance that previous studies have categorized as demographic	Likelihood of Cheating	HE Business Students	×	×	✓

5.8 Conclusion

This chapter has presented the accepted conceptual model called the **Khans' Factor Model**. The **Khans' Factor Model** was developed using mixed-methods that constituted Phase I and Phase II of this research.

The chapter began by restating the objectives of the study and then summarized the methodologies used to fulfill the objectives. The chapter then summarized the results and discussed the implications of those results. The key findings highlighted have been the importance of producing a list of factors that influence e-cheating likelihood in HE students and understanding the interrelationship of the factors to develop the **Khan's Factor Model**.

The following chapter will present a summary of the findings of this study.

CHAPTER 6: CONCLUSION

[I]ntegrity gains intensity and shines forth like a beacon on a lighthouse, helping us all to avoid wrecking ourselves on the shoals of our own collective shallowness

-William Astore, 2009, p. 8

6.1 Introduction

This chapter summarizes and draws conclusions with respect to the research objectives identified in Chapter 1. The chapter highlights the significant contributions made by this study to the field of education and academic honesty. Implications of the study are discussed at industrial, societal and individual levels. Limitations of the study are then identified and the chapter concludes with a discussion on the future direction for this area of research that has emerged from this study.

6.2 Summary of key findings

Various higher education (HE) stakeholders' have concerns over the ethical behavior of students. In the nineteenth century this was transformed with the introduction of honor codes and codes of conduct throughout the 1970s in an effort to curb unethical behavior among students (Gallant, 2008). This concern has stemmed mostly from a direct correlation found between students' ethical behavior in schools to when they become employees and how they perceive unethical behavior in the workplace (Sims, 1995). Researchers have proposed that any form of cheating undermines academic integrity, thus reducing the quality, perception and value of HE (Khan et al., 2006).

Numerous studies have highlighted the increase in cheating cases in HE (see McCabe et al., 2001; Bowers 1964). Though studies have not always agreed upon the rate of cheating, they have always agreed that cheating is rampant and needs to be curbed. Newstead et al. (1996) proposed 21 different types of behavior that are considered as cheating, however no such consolidated list of behaviors were found to be considered for electronic cheating (or e-cheating). This gap has been identified in this study, that majority of other studies seem to have focused on traditional cheating rather than e-cheating behavior.

E-cheating has been defined as 'using some form of ICT to perform academic misconduct or dishonesty in or out of a classroom to gain unfair advantage'. Using existing definitions of e-cheating, this study has proposed 19 behaviors that can be considered as e-cheating. These are any form of academic dishonesty using ICT, and this list of behaviors can be considered a significant contribution to the body of literature:

1. using ICTs to copy and paste another person's ideas, thoughts, images, photos, creativity, and words from online sources as one's own
2. using ICTs to copy another person's music, movie, program from electronic sources as one's own
3. using ICTs to copy and paste another person's words from another student's work with their acknowledgement
4. using ICTs to copy and paste another person's words from another student's work without their acknowledgement
5. using ICTs to allow other students to copy and paste one's own words
6. using ICTs to buy ready-made essays or reports via websites that offer such services either free or for a (minimal) fee
7. using ICTs to buy pre-prepared essays from past students
8. using ICTs to write an essay or report for another student
9. using ICTs to collude with other students by emailing, texting, sharing documents online, sharing references, words between students specially in an individual assessment requirement
10. using ICTs to access restricted websites, specially sites that are meant for instructors or examiners, to access questions before exams
11. using ICTs to access restricted databases from instructors' or schools' computer systems to access questions before exams
12. using ICTs to access other students' accounts to steal their work and use it for one's own gain
13. using ICTs such as Bluetooth, smartphones and such to provide answers to other students during examinations
14. using ICTs to gain answers from other students in or out of classrooms for questions during an examination

15. using unauthorized ICTs such as graphical calculators during examinations to solve equations, sketch graphs for equations and more where clear instructions restrict such use of advanced calculators
16. using ICTs to steal other students' user account details and passwords to access their work, research, printing privileges they may have paid for
17. using ICTs to falsify medical documents to avail special consideration during exams or assessment submissions
18. using ICTs to falsify data, images, figures, tables, graphs to make an essay or report seem worthwhile
19. using ICTs to falsify identity of students to allow one student to take exam for another

Some studies have revealed that e-cheating is on the rise in HE (McCabe & Trevino, 1997; Bushweller, 1999) which is also a concern for HE providers and employers because it is said to undermine the learning process (Nonis & Swift, 2001). Numerous studies have also proposed different ways to curb such behavior (McCabe et al., 1999; Kiehl, 2006; Cooper & Schwartz, 2007). Studies have also suggested that academics should implement strategies that are proactive to reduce e-cheating and that there is a need for the development of a conceptual model of factors that influence HE students' likelihood to e-cheat.

Through a review of literature, this study has produced a comprehensive list of 39 factors that have been classified and grouped into 13 intermediate factors that have been presented in Chapter 2. Based on the literature presented in Chapter 2, two objectives for this study were proposed based on the gap identified:

i) To develop such a conceptual model

ii) To validate that conceptual model in practice

The first objective of this study was achieved through the use of Interpretive Structural Modeling (ISM) (see Attri et al., 2013; Azevedo et al., 2013). In the process of understanding the ISM steps and reviewing literature on the process, this study highlighted a need for more detailed and streamlined steps to perform ISM and suggested more detailed and streamlined process to conduct ISM.

The first objective of developing a conceptual model was achieved by following the nine steps of ISM to propose a conceptual model (see Figure 3.8) and 19 hypotheses (see Chapter 3, Section 3.1.3.8).

The second objective of this research was to validate the proposed conceptual model. This was done by choosing a survey method, then selecting a suitable sample, developing a survey instrument, collecting data and then analyzing the data.

Using a cross-sectional survey (Basha & Harter, 1980), a questionnaire was developed (see Appendix B). The University of Wollongong in Dubai, situated in United Arab Emirates was chosen as the suitable sample pool. A total of 1000 surveys were sent out, 714 surveys were returned, of which 652 were accepted after rejecting missing or incomplete responses and finally 602 complete responses were considered after rejecting 50 outliers, a number that was considered acceptable and viable (O'Rourke, 2003). With the collected data, Exploratory Factor Analysis (EFA) was used to test the appropriateness and retention of the factors. Using EFA, it was found that the intermediate factor Student Personality Traits (SPT) did not load onto itself, but rather as three initial factors: Neutralization; Alienation and Self-Efficacy. This also impacted the hypotheses proposed and the final accepted model (see Figure 4.6).

As part of the second objective, to validate the model, SEM was used to test the model. The findings were:

- All the model fit levels were accepted as reasonably good (see Table 4.3)
- Self-efficacy as a factor was removed from the model as it did not load
- Any other observed variables that did not load onto the latent constructs was removed after the first run
- All other observed variables were accepted in the second run of the modified model

Path analysis and hypotheses testing findings were as follows:

- It was identified that the ethical attitude of students was a significant intermediate factor that had a strong negative influence on students' likelihood to e-cheat. Any factor that positively influenced the ethical attitudes of a student would decrease that student's likelihood to e-cheat. Likewise, if any factor negatively influenced the ethical attitudes of a student, it would increase that student's likelihood to e-cheat

- The teachers' ethical attitude had a positive influence on the ethical attitude of students which negatively influenced the students' likelihood to e-cheat.

- The parents' ethical attitude had a strong positive influence on the ethical attitude of students which negatively influenced the students' likelihood to e-cheat.

- The ethical attitude of peers had a positive influence on the ethical attitude of students which negatively influenced the students' likelihood to e-cheat.

- University policies and codes of conduct had strong positive influence on ethical attitudes of teachers (which had positive influence on ethical attitude of students) and the ethical attitudes of students had a negative influence on students' likelihood to e-cheat.

- Lack of prior high academic achievement had a strong positive influence on students' likelihood to e-cheat. Although this was contradictory to some previous studies (Leming, 1978; McCabe, 2001; Brandes, 1986), many other studies had suggested findings similar to this study that poor academic performance in the past strongly influenced students to e-cheat as a means to attempt to get better grades (Haines et al., 1986; Newstead et al., 1996; Diekhoff et al., 1996; Genereux & McLeod, 1995; McCabe & Trevino, 1996; Bowers, 1964).

- The prior cheating behavior of students had a strong positive influence on the students' likelihood to e-cheat and a strong negative influence on ethical attitude of the students (thus increasing their likelihood to e-cheat). Thus, the more instances of cheating in the past, the more likely students were to e-cheat again.

- Students did not feel pressured from parents, peers or other external pressures to cheat, but definitely felt the pressure to perform well in their previous academic courses which led to poor performance, and that led to their cheating, indirectly increasing their likelihood to e-cheat in HE.

- Extracurricular activities had a positive influence on students' likelihood to e-cheat, that means the more extracurricular activities students got involved in, the more they were likely to e-cheat.

- Both Neutralization behavior and Alienation had strong positive influence on students' likelihood to e-cheat.

- Advancement in ICT did not negatively influence students' ethical attitude or teachers' ethical attitude and hence did not negatively influence students' likelihood to e-cheat.

Upon reflection of this study, the following is a list of significant observations:

- Any factor that increases students' ethical attitude is desired because strong a ethical attitude in students decreases their likelihood to e-cheat in HE.

- Students are generally more tolerant of unethical behavior in lower grades and are more likely to e-cheat in HE if they cheated in the past. So it is important to focus on lower classes both in schools and HE in order to enhance students' ethical attitudes so that they become less tolerant.

- Students do not see external pressure from parents, friends, and schools as pressure, but rather as expectations that they should fulfill. These expectations are most often extrinsic in nature and were more focused on student grades than intrinsic goals such as deeper learning. Therefore, students felt they had to live up to the expectations by trying to get better grades, which often led to e-cheating or cheating (this is a similar finding to Ashbrook, 2010).

- Parents' ethical attitude has a strong influence on students' ethical attitudes, even stronger than peers' or teachers' ethical attitudes. If parents have a strong sense of ethics, it is possible that their children will grow up with string sense of ethics. This is a desired factor because if students have a strong sense of ethics, they are less likely to e-cheat in HE.

- When teachers are more aware of the policies and follow the rules, detect and penalize unethical behavior among students, they enhance students' ethical attitudes, thus reducing their likelihood of students to e-cheat.

- If students feel alienated from their educational environment, teachers and peers, they are more likely to e-cheat.

- If students have a tendency to neutralize their actions, they are more likely to e-cheat.

- The more extra-curricular activities students are involved in, the more likely they are to e-cheat.

- Students that display both alienation and/or neutralization behaviors in HE atmospheres that foster extrinsic goals

- HE providers who have strong codes of conduct and ensure that their teachers and students adhere to these policies, have strict penalties in place and are very vigilant in detecting unethical behavior, positively influence their teachers' ethical attitudes. The presence and strict adherence to such rules also positively influence students' ethical attitude. Both of these outcomes reduce students' likelihood to e-cheat.

- ICT use and advancement does not negatively influence students' ethical attitudes. Findings suggest that ICT advancements and usage may have positive or no influence on students' ethical attitudes because HE providers and teachers are themselves using increased levels of ICT to curb unethical behavior and detect cheaters and e-cheaters (Carnevale, 1999; Akkcay, 2008).

The first major result that can be reported from this study is that:

(1) *when HE providers produce and adhere to strong codes of conduct,*

(2) *when their teachers follow the rules, and*

(3) *when their teachers and invigilators detect and penalize unethical behavior,*

students:

(1) *feel less alienated,*

(2) *develop a strong sense of responsibility of their own actions, and*

(3) *develop deep learning and work towards intrinsic goals,*

thus increasing the students' ethical attitudes that makes them less likely to e-cheat, **even if the HE providers, teachers and students use ICT**.

This finding has accentuated the role of the policies and rules of conduct that, according to this study, develop in students a deeper understanding of what is right and wrong. Even if the ICT use and advancements increase,

(1) *either this has no implications on students' likelihood to e-cheat because there are such strong detection and penalizing processes in place, or*
(2) *they decrease students' likelihood to e-cheat because the teachers' ethical use of such technology helps deter students from engaging in e-cheating.*

The second major result that can be reported is that:

(1) *if students see unethical behavior in favorable light in younger years, and*
(2) *if they have cheated in the past,*

they are more likely to e-cheat during their studies in HE.

Therefore it is important that further studies are carried out on high school systems, school students and parents and develop programs to enhance school students' ethical attitudes in order to minimize prior cheating, thus minimizing their likelihood of students to e-cheat in HE. Based on the findings from this study, the **Khan's Factor Model** has been accepted that represents a tested and validated conceptual model of factors influencing students' likelihood to e-cheat, see Figure 6.1.

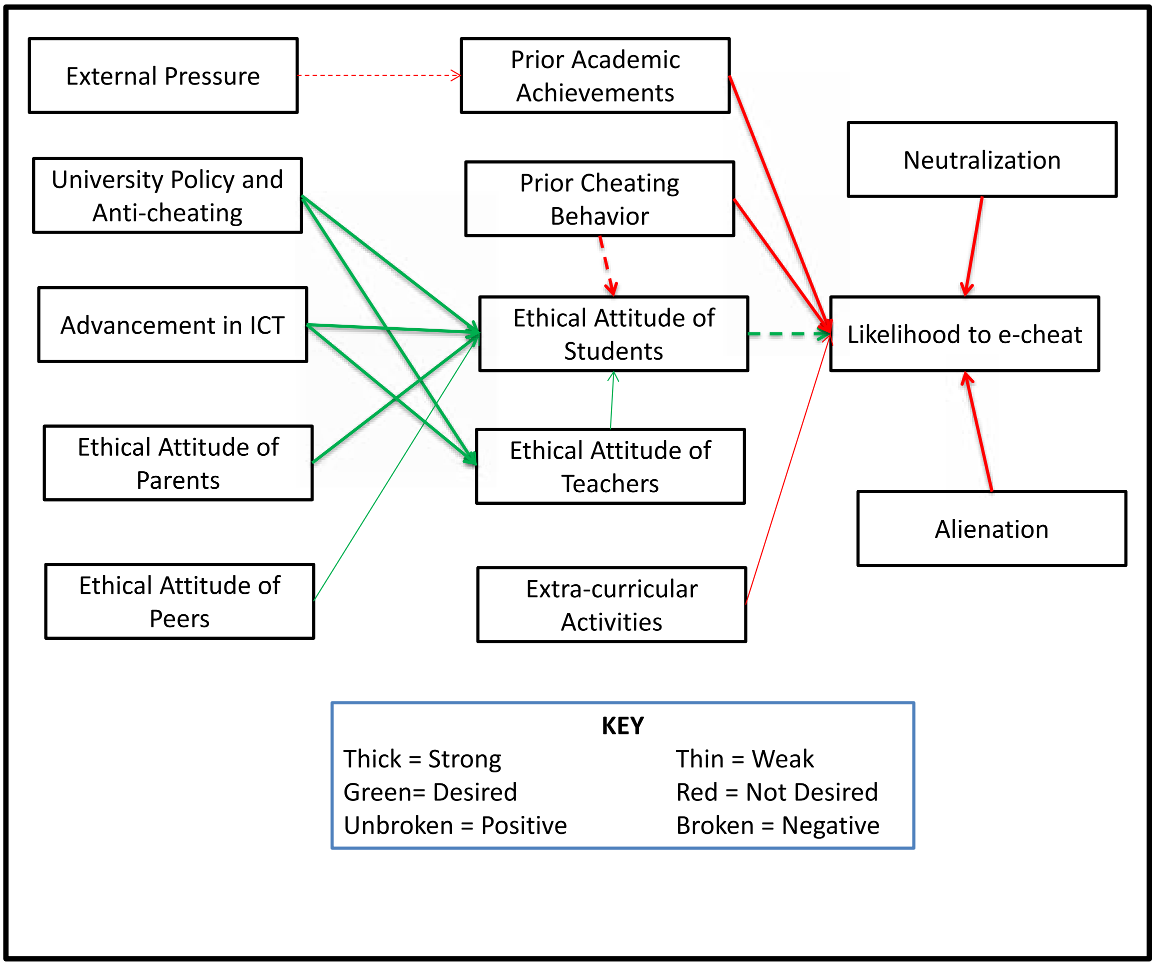

Figure 6-1*:* ***Khan's Factor Model*** *revisited*

6.3 Significance

Bellenger and Greenberg (1978) stated that any good research is always systematic and logical because it has followed a logical process of induction and deduction which is empirical and replicable, therefore, building a logical basis for decisions (Kothari, 2005). It is believed that this research has followed the most appropriate approach and has made some significant contributions to the following major stakeholders:

- Researchers
- Parents
- Schools and universities
- Government agencies and policy makers

6.3.1 Researchers

The literature review findings suggest that until now no such study has been conducted in detail with reference to the United Arab Emirates or any country in the region. Therefore, this thesis provides a distinct direction for research in e-cheating in HE in the region.

From a research perspective:

- Interpretive Structural Modeling (ISM) analysis provides a roadmap for researchers to produce a conceptual model of factors that influence students' likelihood to e-cheat (i.e. a roadmap to decide how a list of proposed factors are related to each other, how they interact and how they influence the dependent variable).

- This study provides a detailed step-by-step process and flow chart on how to apply ISM analysis that is a significant contribution to the body of literature.

- Exploratory Factor Analysis (EFA) of observed variables plots the interrelationships between many factors and explains these variables in terms of their latent constructs.

- Structural Equation Modeling (SEM) analysis of relationships between factors affecting students' likelihood to e-cheat provides a macro level perspective to the analysis and validation of a proposed model in place of a micro-level.

- Multiple analysis techniques (mixed-method) provide triangulation of the results of analysis that leads to validation of results and ultimately provides credence to the results.

- This study supports the relevance of using statistical techniques for education industry research.

- The results of the **Khan's Factor Model** are generic that can be adopted by other HE providers and other countries.

- The results of this study report a detailed investigation into the topic of cheating and e-cheating in HE and extensively reviews the literature to produce a

comprehensive list of actions that can be considered as e-cheating behavior among HE students, this list has not been present in previous studies.

- The study then lists factors that influence students' likelihood to e-cheat. While this research was conducted in the Middle East (United Arab Emirates), it was conducted in a western university (with a large body of international students from numerous nations), and the research outcome is believed to be widely applicable in any other country or any other HE settings. This is mainly due to the fact that the factors affecting HE students' likelihood to e-cheat were identified after the extensive literature review. Thus, it is expected that these factors could be generalized for other universities and other countries with due consideration. The data was collected using a questionnaire survey instrument, which had a generic structure and could easily be customized for other universities and countries. The questionnaire can also be generalized and applied at any other university or country with due consideration.

6.3.2 Parents

This study has provided empirical evidence of the role that parents play in regard to students' ethical attitudes.

Literature has stated that parents have a key role in shaping young children's social orientation, conscience, self-control, moral reasoning, compliance and self-esteem (Berkowitz & Grych, 1998). Besides their own actions, parents need to understand the message they send their children when they oppose strict disciplinary measures taken by schools against unethical behavior of their children. This is extremely important in light of this study's findings that parents' ethical attitudes have a positive influence on students' ethical attitude which makes their role in decreasing students' likelihood to e-cheat prominent. This study has also identified that students do not view unethical behavior in lower grades negatively, so are more inclined to have cheated in the past which has a very strong negative influence on their ethical attitude and a very positive influence on their likelihood to e-cheat. When in schools, parents' role in shaping their children's ethical attitudes is vital to ensuring these children grow up with strong ethics and values they can carry to HE.

The findings of this study have significance for parents as they play a major role in ensuring students' ethical attitudes are at earlier stages, a key to reducing students' likelihood to e-cheat when they are studying in HE.

6.3.3 Schools and Universities

Understanding how students perceive prior cheating and prior academic achievements can be very crucial to schools and universities. As students do not see external pressure as pressure but as expectations, which have influence on their prior academic achievements; it is important that schools move away from a strong focus only on extrinsic goals (grades) to an increased focus on intrinsic goals (such as deeper learning). Schools and universities can do this through re-examining traditional assessment methods and learning objectives. As schools have not been included in this research, further analysis of schools' perceptions of learning, their learning environment and impact on their students' ethical attitudes would be needed to provide further comprehensive analysis.

The results have provided empirical evidence that students' cheating behavior in schools have a negative impact on students' overall ethical behavior. This finding is directly applicable to schools and is therefore crucial for informing future decisions made by schools on their expectations of academic integrity, and how they inform students of such expectations, rather than have HE institutions and HE teachers try to tackle the problem at higher level. Socrates suggested that ethics consists of knowing what one should or should not do and that such knowledge can be taught. James Rest (1983) suggested that

- changes in young children's lives that are linked to fundamental changes in how they see their role in society,
- the number of years of formal education through schooling,
- the school's deliberate attempts to influence the children's awareness of moral problems to influence their reasoning or moral judgment

have high impacts on their ethical attitudes, thus suggesting need for greater emphasis on schools to revisit their attitude towards academic integrity.

The results have provided empirical evidence that university policies and codes of conduct have a very strong positive influence on students' ethical attitudes, thus decreasing their likelihood to e-cheat. The results show that such policies also help to enhance teachers' ethical attitudes, which in turn enhances students' ethical attitudes, ultimately reducing students' likelihood to e-cheat. This study provided evidence that when a university has a strong code of conduct and its educators follow the rules, they reduce alienation among students and students are less likely to neutralize their behavior, taking more responsibility and are less tolerant towards e-cheating behavior.

These results could be used by universities to revisit their codes of conduct to ensure their honor codes or rules and regulations; not only highlight the importance of academic integrity, but that these rules and regulations are enforced by the educators so that the detection of any unethical behavior does not go unpunished. The message given to students should be loud and clear that the university has zero-tolerance for such behavior. However, relationships between factors such as alienation and neutralization and policies are by no means comprehensive, and further analysis of these inter-relations is be needed to provide an analysis towards this conclusion.

The results can provide universities a new outlook on ICT use in academia. Technology use has been blamed for increased unethical behavior among students because it is readily available, cheap and easy to use. This study's findings suggest that e-cheating happens not necessarily because of advancement in ICTs, but because of extrinsic pressures on students, because high-stakes consequences of the system in assessment forces students to perform well. The results provide insight for universities - that given the right culture, presence of university policies and codes, and with frequent use of preventive technologies, it is possible to establish that ubiquitous ICT is not the controlling factor influencing students' likelihood to e-cheat.

6.3.4 Government agencies and policy-makers

This study has proposed a conceptual model and validated it to provide the final **Khan's Factor Model** for e-cheating, which was developed to address a gap in the literature on the list of factors, the interrelationship of these factors and the dependent factor students' likelihood to e-cheat. In doing so, this study has made a significant contribution to the existing body of knowledge about factors affecting students' likelihood to e-cheat that can be directly used by government agencies and policy makers in the education industry. As such, the results provide a model that can be used as a roadmap by government agencies and policy-makers to direct budgets, initiatives and programs towards:

- enhancing parents' understanding of the importance of their role in influencing students' ethical attitudes

- enhancing teachers' ethical attitudes by ensuring teachers in schools and universities understand and follow rules and regulations pertaining to academic integrity, detect and penalize students for any unethical behavior, and teachers themselves uphold academic integrity in their work

- enhancing codes of conduct to meet the required expectations of HE and the workforce

- enhancing accreditation and affiliation processes to include requirements for universities, such as the presence of honor codes, rate of detection of e-cheating behavior and penalties imposed, revision of codes of conduct that reflect the correct use of advancements in ICT to enhance student perception of the positive use of such technologies in education

With programs and initiatives in areas such as those mentioned above, the results provide relevance and appeal of the factor model to other universities and other countries, at the same time, working as a warning to policy makers and government bodies about the importance of universities, schools, teachers and parents in developing policies to govern academic integrity.

6.4 Limitations

This thesis has employed a mixed-method approach to complete the objectives of developing and validating a conceptual model of factors that influence students' likelihood to e-cheat. However, there were some inherent limitations including:

- The sample size could have been larger, particularly covering a larger cross-section of universities. However, the concept of secrecy and competition seemed to be sacrosanct to the universities in the country so much so that it became impermeable for this research. Although the survey did not involve divulging any identifying information, the universities still did not respond, as they did not want to give any information regarding their university, fearing for implied reputation based on the topic being studied.

- The researcher's familiarity with the chosen university, its processes and codes is an advantage that an outside researcher studying another university would not possess.

- Although the survey itself was designed and administered in such a way to assure anonymity, the results depended on student self-reporting. E-cheating or cheating is a sensitive issue that is unacceptable socially because it violates ethical codes and moral values. Thus, students who cheat or e-cheat knowingly (fully aware that their actions are unethical) try to hide such behavior. Then there could be students who cheat or e-cheat unknowingly (not aware that their actions are construed as unethical) and therefore feel they have nothing to report. These could be limitations as some students may be unwilling or unable to admit to or report dishonest behavior or perceptions, anonymity notwithstanding while others might offer socially desirable responses.

- A limitation that not all the surveys were returned and of those returned, not all were completed. Future studies should consider implementing strategies to encourage survey completion by reminding the students that perhaps some of the sections are not complete or stressing on the use of online survey technologies that are made easily available and can be saved and revisited so not requiring the respondents to answer all questions at one seating (Nulty, 2008).

6.5 Future directions

From the results, there is evidence of potential areas for further study, including:

- A study should be conducted on the possible correlation between external pressure, prior cheating behaviors, prior academic achievements and school students' likelihood to e-cheat, as has been explained in Chapter 5, Section 5.6.

- A study should be conducted to test relationship between neutralization, alienation and university policy and anti-cheating to evaluate the influence of university policies and anti-cheating on such behavior in students.

- Future research should be conducted to evaluate students' perceptions of prior cheating and what factors influence prior cheating in students to better understand what they perceive to be unethical behavior and why they would engage in such behavior. This is explained in detail in Chapter 5, Section 5.6.

- Further study into parents' actual ethical attitudes should be conducted to find out what they think about academic integrity (see Chapter 5, Section 5.6 for further detail)

- A study should be conducted to understand what encourages intrinsic goal-oriented attitudes in teachers, in particular researching possible implications of university policy and anti-cheating on teachers' ethical attitudes (see Chapter 5, Section 5.6 for further detail).

- Future research should be conducted to collect data of actual reported cases of cheating and e-cheating to compare with the cases of cheating and e-cheating stated by students as this will help shed light on the comparison of actual to self-reported cases.

- Study should be conducted using other research techniques such as interviews and focus groups to help triangulate results collected through the surveys that might help give a more complete picture of students' responses.

6.6 Summary

This thesis set out to identify and develop a deeper understanding of the factors that influence academic dishonesty particularly through the use of ICT by students in HE; by first developing a conceptual model of factors that was then be validated in practice. The study has enabled examination of interrelationships between various identified factors. Mixed-method techniques provide triangulation of analysis results that lead to validation of the results and eventually the validation of the conceptual mode. In the process, the findings provide some interesting lessons learned that potential to help in developing academic integrity among HE students, including:

- that students do not necessarily see external pressure as pressure, but as expectations

- that parents' ethical attitudes are one of the most important factors influencing what students understand to be right from wrong

- that students do not necessarily see cheating in lower grades as cheating, but as means to get better grades or fulfill expectations

- that advancements in ICT can either have no influence or increase students' ethical attitudes

- that effective codes of conduct and implementation of such codes establish a culture of integrity among the teachers in a university which then facilitate such cultures in students, regardless of advancements in ICT.

It is believed that this thesis has provided empirical evidence of some serious considerations that provide insight into the influence of factors on students' likelihood to e-cheat. In the twenty-first century, where most HE providers are incorporating advanced ICT and their students are already sophisticated users of ICT, solutions must be developed in addressing the traditional educational cultures of goal-oriented learning and overall integrity displayed by parents, teachers, schools and HE providers.

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APPENDIX A: ASSISTANT MODELER/STATISTICIAN

SREEJITH BALASUBRAMANIAN

B Tech, MIB (UOW), PhD Candidate (Mdx, UK)sreejubstar@gmail.comMobile: +97155-4419295

A PhD candidate and Master's degree holder in International business (UOWD) with Certificate in Statistics from University of California, Berkeley having extensive experience in Business Research, Institutional Research and Statistical Analysis.

My career objective is work for a reputed organization to utilize my expertise in business research, statistical skills in the form of data analysis, simulation and interpretation.

<u>RELEVANT SKILLS & EXPERIENCE</u>

- Good knowledge and understanding of the CHEDS data submission procedures and guidelines
- Project head for the last three CHEDS data submission cycles for UOWD.
- Project head for the student data submission to the KHDA website.
- Proven record in delivering statistical data on time for CHEDS, Licensure, KHDA, DIAC and KV.
- Excellent skills in completing research projects in time including questionnaire development, data collection, data interpretation and in writing research reports.
- Good knowledge in statistical methods for survey research including survey scales, data collection procedure, data validity, reliability and statistical tests.
- Experience in conducting quantitative field and online based surveys and qualitative focus grouped based surveys.
- Published papers in high profile journals and conferences like University of Cambridge.
- Strong knowledge of using statistical software's like SPSS, STATA, AMOS, MATLAB and VENSIM
- Strong knowledge of using online survey system such as Qualtrics and Survey Monkey.
- 4 + year experience in research and teaching at university level.
- Effective presentation, communication and interpersonal skills with good command in English with an overall IELTS Score of 7.5.
- Quantitative multivariate analysis such factor analysis, regression analysis, structural equation modeling, time series analysis, trend analysis and cluster analysis
- Qualitative modeling such as Interpretive Structural Modeling, Analytical Hierarchical Process etc.
- Probability theory, calculus, linear algebra, numerical analysis, operations research and operations management
- Microsoft packages include Word, Excel, PowerPoint and Visio

- Software programming skills in C & C++

1. **<u>RELEVANT EXPERIENCE:</u> Organization: University of Wollongong Dubai (June 2012 – till date)**
   Designation: Institutional Research Officer

   Responsibilities

- Conduct wide range of university surveys such University experience survey, Graduate survey, Alumni survey, Incoming student survey etc.
- Responsible for survey deployment, data collection, data analysis, data interpretation and preparing research reports.
- Preparing statistical reports using data extracted from the university database to different stakeholders to understand the Key Performance Indicators of the university.
- Provide accurate data for external data requests from CAA, KHDA, and DIAC etc.
- Develop sensitivity analysis using historical data and understand the implication of policy changes such as scholarship criteria, English proficiencies, minimum grade requirements, probationary condition etc. on student enrolments.
- Develop Cohort Analysis to understand the student attrition rate, academic termination, graduation, voluntary departure etc.
- Responsible for developing the annual University Fact Book.
- Assist in Deans and Program coordinators with the accreditation process by providing program specific data reports.

2. **Organization: University of Wollongong in Dubai (Dec 2009 - June 2012) - Casual**
   Designation: Research Assistant

   Responsibilities

- Assisting the professors with their research activities.
- Duties range from framing the questionnaire to data collection, data analysis, data interpretation and preparing research reports.
- Provide hands on training for academic staff on using statistical packages for data analysis
- Overall contributed for the successful completion of the project and meet deadlines

3. **Organization: University of Wollongong in Dubai (Aug 2010 - Jan 2011) - Casual**
   Designation: Adjunct Tutor for Statistics

   Responsibilities

- Conducting tutorials for statistics
- Work closely with the lecturer in preparing subject materials, student evaluation and feedback
- Provide hands on training for students on using statistical packages for data analysis
- Prepare and conduct class room quizzes, attendance and student progress report.

4. **Organization: KMCT College of Engineering (June 2006-till Aug 2007)-Full time**

Designation: Lecturer

Responsibilities

- Responsible for teaching engineering subjects at all levels as instructed by the college
- Provide proper guidance for students in academic projects and research seminars
- Acted as invigilator and examiner for university examinations.
- Assisted in coordination of University services such as job fair,education fair,study tour and sporting events.

OTHER POSITIONS HELD

5. Organization: CADD Emirates Communications (Oct 2009 – June 2012)
Designation: IT Network Design Engineer

Responsibilities

- To design IT solutions based on the customer requirements which includes both active and passive solutions.
- Introduce new partner products to the customer and identify/create potential business opportunity
- Coordinate with project department from project start till completion.
- Prepare weekly and quarterly reports on regular basis to exercise operational control of projects
- Responsible for training the new sales staff having limited IT background

EDUCATIONAL QUALIFICATION'S:

- *PhD Candidate (2011-)* In Business *Middlesex University, UK*
- *Master of International Business (2007-2008)* with *Distinction* from *University of Wollongong Dubai*
- *B TECH in Electronics and Communication Engineering (2002-2006)* with *First Class* from *Calicut University, India*
- *Certificate in Statistics (2013)* from *University of California, Berkeley*

REFEREED JOURNALS AND CONFERENCE PAPERS

1) Balasubramanian S, Sikdar A, Sundarakani B, Wagner SM (2011), Greening the construction industry supply chain-using system dynamics, Published in the proceeding of *18th EUROMA Conference, University of Cambridge*, UK, ISBN 978-1-902546-94-02)

2) Balasubramanian S (2012), A Hierarchical Framework of Barriers to Green Supply Chain Management in the Construction Sector, *Journal of Sustainable Development*, ISSN 1913-9063(Print) ISSN 1913-9071(Online)

3) Balasubramanian, S.,Khan, Z. Reza.(2012), 'Libraries opt for more online sources', *Lecture Notes in Electrical Engineering*, vol. 152, pp. 29-36.

4) Balasubramanian, S & Khan, Z. Reza.(2012), 'Students go click, flick and cheat... e-cheating, technologies and more', *Journal of Academic and Business Ethics,* vol. 6, no. N/A, pp. 1-26.

5) Balasubramanian, S, Manghat, S (2012), Role of institutional research in identifying factors influencing university choice of students *4th Annual MENA Air Conference*, Doha, Qatar

PROFESSIONAL MEMBERSHIPS:

1) Member of Middle East and North Africa Association of Institutional Research

OTHER ACHIEVEMENTS:

- Successfully designed and implemented a 'Lased based communication system’
- Worked in a team in designing and implementing 'Aircraft Black Box using RFID'
- Presented a paper on 'Big Bang Experiment’ at a ISTE conference held at National Institute of Technology Calicut
- Runner-up in the inter university debate competition held at National Institute of Technology Calicut
- Captained the university cricket team
- Achieved IELTS score of 7.5
- Obtained ‘D’ and above in 7 out of 8 papers in MIB at UOWD
- Certified IELTS Clerical marker.

APPENDIX B: FINAL SURVEY MODEL

Factors affecting students' likelihood of e-Cheat

Part I

This section collects anonymous demographic information pertaining to you. Please tick the most appropriate answer.

Student Personal Details

1. Gender
   - ☐ Male
   - ☐ Female

2. Age group
   - ☐ 16
   - ☐ 17
   - ☐ 18
   - ☐ 19
   - ☐ 20
   - ☐ 21
   - ☐ 22
   - ☐ 23
   - ☐ 24
   - ☐ 25
   - ☐ > 25

Higher Education Details

3. Subject major (area of study)
   - ☐ Business
   - ☐ Accounts and Finance
   - ☐ Humanities
   - ☐ Education
   - ☐ Computer Technology
   - ☐ Engineering
   - ☐ Math and Science
   - ☐ Other please specify ______

4. Degree level
5.
   - ☐ First year
   - ☐ Second year
   - ☐ Third year
   - ☐ Fourth year or higher

6. Average class size *(Select the box which describes the average size of the lectures you attend)*
   - ☐ <20
   - ☐ 21 – 40
   - ☐ 41 – 60
   - ☐ 61 - 80
   - ☐ 81 – 100
   - ☐ >100

7. In the lectures that I attend, a typical class size would be:
    - □ <20
    - □ 21 – 40
    - □ 41 – 60
    - □ 61 - 80
    - □ 81 – 100
    - □ >100

Part II

This section collects information about your Prior Academic Achievements and Prior Cheating. For each statement below, decide which response best describes your answer on a scale from Strongly disagree to Strongly agree:

For your information: cheating is defined as any form of academic dishonesty, including those carried out using electronic/digital devices and media

	Prior Academic Achievements	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
7	Until now, my academic achievement has usually been below average					
8	So far in my degree, my academic performance has typically been below that of my classmates					
9	I don't expect to do as well in assessment tasks as my peers					
10	I have trouble completing assessment tasks at the required level					

	Prior Cheating	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
11	I have cheated on an assignment, quiz, or a test					
12	My peers expect me to help them cheat					
13	In order to be a part of their group, my friends expect me to cheat or help them cheat					
14	In the past there are times when I have cheated.					
15	I feel that other people expect me to cheat					
16	I would cheat or help friends cheat to ensure I was accepted					

Part III

This section collects data on your University's policies and anti-cheating characteristics.

	University policies and anti-cheating characteristics	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
17	People who are caught cheating at my					

	university are severely punished					
18	My teachers and invigilators are very vigilant in detecting any form of cheating in assignments/tests/quizzes					
19	The subjects in my degree are generally quite difficult					
20	My university has an Honour code which defines what appropriate behaviour is					
21	Punishments for cheating at my university are usually quite severe					
22	A second item might be: Lecturers and tutors usually catch people who cheat					
23	I find the subjects in my degree quite hard.					
24	Students at my university are expected to follow the university's Honour code					

Part IV

This section collects data on your Extra-Curricular Activities and External Pressure .

	Extra-curricular activities	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
25	I have no time to study because of my involvement with extra-curricular activities					
26	I have no time to complete assignments because of my involvement with extra-curricular activities					

	External Pressure	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
27	People would generally consider my family to be of high status					
28	My family expects me to perform well academically					
29	My school/university expects me to perform well academically					
30	Academic performance is important to current or future employers					
31	My peers expect me to perform well academically					
32	My family would be perceived as being well off					
33	I feel pressured by my family to do well academically					
34	My teachers and lecturers expect me to do well in my academic studies					
35	My current or future employer would					

	expect me to have good grades					
36	I feel pressure from my friends and peers to do well at uni					

Part V

This section collects data on Advances in Information Communication Technology (ICT).

	Advances in ICT	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
37	Electronic/digital devices (e.g. computers, smart phones, laptops, tablets, etc) are more widely used by my classmates than by our predecessors					
38	In recent years, electronic/digital devices have become widely available to do university work					
39	There are a lot more online courses at my university than there were in previous years					
40	There are a lot more online sources on the Internet than there were in previous years					
41	Online sources are very easy to access from my electronic/digital devices					
42	I think it easy to use the latest technology (such as tablet, smart phones, etc.)					
43	I like the latest technology (such as tablet, smart phones, etc.) because they are so affordable					
44	My classmates use a wide range of electronic/digital devices (e.g. computers, smart phones, laptops, tablets, etc.) than previous uni students did.					
45	Most people like me now have access to appropriate electronic/digital devices					
46	Online courses are now widely available					
47	People like me now have access to many online sources of information					
48	It's easy to find and access information online					
49	The latest technology (such as tablets, smart phones, etc.) is quite easy to use					
50	I can afford the latest technology (such as tablets, smart phones, etc)					

Part VI

This section collects Students' Ethical Attitudes.

1	Students' Ethical Attitude	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
51	It is wrong to cheat even if an assessment task is unreasonably difficult					
52	My university degree is only important if I get something out of it					
53	It is wrong to cheat even if the teacher is not very good					
54	It is wrong to cheat even if the course material seemed useless					
55	It is wrong to cheat no matter what the circumstances					
56	I like the latest advances in technology (such as tablet, smart phones, etc)					
57	It is wrong to pirate movies/music/software					
58	Cheating is unacceptable even in a very difficult assignment or exam					
59	Studying at university is a waste of time unless I get a real benefit from it					
60	It is wrong to cheat even if the instructor does not grade fairly					
61	Even if you don't enjoy a course, you shouldn't cheat in it					
62	Cheating is always wrong, no matter what the circumstances					
63	The latest ICT (such as smart phones, tablets etc.) are important and useful developments					
64	Pirating software/music/software is wrong					
65	It's alright to cheat depending on the circumstances					
66	If another student is seen to be cheating, he or she should be reported					
67	I would cheat if I had a good reason for doing so					
68	It is my responsibility to prevent or report cheating					

Part VII

This section collects Students' Likelihood to Cheat.

	Students' Likelihood to Cheat	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
69	I would cheat in an assessment task					
70	Under the right circumstances, I					

	would cheat in an exam, quiz or assignment					
71	I will probably cheat in exams, quizzes or assignments in the future					

Part VIII

This section collects Teachers' Ethical Attitudes.

	Teachers' ethical attitudes	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
72	Teachers at my university understand and enforce academic integrity					
73	My lecturers and tutors know how to deal appropriately with cheating and they do so					
It is clear that my teachers feel it is wrong to:						
74	Hand in someone else's writing as one's own					
75	Use the Internet to copy text into an assignment					
76	Cheat in quizzes/assignments/tests					
77	Use pirated software/music/movies					
78	Pirate or distribute software/movies/music					

Part IX

This section collects Parents' Ethical Attitudes.

	Parents ethical attitudes	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
It is clear that my parents feel it is wrong to:						
79	Hand in someone else's writing as one's own					
80	Use the Internet to copy text into an assignment					
81	Purchase essays/reports from online sources					
82	Cheat in quizzes/assignments/tests					
83	Use electronic/digital devices without authorization during tests/quizzes					
84	Use pirated software/music/movies					
85	Pirate or distribute software/movies/music					

Part X

This section collects Peers' Ethical Attitudes.

	Peers' ethical attitudes Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
It is clear that my peers feel it is wrong to:						
86	Hand in someone else's writing as one's own					
87	Use the Internet to copy text into an assignment					
88	Purchase essays/reports from online sources					
89	Cheat in quizzes/assignments/tests					
90	Use electronic/digital devices without authorization during tests/quizzes					
91	Use pirated software/music/movies					
92	Pirate or distribute software/movies/music					

Thank you for your time!

Appendix: Definitions

Cheating: the act of using unauthorized materials, methods or someone else's work for one's own benefit. The work copied can be an idea, a written piece of work which may be scholarly in nature, a song, a painting, anything that has not been created, produced or developed by the user

E-cheating or electronic cheating: using some form of ICT to perform academic dishonesty in or out of classrooms in order to gain unfair advantage

APPENDIX C: PARTICIPATION INFORMATION AND CONSENT SHEET

PARTICIPATION INFORMATION SHEET and CONSENT FORM FOR STUDENTS

Dear participant,

This is an invitation for you to participate in a study conducted by researchers at the University of Wollongong in Dubai. The research is called *Implications of psychological and societal factors on students' likelihood to e-cheat.* The investigator of this study has been involved in trying to study the impact of the above-mentioned factors on students' attitude towards e-cheating and would like to have your input for the same. This research has been granted Ethics Clearance by UOWD and UOW Australia under the HREC Approval No: HE11/300.

INVESTIGATOR

Zeenath Reza Khan, Faculty of Computer Science and Engineering

04 – 3672469 zeenathkhan@uowdubai.ac.ae

WHAT WE WOULD LIKE YOU TO DO

If you choose to participate you will be asked to be involved in a 10 minute survey about your use of technology, your attitude, your parents' attitude and teachers'/university's attitude and understanding of ethics in IT. The survey will be recorded either as online or on a paper-based questionnaire. Typical questions include on a five-point scale (Strongly agree to Strongly disagree):-

- Cheating can be defined as an act of deception for profit to yourself.
- 'E-cheating' or electronic cheating can be defined as using information technology (IT) to aid in the process of cheating in a class (King and Case, 2007).
- My parents do not support any level of cheating

These are some sample questions you may find in this survey. Please note you may be asked some questions regarding your parents and/or teachers such as:

- My parents do not buy any pirated movies or software
- My parents are concerned only about my academic success and not how I achieve it
- My teacher or invigilator has been stringent against any form of cheating
- I have strong academic integrity because of my teachers

Please remember you are free to choose NOT to answer any question that you may find distressful. All questions have been included for purely research purpose, to help the researcher answer the proposed question: *Implications of psychological and societal factors on students' likelihood to e-cheat.*

Apart from taking 10 minutes of your time for filling in the questionnaire, we can foresee no risks for you. You are free to decide if you want to be involved in this project or not and you can stop participating at any time ***before you submit this survey***. The survey is anonymous in nature and the **questionnaires with their responses** will not be shared with your University. Independent research assistants have been hired by the researcher to conduct the survey and hand over the results to us. This study is being carried out as part of the primary investigator's PhD dissertation at University of Wollongong, Australia. If you decide to help us in this study, you will provide us with valuable information about how to best understand the impact of societal and psychological factors on students' attitude towards e-cheating. One or more academic publication papers may arise from the findings and subsequent analysis, but we will not use any indicative information that relates to you or your University in any part of the research. The final dissertation or published paper may be shared with your University or other academic institutions.

Disclaimer: Please note any act of cheating or e-cheating either on paper, during examinations, or while writing a report, as copying from others with or without their permission or plagiarism in reports or essays is observed as serious offence at academic level and should not be indulged in any way. Please note your responses will have no legal implications on yourself or others. However, no specific examples should be disclosed in any way. If any illegal examples are disclosed the researcher has an obligation to report it to the relevant authorities.

ETHICS REVIEW AND COMPLAINTS

This study has been reviewed by the Human Research Ethics Committee (Social Science, Humanities and Behavioural Science) of the University of Wollongong, Australia. If you are not happy with the way this research has been conducted, you can tell your parents or the teacher who can contact the Ethics Officer at the University on (02) 42214457 or

Thank you for your interest in this study.

CONSENT STATEMENT

I have read the above comments and agree to participate in this study. I give my permission to fill in a paper-based or online questionnaire, under the terms outlined above. I understand that if I have any questions or concerns regarding this project I can contact the investigator at the above location or the Ethics Officer at the University on (02) 42214457 or email at rso-ethics@uow.edu.au.

____

(Participant’s signature)

APPENDIX D: UOW ETHICS CLEARANCE FORM

UNIVERSITY OF WOLLONGONG

RENEWAL APPROVAL
In reply please quote: HE11/300
Further Enquiries Phone: 4221 3386

3 September 2013

Ms Zeenath Khan
UOW Dubai
C/- A/Prof Peter Hyland

Dear Ms Khan

I am pleased to advise that renewal of the following Human Research Ethics application has been approved. This certificate relates to the research protocol submitted in your original application and all approved amendments to date.

Ethics Number:	HE11/300
Project Title:	E study to identify the societal factors and implications of increased online-sources and readily-available e-technology on students' attitudes towards e-cheating in the UAE
Name of Researchers:	Ms Zeenath Khan
Renewed From:	3 August 2013
Expiry Date:	2 August 2014

Please note that approvals are granted for a twelve month period. Further extension will be considered on receipt of a progress report prior to expiry date.

This certificate relates to the research protocol submitted in your original application and all approved amendments to date. Please remember that in addition to completing an annual report the Human Research Ethics Committee also requires that researchers immediately report:

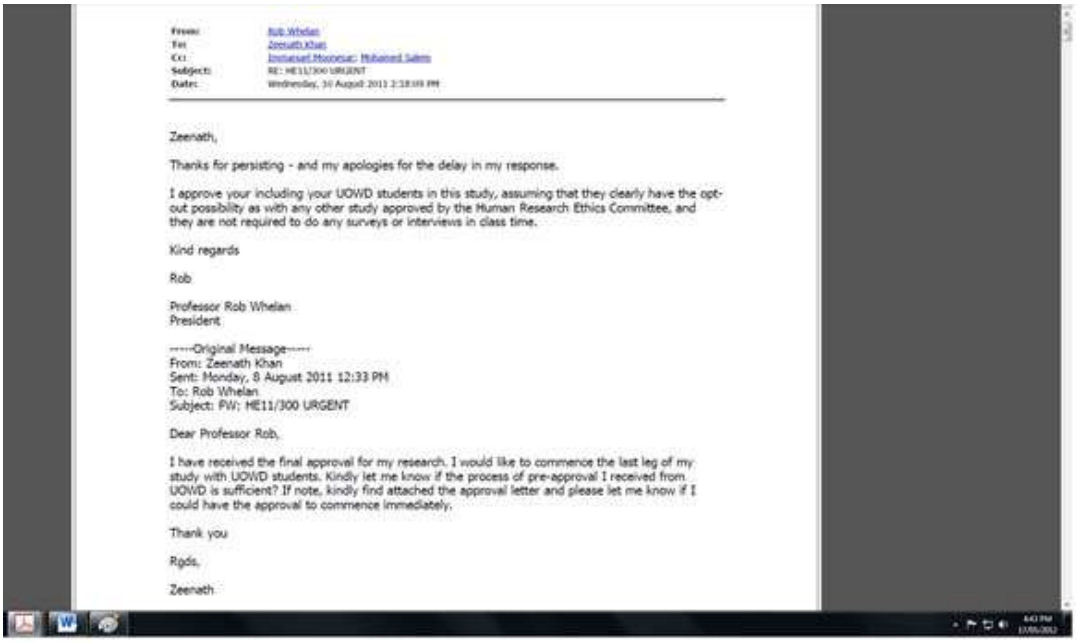
- proposed changes to the protocol including changes to investigators involved
- serious or unexpected adverse effects on participants
- unforseen events that might affect continued ethical acceptability of the project.

Yours sincerely

Cheryl Jecht
Ethics Assistant on behalf of the
Social Sciences Human Research Ethics Committee

Ethics Unit, Research Services Office
University of Wollongong NSW 2522 Australia
Telephone (02) 4221 3386 Facsimile (02) 4221 4338
Email: rso-ethics@uow.edu.au Web: www.uow.edu.au

APPENDIX E: UOWD APPROVAL TO CONDUCT SURVEY ON CAMPUS



From: Rob Whelan
To: Zeenath Khan
Cc: Immanuel Moonesar; Mohamed Salem
Subject: RE: HE11/300 URGENT
Date: Wednesday, 10 August 2011 2:18:09 PM

Zeenath,

Thanks for persisting - and my apologies for the delay in my response.

I approve your including your UOWD students in this study, assuming that they clearly have the opt-out possibility as with any other study approved by the Human Research Ethics Committee, and they are not required to do any surveys or interviews in class time.

Kind regards

Rob

Professor Rob Whelan
President

-----Original Message-----
From: Zeenath Khan
Sent: Monday, 8 August 2011 12:33 PM
To: Rob Whelan
Subject: FW: HE11/300 URGENT

Dear Professor Rob,

I have received the final approval for my research. I would like to commence the last leg of my study with UOWD students. Kindly let me know if the process of pre-approval I received from UOWD is sufficient? If note, kindly find attached the approval letter and please let me know if I could have the approval to commence immediately.

Thank you

Rgds,

Zeenath

APPENDIX F: THIRD PARTY CONSENT AND CONFIDENTIALITY FORM

Third Party Confidentiality/Consent Agreement
Project Title: Societal Factors and E-cheating

1. Approval/Consent Information

______________________________ hereby agree to participate in this research as (please tick one of the following boxes):

☐ research assistant : with the understanding that he/she will be responsible for data collection, data entry and aid in statistical analysis

☐ University faculty (after an approval from the University has been acquired by researcher to conduct study on campus)

2. Confidential Information

The **'Project Title: SOCIETAL FACTORS AND E-CHEATING'** research project hereby confirms that it will NOT disclose certain of its confidential and proprietary information to (please any one o the boxes below):

☐ their research assistant ____________________________

☐ University representative _________________________

Confidential information shall include all data collected and other information disclosed or submitted, orally, in writing, or by any other media, to_______________ by _____________ .

3. Obligations of Third Party

A. ___________________hereby agree that the confidential **'Project Title: SOCIETAL FACTORS AND E-CHEATING'** research study is to be used solely for the purposes of said study. Said confidential information should only be disclosed to researchers of said research study with a specific need to know.

______________________hereby agrees to follow ethical means to collect all data from students without means of coercion and within student participants' rights to choose to participate or reject completing a survey.

______________________hereby agrees not to disclose, publish or otherwise reveal any of the data received from participants of the project to any other party whatsoever except with the specific prior written authorization of the principal investigator.

B. Materials containing confidential information must be stored in a safe location so as to avoid third persons unrelated to the project to access said materials. Confidential Information shall not be duplicated by third party except for the purposes of this Agreement.

3. Completion of the Work

Upon the completion of the work and at the request of the principal investigator, the third party shall return all data collected information received in written or tangible form, including copies, or reproductions or other media containing such confidential information, within ten (10) days of such request.

With his/her signature, _________________________ shall hereby adhere to the terms of this agreement.

APPENDIX G: EFA RESULTS

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.922
Bartlett's Test of Sphericity	Approx. Chi-Square	34867.194
	df	3486
	Sig.	.000

Communalities

1.1.31	Initial	Extraction
PAA_1	.660	.702
PAA_2	.701	.781
PC_1	.567	.508
PC_2	.603	.536
UPAC_1	.604	.545
UPAC_2	.643	.644
UPAC_3	.635	.664
UPAC_4	.605	.570
UPAC_5	.627	.572
UPAC_6	.531	.446
UPAC_7	.626	.771
UPAC_8	.611	.579
ECA_1	.751	.790
ECA_2	.745	.862
EP_1	.424	.327
EP_2	.618	.541
EP_3	.681	.629
EP_4	.615	.524
EP_5	.619	.582

EP_6	.493	.430
EP_7	.498	.274
EP_8	.593	.523
EP_9	.591	.545
EP_10	.421	.258
ICT_1	.644	.514
ICT_2	.792	.724
ICT_3	.479	.336
ICT_4	.731	.649
ICT_5	.760	.726
ICT_6	.764	.729
ICT_7	.551	.416
ICT_8	.630	.583
ICT_9	.700	.618
ICT_10	.662	.612
ICT_11	.788	.722
ICT_12	.728	.636
ICT_13	.758	.727
ICT_14	.540	.403
SEA_1	.702	.623
SEA_2	.387	.155
SEA_3	.727	.650
SEA_4	.771	.671
SEA_5	.693	.627
SEA_6	.604	.474
SEA_7	.561	.378
SEA_8	.586	.526
SEA_9	.339	.106
SEA_10	.670	.623

SEA_11	.775	.720
SEA_12	.784	.716
SEA_13	.532	.364
SEA_14	.544	.283
SEA_15	.533	.387
SEA_16	.488	.365
SLC_1	.782	.772
SLC_2	.821	.843
SLC_3	.846	.884
TEA_1	.673	.570
TEA_2	.685	.551
TEA_3	.739	.710
TEA_4	.835	.811
TEA_5	.868	.862
TEA_6	.900	.916
TEA_7	.903	.919
PEA_1	.898	.868
PEA_2	.895	.846
PEA_3	.874	.847
PEA_4	.881	.862
PEA_5	.887	.872
PEA_6	.869	.846
PEA_7	.879	.865
PeeEA_1	.897	.866
PeeEA_2	.896	.870
PeeEA_3	.857	.851
PeeEA_4	.863	.853
PeeEA_5	.848	.831
PeeEA_6	.879	.829

PeeEA_7	.885	.840
Neu_1	.489	.160
Neu_2	.505	.237
SeE_1	.623	.567
SeE_2	.601	.559
Alie_1	.677	.783
Alie_2	.630	.636
Extraction Method: Maximum Likelihood.		

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	21.235	25.280	25.280	18.742	22.312	22.312	14.375
2	7.841	9.335	34.615	9.017	10.735	33.047	13.792
3	5.900	7.023	41.638	5.748	6.843	39.890	13.671
4	4.155	4.947	46.585	2.854	3.398	43.288	10.611
5	2.914	3.470	50.054	2.817	3.353	46.641	10.621
6	2.542	3.026	53.080	1.603	1.908	48.549	12.690
7	2.428	2.890	55.970	1.811	2.155	50.705	6.365
8	1.885	2.244	58.214	1.922	2.288	52.993	4.113
9	1.704	2.029	60.243	1.610	1.917	54.910	4.917
10	1.648	1.962	62.205	1.696	2.019	56.929	4.069
11	1.594	1.897	64.102	1.447	1.723	58.652	2.888
12	1.487	1.770	65.872	1.082	1.288	59.940	10.363
13	1.232	1.467	67.339	1.196	1.424	61.365	2.167
14	1.201	1.430	68.769	.847	1.008	62.372	2.868

15	1.143	1.361	70.130				
16	1.061	1.263	71.393				
17	.973	1.159	72.552				
18	.917	1.091	73.643				
19	.903	1.075	74.717				
20	.856	1.019	75.736				
21	.800	.952	76.689				
22	.767	.913	77.602				
23	.731	.871	78.473				
24	.703	.837	79.310				
25	.672	.800	80.110				
26	.645	.768	80.878				
27	.612	.729	81.607				
28	.605	.720	82.327				
29	.587	.699	83.026				
30	.564	.672	83.697				
31	.524	.624	84.321				
32	.517	.616	84.937				
33	.508	.605	85.542				
34	.489	.582	86.124				
35	.461	.549	86.673				
36	.452	.538	87.211				
37	.449	.535	87.746				

38	.433	.516	88.262				
39	.423	.503	88.765				
40	.401	.477	89.242				
41	.390	.464	89.706				
42	.379	.451	90.157				
43	.361	.430	90.587				
44	.358	.426	91.014				
45	.351	.418	91.432				
46	.338	.402	91.834				
47	.318	.379	92.213				
48	.310	.369	92.582				
49	.304	.362	92.944				
50	.302	.359	93.304				
51	.290	.345	93.649				
52	.274	.326	93.975				
53	.267	.318	94.293				
54	.261	.311	94.604				
55	.258	.307	94.911				
56	.244	.291	95.202				
57	.242	.289	95.491				
58	.240	.286	95.777				
59	.236	.280	96.058				
60	.225	.268	96.326				

61	.222	.264	96.590				
62	.204	.243	96.833				
63	.199	.236	97.069				
64	.186	.222	97.291				
65	.182	.217	97.508				
66	.172	.205	97.713				
67	.166	.198	97.910				
68	.163	.194	98.105				
69	.153	.182	98.287				
70	.147	.175	98.462				
71	.138	.165	98.626				
72	.136	.162	98.788				
73	.126	.150	98.938				
74	.116	.138	99.076				
75	.112	.133	99.209				
76	.104	.124	99.333				
77	.095	.113	99.446				
78	.091	.108	99.554				
79	.078	.093	99.647				
80	.075	.090	99.737				
81	.069	.082	99.819				
82	.063	.075	99.894				
83	.052	.062	99.956				

84	.037	.044	100.000				
Extraction Method: Maximum Likelihood.							
a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.							

Factor Matrix[a]

	Factor													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PAA_1									.592					
PAA_2									.632					
PC_1														
PC_2														
UPAC_1														
UPAC_2														
UPAC_3														
UPAC_4														
UPAC_5														
UPAC_6														
UPAC_7														
UPAC_8														
ECA_1					.572									
ECA_2					.540									
EP_1														
EP_2														
EP_3														
EP_4														
EP_5														
EP_6														
EP_7														

EP_8															
EP_9															
EP_10															
ICT_1															
ICT_2		.541													
ICT_3															
ICT_4															
ICT_5		.517													
ICT_6		.533													
ICT_7															
ICT_8															
ICT_9		.508													
ICT_10															
ICT_11		.559													
ICT_12		.538													
ICT_13		.528													
ICT_14															
SEA_1															
SEA_2															
SEA_3															
SEA_4	.522														
SEA_5	.553														
SEA_6															
SEA_7															
SEA_8															
SEA_9															
SEA_10															
SEA_11	.554														
SEA_12															

SEA_13														
SEA_14														
SEA_15														
SEA_16														
SLC_1			.629											
SLC_2			.648											
SLC_3			.630											
TEA_1														
TEA_2														
TEA_3	.714													
TEA_4	.786													
TEA_5	.792													
TEA_6	.780													
TEA_7	.777													
PEA_1	.820													
PEA_2	.813													
PEA_3	.806													
PEA_4	.809													
PEA_5	.821													
PEA_6	.687													
PEA_7	.705													
PeeEA_1	.789													
PeeEA_2	.752													
PeeEA_3	.748													
PeeEA_4	.745													
PeeEA_5	.749													
PeeEA_6	.580													
PeeEA_7	.604													
Neu_1														

Neu_2														
SeE_1														
SeE_2														
Alie_1											.503			
Alie_2														
Extraction Method: Maximum Likelihood.														
a. 14 factors extracted. 9 iterations required.														

Goodness-of-fit Test		
Chi-Square	df	Sig.
5175.034	2401	.000

Pattern Matrix[a]														
	Factor													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PAA_1								.857						
PAA_2								.924						
PC_1									.585					
PC_2									.691					
UPAC_1						.777								
UPAC_2						.889								
UPAC_3											.781			
UPAC_4						.689								
UPAC_5						.744								
UPAC_6						.665								
UPAC_7											.892			
UPAC_8						.629								
ECA_1										.888				
ECA_2										.970				

EP_1					.546									
EP_2					.534									
EP_3					.706									
EP_4					.519									
EP_5					.722									
EP_6					.662									
EP_7					.524									
EP_8					.633									
EP_9					.676									
EP_10														
ICT_1	.695													
ICT_2	.789													
ICT_3	.633													
ICT_4	.816													
ICT_5	.859													
ICT_6	.775													
ICT_7	.700													
ICT_8	.818													
ICT_9	.777													
ICT_10	.846													
ICT_11	.867													
ICT_12	.768													
ICT_13	.813													
ICT_14	.569													
SEA_1			.725											
SEA_2														
SEA_3			.816											
SEA_4			.759											
SEA_5			.657											

SEA_6														
SEA_7			.541											
SEA_8			.680											
SEA_9														
SEA_10			.785											
SEA_11			.835											
SEA_12			.853											
SEA_13														
SEA_14														
SEA_15			.606											
SEA_16			.557											
SLC_1							.857							
SLC_2							.914							
SLC_3							.944							
TEA_1														
TEA_2														.514
TEA_3														
TEA_4														
TEA_5												.505		
TEA_6												.905		
TEA_7												.918		
PEA_1		.960												
PEA_2		.919												
PEA_3		.961												
PEA_4		.967												
PEA_5		.970												
PEA_6		.593											.678	
PEA_7		.593											.674	
PeeEA_1				.817										

PeeEA_2				.882										
PeeEA_3				.874										
PeeEA_4				.878										
PeeEA_5				.824										
PeeEA_6				.808										
PeeEA_7				.794										
Neu_1														
Neu_2														
SeE_1								.597						
SeE_2								.632						
Alie_1									.888					
Alie_2									.649					

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

Structure Matrix

	Factor													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PAA_1								.830						
PAA_2								.877						
PC_1									.666					
PC_2									.688					
UPAC_1						.715								
UPAC_2						.782								
UPAC_3											.733			
UPAC_4						.745								
UPAC_5						.742								
UPAC_6						.619								

UPAC_7											.846			
UPAC_8					.520	.748								
ECA_1										.875				
ECA_2										.921				
EP_1														
EP_2	.557				.688	.520								
EP_3					.780	.529								
EP_4					.675	.503								
EP_5					.745									
EP_6					.634									
EP_7														
EP_8					.701									
EP_9					.727									
EP_10														
ICT_1	.690													
ICT_2	.843					.528								
ICT_3	.525													
ICT_4	.796													
ICT_5	.845													
ICT_6	.834					.559								
ICT_7	.618													
ICT_8	.745													
ICT_9	.779													
ICT_10	.760													
ICT_11	.844													
ICT_12	.787													
ICT_13	.839					.517								
ICT_14	.591													
SEA_1			.775											

SEA_2														
SEA_3			.798											
SEA_4			.809											
SEA_5			.775											
SEA_6	.563		.574											
SEA_7														
SEA_8			.717											
SEA_9														
SEA_10			.780											
SEA_11			.838											
SEA_12			.839											
SEA_13			.534											
SEA_14														
SEA_15			.530											
SEA_16														
SLC_1							.875							
SLC_2							.913							
SLC_3							.936							
TEA_1						.549								.500
TEA_2						.543								.530
TEA_3		.700										.672		.525
TEA_4		.776		.507								.795		
TEA_5		.785		.514								.841		
TEA_6		.657		.544								.942		
TEA_7		.647		.526								.939		
PEA_1		.923		.516								.558		
PEA_2		.899		.543								.564		
PEA_3		.895		.539								.526		
PEA_4		.915		.521								.545		

PEA_5		.916		.527								.557		
PEA_6		.610		.537									.620	
PEA_7		.634		.529									.604	
PeeEA_1		.629		.900								.539		
PeeEA_2		.581		.920								.502		
PeeEA_3		.580		.907								.506		
PeeEA_4		.577		.914										
PeeEA_5		.592		.897										
PeeEA_6				.829										
PeeEA_7				.835									.507	
Neu_1														
Neu_2														
SeE_1								.708						
SeE_2								.717						
Alie_1									.875					
Alie_2									.754					
Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization.														

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8
1	1.000	.414	.456	.168	.539	.592	-.161	-.181
2	.414	1.000	.446	.532	.284	.418	-.199	-.109
3	.456	.446	1.000	.336	.449	.518	-.448	-.152
4	.168	.532	.336	1.000	.190	.260	-.125	-.062
5	.539	.284	.449	.190	1.000	.604	-.147	-.093
6	.592	.418	.518	.260	.604	1.000	-.294	-.155
7	-.161	-.199	-.448	-.125	-.147	-.294	1.000	.314
8	-.181	-.109	-.152	-.062	-.093	-.155	.314	1.000

9	-.192	-.141	-.336	-.074	-.047	-.229	.479	.282
10	-.196	-.166	-.226	-.070	-.130	-.166	.296	.366
11	-.092	-.166	-.143	-.041	.015	.037	.245	.343
12	.326	.633	.343	.503	.313	.368	-.171	-.168
13	-.179	-.096	-.049	.192	-.017	-.088	.026	.030
14	.063	.180	.090	.288	.129	.113	.009	.077

Factor Correlation Matrix

Factor	9	10	11	12	13	14
1	-.192	-.196	-.092	.326	-.179	.063
2	-.141	-.166	-.166	.633	-.096	.180
3	-.336	-.226	-.143	.343	-.049	.090
4	-.074	-.070	-.041	.503	.192	.288
5	-.047	-.130	.015	.313	-.017	.129
6	-.229	-.166	.037	.368	-.088	.113
7	.479	.296	.245	-.171	.026	.009
8	.282	.366	.343	-.168	.030	.077
9	1.000	.366	.184	-.108	.112	.083
10	.366	1.000	.407	-.184	.044	.005
11	.184	.407	1.000	-.138	.139	.100
12	-.108	-.184	-.138	1.000	-.019	.373
13	.112	.044	.139	-.019	1.000	.057
14	.083	.005	.100	.373	.057	1.000

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.