THE IMPACT OF ICT SUPPORT SERVICES IN QUALITY EDUCATION ON STUDENTS' PERCEIVED PERFORMANCE: A CASE OF CENTRE OF DIPLOMA STUDIES (PPD), SPACE UTM

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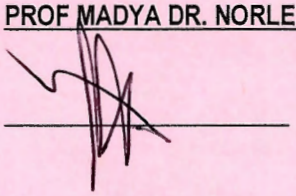

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ABSTRACT

Nowadays the role of Information and Communication Technology (ICT), in the education sector plays an important role, especially in empowering the technology into the educational activities. Education sector can be the most effective sector to expect and eliminate the negative impact of ICT. Technology on another side can be the most effective way to increase the student's knowledge. Education is a socially oriented activity and quality education has traditionally associated with strong teachers having high degrees of personal contact with learners. Using ICT in education lends itself to more student-centred learning settings. But with the world moving rapidly into digital media and information, the role of ICT in education is becoming more and more important and this importance will continue to grow and develop. This study focused on the impact of ICT support services in quality education on student perceived performance and how it affects the student's learning quality to achieve good grades in the 3-years Diploma Programme at Centre of Diploma Studies (PPD) SPACE UTM. The questionnaire was used as the instrument in collecting data from the respondents. It consisted of three parts; part A (personal information of respondents), part B (the impact of ICT support services in quality education on student perceived performance) and part C (quality of work). There were 400 questionnaires distributed randomly to the respondents and 291 were returned to the researcher. Findings have shown that there is a significant relationship between teaching and learning with student perceived performance ($r = 0.618$), education quality and accessibility with student perceived performance ($r = 0.466$), environment of learning with student perceived performance ($r = 0.619$) and motivation of learning with student perceived performance ($r = 0.417$). Based on the results of the research, the results showed that all the factors studied had an impact of ICT support services in quality education on student perceived performance. Hence, ICT support services have become important activities that need to measure from time to time to ensure the advantages of ICT usage. Thus, this paper proposes the effective measurable approach for measuring the quality of ICT support services and the impact on the student performance. This study reviewed the current scope of ICT support services in the term of teaching and learning process, quality and accessibility of education, learning environment and learning motivation. The findings suggest ideas and awareness that ICT support services top managements, providers and users relating to the ICT support services scope.

Keywords – Student Performance, ICT, ICT Support Service, Quality Education

ABSTRAK

Pada masa kini peranan Teknologi Maklumat dan Komunikasi (ICT), dalam sektor pendidikan memainkan peranan penting, terutamanya dalam memperkasakan teknologi ke dalam aktiviti pendidikan. Sektor pendidikan boleh menjadi sektor yang paling berkesan untuk mengharapkan dan menghapuskan kesan negatif ICT. Teknologi di sisi lain boleh menjadi cara yang paling berkesan untuk meningkatkan pengetahuan pelajar. Pendidikan adalah aktiviti berorientasikan sosial dan pendidikan berkualiti secara tradisional dikaitkan dengan guru-guru yang kuat yang mempunyai hubungan peribadi dengan pelajar yang tinggi. Menggunakan ICT dalam pendidikan meminjamkan kepada lebih banyak penekanan pembelajaran berpusatkan pelajar. Tetapi dengan dunia bergerak dengan pesat ke dalam media digital dan maklumat, peranan ICT dalam pendidikan menjadi semakin penting dan kepentingan ini akan terus berkembang dan berkembang. Kajian ini memberi tumpuan kepada kesan perkhidmatan sokongan ICT dalam pendidikan berkualiti terhadap pencapaian pelajar dan bagaimana ia mempengaruhi kualiti pembelajaran pelajar untuk mencapai gred yang baik dalam Program Diploma 3 tahun di Pusat Pengajian Diploma (PPD) SPACE UTM. Soal selidik digunakan sebagai instrumen dalam mengumpul data daripada responden. Ia terdiri daripada dua bahagian; bahagian A (maklumat peribadi responden) dan bahagian B (kesan perkhidmatan sokongan ICT dalam pendidikan berkualiti terhadap prestasi pelajar yang dipersyaratkan). Terdapat 400 soal selidik yang diedarkan secara rawak kepada responden dan 291 telah dikembalikan kepada penyelidik. Hasil kajian menunjukkan terdapat hubungan yang signifikan di antara pengajaran dan pembelajaran dengan prestasi yang dirasakan oleh pelajar (r = 0.618), kualiti pendidikan dan kebolehcapaian dengan prestasi yang dirasakan oleh pelajar (r = 0.466), persekitaran pembelajaran dengan prestasi pelajar yang dirasakan (r = 0.619) motivasi pembelajaran dengan prestasi pelajar yang dirasakan (r = 0.417). Berdasarkan hasil penyelidikan, hasilnya menunjukkan bahawa semua faktor yang dikaji mempunyai kesan terhadap perkhidmatan sokongan ICT dalam pendidikan berkualiti terhadap pencapaian pelajar. Perkhidmatan sokongan ICT telah menjadi aktiviti penting yang perlu diukur dari semasa ke semasa untuk memastikan kelebihan penggunaan ICT. Oleh itu, kertas kerja ini mencadangkan pendekatan yang dapat diukur dengan berkesan untuk mengukur kualiti perkhidmatan sokongan ICT dan kesan kepada prestasi pelajar. Kajian ini mengkaji ruang lingkup semasa perkhidmatan sokongan ICT dalam proses pengajaran dan pembelajaran, kualiti dan aksesibiliti pendidikan, persekitaran pembelajaran dan motivasi pembelajaran. Penemuan ini mencadangkan idea dan kesedaran bahawa perkhidmatan sokongan ICT di atas pengurusan, penyedia dan pengguna yang berkaitan dengan skop perkhidmatan sokongan ICT.

Kata Kunci - Prestasi Pelajar, ICT, Perkhidmatan Sokongan ICT, Pendidikan Kualiti

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LIST OF ABBREVIATIONS

ICT	Information and Communication Technologies
PPD	Pusat Pengajian Diploma
UTM	Universiti Teknology Malaysia
SPACE	School of Professional and Continuing Education
WWW	World Wide Web

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

The technology was an essential component of our everyday life. In reality, in the current world, we need to equip ourselves with the expertise to survive. With this in mind, it is always important for education institution to provide the best education system to ensure that their students are capable to survive when they join the corporate world. To provide the best education it is important that education higher institution to invest in ICT, this is to ensure that their students get the best ICT facilities and ICT support service from the higher institution to provide the best environment in their campus life.

ICT and E-learning enhance the education through innovative ways by increasing the student's motivation, interest and engagement, by facilitating acquire skills and by enhancing the trainer coaching can improve the communication and exchange of knowledge (Pavel *et al.*, 2015). According to Fouji and Islam (2010), ICT has become a subject of discussion within the technological arena and its applications in several sectors and education. It recognizes Information and Communication Technologies (ICTs) as a contemporary instrumental instrument that allows instructors to transform learning methods, that they used to extend the achievement of the learners. Educational establishments around the world adopted ICT as a way of teaching and also as providing ICT-connected tutorial programs.

In a changing world, a person's access to and application of knowledge is essential to fundamental education. It must include the worldwide community's capacity for ICTs. The content has been emphasized by formal learning. The course was produced around textbooks for several years. The teachers trained with tutorials and teaching activities intended to reinforce and exercise the material through lectures and presentations. Modern environments promote a syllabus that encourages achievement and capacity. The syllabus aims at highlighting capacities and improve the data with extra resources (Amin, 2013). The educational institution must improve the standard of laboratory personnel by providing them with adequate coaching and knowledge-based workshops which will change them to produce best-in-class teaching. This laboratory personnel plays a very important part in conveyance teaching to their students and must train them so they'll teach with efficiency. The educational institution must conduct programs to recruit sensible laboratory personnel and train them with the most effective accessible resources.

ICT support services are significance as the ICT services because of each service are concerned in each step of a student's journey, from the enquiry stage through to graduation and on the far side. A student influenced by each contact with the university. The educational institution needs to look at what it to include or improve upon, consider every interaction the university has with the student, although it would be not important. Besides the ICT support services, there are different student services necessary like educational support, the new student orientation, students residential and plenty of others. According to the evaluation, this transition has the ability to disrupt nearly every sector in every nation and developing much more rapidly and with higher effect than any of the past industrial

revolutions. In an increasingly globalized globe, it forces Malaysia to remain competitive in embracing the 4th Industrial Revolution (Technology, 2017). The country, however, requires to be ready to face the deep difficulties ahead in terms of strengths, increasing consciousness, improving the internet infrastructure and focusing more on the service sector.

This study was done at the Centre of Diploma Studies (PPD) at SPACE Universiti Teknologi Malaysia, Jalan Sultan Yahya Petra, Kuala Lumpur. Currently, there are 90 lecturers, it provides 15 diploma programs with a student headcount of over 1,900 (plus the new intake 2019 700 students (Official Web Portal of School of Professional and Continuing Education UTMSPACE Official Portal, 2019). As PPD is the main arm for the UTM in offering the diploma programmes, PPD should be equipped with the latest technology to make a computer lab sustainable. The trends and tools of the 4th industry revolution need to include into account. It needs not only the computer labs, quality instructors or lecturers and computer laboratory personnel are highly critical in order to give quality teaching, learning and advice to students. E-learning should become compulsory, where at that point the usage of computer laboratories will be important as it will conduct some classes in the computer lab. Instructors, lecturers, and computer laboratory personnel should have minimal industrial training or work experience with the public sectors to be more knowledgeable in their work.

1.2 SPACE UTM

In June 1995, at the UTM Kuala Lumpur campus, a new centre called the Centre for Diploma Studies (PPD) provided all these programs under one roof. On May 15, 2006, they renamed the Centre for Diploma Studies as the UTM College of Science and Technology (Kolej Sains dan Teknologi, KST UTM). KST seeks to produce qualified and effective experts in engineering, science and technology leadership. KST provided eight diploma programmes with 4,600 enrolments during the early years. As for now, all UTM diploma programs run by the Professional and Continuing Education School (SPACE), UTM, starting on 1 June 2010. Currently, with 100 lecturers, it provides 15 diploma programs with a student headcount of over 1,900. Therefore, to generate excellent and competent learners to the current corporate globe, ICT support services need to be on par with the present market. It was expected that UTM to be advanced in technology and able to support the vision of SPACE UTM in producing excellent and competent students.

1.3 Problem Statement

Even though there are numerous studies in ICT, especially in terms of the working environment and making a decision, there is no variable that really looks thoroughly into the ICT support services, mostly are ICT in general. This study concerned on the quality education where people reflect on the student's achievement in their academic performance. Even though there is numerous literature that discussed the academic performance, yet most of them are in terms of the output of academic achievement measures. There are still lacking in terms of perceived benefits on the education support system, which are not explicitly discussed, or still remain uncharted. There is still no final

consensus on what is the students' perception of their quality education. Furthermore, when relates to ICT, many authors support that ICT is able to enhance the student's 'performance academically, however, there are still student's that get grades below 3.0, this problem trigger's the study to be conducted and explored.

SPACE UTM is known as high technology institution that provides technological and engineering-based programs. SPACE UTM had facilitated with a lot of updated facilities in ICT, but still, the students' perceived performance did not show the encouraging outcome. Based on internal records of SPACE UTM Academic Affairs (unpublished report) refer to Table 1.1, there is an increment in the number of students in the lowest level CGPA achievement (second class lower).

Table 1.1
Final CGPA for Graduating PPD Diploma Students (Computer Science) (unpublished report from the Academic Affairs of SPACE UTM)

FINAL CGPA FOR GRADUATING PPD DIPLOMA STUDENTS (Comp Sc)		
Semester/ Session	**CGPA (2.00 – 3.00)**	**CGPA (3.00-4.00)**
20182019 Semester 2	21.63%	78.37%
20162017 Semester 2	17.51%	82.49%

Although previous studies have presented empirical evidence on the positive relationships between ICT and student performance (e.g. Bottino, 2003; Sharma, 2003, Hetlevick et al, 2018), the effects of ICT on the teaching and learning may vary (Merino, 2014). The impact towards student's perceived performance might depend on some variables, such as the strategy of a university towards the adoption of Information and Communication

Technologies (ICT), students' abilities, the technology uses in the educational process by teachers and students, or the selection of a methodology that matches with digital uses. As what been discussed in the earlier paragraph, though SPACE UTM had facilitated with more updated pcs, software, and outstanding network to ensure much better outcomes but they are still students that cannot be performed well. Hence, the issue that needs to be considered is whether with the latest specifications of pcs, software, an outstanding network and outstanding student facilities able to boost up the students' perceived performance?

Technology can be a boon to increase students' interest in education and improve their performance; however, the ICT support service needs to help the student in achieving their academic goals. The technology can also contribute to a negative impact on their performance as it might be a distraction instead of to attract their attention. Therefore, the primary aims of this study are to find the connection between ICT and student's services and the students' perceived performance which in return will help PPD UTM's deciding in their future investment, and therefore to enhance their education offering to potential students soon. SPACE UTM has a stable infrastructure and offered technological-based programmes and expected that the student will able to perform excellent however with regards with the performance if compared in previous two batches they are still students who achieved less than 3.0. Based on the discussion above therefore it motivates the study to be conducted as the research questions below.

1.4 Research Question

As mentioned in the previous section, the study is interested to relate the impact of ICT towards education in SPACE UTM, the research questions are as follows:

1. What is the relationship between ICT support services in terms of teaching and learning towards students' perceived performance?
2. What is the relationship between ICT support services in terms of education quality and accessibility towards students' perceived performance?
3. What is the relationship between ICT support services in terms of environment of learning towards students' perceived performance?
4. What is the relationship between ICT support services in terms of motivation of learning towards students' perceived performance?
5. What is the effect between ICT support services in terms of teaching and learning, education quality and accessibility, environment of learning and motivation of learning towards students' perceived performance?

1.5 Research Objectives

The propose of this research is to investigate the impact of ICT support services on students' perceived performance. Therefore, the objectives are as follows:

1. To investigate the relationship between ICT supports services in terms of teaching and learning towards students' perceived performance.
2. To investigate the relationship between ICT supports services in terms of education quality and accessibility towards students' perceived performance.

3. To investigate the relationship between ICT supports services in terms of environment of learning towards students' perceived performance.
4. To investigate the relationship between ICT supports services in terms of motivation of learning towards students' perceived performance.
5. To investigate the effect between ICT supports services in terms of teaching and learning, education quality and accessibility, environment of learning and motivation of learning towards students' perceived performance.

1.6 Scope of the Study

As mentioned earlier, the study focused on the relationship between the impact of ICT support services in quality education on student perceived performance at Centre Of Diploma Studies (PPD) SPACE UTM. The students' perceived performance, as the dependent variable for this study, refers to the student's belief in what they can achieve in the future. The respondents are mainly from the students in the Professional and Continuing Education School (SPACE), UTM programme. The variables for ICT factors that act as the independent variables for this study are comprised of teaching and learning, quality and accessibility of education, learning environment, motivation of learning and student perceived performance.

1.7 Significant of Study

Analysis of the impacts of methodological developments on the attitude of the learners towards the teaching system and on the results of the learners seems to develop towards a consensus that a suitable use of digital techniques in education can have important beneficial impacts on both the attitude of the learners and their accomplishment (Amin, 2013). This study should give a PPD policymaker and administrators an idea of the importance of keeping a resourceful ICT support service including a hardware lab for its students' usage. This could be a strong value proposition to encourage the future student to enrol into PPD's program while giving confidence to the future employer to hire PPD Diploma graduate.

1.8 Thesis Organization

This paper is split into five sections. The first section includes the study issue statement purpose, purpose, issues, study scope, study meaning, and thesis coordination purpose. The topic-related critical literature reviews clarify the dependent and independent variables of prior studies as a basis for the development of the Chapter 2 study framework. Next, the research structure was suggested in Chapter 3 and it responds to the research issue described in this study's first chapter explains the research layout and illustrates the study's sampling scheme and the instruments used to produce the information. This chapter explains the framework, hypotheses, design, measurement, data collection, data analysis techniques, operational definition and the summary.

Investigations of information and discoveries of the exploration are portrayed in Chapter 4. It presents finish results and investigations of the examination as figures, tables or content so the key data featured. Data collected and processed the response to the research question state in chapter 1. Centre of Diploma Studies (PPD) UTM Space aims to explore the effect of students' perceived performance on student ICT support facilities for quality education. Findings presented in Chapter 5 show the potential for merging theory and practice. Major discoveries summarised the research objectives stated. It highlights the implications of finding and their managerial implications. It includes the study constraints and suggestions for future studies into this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this section, the literature review of dependent and independent variables describes information that includes present understanding, including substantive results, and theoretical and methodological contributions to a study.

2.2 Students' Perceived Performance

The combinations of various electronic media examined by a few scholars to determine the combinations for a particular learning style that produce the output of efficient learners. According to Franzoni and Assar (2009), the topic of the discussion forum in combination with some problem-solving item might well assign students a practical job in such a way that learners discuss the given problem quickly. This mixture can profit from a delicate learning style. The previous study demonstrates that while there is a greater and considerably positive bivariate correlation between the accessibility of ICTs and the performance of learners, the correlation becomes low when other student environment features taken into account. In some research, one discovers that it can have a beneficial impact on the performance of the learners when it is weak.

Bradley and Taylor (1998) discovered that the teacher's number of learners does not affect the output of the learners. However, when they studied the connection between the performance variation on the exams, they had a variation but weak effect. Investing in ICT can be regarded as a physical investment that improves the climate of education. First, ICT can function as a means by which interactive learning is implemented by the Higher Education Institution based on a decreased attitude to class size. The use of ICT in higher education makes it possible to move from a teacher-based strategy to a student-based strategy (Becker, 2001). Prestoza (2018) finds that the use of technological instruments has particular advantages, including helping learners' access digital data and supporting student-centred and self-directed learning to develop critical thinking abilities, creating a creative learning atmosphere, fostering collaborative learning, and enhancing the teaching quality and learning. Using technology has a beneficial effect on the attitude of the student, which can influence their academic achievement.

The significance of transforming teaching to incorporate ICT has been highlighted by recent studies. ICT is seen as a catalyst for reforming the system, community, school, or classroom because it offers possibilities to move from teacher-centred to student-centred learning. ICT may also improve educators ' pedagogical repertoire. This teacher impact is most probable to enhance the results of disadvantaged learners as it addresses individual needs and offers a variety of curriculum and evaluation strategies to support student skills across a variety of teaching results. Good pedagogical practice for all learners is to use ICT to improve the learning of disadvantaged learners. ICT can have an effect on the quality

and features of teachers and on the performance and accomplishment of learners since then (Ben Youssef & Dahmani, 2014).

According to Sabado (2018), technology plays a crucial role in assessing the performance of learners. Technology-assisted literature teaching generally enables to increase learners ' academic achievement as technology is used as learners ' intervention and motivation. The output of students depends heavily on the sort of instructions used in the process of teaching-learning. In addition, the research by Dzakpasu and Adom (2017) discovered that it is not possible to underestimate the effect of ICT in providing education in tertiary organizations. However, the required impacts of ICT in education are not felt owing to a multitude of problems in the industry, such as the absence of sufficient skilled labour and the absence of a functional ICT policy framework.

2.3 Information and Communication Technologies (ICT)

In the technological field and its applications in various industries and education in specific, ICT has become a subject of discussion. Information and Communication Technologies (ICTs) are usually recognized as a contemporary instrumental instrument that allows educators to change the learning techniques, they used to improve the efficiency of learners (Fouji & Islam, 2010). According to Banerjee and Das (2014), ICT implies information and communication technologies and is defined as a distinct set of technological instruments and resources for communicating and creating, disseminating, storing and managing information. These techniques include pcs, the Internet, e-mail, web-based PCs, mobile phones, wireless sets, projectors, radio and television broadcasting

techniques and various interactive boards. Thus, ICT is a system that, with the assistance of contemporary technology, collects distinct information or data to interact over some distance.

It has been thought that ICT integration into education is the potential of the new technological scheme. ICT is not only the cornerstone of the Information Age but also a significant catalyst and the instrument for educational reform that transforms our learners into productive knowledge workers. The previous study by Schulz *et al.* (2015) shows that lecturer plays the main role in the selection of teaching approaches and learning materials in greater education situations. In some greater education organisations, ICT instruments such as a Learning Management System (LMS) may be mandatory for all educators. However, extra systems could also be used to help their teaching. The new millennium is witnessing a major transformation of society through worldwide competition and ICT power. This development has many consequences for the education system, the management of schools and the creation of smart schools (Ziden *et al.,* 2011). Bagon and Vodopivec (2016) also found that there are growing numbers of research on the beneficial impacts of ICT-assisted teaching and learning on the outcomes and accomplishments of special needs kids, pupils and students, i.e. the blind and visually impaired, the deaf and hearing impaired, kids with psychological developmental disorders, children with physical disabilities or others.

2.4 Teaching and Learning

The teaching and learning method will not take place without communication based on the literature review (Norliza *et al.*, 2010) and according to Kenneth (2007). Teachers with excellent communication skills will, therefore, generate more effective learning and teaching environment for the learners. Someone with excellent communication skills has the ability to impact others and successful communication strategies (Guerrero & Floyd, 2006). They described ICT as being split into two primary methods in schooling, according to Voogt *et al.* (2005) and Watson (2006): ICT for education and ICT for schooling. ICT for education includes the creation of data and communication technology for learning and teaching purposes, while ICT for education includes the implementation of particular data and communication technology elements for practical use in teaching and learning procedures.

2.4.1 Relationship between Teaching and Learning and Students' Perceived Performance

ICTs that have influenced teaching, learning and research have influenced the field of education (Yusuf, 2005). ICTs can speed up, enrich and deepen abilities, motivate and engage learners, help connect classroom experience to job activities, generate financial viability for employees of tomorrow, and strengthen learning and assist transform schools (Davis & Tearle, 1999; Lemke & Coughlin, 1998; quoted by Yusuf, 2005). Information, communication, and technology (ICT) integration in education relate to the use of computer-based communication that is incorporated into the educational process of the daily classroom. Teachers are the main players in using ICT in their daily schools by

preparing learners for the present digital age. This is because of ICT's ability to provide a vibrant and proactive learning environment for teaching (Arnseth & Hatlevik, 2012).

Integration of ICT in education is a technology-based method of teaching and learning related to the use of learning systems in classrooms. Since learners are acquainted with technology and will learn better in the technology-based setting, it is essential to integrate ICT in schools, particularly in the classroom. This is because the use of technology in education contributes significantly to the pedagogical aspects where the application of ICT will lead to efficient teaching with the assistance and support of elements and parts of ICT (Jamieson-Procter *et al.*, 2013). Many researchers have made an attempt to analyze the factors affecting the adoption of ICT use in schools by educators (Capan, 2012 & Zhang, 2013). It demonstrates that the teachers ' faith was the main obstacle of execution as the educators are the individual who implements the transition in their teaching and learning system. A previous study (Cassim & Obono, 2011) demonstrates that there is a strong correlation between teacher convictions and ICT use. The role of teachers in using ICT in pedagogy is becoming more crucial, which could boost students' accomplishment, creativity, and thinking abilities.

2.5 Education Quality and Accessibility

ICT improves educational flexibility so that learners can access information from anywhere. It can affect the manner in which students teach and how they learn, as they are now taught driven by the procedures and not by educators. This would make learners fully prepared for lifelong learning and enhance learning performance (Noor, 2013). It

becomes essential in today's information-driven culture to empower learners on the information superhighway to be self-driven knowledge "navigators" (Skagen *et al.*, 2006). Teachers also need to learn how to assist their learners in the framework of ICT not only help the learners succeed in their research but also prepare them to assist themselves and their colleagues in the complicated information society (Jamtsho & Bullen, 2007).

2.5.1 Relationship between Education Quality and Accessibility and Students' Perceived Performance

Malaysia's Ministry of Education has scheduled three primary educational ICT strategies. The first policy insists that all learners have a chance to use ICT. It seeks to decrease the school digital gap. The second strategy focuses on ICT's role and function in education. Another policy emphasized the use of ICT to access data, interaction and as an instrument for efficiency (Chan, 2002). Nevertheless, ICT infrastructure and facilities are required to provide schools across the country. Sufficient computer laboratories and ICT facilities are the main factors in the use of ICT. This is to guarantee that subject educators have whenever they need access to ICT instruments (Hennessy *et al.*, 2003). Lack of appropriate ICT equipment and internet access is one of the main issues currently facing schools in rural regions. For example, the results of the research show that some schools in Kenya have a computer, but in the office, this could be limited to just one computer. The student-computer ration is high even in computer classrooms (Ghavifekr & Rosdy, 2016).

A study by Türel and Johnson (2012) disclosed that technical issues are becoming a significant teacher obstacle. These issues include low connectivity, virus attack, and a non-functioning printer. There are some exceptions, though. Schools in nations such as the Netherlands, the United Kingdom and Malta have recognized the significance of technical assistance to help educators in-classroom use of ICT (Yang & Wang, 2012). Solar *et al.* (2013) asserted that ICT adoption increases learning quality and improves educational quality. This is compatible with the research by Gallego *et al.* (2014), which argues that a nation requires ICT policies and laws to be efficient and energetic at all levels in order to successfully improve the quality of education. Research results show that the use of technological instruments has particular advantages, including helping learners' access digital data and supporting student-centred and self-directed learning in developing critical thinking abilities, creating a creative learning atmosphere, encouraging cooperative learning, and enhancing the quality of teaching and learning.

2.6 Environment of Learning

ICT is altering teaching and learning procedures by adding vitality aspects to learning environments, including for this purpose virtual settings. ICT is a strong instrument to provide possibilities for education. Future learning environments that are not back up by ICT (Noor, 2013) are hard and perhaps impossible to imagine (Noor, 2013). Looking at the present extensive diffusion and use of ICT in contemporary societies, it should be evident that ICT will influence the entire learning process today by the young the so-called digital generation. Authenticity is a significant problem that should be addressed in teaching environments design and growth (Collins, 1996). The transformation of teaching-

learning methods into the e-learning to set has drawn scientists to know, examine, and test the role of ICTs in the learning to set. Due to their distinct learning preferences, needs and methods, learning and education vary among students (Abdullah *et al.*, 2015).

2.6.1 Relationship between Environment of Learning and Students' Perceived Performance

Learning management systems (LMS) is used in teaching-learning processes, in Higher Education Institution (Sayfouri, 2016). For the enhanced number of modules and shifting towards mixed learning flip teaching, the material was supplied to learners prior to class beginning. This enables learners to use LMS to have interactive, cooperative and flexible learning both inside and outside the classroom, where learning can take place at anytime and anywhere (Hasan, 2019). The achievement of a student can be improved by using blended learning accompanied by video / multimedia streaming that can increase the level of student comprehension (Anderson, 2005).

Learning environments based on the use of technology and digital resources, through the operations they enable, are mediators in the teaching process. This is because, within an ongoing communication system, they promote interaction and interrelation, thereby improving the development and reconstruction of understanding and meanings, the development of behaviours and attitudes within a structure common to all those engaged in the instructional system (Becerra, 2011). ICT has the ability to change the nature of schooling, such as where, when, how and how learning occurs. It will promote the development of an accountable, knowledgeable culture that emphasizes lifelong learning

with meaningful and pleasant teaching and learning experiences; moving from the teaching and learning reproductive model to an autonomous learning model that encourages autonomous study projects, creativity and critical thinking (Ugwu & Kingsley, 2019).

2.7 Motivation of Learning

Learning methods using modern ICTs offer many possibilities for constructivist learning by providing and supporting resource-based, student-centred environments and allowing context- and practice-related learning (Berge, 1998; Barron, 1998). Kozma (2015) also demonstrates that ICTs are the learning focus through which learners are better ready for work involving the use of ICTs. They can use ICTs to enhance student knowledge, enhance educational performance, and enhance the economic effect of education. According to Jonassen (1996), students who use ICTs for teaching are immersed in teaching and as more and more learners use pcs as sources of data and behavioural instruments, the technology's impact will continue to improve in promoting how learners learn.

2.7.1 Relationship between Motivation of Learning and Students' Perceived Performance

Grabe (2007) indicates that ICT plays a part in the ability, motivation and understanding of students. It is used to show and assist learners finish teaching assignments with data. It again accommodates variations in learning styles and by offering extended possibilities and individualized learning experiences removes obstacles to learning. Contemporary learning environments promote learners to take responsibility for their own learning through technology-friendly methods. The increasing use of ICT as an educational medium

is evolving, and many of the methods used by educators and learners in the teaching process are likely to continue to alter (Stephenson, 2001). Using ICT in teaching environments acts to promote different elements of knowledge building and as more and more learners use ICTs in their teaching procedures, it will have a more pronounced effect (Dzakpasu & Adom, 2017).

Moore (2005) described the beneficial effect of ICT on teaching for pupils, such as enhanced motivation for learners to remain on the job and drive them to act better and generate a high-quality job. In addition, through ICT, learners learned more and worked more quickly. Learning can be distracted by ICT. This can be significant at home, where Internet access can be a cause of diversion because of chat rooms or internet games, decreasing the time spent doing homework or learning. Thus, their particular uses will rely on the effect of ICT accessibility on student teaching (Ben Youssef & Dahmani, 2014). According to Norlida and Supyan (2002), the World Wide Web (WWW)'s potential in writing courses includes access to web-based teaching and learning resources such as internet exercises, internet quizzes, reference materials, useful interactive computerized courses to help students not only enhance their linguistic use but also promote the writing process. The wealth of materials (with various elements of socio-cultural topics, current events, cross-cultural communication) found in the World Wide Web (WWW)'s for writing reference could elicit positive attitudes and that there are positive changes in students' motivation, confidence and anxiety level when students are exposed to such learning materials in writing classes.

2.8 ICT Support Service

Shabya (2009) highlights ICT's changing role in providing instruction in Kenya's institutions of higher education. Research has shown that ICT explores and simulates abstract ideas while promoting the capacity to self-learn to tackle complicated issues, promoting teamwork and enabling critical thinking. Ghavifekr and Rosdy (2016) discovered that most educators agreed that using ICT would provide many possibilities for efficient teaching and ICT-based teaching would make learning more efficient. This scenario demonstrates that educators see the use of ICT in the teaching and learning system as beneficial where ICT is the help educators need to make the teaching and learning method effective.

ICT support services have become one of the important ICTS activities that need to be measured from time to time to ensure the advantages of ICT usage (Haizan *et al.*, 2013). Further, Andreea (2015) also found that ICT support plays a significant and positive influence on ICT use. However, the school level has no influence on how teachers use the technology provided by the schools as the teachers use the computer to communicate, access the internet, process texts, develop presentations and use educational CD's. Oddershede *et al.* (2015) also discovered that ICT systems help create the behaviours of the performers and who is more important to them. Students and educators had ICT support priorities. Computer-assisted system assistance (internet, emails, web, etc.) has more meaning to learners and educators. Support for ICT is essential for student activities where learners declare that this is more relevant to learning and studying. Harman and Nguyen (2010) claim that Vietnamese educators are now facing technology-driven education

difficulties. In this context, the critical need for educators is to obtain fresh understandings and abilities in using ICT to help to learn with a student-centred strategy in mind.

Malach *et al.,* (2016) found that the ICT support service can help academic scholars evaluate the possibilities of influencing university students, particularly their use of ICT and its tools in education, their information needs and encourage them to use ICT applications for both study and extracurricular activities. This would help improve the level of the so-called digital literacy of university students, which is and will continue to be desirable and even necessary in professional life.

In addition, Ben Youssef *et al.* (2014) also found that ICT seems to have a profound impact on the process of learning in higher education by offering new possibilities for learners and teachers. These possibilities can have an impact on student performance and achievement. ICT is a form of GPT and immature by nature, a long process of appropriation and exploration of their possibilities by higher education institutions is needed before observing any significant change. Universities have invested heavily in equipment, and at the same time students and teachers are using these technologies more and more, there has been little change on the organisational side. The adoption of complementary organisational innovations is a major factor in student performances and achievement. Students are acquiring new skills and new competencies more collaboration, team building, project management closer to the needs in the job market and perhaps less performance on curricula.

2.9 Technology Acceptance Model (TAM) in ICT Support Services towards Students' Perceived Performance

The Technology Acceptance Model (TAM) provides a framework for predicting ICT use based on users' beliefs and attitudes about technology (Handayani, et al., 2016; Teo, Lee, Chai, & Wong, 2009). The technology acceptance model (TAM) is an information systems theory that models how users come to accept and use technology. The model suggests that when users are presented with new technology, a number of factors influence their decision about how and when they will use it (En.wikipedia.org, 2019). The study has been based on the technology acceptance model (TAM) as the theory supports the main relationship of the variables in the study. Since the research objective is concerned with student's ICT support services towards their perceived performance. Therefore, TAM can support the students' perceived performance to choose the variables to involve in this study based on the current situation.

A 22-item questionnaire was used to assess the student's acceptance, particularly the Students' Perceived Performance (SP; 5 items), Teaching and Learning (TL; 6 items), Education Quality and Accessibility (QA; 5 items), Environment of Learning (EL;5 items) and Motivation of Learning (ML;5 items). Items were rated on five-point Likert Scale ranging from 1 (strongly disagree) to 5 (strongly agree).

However, the development of the new theoretical research framework will depend on a number of factors but not limited to the following: the research problems and objectives, gap analysis, the target market (users or developers), the organizations' goals and the understanding of technology adoption models and theories based on the available materials

and others. Such understanding is vital to enable the interested parties (e.g. students, academics, researchers, government, organizations) to relate with both the theory and practical aspects of the technology adoption models and theories. These reviews will shed some light and potential applications for technology applications for future researchers to conceptualize, distinguish and comprehend the underlying technology models and theories that may affect the previous, current and future application of technology adoption (Lai, 2017).

2.10 Summary

This section examined the important factors on the effect of students' perceived performance on student ICT support facilities on quality education at Centre of Diploma Studies (PPD) SPACE UTM. ICT is designed to provide an efficient teaching atmosphere for learners that will then boost their academic performance. It also used to improve the current teaching and learning curriculum and pedagogy. It offers many benefits in schooling; first, the computer's autonomous access can enhance the efficiency of the learners. Second, ICT allows learners in need of special education to fulfil a job at their own speed. Furthermore, learners can interact more with the assistance of ICT for those with deep and multiple learning difficulties. The hypothesis will be examined in Chapter 3 on the basis of the literature review.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter provides a description on how the research was carried out and the methodology employed to test the hypotheses. This chapter was divided into 8 sections. In the present study, the research framework is adapted from TAM theory.

3.2 Research Framework

A research framework clearly illustrates the structure of the research plan and helps the researcher formulate relevant research questions says Albert J. Mills 2010. The research framework exists in this study because,

1. A research framework is the theoretical framework that introduces and describes the theory that explains why the research problem exist in this study
2. In present study, the research framework is adapted from TAM theory.
3. By assisting a noticeable illustration of theoretical constructs with the study factors, a conceptual study framework is used to direct the research.
4. As mentioned earlier in Chapter 1, the study's main objective is to investigate the relationship between the Independent Variables (IV) and Dependent Variable (DV). The IV's are Teaching and Learning, Education Quality and Accessibility, Environment of Learning and Motivation of Learning and the DV is Students' Perceived Performance as shown in figure 3.1.

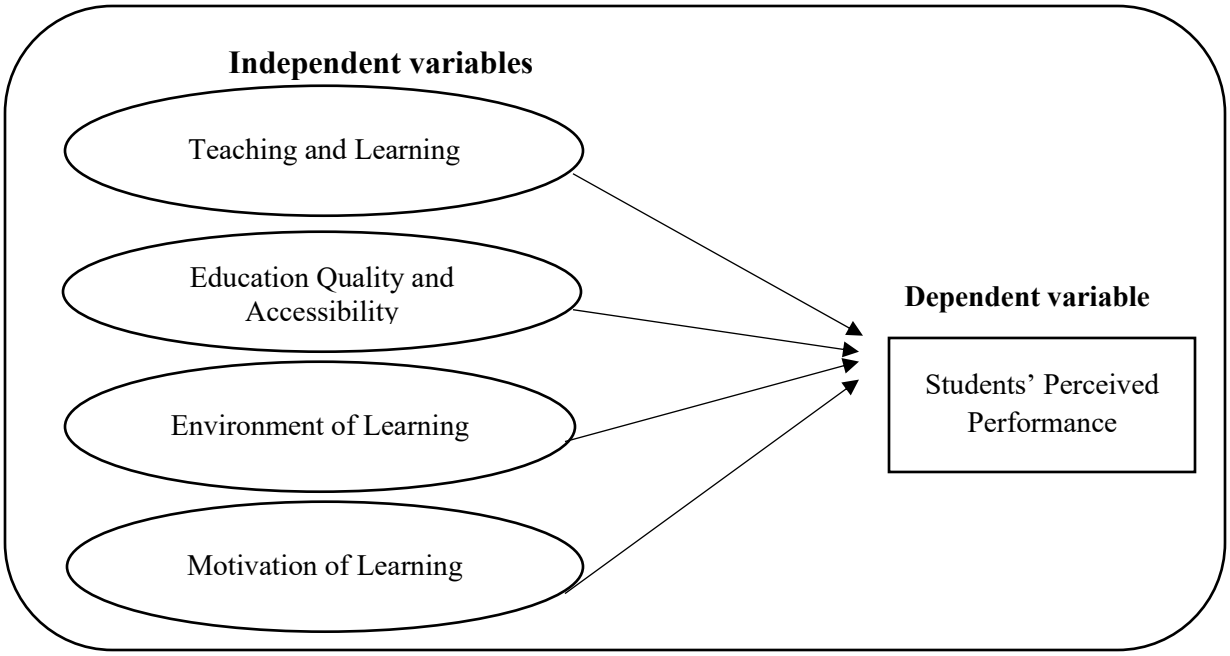

Figure 3.1
The Conceptual Research Models

3.3 Hypotheses Development

The study framework suggested that all independent variables be tested in order to determine the important dependent variable connection. The following hypotheses created on the basis of the literature review in Chapter 2:

Ha_1: The relationship between ICT supports services in terms of teaching and learning towards students' perceived performance.

Ha_2: The relationship between ICT supports services in terms of education quality and accessibility towards student s' perceived performance.

Ha_3: The relationship between ICT supports services in terms of environment of learning towards students' perceived performance.

Ha_4: The relationship between ICT supports services in terms of motivation of learning towards students' perceived performance.

H_{a5}: The effect between ICT supports services in terms teaching and learning, education quality and accessibility, environment of learning and motivation of learning towards students' perceived performance.

3.4 Research Design

3.4.1 Type of Study

The study approach used in this study the cross-sectional and quantitative research. It focuses on examining and looking at components in the ICT support services that contribute to the students' perceived performance. The was data collected to increase a deeper understanding on the relationship between support services in quality education towards students' perceived performance.

3.4.2 Data Source

3.4.2.1 The Primary Data

Data was collected through questionnaire that was distributed among the students of Centre of Diploma Studies (PPD) SPACE UTM. This was a cheap technique useful in which literacy is high, and respondents cooperate to complete the whole survey. This data gets information that is used to decide about important issues and to pass information to the related party. To have more clarification of the most factors influencing the impact of ICT support services in quality education on student performance at Centre of Diploma Studies (PPD) SPACE UTM.

This study made use of a prepared survey questionnaire that has different sections divided into three (3) different parts:

i. Demographic section: where the student will ask questions based on the respondent's biodata.
ii. Inquiry of the student performance on the dependent variable (DV) where their respondent indicates their perceptions on their performance towards their quality educations.
iii. To measure the student's perception on the component support services, mainly ICT improving teaching and learning, ICT improving education quality and accessibility, ICT improving environment of learning and ICT improving motivation of learning.

3.4.2.2 The Secondary Data

This research used secondary data as references where data collected from the journal, official statistic, report and proceeding paper. The advantages of secondary data:

i. Easy to get access and sources identification.
ii. It aids fact findings: provide descriptive information to support research.
iii. With secondary data, the relationship between two or more variables is specified.

3.4.3 Questionnaire Design

Questionnaire design is a process that requires attention to many details at one time. Designing the questionnaire is complicated because surveys can ask about topics in varying types of detail, questions can be asked in different ways, and questions asked earlier in a survey may influence how people respond to later questions. Researchers also are often

interested in measuring change over time and therefore must be attentive to how opinions or behaviours have been measured in prior surveys.

3.4.4 Sampling Method

This research uses a population table taken from Krejcie and Morgan (1970). This study's population students are 1200, with a sample size of 291. This technique is quicker and cheaper to get feedback from the participants. A stratified random sampling method was used in this study. The formula for the sample size given below in table 3.1 is as follows:

Population size / Total student population * 291

Table 3.1
Sample Size and Population

Programme	Population Size	Sample Size
Diploma in Architecture	85	17
Diploma in Quantity Surveying	100	23
Diploma in Urban and Regional Planning	60	16
Diploma in Land Surveying	40	8
Diploma in Property Management	95	20
Diploma in Computer Science (Information Technology)	250	60
Diploma in Computer Science (Multimedia)	70	19
Diploma in Civil Engineering	65	22
Diploma in Electronic Engineering	50	4
Diploma in Electronic Engineering (Power)	26	3
Diploma in Electronic Engineering (Mechatronic)	38	6
Diploma in Mechanical Engineering	125	31
Diploma in Chemical Engineering	5	1
Diploma in Technology Management	130	38
Diploma in Technology Management (Accounting)	85	23
TOTAL	**1200**	**291**

3.5 Operational Definition

Student Performance refers to the common measured by examination or ongoing evaluation, but there is no particular consensus on how best to test it or which elements are most important — procedural knowledge such as abilities or declarative information such as facts (Annie Ward, 1996).

ICT Improving Teaching and Learning refers to the teacher's task of organizing the context of teaching / learning so that all learners are more likely to use the greater order learning procedures spontaneously used by "scholarly" learners (John Biggs, 1999).

ICT Improving Education Quality and Accessibility refers to the definition of quality as fitness for purpose and adequacy of accessible resources for education (Okebukola, 2005).

ICT Improving Environment of Learning refers to a variety of learning environments from a stand-alone computer in a classroom to a scenario where the teaching is performed by a computer using pre-packaged ' teacher-proof courseware ' (Laferrière, 1999).

ICT Improving Motivation of Learning refers to ICT-assisted teaching and learning about children, pupils and students ' outcomes and accomplishments (Bagon & Vodopivec, 2016).

ICT Support Services refers to the spectrum of services provided by academic organizations to guarantee the continuity and efficiency of ICT-assisted training centres without discontinuity (ICT Support Services, 2018).

3.6 Measurement

3.6.1 Questionnaire Structure

This questionnaire is a self-administered question that ensured a high return charge and support freedom of expression from the respondents. The questionnaires were completed based on availability and the questionnaires collected from individual respondents. 1200 questionnaires were sent to the participants by email, and it is estimated that each questionnaire would take about 10 to 15 minutes to complete. It took a month to get all the answers back.

In order to ensure that the adaptation of the questionnaires is valid and reliable. The questionnaire had been reviewed by two (2) academic personnel.

3.6.2 Design of Questionnaire

The questionnaire was intended and provided using easy wordings in which participants could comprehend the questions and reply depending on their private view. An established survey was used as a tool for collecting respondent information. The scale using the Likert-scale where one (1) represent strongly disagree, and five (5) represent strongly agree which permit respondents to explicit their settlement and choose the first-class answer that fits them exceptional. Adapting and developing the parts and variables used in this research from the following sources:

Table 3.2
Questionnaire Variables

Variables	Dimensions	Total number of items	Scales	Sources
Section A: Demographic Profile				
Demographic Information	General information about gender, age, race	3		
	Department, programme, mode of study and reason choose the programme	4		
Section B: The Impact of ICT Support Services in Quality Education on Student Performance: A Case Study of Centre of Diploma Studies (PPD) SPACE UTM				
Teaching and Learning	Integrating ICT in teaching can be a success in improving learning abilities for learners.	6	Likert Scale 1-5	Ghavifekr & Rosdy (2016)
Education Quality and Accessibility	The flexibility of educational delivery so that learners can access understanding from anywhere.	5	Likert Scale 1-5	Oyovwe-Tinuoye & Adogbeji (2013)
Environment of Learning	To what extent do you agree that ICT provides learners with fresh learning to set?	5	Likert Scale 1-5	Mantoro, *et al.* (2015)
Motivation of Learning	To what extent do you agree with ICT, by enhancing learner motivation and commitment, can you improve the quality of education in several ways?	5	Likert Scale 1-5	Adegbite (2017)
Students' Perceived Performance	ICT as a teaching and learning help and its effect on the academic performance of learners.	5	Likert Scale 1-5	Kirkwood & Price (2016)

3.7 Data Collection and Administration

Distribution of questionnaire done by email and permission is received from the management Centre of Diploma Studies (PPD) SPACE UTM to access to the student email. The data identified to look for any exclusion, blunders or lacking records to make sure all surveys are finished.

3.8 Techniques for Data Analysis

3.8.1 Descriptive analysis

Raw data transformation to describe fundamental features such as central tendency, distribution, and variability. The analysis used in this research to count the average frequency and percentage distribution of respondents ' population profiles such as gender, age.

3.8.2 Reliability test

In this study, the reliability test was conducted using SPSS version 23. It determines Cronbach's alpha expression, and the coefficient of reliability demonstrates how the products correlated with each other (Sekaran & Bougie, 2010). This test is measured using the alpha coefficient. Table 3.3 demonstrates the results of using SPSS.

Table 3.3
Reliability table adapted from Zikmund et al., (2010)

Alpha Coefficient Range	Strength of Association
<0.60	Poor
0.60 to <0.70	Moderate
0.70 to <0.80	Good
0.80 to <0.90	Very Good
0.90 and above	Excellent

3.8.3 Inferential Analysis

3.8.3.1 Analysis of Pearson's Correlation

Pearson's correlation assessment used to determine the connection between student performance and four factors (teaching and learning, education quality and accessibility, environment of learning and motivation of learning) on hypotheses 1, 2, 3, and 4 with a meaning point of 5 percent. The greater the coefficient of correlation, the more powerful the level of affiliation, and depending on the path of association between factors, it can be efficient or poor.

Table 3.4
Rule of Coefficient Size (Hair et al., (2007).

Coefficient range	Strength of Association
±0.91 to ±1.00	Very strong
±0.71 to ±0.90	High
±0.41 to ±0.70	Moderate
±0.21 to ±0.40	Small but definite relationship
±0.01 to ±0.20	Slight, almost negligible

3.8.3.2 Multiple Regression

Regression is used to analyse the connection with the dependent variable that affects two or more independent variables. Regression equation included independent variables such as teaching and learning, education quality and accessibility, environment of learning and motivation of learning to identify the connection with student performance. The equation used to show the relationship of all variables with student performance:

Student Perceived Performance = $a + b_1$ (Teaching and Learning) + b_2 (Education Quality and Accessibility) + b_3 Environment of Learning) + b_4 (Motivation of Learning)

3.9 Summary

This chapter fulfils its obligations as stated in the introductory section. It is about the method the researcher used in carrying out the studies, this includes hypothesising research hypothesis from the previous chapter, and the drawn of the research framework to test the direction of the relationship among the variables under considerations. This chapter also examines the population samples and sampling selection procedure, questionnaire design and measurement of variables. The last but not the least section describes the methods in the next chapter to be implemented.

CHAPTER 4

RESULT AND DISCUSSION

4.1 Introduction

This chapter discussed on the results of the data analysis and the result outcomes. The survey was conducted by the respondents processed and analyse in this chapter. It includes the demographic analysis, descriptive analysis, measurement, correlation, regression analysis and the summary of the chapter.

The discussion is to interpret and describe the significance of your findings in what was already known about the research problem being investigated and to explain any new understanding or insights that emerged as a result of the study problem. The discussion will connect to the introduction of the research questions or hypotheses posed and the literature reviewed, but the discussion does not simply repeat or rearrange the first parts of the research. (Annesley, Thomas M. "The Discussion Section: Your Closing Argument." Clinical Chemistry 56 (November 2010).

The data collected for five variables such as teaching and learning, education quality and accessibility, environment of learning and motivation of learning and students'

perceived performance is coded to reduce the quantity of information and simplify the technique of record analysis. Table 4.1 (a) and (b) below shows the Independent and Dependent variables in this study.

Table 4.1 (a)
Independent Variables

Independent Variables	
Variable	**Items**
Teaching and Learning (TL)	TL1: My university's ICT facilities work well and can be used.
	TL2: If educators are confronted with problems, technical support will be given.
	TL3: All of my university's ICT instruments go to waste and fewer educators use them.
	TL4: ICT makes it possible for learners to be more imaginative and creative.
	TL5: Using ICT enables learners explore associated teaching understanding and information.
	TL6: ICT use enables learners to discover associated teaching understanding and knowledge.
	TL7: With the help of ICT, teachers are provided the choice to design their own teaching.
Education Quality and Accessibility (QA)	QA1: Access to what I need anytime.
	QA2: Access to remote resources I want anytime.
	QA3: Improvement of teaching and learning by using quality data resources.
	QA4: Improvement in educational quality.
	QA5: Encourages collaborative and interactive learning
Environment of Learning (EL)	EL1: Do you believe using ICT improves the level of knowledge of learners?
	EL2: Do you believe using ICT will make learners enjoy their classes?
	EL3: Do you think that not using ICT is old fashioned?
	EL4: Can ICT be a tool to make students independent?
	EL5: Does ICT facilitate students' needs?
Motivation of Learning (ML)	ML1: ICT is an Innovative teaching method that are based on active and experimental learning and increases student engagement and performance.
	ML2: ICT encourages and supports disadvantaged students in their learning, raises students' motivation to learn through giving the learner more control over the learning experience.
	ML3: ICT offers different operations to test the development of student understanding and skills.
	ML4: By assigning group projects where learners meet online, ICT offers possibilities for knowledge acquisition through cooperation, conversation, and negotiation.
	ML5: ICT is used to support subject-specific learning, and have positive impact on attainment.

Table 4.1 (b)
Dependent Variables

Dependent Variables	
Variable	**Items**
Students' Perceived Performance (SPP)	SPP1: This will assist me in my studies to get better outcomes.
	SPP2: It will help me to understand the subject more profoundly.
	SPP3: It will improve my career or work possibilities in the long term.
	SPP4: Technology interferes with my ability to concentrate and deeply think on subjects that I care about.
	SPP5: I wish my university lecturers would use and integrate more technology into their teaching.

4.2 Response Rate

Based on the stratified sampling, the survey response rate should be calculated as the number of returned questionnaires divided by the total sample sent for survey initially.

4.3 Reliability Test

The reliability test is running in SPSS for five variables such as teaching and learning, education quality and accessibility, environment of learning, motivation of learning and student perceived performance. Testing is carried out to assess internal consistency and how near a set of items is as a group using the Cronbach's alpha It is regarded as a measure of reliability of the scale. The "elevated" alpha value does not mean a one-dimensional size. Reliable values ranging from 0.7 and above and values below 0.6 are regarded as weak. The findings are shown in Table 4.2.

Table 4.2
Reliability Analysis

Items	No. of Items	Cronbach's Alpha
Teaching and Learning (TL)	7	0.733
Education Quality and Accessibility (QA)	5	0.873
Environment of Learning (EL)	5	0.738
Motivation of Learning (ML)	5	0.860
Student Perceived Performance (SP)	5	0.814

From the table 4.3, the results show the Cronbach's alpha values of are above 0.6 and it shows that the items are all at acceptable values. The elements of ICT Improving Teaching and Learning are worth 0.733 which means the power of the association is Good, the elements of ICT Improving Education Quality and Accessibility are worth 0.873 means the power of the association is Very Good, ICT Improving the learning environment with a value of 0.738 means the power of the association is Good, ICT Improving learning motivation with a value of 0.860 means association strength is Very Good and student performance with a value of 0.814 means association strength is Very Good.

4.4 Demographic Profile Analysis

Based on the questionnaires collected, the respondents were analysed. The gender aspect, age, marital status, etc. to define the respondents ' distribution. The participants were from different types of program and research from the complete questionnaires gathered.

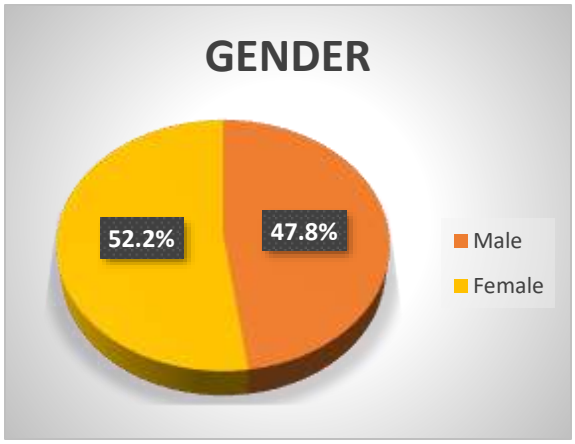

Figure 4.1: Gender

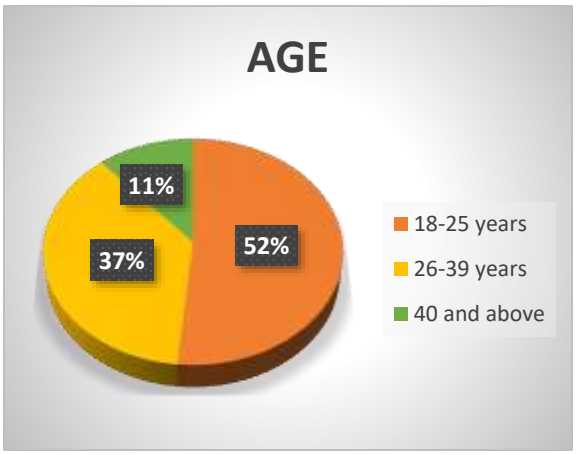

Figure 4.2: Student's Age

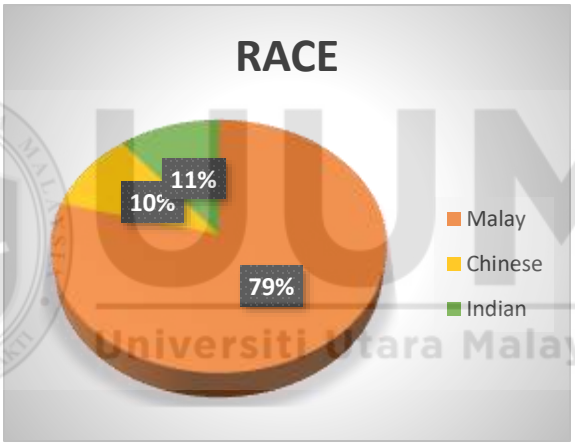

Figure 4.3
Respondents' Race

Out of the 291 respondents, the respondents consisted of 47.8% male and 52.2% female. As for the age of the respondents consisted of 51.5% age range from 18 to 25 years, 37.1% age range from 26 to 39 years and balanced 11.3% age range from 40 and above. The race of the respondents consisted of 79.0% Malay, 10.3% Chinese, and 10.7% Indian.

The respondent is from the Centre for Diploma Studies (PPD) SPACE UTM's 15 Diploma Program including learners from the first year, second year, and third year. The largest respondent is a 20.6% Diploma in Computer Science (Information Technology), a 13.1% Diploma in Technology Management, a 10.7% Diploma in Mechanical Engineering, a 7.9% Diploma in Quantity Survey and a 7.9% Diploma in Technology Management, a 7.6% Diploma in Civil Engineering, a 6.9% Diploma in Property Management. The smallest number of respondents is from Diploma in Land Survey at 2.7%, followed by Diploma in Electronic Engineering (Mechatronic) at 2.1%, Diploma in Electronic Engineering at 1.4%, Diploma in Electronic Engineering (Power) at 1.0% and Diploma in Chemical Engineering at 0.3%.

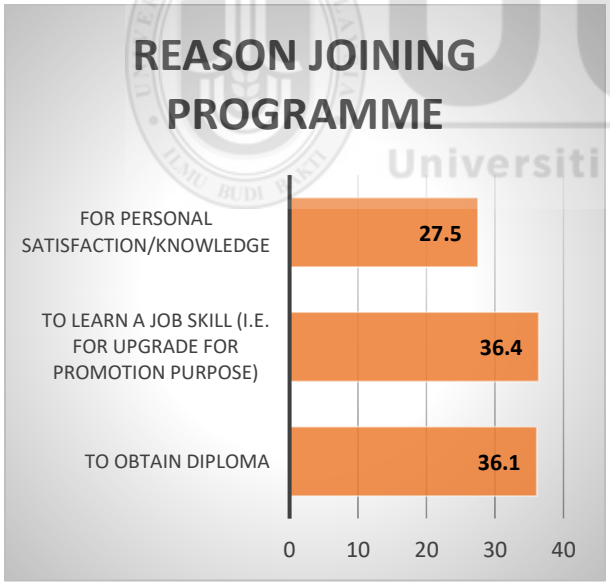

Figure 4.4
Reason Joining Programme

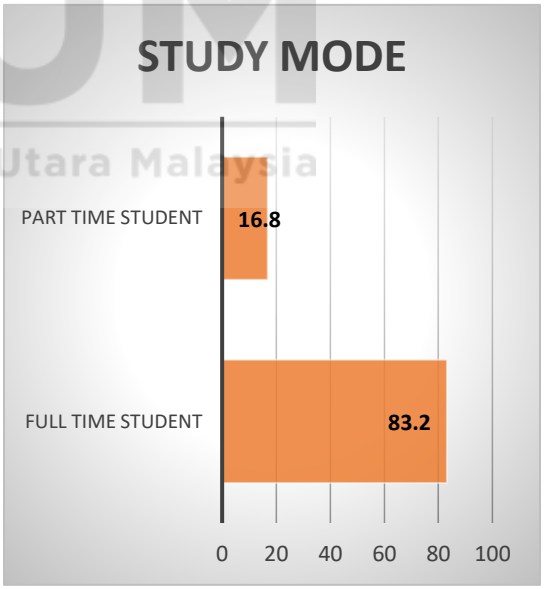

Figure 4.5
Study mode of Respondents

From the outcome it demonstrates that the majority of the respondent joins the Diploma Program at the Centre for Diploma Studies (PPD) SPACE UTM because of To learn a

work skill (i.e. for promotional upgrade) with 36.4% followed by to graduate with 36.1 and the remainder join this program because of For personal satisfaction / knowledge with 27.5%.

4.5 Descriptive Analysis

Descriptive analysis shows mean values, standard deviations, final internal correlations and variables inter-correlation. The analysis enables the researchers to make some assumptions and general outcomes observations. The descriptive analysis was carried out for respondents ' population profiles, autonomous variables, and dependent variable. Table 4.3 showed the information of the consequence.

Table 4.3
Item and Grand Mean

Variable and Variable Item	Mean
Teaching and Learning (TL)	
My university's ICT facilities work well and can be used.	4.35
If educators are confronted with problems, technical support will be given.	4.52
ICT makes it possible for learners to be more imaginative and creative.	4.84
Using ICT enables learners explore associated teaching understanding and information.	4.36
ICT use enables learners to discover associated teaching understanding and knowledge.	4.23
With the help of ICT, teachers are provided the choice to design their own teaching.	4.68
Grand mean	**4.49**
Education Quality and Accessibility	
Access to what I need anytime.	4.24
Access to remote resources I want anytime.	4.23
Improvement of teaching and learning by using quality data resources.	4.09
Improvement in educational quality.	4.42
Encourages collaborative and interactive learning	4.24
Grand mean	**4.24**
Environment of Learning	
Using ICT improves the level of knowledge of learners	4.30
Using ICT will make students enjoy their classes	4.54
using ICT is old fashioned	4.11
ICT be a tool to make students independent	4.12

ICT facilitate students' needs	4.17
Grand mean	**4.25**
Motivation of Learning (ML)	
ICT is an Innovative teaching method that are based on active and experimental learning and increases student engagement and performance.	4.31
ICT encourages and supports disadvantaged students in their learning, raises students' motivation to learn through giving the learner more control over the learning experience.	3.96
ICT offers different operations to test the development of student understanding and skills.	3.86
By assigning group projects where learners meet online, ICT offers possibilities for knowledge acquisition through cooperation, conversation, and negotiation.	4.16
ICT is used to support subject-specific learning, and have positive impact on attainment.	4.07
Grand mean	**4.07**
This will assist me in my studies to get better outcomes.	4.24
It will assist me in comprehending more deeply the topic matter.	4.33
It will enhance my long-term career or job opportunities.	4.11
Technology interferes with my capacity to focus on topics I care about and believe profoundly.	4.22
I wish my college professors would use more technology and incorporate it into their learning.	4.77
Grand mean	**4.33**

Table 4.3 shows the descriptive analysis, such as the mean score and grand mean for each variable. For Teaching and Learning (TL), the mean for the statement "Using ICT enables learners explore associated teaching understanding and information" is 4.36 which made up the highest mean score. Subsequently, the statement of "ICT makes it possible for learners to be more imaginative and creative" is the second-ranked mean which is 4.24, followed by the statement of "ICT use enables learners to discover associated teaching understanding and knowledge" and "With the help of ICT, teachers are provided the choice to design their own teaching" is the third- and fourth-ranked mean which is 4.23 and 4.08 respectively. The mean for the statement "If educators is confronted with problems, technical support will be given" and "My university's ICT facilities work well and can be used" is in the fifth and

six ranked with mean 4.35 and 4.52. The result for a grand mean of six items in the Teaching and Learning (TL) is calculated as 4.49.

The results of mean score for Education Quality and Accessibility (QA) items shown that the highest mean score which is 4.42 goes to the statement of "Improvement in educational quality". The second ranked goes to the statement of "Access to what I need anytime" and "Encourages collaborative and interactive learning" with the mean score of 4.24. Meanwhile, for the statement "Access to remote resources I want anytime" in fourth-ranked with mean 4.23. Finally, the statement of "Improvement of teaching and learning by using quality data resources" has the lowest mean score of 4.09. The result for a grand mean of five items in Education Quality and Accessibility (QA) is calculated as 4.24.

Table 4.3 above shows the result of the mean score for the Environment of Learning (EL). The statement of "Do you believe using ICT will make learners enjoy their classes?" obtained the highest mean score with 4.54. The statement of "Do you believe using ICT improves the level of knowledge of learners?" ranked as second with mean 4.30 and "Does ICT facilitate students' needs?" is ranked as third with a mean score 4.17. The statement of "Can ICT be a tool to make students independent?" is in fourth-ranked with a mean score of 4.12. The lowest mean score goes to the statement of "Do you think that not using ICT is old-fashioned?" which is 4.11. The result for a grand mean of five items in the Environment of Learning (EL) is calculated as 4.25.

The results of the mean score for the Motivation of Learning (ML) are shown in Table 4.3. The statement of "ICT is an Innovative teaching method that are based on active and experimental learning and increases student engagement and performance" got the highest mean score with 4.31. Statement of "By assigning group projects where learners meet online, ICT offers possibilities for knowledge acquisition through cooperation, conversation, and negotiation" ranked as second with mean 4.16 and "ICT is used to support subject-specific learning, and have positive impact on attainment" ranked as third with a mean score 4.07. Statement of "ICT encourages and supports disadvantaged students in their learning, raises students' motivation to learn through giving the learner more control over the learning experience" is in fourth-ranked with a mean score of 3.96. The lowest mean score goes to the statement of "ICT offers different operations to test the development of student understanding and skills" with mean 3.86. The result for a grand mean of five items in the Motivation of Learning (ML) is calculated as 4.07.

Finally, the results of the mean score for Student Perceived Performance (SP) are calculated. The statement of "I wish my college professors would use more technology and incorporate it into their learning" has the highest mean score with 4.77. Meanwhile, the statement of "It will assist me in comprehending more deeply the topic matter" is ranked as the second highest mean score 4.33. The statement that ranked in third and fourth-ranked is the statement of "This will assist me in my studies to get better outcomes" and "Technology interferes with my capacity to focus on topics I care about and believe profoundly." with a mean score 4.24 and 4.22 respectively. The statement of "It will enhance my long-term career or job opportunities" is in the last ranked with the mean score

of 4.11. The result for a grand mean of six items in Student Perceived Performance (SP) is calculated as 4.33.

4.6 Validity test, Factor Analysis

The validity of the construct of the questionnaire will be identified from the Kaiser-Meyer-Olkin (KMO) value. The Kaiser-Meyer-Olkin (KMO) values for "mediocre" is the range from 0.5 to 0.7 are, values for "good" is the range from 0.7 to 0.8, values for "great" is the range from 0.8 and 0.9 while values for "excellent" is above 0.9 (Kaiser, 1974). The significant of p-value <0.001 for Bartlett's Test of Sphericity revealing statistics that maintain the correlation matrix abilities factor, listing several associations between the study variables.

Table 4.4
Independent Variables Validity Test

Variables	Items	Factor Loading
Teaching and Learning (TL)	My university's ICT facilities work well and can be used.	0.810
	If educators are confronted with problems, technical support will be given.	0.594
	ICT makes it possible for learners to be more imaginative and creative.	0.906
	Using ICT enables learners explore associated teaching understanding and information.	0.709
	ICT use enables learners to discover associated teaching understanding and knowledge.	0.859
	With the help of ICT, teachers are provided the choice to design their own teaching.	0.882
Education Quality and Accessibility (QA)	Access to what I need anytime.	0.883
	Access to remote resources I want anytime.	0.812
	Improvement of teaching and learning by using quality data resources.	0.768
	Improvement in educational quality.	0.931
	Encourages collaborative and interactive learning	0.890
Environment of Learning (EL)	Do you believe using ICT improves the level of knowledge of learners?	0.756
	Do you believe using ICT will make learners enjoy their classes?	0.841
	Do you think that not using ICT is old fashioned?	0.818
	Can ICT be a tool to make students independent?	0.805
	Does ICT facilitate students' needs?	0.727

Motivation of Learning (ML)	ICT is an Innovative teaching method that are based on active and experimental learning and increases student engagement and performance.	0.790
	ICT encourages and supports disadvantaged students in their learning, raises students' motivation to learn through giving the learner more control over the learning experience.	0.882
	ICT offers different operations to test the development of student understanding and skills.	0.805
	By assigning group projects where learners meet online, ICT offers possibilities for knowledge acquisition through cooperation, conversation, and negotiation.	0.878
	ICT is used to support subject-specific learning, and have positive impact on attainment.	0.869
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)		0.796
Approximate Chi-Square		8707.666
Bartlett's Test of Sphericity		0.000

For the valid scale, the KMO value should be above the value of 0.04. There is significant of p-value <0.001 for Bartlett's Test of Sphericity. The independent variables value of KMO is 0.796. The value is great and acceptable for further analysis for Bartlett's Test of Sphericity. As for the factor loading, the acceptable value is above 0.5 shows that the items are not overlapping, are reliable, and they support the respective constructs. The total variance explained will identify the percentages of effects of each data being analysed.

Table 4.5
Dependent Variable Validity Test

Variables	**Items**	**Factor Loading**
Student Perceived Performance (SP)	This will assist me in my studies to get better outcomes.	0.856
	It will assist me in comprehending more deeply the topic matter.	0.847
	It will enhance my long-term career or job opportunities.	0.420
	Technology interferes with my capacity to focus on topics I care about and believe profoundly.	0.698
	I wish my college professors would use more technology and incorporate it into their learning.	0.096
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)		0.598
Approximate Chi-Square		923.910
Bartlett's Test of Sphericity		0.000

The KMO value for the dependent variable is 0.598, and the data is fit for further analysis. The result for Bartlett's test is significant. However, the value of factor loading for an item Student Performance (SP) - It will improve my career or employment prospects in the long term have the value below 0.5 and the item were removed.

4.7 Inferential Analysis

4.7.1 Used of Pearson Correlation Coefficient Analysis

The test used to identify the relationship between linear variables (Mekovec & Hutinski, 2012) and Pearson correlation analysis used to test hypotheses 1 to 4. The analysis is to determine whether teaching and learning, education quality and accessibility, environment of learning and the motivation of learning have the impact of student performance. Table 4.6 shows the output.

Table 4.6
Pearson Correlation Coefficient among the Variables

		TL	QA	EL	ML	SP
TL		1	.527**	.802**	.754**	.618**
	Sig. (2-tailed)		.000	.000	.000	.000
QA		.527**	1	.362**	.520**	.466**
	Sig. (2-tailed)	.000		.000	.000	.000
EL		.802**	.362**	1	.720**	.619**
	Sig. (2-tailed)	.000	.000		.000	.000
ML		.754**	.520**	.720**	1	.417**
	Sig. (2-tailed)	.000	.000	.000		.000
SP		.618**	.466**	.619**	.417**	1
	Sig. (2-tailed)	.000	.000	.000	.000	

**. Correlation is significant at the 0.01 level (2-tailed).
TL - Teaching and Learning, QA - Education Quality and Accessibility, LE - Environment of Learning, ML - Motivation of Learning and SP - Student Perceived Performance

Hypothesis 1

H_0: There is no relationship between ICT supports services in terms of teaching and learning towards students' perceived performance

Ha_1: There is a relationship between ICT supports services in terms of teaching and learning towards students' performance (TL).

Table 4.7
Correlation summary between teaching and learning with students' perceived performance

		SP	p-value
Teaching and Learning (TL)	Pearson Correlation	0.618**	0.000
	Sig. (2-tailed)		

**. Correlation is significant at the 0.01 level (2-tailed).

The result shows that there is relationship teaching and learning with student perceived performance. The correlation value of r = 0.618 and this means a positive and moderate relationship exists between two variables. Hence, Ha_1 is accepted and H_0 is rejected.

Hypothesis 2

H_0: There is no relationship between ICT supports services in terms of education quality and accessibility towards students' perceived performance.

Ha_2: There is a relationship between ICT supports services in terms of education quality and accessibility towards students' perceived performance (QA).

Table 4.8
Correlation summary between education quality and accessibility with students' perceived performance

		SP	p-value
Education Quality and Accessibility (QA)	Pearson Correlation	0.466**	0.000
	Sig. (2-tailed)		

**. Correlation is significant at the 0.01 level (2-tailed).

The result shows that there is a relationship between education quality and accessibility with students' perceived performance. The correlation value of r = 0.466 and this means a positive and moderate relationship exists between two variables. Hence, Ha_2 is accepted and H_0 is rejected.

Hypothesis 3

H_0: There is no relationship between ICT supports services in terms of environment of learning towards students' perceived performance

Ha_3: There is a relationship between ICT supports services in terms of environment of learning towards students' perceived performance (EL).

Table 4.9
Correlation summary between environment of learning with student perceived performance

		SP	p-value
Environment of Learning (EL)	Pearson Correlation	0.619**	0.000
	Sig. (2-tailed)		

**. Correlation is significant at the 0.01 level (2-tailed).

The result shows that there is a relationship between environment of learning and student perceived performance. The relationship exists between the two variables is moderate because the correlation value of r = 0.619. Hence, Ha_3 is accepted and H_0 is rejected.

Hypothesis 4

H_0: There is no relationship between ICT supports services in terms of motivation of learning toward students' perceived performance

Ha_4: There is a relationship between ICT supports services in terms of motivation of learning toward students' perceived performance (ML).

Table 4.10
Correlation summary motivation of learning with students' perceived performance

		SP	p-value
Motivation of Learning (ML)	Pearson Correlation	0.417**	0.000
	Sig. (2-tailed)		

**. Correlation is significant at the 0.01 level (2-tailed).

The result shows that there is a relationship between motivation of learning and student perceived performance. The relationship exists between the two variables is moderate, with the correlation value of r = 0.417. Hence, Ha_4 is accepted and H_0 is rejected.

4.7.2 Multiple Linear Regression Analysis

The analysis was used to check for hypothesis 5, and multiple regression described the relationship between the dependent variable and independent variables by fitting a linear equation to observed data.

Table 4.11
Summary for R values

Model	R	R^2	Adjusted R^2	Change Statistics		
				R^2 Change	F Change	Sig. F Change
1	0.708[a]	0.502	0.495	0.502	72.033	0.000

a. Predictors: (Constant) teaching and learning, education quality and accessibility, environment of learning and motivation of learning

b. Dependent Variable: Student Perceived Performance

The R^2 value will explain the fitness of the model. The percentage will identify the levels of fitness of items to the model. When the percentage is higher than 40% or the value is less than 0.4, the variable is fit to the model. Table 4.13 appear the result for R^2 is 0.502 where there is 50% of variation for the four independent variables such as teaching and learning, education quality and accessibility, environment of learning and motivation of learning with the dependent variable of student perceived performance.

Table 4.12
Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.221	4	7.805	72.033	0.000[b]
	Residual	30.990	286	0.108		
	Total	62.211	290			

a. Dependent Variable: Student Performance

b. Predictors: (Constant) teaching and learning, education quality and accessibility, environment of learning and motivation of learning

Table 4.13
Model Summary of Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig. (p-value)
		B	Std. Error	Beta		
1	(Constant)	0.783	0.233	-	3.356	0.001
	TL	0.379	0.099	0.311	3.831	0.000
	QA	0.273	0.048	0.293	5.703	0.000
	LE	0.529	0.088	0.503	6.742	0.000
	LM	-0.389	0.081	-0.332	-4.811	0.000

TL - Teaching and Learning, QA - Education Quality and Accessibility, LE - Environment of Learning, ML Motivation of Learning and SP - Student Perceived Performance

a. Dependent Variable

The equation for the student performance as below:

Student Performance = 0.783 + 0.379 (Teaching and Learning) + 0.273 (Education Quality and Accessibility) + 0.529 (Environment of Learning) - 0.389 (Motivation of Learning)

Hypothesis 5

H0: There no effect of ICT supports services in terms of teaching and learning, education quality and accessibility, environment of learning and motivation of learning toward students' perceived performance.

Ha_5: There is an effect of ICT supports services in terms of teaching and learning, education quality and accessibility, environment of learning and motivation of learning. toward students' perceived performance.

The results obtained from the regression analysis of all four factors of the impact of student perceived performance were significant at $R^2 = 0.502$, $p < 0.05$, at $F = 72.033$. Nevertheless, only two factors were significant while two are not significant. All factors are significant. Ha_5 is accepted and H_0 is rejected.

4.8 Summary

All five hypotheses were tested and clarified using Statistical Package for Social Science (SPSS) version 23 in this chapter. In the next chapter, the major findings, consequences that may happen, limitations that might influence the results in future and critical suggestion will be discussed in detail.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter summarises the findings, conclusion and recommendation for the study of the impact of ICT support services in quality education on student performance at Centre of Diploma Studies (PPD) SPACE UTM. This section discusses and summarises the research questions and five hypotheses that state in this study. The five hypotheses involved in the study will range from teaching and learning, quality and accessibility of education, learning environment and motivation of learning with the impact of student perceived performance.

5.2 Summary of the study

The aim of this study is to investigate the impact of ICT support services in quality education on student performance at Centre of Diploma Studies (PPD) UTM Space. Finally, with all the findings and the summarised the research objectives stated. Implications of the findings and managerial implications will be highlighted. The limitations of the study and future research recommendations that will be incorporated into this chapter.

5.3 Recapitalization of The Research Objective

5.3.1 Objective

This study concludes the student performance level at Centre of Diploma Studies (PPD) UTM Space is moderate in consistence with prevailing learning conditions, and there is a strong need for a paradigm shift to provide the quality of education. This research has provided valuable contributions to the literature. It has increased our knowledge about the motivational beliefs and learning strategy use by the students and how these beliefs and strategies have implications for their academic performance. Terry *et al.* (2003) and Leuven *et al.* (2004) comparing three methods of online, on-campus and hybrid methods of teaching reported that there is no evidence for a relationship between increased educational use of ICT and students' performance. In fact, they found a consistently negative and marginally significant relationship between ICT use and some students' achievement measures.

The findings of Kulik (1994); Coates *et al.* (2004); Leuven *et al.* (2004) and Astin (1999) also gave more credence to the findings of other researchers. With the comparison of the examination scores between students in the hybrid and students in the on-campus classes, there was no significant difference. The study of Sheard *et al.* (2007), on performance and progression of first year ICT students showed a similar outcome to this result. The results of the study showed that there was an influence of prior experience towards programming on those who performed well. ICT appears to have a deep effect on the higher education learning system by providing fresh learner and teacher opportunities. These opportunities

can affect the efficiency and accomplishment of the student (Ben Youssef & Dahmani, 2014).

In addition, Nguyen and Williams (2016) also found that the student became more active and autonomous in their learning. They created their abilities such as ICT abilities, data search abilities, ideas presentation and explanation. Also, in their presenting, they became more confident, motivated, vibrant and active. Moreover, they improved their ability to present and explain optics subjects during the course. The above results suggest that ICT is a useful tool to enhance students' physics learning and students' physics performance which confirm the findings of the earlier work by (Christina and Dimitrios 2008), (Wang 2009) and (Driver and Scott 1996).

5.3.2 Relationship between Teaching and Learning and Students' Perceived Performance

The findings show that there is a moderate relationship between teaching and learning and students' perceived performance with a 0.618 correlation. This shows that teaching and learning impacts student performance. According to Pittard *et al.* (2003), ICT provided the significant contributions to teaching and learning in all subjects and to all ages. ICT can motivate children and engage them in learning, besides meeting individual learning needs. A similar study proved that teaching and learning to use ICT improved the achievement of moderate learners (Norzita, 2004). Ziden *et al.* (2011) found that there was a positive correlation between the use of ICT in teaching and learning with students' achievements. According to the findings, students' achievements increased when ICT was used in a

lesson. Students' achievements found decreasing in a non- ICT-based lesson. According to Cox (1999), using ICT in lessons can enhance self-esteem, leading to expectations of achieving goals. Becker (2001) also suggested that using ICT in lessons may help students in mastering subject skills. ICT used in lessons, especially in the science subject, produced higher quality output of students.

5.3.3 Relationship between Education Quality and Accessibility and Students' Perceived Performance

The findings show that there is a moderate relationship between education quality and accessibility and students' perceived performance with a 0.466 correlation. Previous studies found that people have to access knowledge via ICT to keep pace with the latest developments (Plomp, *et al.*, 2007). ICTs also allow for the creation of digital resources like digital libraries where the students, teachers and professionals can access research material and course material from any place (Bhattacharya & Sharma, 2007; Cholin, 2005). It also improves the quality of education by facilitating learning by doing, real time conversation, delayed time conversation, directed instruction, self-learning, problem solving, information seeking and analysis, and critical thinking, and the ability to communicate, collaborate and learn (Yuen *et al.,* 2003). Casal (2007) mentions that ICTs also provide a platform for sharing information and knowledge.

5.3.4 Relationship between Environment of Learning and Students' Perceived Performance

The findings show that there is a moderate relationship between environment of learning and students' perceived performance with a 0.619 correlation. Kerr's (1991) interviews and observations with American teachers who had successfully incorporated technology into their practice showed that using it allowed 'obvious and dramatic' changes in classroom organisation and management. Using graphical presentations instead of navigating in texts decreases the cognitive overload of students, makes it easier for students to comprehend relations between complicated concepts, and presents multiple ways of reaching information in these environments (O'Donnell *et al.*, 2002). According to Noor (2003) ICT environment improves the experience of the students and teachers and to use intensively the learning time for better results. The ICT environment has been developed by using different software and also the extended experience in developing web-based and multimedia materials. ICTs have an important role to play in changing and modernising educational systems and ways of learning.

5.3.5 Relationship between Motivation of Learning and Students' Perceived Performance

The findings show that there is a moderate relationship between motivation of learning and students' perceived performance with a 0.417 correlation. Sansone *et al.* (2011) addresses motivation and note that students who already have a greater interest in computers may display greater knowledge and interest because the tasks they may do on a computer are already relevant to their interests and they can make connections on their own. Learning

approaches using contemporary ICTs provide many opportunities for constructivist learning through their provision and support for resource-based, student cantered settings and by enabling learning to be related to context and to practise (Berge, 1998; Barron, 1998). According to Noor (2003), the teachers could make their lecture more attractive and lively by using multi- media and the students could capture the lessons taught to them easily. As they found the class very interesting, the teachings also kept in mind for a longer span which supported them during the time of examination.

5.3.6 Significant effect on Students' Perceived Performance

In summary, the research proved that there is a significant impact on students' performance between variables such as teaching and learning, education quality and accessibility, ICT environment of learning and motivation of learning. ICT was found more effective on students' academic achievement as compared to traditional teaching method on post-test.

The results are consistent with Agrahari and Singh (2013), who found that ICT has a positive effect on student achievement scores in chemistry at secondary level. Okoro and Ekpo (2016) concluded that students performed well who were taught through ICT as compared to those who were taught via conventional instructional strategy. This has become a serious matter as many previous researches have proven the usage of ICT in teaching and learning process could improve students' achievement (Nakayima, 2011; Jamieson-Proctor et al., 2013). Previous research of Cassim and Obono (2011) shows that the correlation of teachers' beliefs and the use of ICT are high. Teachers' role is getting

more important especially in the usage of ICT in pedagogy which could increase the achievement of the students, their creativity and thinking skills.

According to Basri *et al.* (2018), ICT performs a role more than academic for most university students. Besides searching for information from the Internet, these university students make use of ICT for communication and social connections with friends and relatives. This explains why it is a major booster to the academic performance of the students in the university. ICT can remove communication barriers such as space and time (Lim and Chai, 2004). ICT eliminating time barriers in education for learners and teacher. It eliminates geographical barriers as learners can log on from any place (Sanyal, 2001; Mooij, 2007; Cross & Adam, 2007).

Bakia *et al.* (2012) found that blended (both online and in-person) instruction can lead to positive effects on student achievement, especially when it is collaborative and promotes self-reflection in students. Other studies emphasise the importance of live interaction between teachers and students for improving educational outcomes (Zhao *et al.*, 2005), and real-time data feedback for teachers and consistent access to the technology for all students, regardless of need (Brush & Hew, 2006). Gašević *et al.* (2016) showed that the association of data regarding students' activities in a VLE with students' performance is moderated by the teaching conditions.

Ashley (2016) reiterates that technology helps educators in preparing students for the real-world setting and stresses that as our countries turn out to be progressively more technology dependent, it becomes significantly more essential that to be good citizens, students must figure out how to be well informed about ICT. One more advantage of introducing ICT in schools is that the learners who do not have accessibility at home may utilize them in schools. It can be used as a learning device to give instructions to enhance students' learning and retention (Aslan & Dogdu, 1993).

5.4 Research Implications

In research implication there are two (2) type of implications, that are as stated below:

1. The Managerial Implications should come directly from the objectives, summarizing the answers to the questions asked and there is evidence in supporting the answers.
2. The Theoretical implication on the other hand, is a newly found addition(s) to the existing theories. In a research perspective, the job of theory is to provide interesting areas to work on.

5.4.1 Management practical Implications

ICT enhancing teaching and learning process, ICT enhancing quality and accessibility of education, ICT enhancing the learning environment and ICT enhancing learning motivation show positive relationships with student performance. The results are helpful in giving information for the benefit of multiple parties and for improvement.

5.5 Limitation

There are several limitations affecting the preparation of research. The limitation in this study is provided for future researchers to improve their expertise and to avoid the shortcomings, conditions or influences on method and conclusions.

5.5.1 Sampling Location

There are other universities involved in ICT support service development for the benefit of their students. Researchers need to expand sample locations by incorporating universities throughout Malaysia to obtain research results.

5.5.2 Respondents

The target population is the student from Diploma Programme at Centre of Diploma Studies (PPD) SPACE UTM including first year, second year and third-year students selected as respondents and sample size is limited to 291. The limited sampling size is difficult to identify the quality of the research as it represents only one faculty member, not the opinion of the students from another department. Students' opinions from all departments need to be taken into account for a better understanding of the impact of student performance on student ICT support services. This study involves only year-end students; Different age groups of individuals may have various thoughts on this matter.

5.5.3 Time Constraints

This research study only analyses the ICT support services on student performance but is unrealistic because it does not describe the real situation. Researchers cannot do this longitudinal study within a limited time at the start and end of each task in the study.

5.6 Future Research Recommendations

Researchers need to conduct investigations at all universities throughout Malaysia to get higher accuracy from students more accurately to maintain the likely tendency of the impact of student performance on student ICT support services towards quality education. In addition, there were only 291 respondents from this study. Researchers need to increase the number of respondents so that the results are better and involve the whole student, from private and public education. Researchers can improve the survey questions to better suit the aim of the investigation. The validation test should be conducted to ensure that the survey is important for questioning. It might be too common for issues and challenges of ICT integration to be discussed, but in-depth study of ICT integration in core subjects in schools is least discussed. It is good if further studies can be made based on what barriers academic are facing in using ICT in their daily classrooms in the education institution.

This research requires more data to get more explanation. Therefore, future researchers can use other information gathering strategies such as interviews or observations. This can increase the interest of respondents and get more views from different angles. In addition, there is a lower probability that the respondent will be confused if the question asked is less clear. Only four variables tested in this study, future researchers may consider other

factors that may affect to get better research results. In conclusion, future researchers conduct investigations over a longer time. This can guarantee reliable results that ICT support services can have a greater impact on student performance.

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APPENDIX A - QUESTIONNAIRE

UNIVERSITI UTARA MALAYSIA

Dear Respondents,

I am a postgraduate student of University Utara Malaysia and conducting a survey on the impact of ICT support services in quality education on student performance: a case study of Centre of Diploma Studies (PPD) UTM Space to fulfill the master's requirement of the university.

I understand recognize that your time is valuable and many demands are made upon it by your heavy workload. However, your participation in this survey, which will require only about 10-15 minutes of your time, is vital to the success of this study.

All information provided in this questionnaire will be confidential for the present study purposes. No information pertaining to individuals will be divulged to any third person or organization. In sum, the information obtained in this study will be used purely for academic purposes only.

Should you have any queries regarding this research please do not hesitate to contact me at aida.kl@utm.my or call me at 019-6421549. Thank you very much for your cooperation in responding to the questionnaire. Your participation in this study is greatly appreciated.

RAJA AIDA BINTI RAJA SHAHARUDDIN
MSc (Management)

SURVEY OF THE IMPACT OF ICT SUPPORT SERVICES IN QUALITY EDUCATION ON STUDENT PERFORMANCE: A CASE STUDY OF CENTER OF DIPLOMA STUDIES (PPD) UTM SPACE

Section A: Demographic Information

Please check (✓) in the appropriate box or fill in the blank, where appropriate.

1. **Your gender:**
- ❑ Male
- ❑ Female

2. **Your age:**
- ❑ 18-25 years
- ❑ 26-39 years
- ❑ 40 years and above

3. **Race:**
- ❑ Malay
- ❑ Chinese
- ❑ Indian
- ❑ Others, please specify: _____

4. **Department (example: computer science):**
_____

5. **Course of study (example: Dip comp science):**
_____

6. **Reason joined this Diploma program:**
- ❑ To obtain diploma
- ❑ To learn a job skill (i.e. for upgrade for promotion purpose)
- ❑ For personal satisfaction/knowledge

7. **Study mode:**
- ❑ Full time student
- ❑ Part time student

Section B: Factors that contribute to the impact of ICT support services in quality education on student performance: a case study of Center of Diploma Studies (PPD) UTM Space.

Factor: Teaching and Learning

Indicate your level of agreement with the following sentences from 1 (strongly disagree) to 5 (strongly agree). Choose the best answer according to the scale above.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

1	My university's ICT facilities work well and can be used.	1	2	3	4	5
2	If educators are confronted with problems, technical support will be given.	1	2	3	4	5
3	ICT makes it possible for learners to be more imaginative and creative.	1	2	3	4	5
4	Using ICT enables learners explore associated teaching understanding and information.	1	2	3	4	5
5	ICT use enables learners to discover associated teaching understanding and knowledge.	1	2	3	4	5
6	With the help of ICT, teachers are provided the choice to design their own teaching.	1	2	3	4	5

Factor: Education Quality and Accessibility

Indicate your level of agreement with the following sentences from 1 (strongly disagree) to 5 (strongly agree). Choose the best answer according to the scale above.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

1	Access to what I need anytime.	1	2	3	4	5
2	Access to remote resources I want anytime.	1	2	3	4	5
3	Improvement of teaching and learning by using quality data resources.	1	2	3	4	5
4	Improvement in educational quality.	1	2	3	4	5
5	Encourages collaborative and interactive learning	1	2	3	4	5

Factor: Environment of Learning

To what extent do you agree that ICT provides learners with a fresh learning to set? Choose the best answer according to the scale above.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

1	Do you believe using ICT improves the level of knowledge of learners?	1	2	3	4	5
2	Do you believe using ICT will make learners enjoy their classes?	1	2	3	4	5
3	Do you think that not using ICT is old fashioned?	1	2	3	4	5
4	Can ICT be a tool to make students independent?	1	2	3	4	5
5	Does ICT facilitate students' needs?	1	2	3	4	5

Factor: Motivation of Learning (ML)

To what extent do you agree with ICT, by enhancing learner motivation and commitment, can you improve the quality of education in several ways? Choose the best answer according to the scale above.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

1	ICT is an Innovative teaching method that are based on active and experimental learning and increases student engagement and performance.	1	2	3	4	5
2	ICT encourages and supports disadvantaged students in their learning, raises students' motivation to learn through giving the learner more control over the learning experience.	1	2	3	4	5
3	ICT offers different operations to test the development of student understanding and skills.	1	2	3	4	5
4	By assigning group projects where learners meet online, ICT offers possibilities for knowledge acquisition through cooperation, conversation, and negotiation.	1	2	3	4	5
5	ICT is used to support subject-specific learning, and have positive impact on attainment.	1	2	3	4	5

Factor: Student Perceived Performance

Indicate your level of agreement with the following sentences from 1 (strongly disagree) to 5 (strongly agree). Choose the best answer according to the scale above).

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

1	This will assist me in my studies to get better outcomes.	1	2	3	4	5
2	It will assist me in comprehending more deeply the topic matter.	1	2	3	4	5
3	It will enhance my long-term career or job opportunities.	1	2	3	4	5
4	Technology interferes with my capacity to focus on topics I care about and believe profoundly.	1	2	3	4	5
5	I wish my college professors would use more technology and incorporate it into their learning.	1	2	3	4	5

END OF QUESTIONNAIRE

THANK YOU

APPENDIX B – DEMOGRAPHIC ANALYSIS

Your gender:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	139	47.8	47.8	47.8
	Male	152	52.2	52.2	100.0
	Total	291	100.0	100.0	

Your age:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25 years	150	51.5	51.5	51.5
	26-39 years	108	37.1	37.1	88.7
	40 and above	33	11.3	11.3	100.0
	Total	291	100.0	100.0	

Your race:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cina	30	10.3	10.3	10.3
	India	31	10.7	10.7	21.0
	Malay	230	79.0	79.0	100.0
	Total	291	100.0	100.0	

Department (example: computer science):

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Department of Computer Sciences and Services	79	27.1	27.1	27.1
	Department of Engineering	67	23.0	23.0	50.2
	Department of Geomatic and Built Environment	64	22.0	22.0	72.2
	Department of Management	81	27.8	27.8	100.0
	Total	291	100.0	100.0	

Course of study (example: Dip comp science):

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma in Architecture	17	5.8	5.8	5.8
	Diploma in Chemical Engineering	1	.3	.3	6.2
	Diploma in Civil Engineering	22	7.6	7.6	13.7
	Diploma in Computer Science (Information Technology)	60	20.6	20.6	34.4
	Diploma in Computer Science (Multimedia)	19	6.5	6.5	40.9
	Diploma in Electronic Engineering	4	1.4	1.4	42.3
	Diploma in Electronic Engineering (Mechatronic)	6	2.1	2.1	44.3
	Diploma in Electronic Engineering (Power)	3	1.0	1.0	45.4
	Diploma in Land Surveying	8	2.7	2.7	48.1
	Diploma in Mechanical Engineering	31	10.7	10.7	58.8
	Diploma in Property Management	20	6.9	6.9	65.6
	Diploma in Quantity Surveying	23	7.9	7.9	73.5
	Diploma in Technology Management	38	13.1	13.1	86.6
	Diploma in Technology Management (Accounting)	23	7.9	7.9	94.5
	Diploma in Urban and Regional Planning	16	5.5	5.5	100.0
	Total	291	100.0	100.0	

Reason joined this Diploma program:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	for personal satisfaction/knowledge	50	17.2	17.2	17.2
	For personal satisfaction/knowledge	30	10.3	10.3	27.5
	To learn a job skill (i.e. for upgrade for promotion purpose)	106	36.4	36.4	63.9
	To obtain diploma	105	36.1	36.1	100.0
	Total	291	100.0	100.0	

Study mode:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.3	.3	.3
	Full time student	241	82.8	82.8	83.2
	Part time student	49	16.8	16.8	100.0
	Total	291	100.0	100.0	

APPENDIX C – DESCRIPTIVE ANALYSIS

Dependent Variables

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SP1	291	2.0	3.0	5.0	4.244	.0440	.7513	.564	-.434	.143	-1.117	.285
SP2	291	2.0	3.0	5.0	4.333	.0381	.6504	.423	-.460	.143	-.705	.285
SP3	291	2.0	3.0	5.0	4.113	.0343	.5850	.342	-.021	.143	-.151	.285
SP4	291	2.0	3.0	5.0	4.220	.0354	.6044	.365	-.141	.143	-.485	.285
SP5	291	1.0	4.0	5.0	4.770	.0247	.4217	.178	-1.288	.143	-.343	.285
Valid N (listwise)	291											

Independent Variables

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
TL1	291	3.0	2.0	5.0	3.749	.0425	.7256	.527	.259	.143	-.786	.285
TL2	291	2.0	3.0	5.0	3.918	.0330	.5633	.317	-.021	.143	.111	.285
TL3	291	2.0	1.0	3.0	2.481	.0328	.5591	.313	-.462	.143	-.825	.285
TL4	291	2.0	3.0	5.0	4.244	.0299	.5108	.261	.296	.143	-.248	.285
TL5	291	2.0	3.0	5.0	4.364	.0307	.5232	.274	.126	.143	-1.052	.285
TL6	291	2.0	3.0	5.0	4.227	.0409	.6974	.486	-.341	.143	-.918	.285
TL7	291	2.0	3.0	5.0	4.082	.0393	.6696	.448	-.096	.143	-.765	.285
QA1	291	2.0	3.0	5.0	4.237	.0384	.6556	.430	-.290	.143	-.737	.285
QA2	291	2.0	3.0	5.0	4.234	.0399	.6800	.462	-.328	.143	-.842	.285
QA3	291	2.0	3.0	5.0	4.093	.0405	.6911	.478	-.124	.143	-.898	.285
QA4	291	1.0	4.0	5.0	4.423	.0290	.4948	.245	.315	.143	-1.914	.285
QA5	291	2.0	3.0	5.0	4.237	.0293	.5005	.250	.373	.143	-.180	.285

EL1	291	2.0	3.0	5.0	4.302	.0283	.4821	.232	.583	.143	-.956	.285
EL2	291	2.0	3.0	5.0	4.540	.0305	.5196	.270	-.382	.143	-1.346	.285
EL3	291	2.0	3.0	5.0	4.110	.0240	.4089	.167	.793	.143	2.205	.285
EL4	291	2.0	3.0	5.0	4.124	.0370	.6312	.398	-.103	.143	-.525	.285
EL5	291	2.0	3.0	5.0	4.179	.0423	.7209	.520	-.282	.143	-1.042	.285
ML1	291	1.0	4.0	5.0	4.313	.0272	.4644	.216	.812	.143	-1.350	.285
ML2	291	3.0	2.0	5.0	3.959	.0360	.6145	.378	-.066	.143	-.065	.285
ML3	291	2.0	3.0	5.0	3.856	.0288	.4911	.241	-.318	.143	.653	.285
ML4	291	1.0	4.0	5.0	4.158	.0214	.3654	.134	1.884	.143	1.561	.285
ML5	291	2.0	3.0	5.0	4.065	.0292	.4974	.247	.137	.143	.987	.285
Valid N (listwise)	291											

APPENDIX D – RELIABILITY TEST

Teaching and Learning Process

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.733	.707	7

Item Statistics

	Mean	Std. Deviation	N
TL1	3.749	.7256	291
TL2	3.918	.5633	291
TL3	2.481	.5591	291
TL4	4.244	.5108	291
TL5	4.364	.5232	291
TL6	4.227	.6974	291
TL7	4.082	.6696	291

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.866	2.481	4.364	1.883	1.759	.417	7
Item Variances	.375	.261	.527	.266	2.018	.012	7

Quality and Accessibility of Education

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.873	.885	5

Item Statistics

	Mean	Std. Deviation	N
QA1	4.237	.6556	291
QA2	4.234	.6800	291
QA3	4.093	.6911	291
QA4	4.423	.4948	291
QA5	4.237	.5005	291

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.245	4.093	4.423	.330	1.081	.014	5
Item Variances	.373	.245	.478	.233	1.950	.013	5

Environment Learning

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.738	.733	5

Item Statistics

	Mean	Std. Deviation	N
EL1	4.302	.4821	291
EL2	4.540	.5196	291
EL3	4.110	.4089	291
EL4	4.124	.6312	291
EL5	4.179	.7209	291

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.251	4.110	4.540	.430	1.105	.032	5
Item Variances	.318	.167	.520	.353	3.109	.020	5

Motivation of Learning

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.860	.875	5

Item Statistics

	Mean	Std. Deviation	N
ML1	4.313	.4644	291
ML2	3.959	.6145	291
ML3	3.856	.4911	291
ML4	4.158	.3654	291
ML5	4.065	.4974	291

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.070	3.856	4.313	.457	1.119	.031	5
Item Variances	.243	.134	.378	.244	2.828	.008	5

Student Perceived Performance

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.814	.792	5

Item Statistics

	Mean	Std. Deviation	N
SP1	4.244	.7513	291
SP2	4.333	.6504	291
SP3	4.113	.5850	291
SP4	4.220	.6044	291
SP5	4.770	.4217	291

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.336	4.113	4.770	.656	1.160	.065	5
Item Variances	.375	.178	.564	.387	3.174	.020	5

APPENDIX E – FACTOR ANALYSIS TEST

Dependent Variable

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.598
Bartlett's Test of Sphericity	Approx. Chi-Square	923.910
	df	10
	Sig.	.000

Communalities

	Initial	Extraction
SP1	1.000	.856
SP2	1.000	.847
SP3	1.000	.420
SP4	1.000	.698
SP5	1.000	.096

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.917	58.340	58.340	2.917	58.340	58.340
2	.948	18.957	77.298			
3	.685	13.695	90.993			
4	.397	7.937	98.930			
5	.054	1.070	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
SP1	.925
SP2	.920
SP3	.648
SP4	.836
SP5	.310

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Independent Variable

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.796
Bartlett's Test of Sphericity	Approx. Chi-Square	8707.666
	df	231
	Sig.	.000

Communalities

	Initial	Extraction
TL1	1.000	.810
TL2	1.000	.594
TL3	1.000	.602
TL4	1.000	.906
TL5	1.000	.709
TL6	1.000	.859
TL7	1.000	.882
QA1	1.000	.883
QA2	1.000	.812
QA3	1.000	.768
QA4	1.000	.931
QA5	1.000	.890
EL1	1.000	.756
EL2	1.000	.841
EL3	1.000	.818

EL4	1.000	.805
EL5	1.000	.727
ML1	1.000	.790
ML2	1.000	.882
ML3	1.000	.805
ML4	1.000	.878
ML5	1.000	.869

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.026	45.571	45.571	10.026	45.571	45.571
2	3.317	15.079	60.650	3.317	15.079	60.650
3	1.982	9.010	69.660	1.982	9.010	69.660
4	1.342	6.101	75.761	1.342	6.101	75.761
5	1.149	5.221	80.982	1.149	5.221	80.982
6	.850	3.863	84.845			
7	.800	3.638	88.483			
8	.605	2.750	91.233			
9	.357	1.621	92.854			
10	.317	1.440	94.295			
11	.285	1.294	95.589			
12	.222	1.008	96.597			
13	.172	.784	97.380			
14	.145	.660	98.040			
15	.119	.542	98.582			
16	.102	.463	99.045			
17	.069	.315	99.360			
18	.056	.257	99.617			
19	.041	.189	99.806			
20	.017	.079	99.885			
21	.016	.073	99.958			
22	.009	.042	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component				
	1	2	3	4	5
TL1	.803	-.254	-.296	-.106	-.035
TL2	.668	.087	.096	.130	-.338
TL3	-.443	.219	.307	.362	.364
TL4	.356	.173	-.238	-.591	.586
TL5	.758	-.192	.106	-.215	-.201
TL6	.837	-.124	.203	-.283	-.149
TL7	.776	-.334	.371	.112	.137
QA1	.340	.873	-.031	-.032	-.060
QA2	.251	.815	.197	.093	-.192
QA3	.840	.218	.004	-.090	.076
QA4	.678	.658	.190	.030	.024
QA5	.823	.266	-.259	-.271	.041
EL1	.813	.151	-.229	.106	-.091
EL2	.690	.218	.535	-.153	-.086
EL3	.178	-.458	.689	-.310	-.076
EL4	.626	-.633	-.100	-.034	-.024
EL5	.606	-.382	.331	.318	-.056
ML1	.823	.173	-.247	.109	-.101
ML2	.675	-.402	-.505	.094	-.010
ML3	.654	-.049	.273	.079	.542
ML4	.799	-.070	-.274	.397	.032
ML5	.765	-.010	.051	.431	.311

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

APPENDIX F – PEARSON CORRELATION ANALYSIS

Descriptive Statistics

	Mean	Std. Deviation	N
TL	3.8665	.37980	291
QA	4.2447	.49751	291
EL	4.2509	.39360	291
ML	4.0701	.39484	291
SP	4.3361	.46316	291

Correlations

		TL	QA	EL	ML	SP
TL	Pearson Correlation	1	.527**	.802**	.754**	.618**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	291	291	291	291	291
QA	Pearson Correlation	.527**	1	.362**	.520**	.466**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	291	291	291	291	291
EL	Pearson Correlation	.802**	.362**	1	.720**	.619**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	291	291	291	291	291
ML	Pearson Correlation	.754**	.520**	.720**	1	.417**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	291	291	291	291	291
SP	Pearson Correlation	.618**	.466**	.619**	.417**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	291	291	291	291	291

**. Correlation is significant at the 0.01 level (2-tailed).

APPENDIX G – REGRESSION ANALYSIS

Descriptive Statistics

	Mean	Std. Deviation	N
SP	4.3361	.46316	291
TL	3.8665	.37980	291
QA	4.2447	.49751	291
EL	4.2509	.39360	291
ML	4.0701	.39484	291

Correlations

		SP	TL	QA	EL	ML
Pearson Correlation	SP	1.000	.618	.466	.619	.417
	TL	.618	1.000	.527	.802	.754
	QA	.466	.527	1.000	.362	.520
	EL	.619	.802	.362	1.000	.720
	ML	.417	.754	.520	.720	1.000
Sig. (1-tailed)	SP	.	.000	.000	.000	.000
	TL	.000	.	.000	.000	.000
	QA	.000	.000	.	.000	.000
	EL	.000	.000	.000	.	.000
	ML	.000	.000	.000	.000	.
N	SP	291	291	291	291	291
	TL	291	291	291	291	291
	QA	291	291	291	291	291
	EL	291	291	291	291	291
	ML	291	291	291	291	291

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.221	4	7.805	72.033	.000[b]
	Residual	30.990	286	.108		
	Total	62.211	290			

a. Dependent Variable: SP

b. Predictors: (Constant), ML, QA, EL, TL

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.783	.233		3.356	.001
	TL	.379	.099	.311	3.831	.000
	QA	.273	.048	.293	5.703	.000
	EL	.592	.088	.503	6.742	.000
	ML	-.389	.081	-.332	-4.811	.000

a. Dependent Variable: SP

Model Summary for R Values

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.708[a]	.502	.495	.32918	.502	72.033	4	286	.000

a. Predictors: (Constant), ML, QA, EL, TL