COMPARATIVE ANALYSIS FOR THE EDUCATIONAL USE OF CLOUD COMPUTING SERVICES IN MOBILE LEARNING ENVIRONMENT

A THESIS SUBMITTED TO THE INSTITUTE OF GRADUATE STUDIES
OF
NEAR EAST UNIVERSITY

By
ANNE BAKUPA MBOMBO

In Partial Fulfillment of the Requirements for the Degree of Master of Science in Computer Information Systems

NICOSIA, 2021

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To my parents...

ABSTRACT

In today's 21st century world, technology has not only evolved, but increasingly extends to many areas of life. The field of education could not escape this development. If yesterday we were content with a computer lab in one of the rooms of a university, today we are talking about distance learning or mobile learning. In researching mobile cloud computing (mcc), we found that most of the work focused on integrating mcc into education, and very little on the factors that might make students or teachers want to continue use it as a tool in their learning process. This thesis examines the factors that can influence students and teachers to continue using mobile cloud computing after integrating it into their learning mode, the advantages of mobile cloud computing and also focuses on a comparative study of mobile cloud computing between one of the universities in northern Cyprus and some universities. in the Democratic Republic of the Congo. To carry out this study, a survey was conducted among a total of 430 participants, including 227 for the University of the Near East in northern Cyprus and 203 for a few universities in the Democratic Republic of the Congo using the questionnaire method, then the collected results were examined with the SPSS statistical analysis software which led us to note a similarity between the results of the analyzes of the two countries. This study could serve as a reference for future researchers who will focus on a similar subject.

Keywords: Cloud computing; mobile learning; mobile cloud computing; e-learning; comparative analysis

ÖZET

Günümüzün 21. yüzyıl dünyasında, teknoloji sadece gelişmekle kalmadı, aynı zamanda yaşamın birçok alanına giderek daha fazla yayıldı. Eğitim alanı bu gelişmeden kaçamadı. Dün, üniversitenin odalarından birinde bilgisayar laboratuarının bulunmasından memnun oluyorken, bugün uzaktan eğitimden veya mobil öğrenmeden bahsediyoruz. Mobil bulut bilişimi araştırılırken, çalışmaların çoğunun Mobil Bulut Bilişim'in eğitime entegre etmeye odaklandığını ve çok azının da öğrencilerin veya öğretmenlerin bunu öğrenme süreçlerinde bir araç olarak kullanmaya devam etmelerine neden olabilecek faktörlere odaklandığı tesbit edildi. Bu tez çalışmasında ise öğrencileri ve öğretmenleri öğrenme modlarına entegre ettikten sonra mobil bulut bilişimi kullanmaya devam etmeleri için etkileyebilecek faktörlerin belirlenmesine çalışılmıştır. Ayrıca çalışmada, elde edilen sonuçlar Kuzey Kıbrıs'taki üniversiteler ile Demokratik Kongo Cumhuriyeti'ndeki üniversiteler arasında karşılaştırma yapılmıştır. Bu çalışmayı gerçekleştirmek için 227 veri Kuzey Kıbrıs'dan 203 veri de Kongo Demokratik Cumhuriyeti olmak üzere toplam 430 katılımcının katıldığı anket çalışması ile toplanmıştır. Sonuçlar SPSS istatistiksel analiz yazılımı ile analiz edilmiştir. Elde edilen sonuçlar, iki ülke analiz sonuçları arasında bir benzerlik olduğunu ortaya çıkarmıştır. Her iki ülkede de mobil bult bilişimin eğitimde kullanımını etkileyen faktörlerin belirlenmesine yönelik oluşturulan model üzerine oluşturulan tüm hipotezlerin kabül edildiği tesbit edilmiştir. Çalışma, benzer konuya odaklanacak gelecekteki araştırmacılar için referans görevi görebileceği düşünülmektedir.

Anahtar Kelimeler: Bulut bilişim; mobil öğrenme; mobil bulut bilişim; e-öğrenme; karşılaştırmalı analiz

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LIST OF ABBREVIATIONS

CC:	Cloud Computing
MCC:	Mobile Cloud Computing
ANOVA:	Analysis of Variance
NC:	North Cyprus
DRC:	Democratic Republic of Congo
NEU:	Near East University
UNIKIN:	University of Kinshasa
UPN:	National Pedagogy University
ICS:	Institute of Commercial Sciences
UPC:	Protestant Uni. of Congo
ULK:	Free University of Kinshasa
UCC:	Catholic University of the Congo
ISIPA:	Higher Institute of Computer Programming and Analysis
ICT:	Information and Communication Technology
OLR:	Online Learning Resources
PC:	Personal Computer
LMS:	Learning the Executive Framework
IT:	Information Technologies
SEM:	Structural Equation Modeling
TRA:	Theory of Reasoned Action
TAM:	Technology Acceptance Model
CSE:	PC self-viability
ECG:	Electrocardiograph
PACS:	Picture Archiving and Communication Systems
SVM:	Support Vector Machine
E-learning:	Electronic learning
VM:	Virtual machine
SaaS:	Software as a service
PaaS:	Platform as a service
IaaS:	Infrastructure as a service

DIC: Data-Intensive computing

CSP: Cloud Service Provider

CRM: Customer Relationship Management

CHAPTER 1

INTRODUCTION

This is the introductory chapter that introduces the study aim and problem statement, importance, study hypotheses and summary of the all chapters in view.

1.1 Overview

E-learning has overwhelmed conventional learning, yet beside the benefit of openness that doesn't need actual presence. Web based learning is a nonexclusive term to allude to innovation upheld learning, as opposed to comparable terms, for example, electronic learning (e-learning), online learning, dispersed learning and innovation interceded learning. Schools and colleges are taking advantage of the ongoing improvement in Information and Communication Technology (ICT) grasping Online Learning Resources (OLR) as a vital piece of educating and learning exercises (Panzeri, 2018). Online assets allude to a wide scope of data accessible on the Internet including text, pictures, recordings, contextual analyses, diaries, information bases, and educational plan. E-learning is an order where instructing speculations and new data and correspondence advances are joined to empower the student to finish their instructional class through the web. better approaches for learning through the web have picked up notoriety as of late. Fresher types of discovering that depend on the web, present remarkable occasions to democratize schooling and to give understudies across the world omnipresent admittance to excellent courses. The web and its prospects in advanced education present expectation and potential open doors for understudies in non-industrial nations (McGill & Klobas, 2009). Likewise, quickly changing nature of innovation is a typical sight when the more youthful ages especially younger students are currently the "advanced locals" contrasted with the more established age. Understudies in school and colleges are by far most of individuals who have been presented to online climate. They rule the exercises of messaging, web based talking, writing for a blog, tweeting and a few longrange interpersonal communication destinations to connect with their companions. Indeed, youth may associate more effectively with PCs than they do in up close and personal settings. Because of this, most instructors in school have decided on web based training where it most offers a comparative scope of supportive highlights to help them make, oversee, transfer their framework of subject to study. Instructors have also started to capture student income by learning the language with multiple active online channels. Understudies are more occupied with learning in the event that we coordinate viewing a video,

research-utilizing Internet, participate in the pretend or discussion. This won't supplant up close and personal instructing yet extraordinarily upgrades the viability of training (Elbaum et al., 2002).

E-learning will be in the standard of learning later on and will make a great deal of preferences. The favorable circumstances are first the wellspring of learning is sharing so no more space impediment. Second, there is no additional time impediment if the showing stage worker and the Internet association work regularly, which implies students can learn whenever on the web. Third, learning materials can be re-utilized again and again. Fourth, educators can utilize interactive media to communicate the substance importance of e-learning. Fifth, e-learning is singular instructing and learning; the instructor can find out each learning circumstance to help the student. 6th, e-learning can upgrade learning interests in light of the fact that the encouraging style is more dynamic (Panzeri, 2018). So, the upsides of e-learning are that students can acquire more plentiful and beautiful materials and educators can comprehend the necessities and circumstance of students. Today, e-learning is thought as a ground-breaking and groundbreaking device to expand the conventional methods of learning and assemble limit in schooling and preparing in Western nations and the remainder of the world. E-learning not only provides educational institutions with productive intentions for their preparation, but also gives them the means to classify and competently share their scientific information (Mikhaylov & Fierro, 2015). E-learning is just characterized as the utilization of PC innovation to convey schooling or instructional classes to students; such courses might be considered on the web, disconnected or by any combination of these modes. Therefore, e-learning provides students with adaptability with respect to the factor of time and place; it can also be a teaching medium that combines personal inspiration, correspondence, productivity and innovation. Online learning is the securing and use of information conveyed and encouraged fundamentally by electronic methods (Al-Busaidi, 2012). The present instruction scene is immensely not quite the same as it was only 10 years earlier. Schools at this point don't just depend on paper tasks, rubrics, and grade books to give important training to understudies. Today, schools are utilizing their own focal processing frameworks that handle distance learning and educating, showing materials in various arrangements, intuitive educational program, and gathering organized learning (Hemming, 2008; Al-Busaidi, 2013). These key advances that are utilized in the homeroom can be executed effectively utilizing different distributed computing administrations, for example, Blackboard, a SaaS stage that furnishes schools with a learning the executive framework learning management systems (LMS). LMS's are intended to deal

with numerous media designs, understudy evaluating, bunch learning, and distance instructing and learning. On account of the development of e-learning stages in the most recent decade, distance learning philosophies in college degree, for example, on the web and mixed learning have been united. In every one of them, the utilization of web based learning devices is basic as they assume a basic part in the mix of instructive stages at colleges (Janda, 2016; Tetteh, 2016). By methods for these stages, typically called learning management systems (LMS), the understudies can work independently, the association with different clients regardless of whether understudies or speakers is encouraged through cooperative apparatuses, new techniques for asset the board are given and, most importantly, new instructing and learning models are merged. Over the most recent couple of years, new regions of study are being investigated with the shared objective of improving the instructing and learning measure using LMS stages.

Cloud innovation underpins reasonable learning ideas, for example, agreeable and constructivism learning. In the advanced education space, records can be made in one area and be altered continuously in another area on account of online communitarian administrations, for example, Google Docs and Office 365 (Vujin, 2011). In the auditorium Running head: of a school, a teacher can write his lecture notes when he is not at the university and access them by connecting to the cloud at the moment of his speech. Likewise, students can not only have a copy but can also compose their own course according to the explanations received. Online cooperative programming, for example, Google Docs and Office 365 are types of cloud advances (Aaron & Roche 2012). This joint effort that cloud innovation gives permits schools and colleges to help present day learning models. Agreeable learning is a learning idea that elevates people to cooperate to accomplish an objective an idea that is emphatically upheld by cloud arrangements, for example, record sharing administrations and online communitarian apparatuses (Denton, 2012). Utilizing Google Docs for instance, a little gathering in a school class can utilize Google Sheets to make a living bookkeeping page archive that can be altered at whenever, anyplace. This permits the gathering individuals to adjust with one another and work off of one another's work, giving an agreeable learning climate. The highlights of constructivism learning are likewise enormously improved by distributed computing ideas. Constructivism urges understudies to incorporate earlier information into new circumstances, and cloud computing arrangements, for example, Google Docs and LMS's give students a road to post remarks and offer their previous information, and permit them to work off of one another (Denton, 2012). The online conversation discussions and sheets of a LMS, for example,

Blackboard permits useful input to happen, bringing about understudies gaining from one another. Online coordinated effort has changed the homeroom from a static talk climate to a more community and energizing learning experience.

The framework actually should be set up to help this new learning climate, notwithstanding. This is the place where administrations Running head, for example, learning management systems (LMS) become an integral tool. Well known LMS suppliers incorporate Moodle, Blackboard, Schoology, and Sakai. These frameworks are continually growing new highlights, for example, incorporation with outsider devices, notices, online conversation sheets, and video playback to furnish the homeroom with cutting edge innovation that will uphold new learning models and ideas, for example, distance learning. Cloud innovation has become a standard of IT arrangements in industry, organizations, government just as the scholarly community. The cloud has essentially changed the computerized world through its powerful instrument of facilitating administrations and performing calculations (Petrovica, 2020). In the ongoing past, the Internet presence and its side-effect advancements have created a huge effect on our methods of living, working, imparting, instructing and leading examination. Also, with the appearance of cloud computing, the method of schooling is being changed impressively. In the same way as the internet has supplanted customary libraries with computerized libraries, the cloud will supplant conventional PC research centers with virtual labs that are more alluring to scholastic establishments regarding cost, versatility, preparation and accessibility (Sorour et al., 2021). The e-learning office gave through distributed computing is quickly supplanting the customary educating and learning techniques which can be additionally changed by improving portability, coordinated effort, and client insight (Yadegaridehkordi et al., 2019; Yang et al., 2019).

As the world is currently hit by the Covid-19 pandemic, educational institutions have resorted to online learning to be able to continue to provide the subject and to function and this thesis aims to make a comparative analysis between two countries on their educational use of the service of cloud computing in a mobile learning environment while emphasizing the advantages and benefits that educational institutions could have through the integration of cloud computing in their operations. This thesis has limitations geographically and therefore cannot be generalized in any way to the car. Most of the work talks about the integration of cloud computing into the learning environment or why it is integrated and very few talk about the why to keep using it or the attitude looking for the intention of wanting to keep using it for educational purposes, and this thesis will also talk about this aspect of things. The aim of the

study to determine the factors which could influence the students as well as the instructors of the universities of the Democratic Republic of the Congo and of North Cyprus to want to continue to use the mobile cloud computing as a learning tool in their curriculum.

1.2   Problem of the Thesis

Electronic-learning (e-learning) is acquiring in prevalence in schools and flow research uncovers its potential for meeting the scholarly requirements of students and educators (Amit et al., 2021). Mobile Cloud Computing (MCC) as another conveyed registering worldview can be characterized as a framework, application or interaction, where the information stockpiling and handling relocated from smart portable advancements to the circulated cloud servers (Dinh, Lee, Niyato & Wang, 2013). The MCC has acquired a significant consideration of both the associations and people as a promising answer for the universal conditions, in which information stockpiling and handling happen over a "cloud" through the Internet (Zhang & Min, 2020). Putting resources into the MCC, associations improved their ability and capacities without the expense of putting in new framework or programming (Ruangvanıch & Pırıyasurawong, 2019). Universities today are realizing the importance as well as the benefits of this technology all the more during this pandemic period forcing universities to deliver their courses at a distance. The majority of the studies are much more focused on a general study of mobile cloud computing or the importance of its integration in the educational field but very few studies about the elements which would lead students and professors to continue to use it within the framework of learning. But the problem is not only to realize or to start to use it but also to continue to use it and for that it would be necessary to determine the factors which could influence the students as well as the instructors of the universities of the Democratic Republic of the Congo and of North Cyprus to want to continue to use the mobile cloud computing as a learning tool in their curriculum. To be able to determine these factors influencing the decision to continue or not to use mobile cloud computing, a questionnaire was done and the data collected was structured and analyzed in order to compare the results of the Democratic Republic of the Congo and those of North Cyprus. Especially since until now there is not yet such a study on the Democratic Republic of the Congo and there are very few studies on the factors that can influence the intentions of students and those of instructors in deciding whether or not to continue using mobile cloud computing.

1.3   The Aim of the Thesis

Aim of this study is to do a comparative analysis between two country and for that the researcher will find the relationship between independent variables (gender, age, participants, universities, e-learning platforms, purpuse of using e-learning platforms) on the dependent variable (factors which affect usage of the mobile cloud computing systems) and compare them according to the geographical area (North Cyprus – Democratic Republic of Congo).

1.4   The Importance of the Thesis

This thesis does not only allow obtaining the degree of Master but will also serve as a light for educational administrations wanting to integrate mobile cloud computing into their learning system and for future researchers who will also want to broaden the subject. It's also the first work that compare the universities of Democratic Republic of Congo to Near East University.

1.5   Limitations of the Thesis

This thesis has a following limitations:

- Questionnaire was used to collect data.

- This thesis is only restricted to Near East University and 7 of universities in Democratic Republic of Congo.

- This study is limited by the date that starts from September 2020 to February 2021.

- The factors that were used in this study are behavioral intentions, attitude, information retrieval, information storage, information sharing, information application.

1.6   Overview of the Thesis

The study was grouped into six unique independent chapters, the following explained in details regarding each chapter as follows:

Chapter One is introductory chapter that introduces the study to readers and it comprises the main component of the entire study in details such as the aim, hypothesis, problem statement, importance and finally the study overview of other chapters to follow.

Chapter Two explains the subject under study in more detail with emphasis on what has been researched before and what other researchers found during their research. This chapter forms the backbone of this study and is key in understanding the principles underlying the study.

Chapter Three compares the features and services offered by the cloud computing and mobile cloud computing. In addition the architectural component of mobile cloud computing system is analyzed, and lastly a conceptual framework of the mobile cloud computing explained in detail.

Chapter Four gives a detailed explanation of the research model that the researcher used, the participants and how they were selected, tools utilized for collecting of data, the adopted methods for analysis of data, scheduling of research, test for checking data reliability of questionnaire dimensions together with a Gantt chart showing how the research progressed over a period of time.

Chapter Five explains the results obtained after data analysis with reference to previous research in order to fully understand the study. Each research question is fully analyzed and results stated.

Chapter Six gives a summary of the entire study with a focus on the results and recommendations for future research. The researcher outlines observations noted during research and how some limitations of this study could be rectified in future research.

CHAPTER 2

RELATED RESEARCH

This chapter explains the subject under study in more detail with emphasis on what has been researched before and what other researchers found during their research. This chapter forms the backbone of this study and is key in understanding the principles underlying the study.

2.1 Related Researches on Cloud Computing Services

Zheng et al. (2020) identified this information sharing is a successful model to decline the expense of people or organizations in managing information. In any case, the current information sharing plan can't decrease correspondence cost under guaranteeing the security of clients. In this paper, a mysterious and recognizable information sharing plan is introduced. The proposed plan can secure the protection of the client. Likewise, the proposed conspire additionally can follow the client transferring unimportant data. Their security and execution examinations show that the information sharing plan is secure and successful.

Jui-chien et al. (2013) found that versatile teleconsultation and distributed computing are two focal segments of current telecardiology. As they would see it, Picture Archiving and Communication Systems (PACS) ought to likewise be applied to distributed computing since PACS encourages the interoperability of Electrocardiograph (ECG) information, picture records and symptomatic reports. Through information interoperability, a clinical counsel, exploration and instructing stage can be set up where clinicians, scientists, teachers and territorial and global understudies can transfer or download clinical information, including ECGs, picture documents and clinical reports to look at and talk about infection signs and analytic outcomes. Whenever recorded, designed and put away with a similar norm, clinical information will be simpler to reference and analyze. On the off chance that there are sufficient senior cardiologists from around the globe who partake in the discussion group on the stage, a 24-hour teleconsultation will be conceivable. With the collection of information, research on enormous information will be possible. Distributed computing has the benefits of profoundly productive IT execution, cost-viability and satisfactory stockpiling for information conveyance and the board. In cardiology, distributed computing innovation and versatile teleconsultation

should be joined in light of the fact that portable teleconsultation requires rapid information conveyance and an enormous server farm where information can be securely conveyed, put away, recovered and oversaw. Since heart patients may require hospitalization or re-hospitalization and are frequently helpless against unexpected demise, it is fundamental that medical services experts give pre-emergency clinic, emergency clinic and post-clinic patients with convenient and suitable conclusion and therapy. Notwithstanding, opportune clinical administrations are not generally accessible in provincial zones as well as in metropolitan emergency clinics. Likewise, post-clinic patients, paramedics and on location clinical experts, including crisis doctors and bedside medical caretakers, frequently require earnest counsel with experienced cardiologists who are off-site. Thusly, tele-conference, particularly versatile tele-interview, is by all accounts a decent answer for crisis clinical circumstances. Simultaneously, distributed computing with PACS can encourage information interoperability and, in this way, empower the convenient conveyance of all the information important for crisis teleconsultation between experts, among patients and clinicians, and between medical clinics. To accomplish this, they proposed the accompanying assignments: the main undertaking is to guarantee information security in the cloud. The subsequent undertaking is to convey more secure and more solid public organizations. The third undertaking is to build the inspiration of clinicians and producers to work together and embrace new ECG gadgets or imaging modalities that are interoperable, which will at that point advance interoperability of the framework between clinics. In the event that these issues are settled, the pervasive stage administrations will be not difficult to utilize, cheap, and advantageous to clinicians, analysts, and understudies. Above all, these administrations will fortify worldwide joint effort to empower cardiologists to more readily speak with laypeople in their districts, or from assorted areas and countries, and furthermore to encourage crafted by altruistic associations to give mastery to agricultural nations. Thusly, clinical practice and logical examination in cardiology will advance all the more quickly around the world.

Chinyao and Yahsueh (2011) conducted an examination on the variables impacting the reception of cloud computing in the high technology environment, revealing eight factors having a significant effect on the integration of cloud computing which are: relative preferred position, intricacy, similarity, senior administration uphold, organization size, innovation preparation, serious pressing factor and pressure from business partners.

2.2 Related Researches on Cloud Computing Services Usage in Education

Sorour et al. (2021) have had as an objective in their work , to recognize and help address to basic difficulties and components that impact the e-learning framework for Computer Maintenance courses during the COVID-19 pandemic. The paper inspects the impact of a crossover displaying approach that utilizes Cloud Computing Services (CCS) and Virtual Reality (VR) in a Virtual Cloud Learning Environment (VCLE) framework. The VCLE framework gives understudies with different utilities and instructive administrations like introduction slides/text, information sharing, tasks, tests/tests, and chatrooms. Moreover, learning through VR empowers the understudies to mimic actual presence, furthermore, they react well to VR conditions that are nearer to reality as they feel that they are a necessary piece of the climate. Likewise, the examination presents a rubric evaluation that the understudies can use to ponder the abilities they utilized during the course. The examination discoveries offer valuable proposals for empowering understudies to get familiar with the proposed framework's use, particularly during the COVID-19 pandemic, and for improving understudy accomplishment more than the customary techniques for learning.

Qasem et al. (2020) found that there was a huge gap on the work that spoke about the continued use of the cloud computing in higher education institutions and to fill this the goal of their examination expects to research the predecessors of cloud registering continuation use in HEIs. Consequently, drawing on the earlier writing in hierarchical level duration, this examination set up a calculated model that expands and contextualizes the IS duration model through the viewpoint of the TOE system (i.e., innovative, hierarchical, also, natural impacts). The aftereffects of a pilot study, directed through a study with data and correspondences innovation (ICT) leaders, and dependent on the proposed applied model, demonstrate that the instrument is both dependable and legitimate, thus point the way towards additional exploration

Ibrahim (2019) conducted a study on the determinants of students' predictions to use MCC for student purposes by studying their behaviors when using MCC to manage all their information (recovery, storage, application and sharing). Based on a sample of 308 undergraduate students, he used a conventional SEM-based approach that found that the information collected during student practice (recovery, storage, application and sharing) was associated with their attitudes that were influenced by their intentions. Structural Equation Modeling (SEM)is quantitative examination procedure that can likewise fuses subjective strategies. SEM is utilized to show the causal connections between factors. The connections appeared in SEM address the

speculations of the analysts. Commonly, these connections can't be measurably tried for directionality. Algorithms applied in this study predicted students' behavioural intentions with more than 72% accuracy in most cases. As a result, his study in the MCC region into a multi-analytical approach that emphasized that the findings implied that the use of MCC services for management should be supported and encouraged in higher education while designing learning in an authentic environment and scaffolding students in the use of these services.

Brett (2009) in her work suggested that it is up to teachers to rethink their way of giving classes to finally awaken enthusiasm among their learners so it offers a motivational model for students based on five elements: (1) empowerment, (2) utility, (3) success, (4) interest, and (5) care.

Vladmir et al. (2014) conducted a research on a sample of 121 students to be able to understand the motivations of the students to want to use cloud computing instead of LMS. Based on the TAM method, they concluded that students needed to be able to store and share files on the Internet through file synchronization.

Veera and Michael (2016) conducted research in two large universities in Thailand to comprehend the level of impact of each on the selection of the cloud in an instructive setting. Examination whose results have shown that the usability and saw value, intent of use, convenience, confidence and functionality of software have a statistically positive relationship with the adoption of cloud computing thus leading to the Thai people gave more importance to the concept of cloud computing.

Minhaj and Khaled (2019), in their work have made a commitment containing an investigation of cloud-based models, difficulties and e-learning arrangements by implying progressed approaches for associations to relocate foundation existing IT towards an e-cloud which is a learning climate while remembering the plan, the functionalities and the potential requirements. In this article, they depicted how the cloud can fundamentally uphold and encourage educating and e-learning while at the same time thinking about usage of cloud selection by notable scholarly foundations. They additionally introduced an exhaustive report and scientific classification of the utilization of the cloud for e-learning just as use cases representing how the cloud can be utilized to improve the learning experience of understudies. They additionally introduced an examination and correlation of the primary existing commitments pointed toward instructing and e-picking up utilizing distributed computing, with features on their methodologies, their fundamental parts and their principle qualities. They finished up by saying that soon the pattern to utilize the cloud in advanced education is relied upon to increment

drastically however there is still some difficult work and exertion to go into framing the cutting edge distributed computing stage which might be promptly accessible to advance instructing, quicken research, and improve coordinated effort between the scholarly and exploration networks.

Hosam et al. (2017) in their survey of the writing they directed a study on the factors affecting students and teachers in making the decision to continue using e-learning. Study leading to a conclusion that students and teachers should be continually happy with the e-learning frameworks offered by advanced education foundations on the off chance that they are to keep on utilizing them.

Esteban (2012) started from a sample of 388 students, conducted a study with two objectives: to determine whether smartphones had a positive impact on the studies of students and also to determine the functionalities of the applications considered to have a significant contribution by students during their distance learning.

Muhammad et al. (2016) suggested that omnipresent information can address the issue to incorporate innovations, for example, distributed computing, huge information, Web 2.0 and the Semantic Web. Inescapable information rethinks the additional worth, assortment, volume and speed of OLR, which is adaptable regarding asset reception, information procurement and mechanical execution. The headway of ICT applied to learning frameworks is changing the wellsprings of internet learning materials, with understudies better dominating their learning experience. Large information, web-based media and distributed computing are important to measure and coordinate current disclosures into a universal learning experience. The instructive establishment should create techniques that will permit it to secure a few channels of information and ROL, known as pervasive information. The pervasive information model incorporates the usefulness of interpersonal organizations, huge information and the distributed computing approach. OLR, because of an unavoidable information, can stretch out innovative advances to assume responsibility for their advantages. Truth be told, the OLR in an instructive organization ought to permit a specific adaptability in a setting of innovation, for example, distributed computing and Web 2.0. Distributed computing performs administrations on interest with insignificant support. Web 2.0 can be reached out to consolidate the abilities of understudies to produce information content. Huge information in omnipresent information incorporates different wellsprings of information to become added an incentive for clients (educators and understudies). At last, the archive triggers research headings as per which the OLR can be coordinated into different sources, for example, informal organizations, large

information and the semantic Web because of the help of distributed computing to acquire an upper hand and ubiquitous information.

Ibrahim (2017), in his study aims to study the consequences related to the integration of cloud computing in education. Using the modeling of structural equations on a sample of 221 students over a 14-week study period, the author investigated the relationships between innovation, preparing and instruction, and convenience of distributed computing administration. The outcomes show that apparent utility is altogether connected with assumptions for information creation and disclosure, stockpiling and sharing. Among others, the assumptions regarding information stockpiling and sharing. What's more, development, preparing and instruction are essentially connected without any difficulty of utilization of insights. The outcomes propose that instructive foundations can advance the reception of distributed computing in schooling by expanding information on information the executives rehearses.

Wang et al. (2019) leded an investigation to exhibit the expectation of understudies to need to keep utilizing cloud applications on the web. Their study was directed among 170 software engineering understudies at one of Malaysia's private colleges accordingly discovering five key factors that can impact understudies. These are: PC self-viability (CSE), joy (E), saw convenience (PEU), saw utility (PU) and client discernment (UP). They conjectured that the five autonomous factors were decidedly connected with a needy variable in particular the goal to proceed (CI) and following their outcome they closed by saying that lone the factors of self-adequacy and the satisfaction in PCs significantly influenced understudies' readiness to keep utilizing the cloud e-learning application in their investigations.

Cole (2015) clarified the advantages of distributed computing and examines the issues characteristic in these school-based arrangements, bringing about an answer model that can be applied to various instructive settings, from K12 schools to universities and colleges. By following the proposals offered and talked about, instructive foundations will see more achievement in actualizing cloud-based arrangements. Cloud arrangements carry numerous advantages to the instructive association, remembering investment funds for working expenses and decreased chance to advertise. To see these advantages, the association should have the option to actualize these cloud-based arrangements moderately rapidly and effectively. Numerous advanced education establishments and K12 need to depend on government and state financing and gifts to get by, bringing about restricted spending plans for actualizing IT arrangements. Through examination on the issues looked by instructive establishments in executing arrangements, techniques, procedures, best practices and cloud-based models,

arrangements have arisen as arrangements that instructive foundations schooling, from Kindergarten to Grade 12 and advanced education, can use to beat obstructions and guarantee effective usage of cloud-based administrations. This examination can be utilized as a manual for comprehend both the advantages of utilizing cloud answers for instruction and to direct chairmen in executing cloud arrangements.

Ibrahim et al. (2015) demonstrated in their research that security and privacy when using cloud computing services in educational institutions had a strong influence on student attitudes when using cloud computing as a tool for education learning.

Tashfeen (2020) conducted a study of 145 Jamaican students to examine their perceptions and perspectives on the issue of integrating the mobile phone as a teaching tool. Their outcomes showed a general positive view of the understudies towards the utilization of cell phones as a learning apparatus as 83% of reactions to the inquiries posed gave a more good than ominous rating for its appropriation and creator additionally found that understudies set the most noteworthy significance on utilizing the cell phone to team up (84%), impart (75%), and request help from instructors (79 percent), along these lines understudies rate high need to its utilization as a wellspring of expanded association and empowering more elevated levels of commitment particularly as they exploit the functionalities of cell phone innovation to supplement and advance their learning experience by working together external the homeroom.

Eleni et al. (2020) were based on the elements impacting the integration of cloud computing at the faculty level of two Greek universities only. To achieve this, they used these are based on a total of 697 teachers and they used several algorithms that could help them like (k-NN, One R, Hoeffding tree and support vector machine) but it is the SVM classifier that has been shown to be more efficient than the others, giving a precision on the intention to use the cloud computing up to 0.9985. they concluded by saying that the ease of use of such technology was the most important aspect in determining the willingness of users to use cloud computing.

2.3   Summary

As you can see Ibrahim (2019) conducted a study on the determinants of students' predictions to use MCC for student purposes by studying their behaviors when using MCC to manage all their information (recovery, storage, application and sharing). In is work the author focuses on the attitude of the students when using the cc to be able to determine their intentions to want to continue using it for educational purposes or not, while in other works the authors focus on the

advantages or disadvantages of cc like Cole (2015), who clarified the advantages of cloud computing and examines the issues inborn in these school-based arrangements, bringing about an answer model that can be applied to various instructive settings or other authors who have focused on the question of why to integrate CC into educational institutions as is the case with the work of Eleni et al. (2020), who was based on the elements impacting the integration of cloud computing at the faculty level of two Greek universities or Tashfeen (2020) conducted a study of 145 Jamaican students to examine their perceptions and perspectives on the issue of integrating the mobile phone as a teaching tool.

Most of the work is focused on in-depth studies of mobile cloud computing, advanatges of its integration in education, but very little of the work talks about factors influencing students and teachers to continue to use it as an educational tool in their learning process and currently there is no work that has done a comparative analysis between the use of mobile cloud computing between Northern Cyprus and the Democratic Republic of Congo.

CHAPTER 3

THEORETICAL FRAMEWORK

In this chapter, the background of the study is been encapsulated. It has been explained the advantages and disadvantages of the study, the types and the proposed model of the study. The investigation in this manner tried the examination model by utilizing the traditional SEM approach and utilized the SEM way to deal with comprehend causal connections. Further, this examination moves toward the MCC reception from a data the board point of view. The way that giving a compelling data the board was one of the principle preferences of the MCC administrations bolsters that people's data the executives practices may have a basic part in their selection choice. In like manner, this examination researched the part of understudies' data the board rehearses on their mentalities toward utilizing the MCC administrations in instructive settings.

3.1   Cloud Computing

Cloud computing is the practice of providing IT services, such as networking, analytics, storage, and databases over the Internet. This technology allows us to run software without installing it on our devices and can be portrayed as the course of action of hardware, associations, storing, organizations, and interfaces that combine to pass on pieces of enlisting as an organization. Cloud organizations join the movement of programming, establishment, and limit over the Internet (Adhikari et al., 2017).

Cloud computing is a moderately new model of conveying registering assets, which comprises of preparing, memory, stockpiling, and organization. These assets are virtualized, configurable, and available by clients with Web through the web (Oberheide et al., 2008). In distributed computing, client created applications are run on a virtual machine (VM), which has the elements of a genuine PC. The elements of VM are consistently observed by the cloud to guarantee the applications are consistently accessible and open. While being virtualized for clients in the cloud, these figuring assets can be changed dependent on clients' requests with high versatility (Zou et al., 2010).
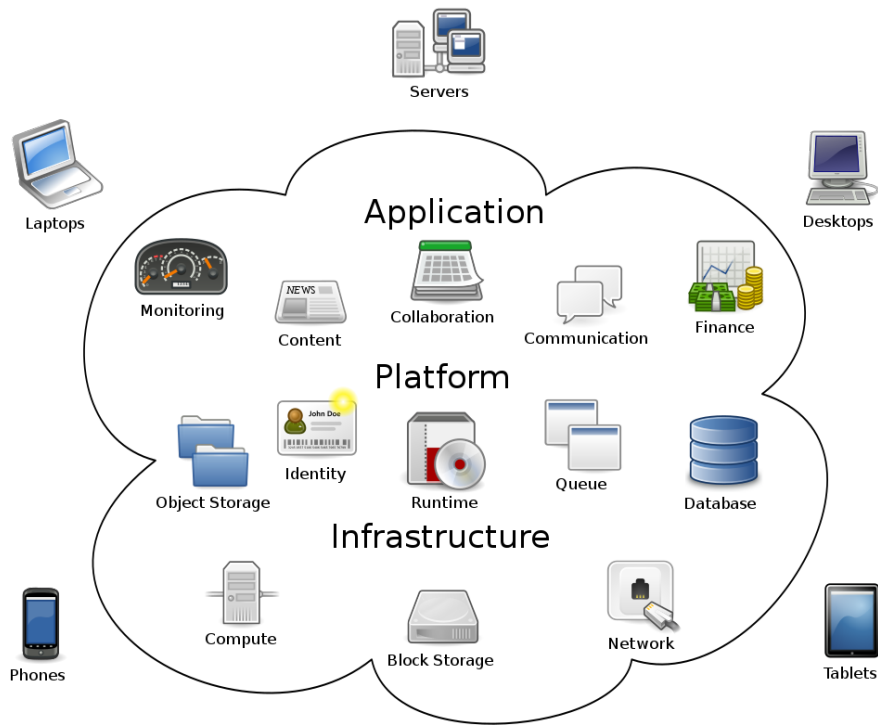
Figure 3.1: Cloud Computing (https://en.wikipedia.org/wiki/Cloud_computing)

It should be noticed that distributed computing clients are given quick admittance to processing assets as utility registering with ease. The high accessibility, availability, and adaptability are the vital attributes of distributed computing innovation. Significantly, most distributed computing suppliers can regularly back up information and store the copied information at various datacenters of the cloud suppliers. Thusly, information can be recuperated if there should arise an occurrence of hardware harms or breaking down. To protect clients' information, cloud suppliers offer strong and progressed firewall to sift through break-in exercises of unapproved clients (Jui-Chien et al., 2013).
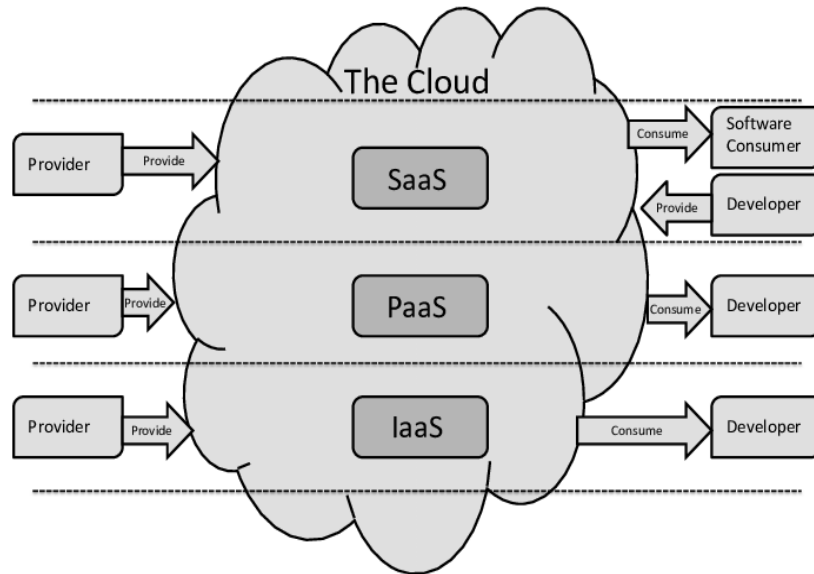
Figure 3.2: Architecture of Cloud Computing (Muchahari, 2013)

A cloud computing based design gives admittance to shared assets through a compensation for every utilization model. The assets, for example, huge capacity gadgets and top of the line workers are generally associated through an elite organization to offer types of assistance to its clients. Notwithstanding its earliest stages, distributed computing has become a well known worldview, and thusly, a critical development rate has been shown by cloud sellers by offering types of assistance to their clients (Christensen, 2009). The achievement of the distributed computing worldview is ascribed to its dynamic engineering which guarantees superior, financially savvy, and versatile answers for its clients. Its administration situated model targets offering types of assistance through layers comparing to framework, stage, and programming. Its conventional design has been useful for countless applications including those for the insightful local area and preparing (Lifka et al., 2013). The photos with preconfigured programming and gadgets gave by the cloud grant to dispatch focused in and facilitated included errands and endeavors. With the foundation and plan issues soothed through cloud, an instructor can warm pictures (arrangements) and make them speedily available for understudies to use right away. As of January 2019, more than 7000 insightful associations are using AWS Cloud to energize and maintain teaching and exploration. As indicated by XSEDE report , the cloud is essentially extensively used in STEM fields, similarly as economy, account, humanities, articulations, and humanistic systems. Considering data assembled from 80 cloud

teachers and researchers across the world, the report diagrams the ability of the cloud in enlivening examination, overhauling composed exertion, and improving preparing.

3.2 Service Models

The Different Types of Cloud processing is contained various advances and administrations. It is the overall term that is utilized to depict stages and administrations that store information and offer different capacities and applications dependent on that information to its clients. Notwithstanding the gathering and putting away of information on the web, distributed computing as it is applied to instructive establishments is included three Running head: essential sorts of administrations: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS).

3.2.1 Software as a service (SaaS)

Saas (software as a service) is a cloud computing model in which the client company remotely uses a software solution hosted by the publisher, for a monthly subscription. Software as a Service enables users to access cloud-based applications over the Internet. This includes comprehensive software that can be used by your organization without requiring installation. You may already be using SaaS software without realizing it. Email sites such as Outlook and Yahoo! Mail are examples of SaaS-based free software that are used by millions of people and organizations every day (O'Hanlon & Schaffhauser 2012).

Organizations typically use SaaS-based document management tools, customer relationship management software, or collaboration services on a subscription basis. SaaS is also scalable, depending on the features used by your organization. This means that you only have to pay for the services that you actively use (Amit et al., 2021). The biggest advantage of using SaaS is that it allows your employees to access applications and data from anywhere with an Internet connection. This means they won't have to focus on developing and running applications because your SaaS has already done it for you. It can be a crm-type solution, a payroll management tool, an erp (management software package), an office suite in cloud mode such as microsoft office 365, software business management, or a videoconferencing or cloud-based telephony solution (Mohammed & Aris, 2019).

Compared to classic software:

The software in saas mode, is not installed on your physical machine but accessible via the internet, accessible on several media (desktop computer, laptop, smartphone, tablet), does not require a "manual" update from the user, the publisher ensures updates and security fixes (Dessoff, 2010).

The advantages for your company are many in terms of:

Cost: the user only pay a monthly subscription, no license purchase, no maintenance fees, mobility*:* as long as you have an internet connection, you can connect to your software in saas mode, you access the solution wherever you are, flexibility*:* Need to add or delete a user, a few clicks and you're done, efficiency: the user remain operational in all circumstances (Rogers, 2014).

3.2.2 Infrastructure as a sevice (IaaS)

The Infrastructure as a Service (IaaS) cloud is a cloud computing model in which the cloud host provides its users with the outsourced it infrastructure they need. This form of cloud service relates to the web architecture required to host websites and data. This hosting could be provided and managed over the internet or intranet. IaaS delivers all the necessary tools through the cloud, and gives your organization the freedom to create whatever it needs. Using IaaS can save you the costs of setting up and managing a data center in the workplace. This makes it especially useful for small businesses and start-ups with limited finances and premises (O'Hanlon & Schaffhauser 2012).

This form of cloud computing is also easy to implement, depending on your needs. It is often used to provide the infrastructure necessary to support storage servers, web servers, and network resources for web applications. Other essential resources are also provided, such as servers, bandwidth and data storage, however the client company remains responsible for updates to the solution (Alsabawy et al., 2013).

In summary, the user no longer need to invest in the hardware necessary to operate own infrastructure. Also, the user just rent your servers from a service provider.

The advantages are many compared to a hosting on site:

- Lower infrastructure costs

- Space saving

- Quick installation

- Maintenance

The user still have full control over the type of server you want to install, and the OS (operating systems) you want to use.

3.2.3 Platform as a service (PaaS)

Platform as a Service (PaaS) has basic IaaS services but offers more extensive support. This form of cloud computing provides the tools needed to build, test, deploy, and manage software products. PaaS includes many of the same infrastructure tools as IaaS, but includes the addition of necessary operating systems, database management systems, business intelligence services, and development tools. to the creation of software applications (Alali et al., 2012). Organizations using PaaS can avoid the tedious and costly practice of purchasing and managing software licenses, application infrastructure, and development tools. This form of cloud computing also provides tools for data analysis and exploitation (O'Hanlon & Schaffhauser 2012). This information could then be used to make important business decisions. The cloud provider provides client companies with the entire execution architecture: servers, storage, ram, bandwidth, but also all middleware applications such as the operating system (windows, linux, etc.), database engines (oracle database, microsoft sql server, mysql…) and the web server (Ye-Chi et al., 2013).

3.3 Deployment Models

There are different cloud organization models, for example, private, public, network, and crossover cloud. Organization models offered by cloud suppliers have various degrees of security. In private and network cloud, the cloud foundation is overseen by the association or an outsider, and may exist on reason or off reason (Shon et al., 2014). In any case, in broad daylight cloud the framework is unveiled accessible to the general. In half breed cloud, the cloud system is a piece of at any rate two association models that stay novel components, yet are bound together by standardized or selective development that engages data and application

conveyability (Mell & Grance, 2009). A portrayal of the four sending models in cloud innovation applications is seen in, where these cloud types are named as private, public, community and hybrid cloud.

The private cloud, as the name recommends, is utilized exclusively inside one association and its framework might be either independent or worked by an outsider (Mell & Grance, 2009). This model is normally picked when security issues are a worry for a specific association, so in the scholarly area, this might be because of responsibility for assets or to develop an online network. Private mists settle a significant number of the issues that the public cloud presents, yet at a more prominent financial and foundation cost (Dillon, 2010). With the private cloud the customer controls the information consistently, yet requires a strong foundation set up before it is executed, coming about in a less "set it and fail to remember it" approach that the public cloud gives (Jingtai et al., 2018).

Concerning the community cloud model, numerous foundations may utilize the very fundamental framework that is facilitated either by a third gathering or by one of the associations that is important for the network. Associations may believe this model to be a preferred position either through shared expenses and assets or in light of the fact that apparent dangers are decreased when the model is shared (Qasim, 2017). This model may function admirably when utilized by collaborating associations, or when foundations have a cozy relationship or are interlinked somehow or another however can be an issue in advanced education area where numerous comparable establishments are basically in rivalry with one another for understudies, financing and different assets.

The public cloud is likely the most mainstream type of cloud sending and is overseen by the supplier of the administration, and the most notable suppliers are Microsoft One Drive, Dropbox, and Google Drive just as those gave by Amazon. In the field of schooling, clients, for example, understudies, speakers and personnel staff will most likely be acquainted with the framework, which is one of its favorable circumstances (Brandic et al., 2010). Public cloud administrations are generally basic and reasonable in both establishment and upkeep as they are to a great extent "set it and fail to remember it" kinds of administrations. With public cloud administrations there is a more serious danger of security penetrates as different customers are utilizing a similar cloud source. Furthermore, public cloud administrations present an apparent absence of information control to its clients as the information is housed off site (O'Hanlon & Schaffhauser, 2012).

The last model of organization is the hybrid cloud, which consolidates at least two models. Using more than one model saddles the advantages of each model and expects to relieve the disservices of each and every model just as to give a more adaptable and wide-going methodology (Madhumathi & Ganapathy, 2013). Mixture cloud approaches consolidates the adaptability and on interest nature of the public cloud with the security and availability of the private cloud.
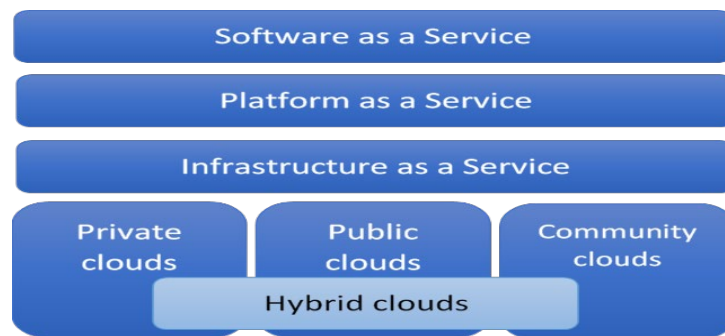
Figure 3.3: Cloud computing service models and deployment models (Saini et al., 2019)

3.4   SWOT Analysis of Cloud Computing

3.4.1   Strengths of Cloud Computing

Strengths are typically inner highlights of an association or business that gives it an advantage over its adversaries. These are generally things like the quality, notoriety, resources, individuals, offer, upper hands, topographical area, and so forth (Marston et al., 2011). Information sharing, versatile extra room, upgrade accessibility of information and administrations, advancement of OS-autonomous applications, improved exhibitions of administrations, dependability of information and administrations, decreased expense (pay-per utilization), outstanding burden variety, force the executives adaptability (Broderick et al., 2010).

The cloud contributions are heterogeneous and without concurred interfaces. Expanded security level for gadgets accomplished by a brought together observing and upkeep of programming. Number of new functionalities may be advertised. Movability of utilization is conceivable. Improve business readiness while keeping up IT security and control. Achieve cloud financial aspects while utilizing existing IT ventures. Estimating straightforwardness. Controlled interface, universal access, area freedom, sourcing self-sufficiency, virtual expert conditions, and rushed flexibility. Conveying variable expenses, decreased capital use, lower staff costs,

cost productive combination of actual assets. Improving access and the board of utilizations and IT assets in a virtualized on-request model. Adaptable and tough in calamity recuperation. Administration Level Agreement (SLA) ensures the administrations from the cloud specialist co-ops to customer (Armbrust et al., 2009).

3.4.2   Weakness of Cloud Computing

Weakness are regularly inside qualities of an association that place it as a shortcoming to the rivals. These are typically things like standing or validity, IT frameworks, monetary angles, individuals or business measures, loss of key staff, and so forth interoperability (interchanges between the cloud) (Marston et al., 2011). Worldwide consistence issue/diverse consistence in various districts. Open Standards. W4 A mass burdens are restricted by transmission capacity. Cloud administrations are multi-merchants arrangements by definition. Not many genuine half breed cloud contributions exists today. Adjustment on support model. Worldview swing at present word related and IT divisions. No simple relocation to another Cloud Service Provider (CSP). More and inside and out information is needed for overseeing and executing SLA contracts with CSP's. Outsider/CSP trustworthiness for processing administrations. Fast Internet association fundamental to interface with cloud information base. No exact technique to choose/discover CSP (Marston et al., 2011).

3.4.3   Opportunities of Cloud Computing

Opportunities are outside variables that present the chance to extend benefits, deals, and additionally get piece of the overall industry. This may incorporate ingoing a commercial center wherein there might be extreme development, growing new items, frail rivalry, improving showcasing plans, or making new organizations (Swabey, 2008). Conquering dormancy constraints. Improving data transmission use. Dynamic organization checking. Specialized issues goal. Customer Relationship Management (CRM) has gotten perhaps the most open chance. Market passage or application arrangement is less expensive, speedier reimbursement of progress charges, and prevalent quantifiable profit (Tucker, 2009).

Better cognizance of cycle and administration danger will move the inclinations of IT proprietors toward the auditable and exceptionally proficient security practices of CSPs. Clients

will turn out to be more forceful in dropping their expense of both business and individualized computing, and will get undeniably additionally tolerating of lightweight customer machines running free and open-source working frameworks and applications. Generally development being developed interest will extend the meaning of high-influence application structures that permit snappier advancement of greater items. Versatile to future requirements (Marston et al., 2011). Cloud gives an amazing back-finish to portable applications. Upgrading the convenience and capability of distributed computing conditions. Alleviating character, protection, security, unwavering quality, and sensibility chances in cloud-based conditions, as they shift from customary server farms. Extension and development (Marston et al., 2011). The more viable utilization of PC assets to help the climate and empower energy saving.

The greater part of the cloud suppliers imitate client's information in different spots. This increases repetition of information and information freedom from framework disappointment offers a degree of calamity recuperation. CSP can migrate security assets for separating, traffic forming or encryption, powerfully, to build the guarded measures. The association can focus on genuine undertakings without encountering extra expenses regarding IT staffing and preparing. The distributed computing approach speeds the sending while at the same time protecting unique adaptability (Datta, 2008).

3.4.4 Threats of Cloud Computing

Threats are outside variables which could introduce a peril to the current or future business. These dangers might be outside the control of an association. Instances of these dangers may include value expansion or collapse, legitimate, monetary conditions, serious estimating or new contenders, or absence of key accomplices or agreements (Marston et al., 2011).

Security issues (Privacy, Authentication, Malware, Confidentiality, Third gathering, Data respectability, Loss of information: Is predictable, subsequently reinforcement for each use must be kept up on the PC). The executives of information. Information proprietorship. Network, Speed, Safety and Efficiency. Virtual security is basic and security concern should be tended to on the way to half breed cloud arrangements. Actual area of programming and equipment is unidentified. Site examinations and investigations are hard. Quality issues with CSP. Estimation of valuable asset use and end client exercises lies in the possession of the CSP. Dark expense structure in view of more noteworthy adaptable use of cloud administrations. No

or little knowledge in CSP unsure strategies. Common cataclysms. Movement starting with one cloud stage then onto the next is troublesome. Transportability: porting of administrations/application at another area might be lumbering. Merchant closure: the seller may abruptly leave business and close the shop. This would make a truly temperamental circumstance for customer (Marston et al., 2011).

3.5 Education And Cloud Computings Services

The adoption of technologies in education environment has been set as the significant move in education insitiuion and is yet to be emerged in its maximum capacity (Qasem et al., 2020). Cloud computing (CC) is progressively turning into a springboard for advanced development and authoritative spryness. Higher education institutions (HEIs) are dealing with the issues with the expanding of members, developing need of IT and framework, instruction nature of arrangement, and moderate training administrations (Alexander, 2008). Establishments hoping to contend in the new world need an adaptable yet complete computerized change outline that incorporates different innovations across the organization with CC being at its establishment (Mell & Grance, 2011). CC, as the current age in figuring innovation of the fourth industrial revolution (IR 4.0) (Goksu & Cavus, 2019), has arisen as the fundamental norm of administration and asset conveyance, in which it has gotten a fantastic option for HEIs to help cost decrease, quality improvement and, through this, instructive manageability by giving the necessary foundation, programming, and capacity as an assistance (Sultan, 2010).

3.5.1 Benefits of Cloud Computing Services to Educational Institutes

Cloud computing Services (CCS) have gotten eminent consideration in different data innovation fields (Sorour et al., 2021). They use numerous administrations as organized stockpiling frameworks just as person to person communication and disseminated document frameworks to ease information sharing, stockpiling, multi-design substance, and synchronization (Almaiah et al., 2020). Therefore, numerous instructive foundations have received CCS innovation, which makes it simple for clients to build up their instructive ability by means of administrations that can be gotten to anyplace and whenever without stressing over working cloud administrations or their area (Ratten, 2014). As per the current exploration, utilizing CCS has a few advantages. Right off the bat, CCS supply e-learning administrations

like reenactments, virtual universes, and video real time in Massive Open Online Courses (Alajmi & Sadiq, 2016; Mbombo & Cavus, 2021). They supply instructors and understudies with helpful strategies from registering assets for research centers and talks dependent on explicit adapting needs. Educators can plan and execute virtual PCs (likewise called Virtual Machines or VMs) with pre-introduced programming to send figuring research facilities rapidly (Verma & Rizvi, 2013). Furthermore, distributed computing is financially savvy and thusly helpful when assets are inaccessible or scant, and scholastics acquire a positive and significant experience from utilizing it (Naranjo et al., 2019). Thirdly, CCS innovation can uphold understudies and scholastics. Fourthly, it permits clients to share, alter, cycle, and save huge measures of information in instructive conditions and to utilize educating and learning (Elgelany & Alghabban, 2017). Ultimately, CCS establish a customized learning climate or virtual learning and showing networks (Sorour et al., 2020).

3.5.2 Learning Management Systems

Advanced education establishments have fused data and correspondence innovations to help the manner in which speakers instruct and understudies learn (Nazir & Cavus, 2017). One boundless illustration of that help is the use of Learning Management Systems (LMS), whose use has filled altogether somewhat recently (Cavus, 2013; Li et al., 2018). A LMS is a product application for the conveyance, documentation, following, announcing and organization of instructive courses and getting the hang of, preparing and improvement programs (Ellis, 2009). By utilizing the Internet, LMSs address a significant apparatus to change the conventional vis-à-vis courses into mixed and online projects (Cavus, Uzunboylu & Ibrahim, 2007; Conijn et al., 2017). Additionally, LMSs are likewise used to help most of eye to eye courses, due to the functionalities they give like course content administration, correspondence, task conveyance and appraisal, online surveys and tests, and understudy evaluating, among others (Cavus, 2015; Llamas et al., 2011).

3.6 Mobile Learning and Environment

Mobile learning (m-learning) is a new way to access educational content, from a mobile device. This type of learning allows students to learn where they want and when they want (Elammari, & Cavus, 2019), since it is enough to have a modern mobile device connected to the Internet (Cavus, 2020). Instructors can ask questions during face-to-face training, then participants can

answer them directly from their smartphone by completing a questionnaire (Naim, 2020). The trainer gives access to it by sharing a link, by inviting participants by email or by creating video conferences using for example: googlemeet, zoom, teamlink etc. As the trainer and the participants can immediately receive feedback (Sadiq, Cavus & Ibrahim, 2019), this is a particularly effective approach when one wishes to form large groups. M-learning allows students to always have their courses and training materials with them so they don't have to be in a specific location or congregate to study at the same time (Cavus & Ibrahim, 2017; Jakia, 2020). Since all of the courses content is right in the palm of their pocket, they can use the time available to them (waiting at the airport, traveling etc.) to accomplish something productive. Especially with the current global health crisis which requires social distancing measures but with m-learning students can continue to study directly from their bed (Amit et al., 2021).

Mobile learning offers significant advantages to fabricate and uphold innovative, collective, and open learning conditions (Cavus & Ibrahim, 2009); Sorour et al., 2020) . Environment is where students search at data so it should be configuration appropriately to get positive learning encounters.. Understudies concentrating altogether online should approach the entirety of the unit content including the learning results, task necessities and pertinent assets (Fezile & Cavus, 2011). Understudies going to eye to eye classes may get the substance in class and extra substance on online with versatile advancements (Siragusa et al., 2007). Climate must expanded connection between understudies and understudies educators. Social media (Cavus, Sani, Haruna & Lawan, 2021), informal organizations, or sites can use for increment social cooperation and this enviornments should plan accessible for cell phones, workstations and other portable apparatuses (Sama'a et al., 2019; Ababneh, Al-Jarrah & Cavus, 2020).

3.7 Theory of Reasoned Action

The Theory of Reasoned Action (TRA) is a model that originates from social psychology. This model developed by Fishbein and Ajzen (1975) defined the links between beliefs, attitudes, norms, intentions and behaviors of individuals. According to this theory, a person's behavior is determined by their behavioral intention to adopt it. This intention would in turn be determined by the person's attitude and his subjective standards for the behavior in question (Arpaci, 2019). TRA postulated that beliefs affect attitudes, which influence behavioral intentions, while intentions ultimately influence actual behavior (Fishbein & Ajzen, 1975). Likewise, Nistor

(2014) argued that education studies on the acceptance of technology should take into account educational context characteristics.

CHAPTER 4

METHODOLOGY

This section gives a detailed explanation of the research model that the researcher used, the participants and how they were sampled, tools for data collection, methods of analyzing data, the study schedule, reliability tests of questionnaire dimensions showing how the research progressed over a period of time.

4.1 Research Model

Comparative research method was used in this study. The online survey method was utilized for the study to collect data from the participants. This study was in general explore students' and instrucators' discernments on selection and use of versatile distributed computing by colleges in Northern Cyprus and Democratic Republic of Congo. Furthermore, fundamental point of this study is to comprehend the view of educators and understudies towards versatile distributed computing appropriation and use in colleges as for the degree of utilization, showing experience, and area.

This study used the research model of Arpaci (2019). The owner of the model stated that additional constructs were added to the original "Theory of Reasoned Action" (TRA) so that it can explain the research context better. The Figure 4.1 displays the research model of the study and the hypotheses to be tested.
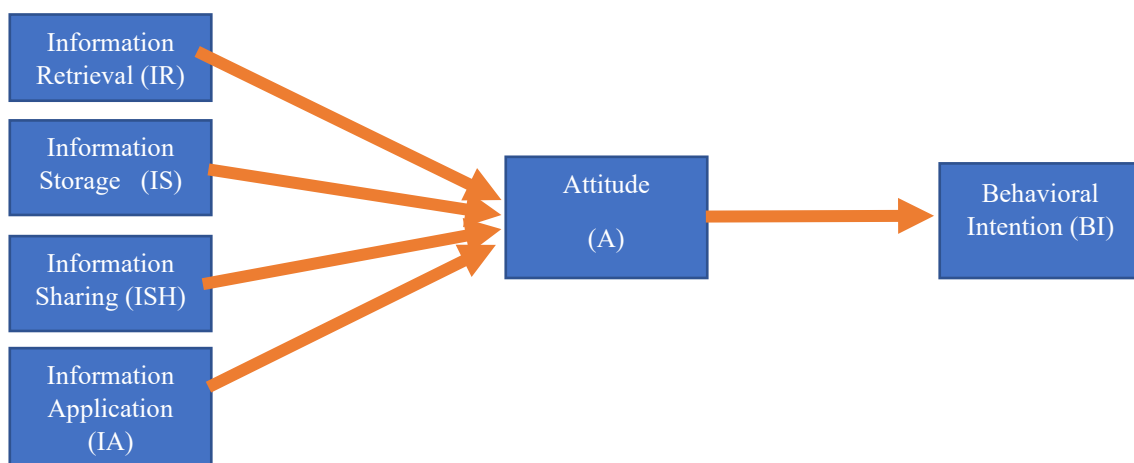

Figure 4.1: The structural model

In order to fully understand the influence of the independent variables on dependent variables in the study, developed a model using questionnaire dimensions obtained from various researchers who have indicated throughout the literature that the effects of demographic information (gender, age, participants' status, university), e-learning platforms (Google Classroom, Moodle, Canvas, Edmodo, Blackboard, Sakai, and others), and factors affect usage of the mobile cloud computing systems.

4.2 Hypotheses

The Technology Acceptance Model (TAM) created by Davis was proposed in 1986 to address the inquiry, why clients acknowledge or reject data innovation. The model was gotten from the Theory of Reasoned Action (TRA), created by Fishbein and Ajzen (1975). Hat was a success for displaying client acknowledgment of data frameworks. It has stood the trial of time by being the main model for almost twenty years. Cap is viewed as the most powerful and normally utilized hypothesis for portraying a person's acknowledgment of data frameworks. Identifying with all components talked about over, coming up next are the speculations for testing the relationship among these variables as proposed in the exploration model. Davis (1989) proposed the TAM to center in the explanation the clients acknowledge or reject the data innovation and how to improve the acknowledgment, offering, along these lines, a help to predict and clarify the acknowledgment. Figure 4.2 shows construction of the TAM model.
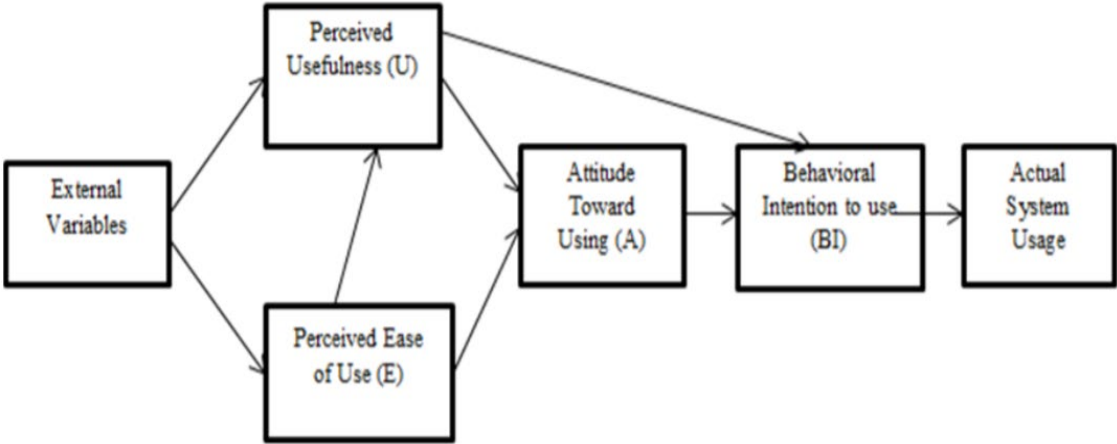

Figure 4.2: Technology Acceptance Model (TAM)

A- Data the executives rehearses

Data is prepared, arranged, coordinated or organized information (Davenport & Prusak, 2000; Nonaka, 1994). Be that as it may, information is a blend of abilities, data, experience, and bits of knowledge (Nonaka & Takeuchi, 1995). This examination characterized data the board as practices that help recover and store data, share it with others, and apply it to tackle issues and settle on better and convenient choices (Alavi & Leidner, 2001; Mitchell, 2003). Turban, Sharda and Delen (2011) recommended the utilization of data innovations to upgrade data the board practices of recovery and access, move, stockpiling, and application. In a similar vein, the current examination recommended the coordination of shrewd versatile advancements into the advanced education to help individual data the board. The more data oversaw by utilizing the MCC administrations the more positive the disposition towards utilizing such administrations for instructive purposes. Further, the understudies' data the executives practices would be an indicator of the conduct expectation to utilize the MCC administrations for instructive purposes.

H1: Information retrieval has a significant affect on behvaioral Intention and attitudes of the e-learning.

H2: Information storage has a significant affect on behvaioral Intention and attitudes of the e-learning.

H3: Information sharing has a significant affect on behvaioral Intention and attitudes of the e-learning.

H4: Information application has a significant affect on behvaioral Intention and attitudes of the e-learning.

B- Behavioral intentions and attitudes

"Behavioral intention" was defined as a person's level of belief that they will continue to use a system (Arpaci, 2019). Notwithstanding, perspectives towards utilizing an innovation was characterized as "an individual's overall affective reaction to use a particular system" (Arpaci, 2017). This investigation thusly conjectured that the mentality toward utilizing the MCC administrations would be emphatically connected with the social expectation to utilize such administrations for instructive objecctives. Further, the demeanor would be an indicator of the social expectation. Therefore;

H5: Position toward utilizing the MCC administrations would be emphatically connected with the conduct aim.

H6: Position toward utilizing the MCC administrations would anticipate the conduct goal.

4.3 Research Participants

The volunteer members in this investigation comprised of 227 voluntary participants attended from the Near East University in Northern Cyprus and 203 participants attended from the 7 different Universities in Democratic Republic of Congo (University of Kinshasa, National Pedagogical University, Institute of Commercial Sciences, Protestant University of Congo, Free University of Kinshasa, Catholic University of Congo, and Higher Institute of Computer Science, Programming and Analysis). A random sampling method was used to select participants at the universities. Utilizing the Raosoft test estimate number cruncher, the populace measure from all divisions was 1000 and the confidence level was 95% on the grounds that the overview questions was in excess of 20. The Raosoft sample size calculator (http://www.raosoft.com/samplesize.html) gives recommended sample size as 380 and this is the minimum recommended size of our survey. For this review the focused on 400 which is approximately the Raosoft adding machine suggested measure and it adopted to 430. Table 4.1 illustrates the frequency of the gender distributions. this table shows the number of participants and their percentage for each sex during the data collection on behalf of Northern Cyprus and the DRC

Table 4.1: Frequencies of the gender distributions

	Gender	Frequency	Percent
North Cyprus	**Male**	146	64.3
	Female	81	35.7
Democratic Republic of Congo	**Male**	107	52.7
	Female	96	47.3

Figure 4.3 illustrates the frequencies of the age distributions. This figure shows the percentage in graphical form of each age range of participants (students and teachers) when collecting data on behalf of Northern Cyprus and DRC.
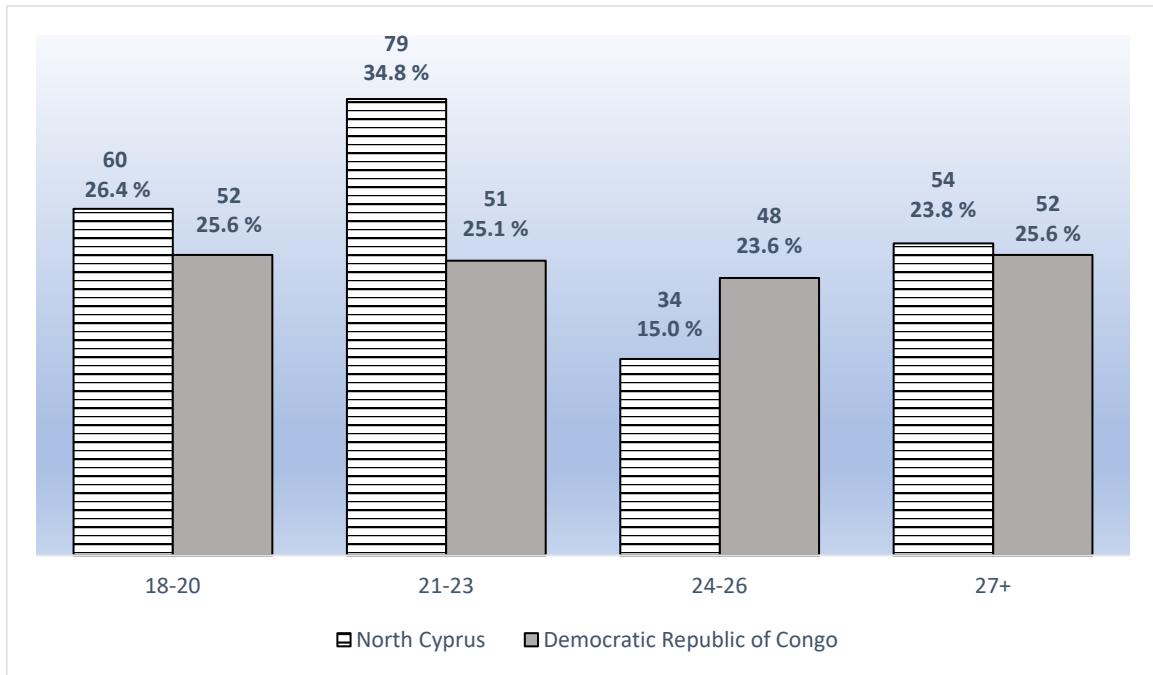
Figure 4.3: Frequencies of the age distributions

Figure 4.4 illustrates the frequencies of the participants' status distributions. this figure shows the percentage in graphical form of the participation of students as well as teachers during the data collection on behalf of Northern Cyprus and the DRC.
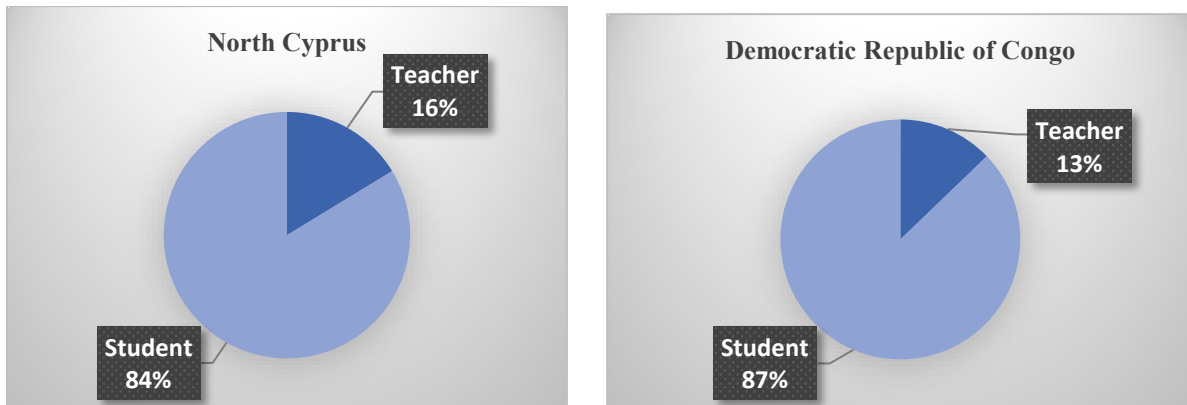
Figure 4.4: Frequencies of the status distributions

Figure 4.5 shows the frequency distribution of the e-learning platforms. this figure shows the percentage in graphical form the frequency of use of the few e-learning platforms by students and teachers on behalf of Northern Cyprus and the DRC.

Figure 4.5: Frequency distribution of the e-learning platforms

Figure 4.6. illustrates the frequency distribution of the purpose of using e-learning. this figure shows the percentage in graphical form of the purpose for which students and teachers use the e-learning platforms on behalf of Northern Cyprus and the DRC.
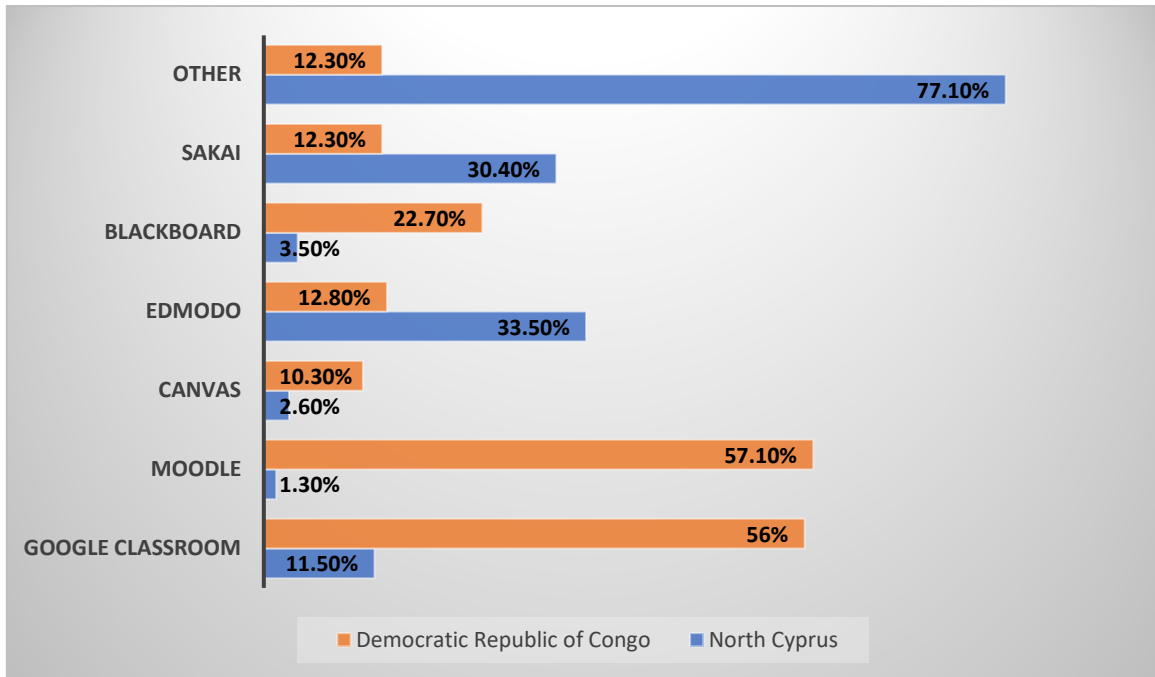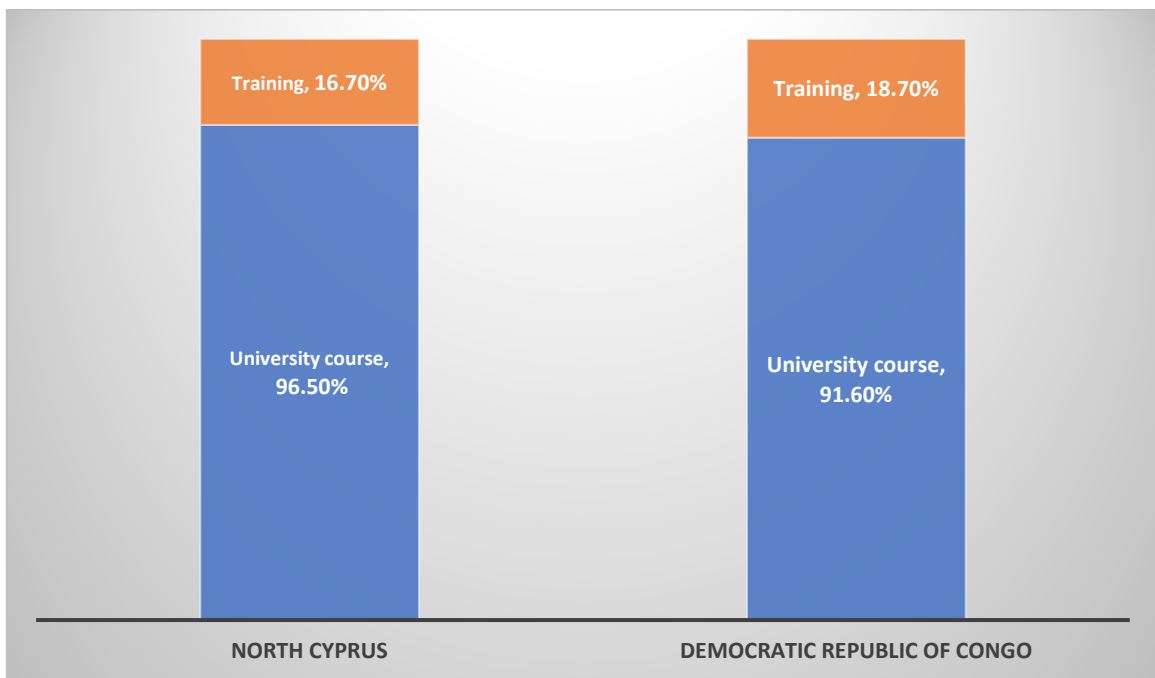
Figure 4.6: Frequency distribution of the purpose of using e-learning

4.4 Data Collection Tools

There were three sections: Section 1 is the demographic informations and items divided into 4 dimensions as follows:

Section 1: Demographic Information

Collecting data from participants for this study, after deciding on the nature of the participants which were precisely university students and lecturers. The collected data was partitioned into different information bunches dependent on segment data congregated from the questionnaire. Precisely, this section provides with a detailed explanation of the demographic information of participants, such as their gender, age, participants' status (student or teacher), nationality (North Cyprus or the Democratic Republic of Congo) from different universities.

Section 2: Experience with the e-learning

The study tries to investigate the factors that Experience with the e-learning of students' and teachers' preference to trying to investigate the different types of e-learning systems used as a data parameter of the gathered questionnaire. Questions like *'Until today which e-learning platform did you use?', 'Purpose of using e-learning platforms?'* to help in achieving some of the primary objective of this study, the researcher examined the above research questions with multiple answers. Furthermore, this section provides information on the usage of e-learning systems that are used by participants in terms of the preferred e-learning systems and functionality.

Section 3: Factors which Affect Educational Usage of the Mobile Cloud Computing Systems

A total number of 24 questions were asked regarding the scaling factors influencing university students' and teachers' usage of the Mobile Cloud Computing Systems in education. This section gives detailed information on the six main factors that affect of the MCC systems among students and teachers such as information retrieval, information storage, information sharing, information application, attitudes, and behavioral intention to use MCC for educational purposes. The questionaire adopted from Arpaci (2019). Seven-point scale, strongly agree (7); strongly disagree (1) was used in the questionnaire to analyse participants's reply.
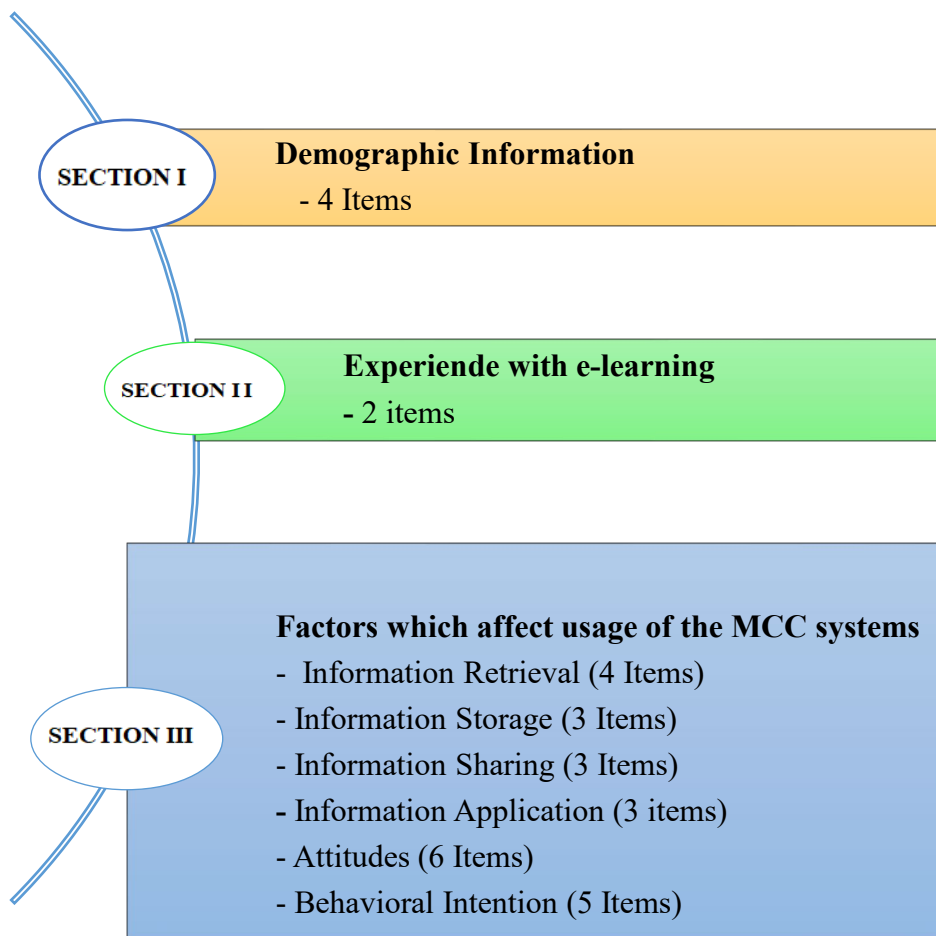
Figure 4.7: The illustration of questionnaire structure

4.4.1 Internal Reliability and Validity

Robinson et al. (2013) argued that the Cronbach's Alpha value should be at least 0.60 before it can be considered satisfactory. From these results, we can clearly see that the reliability of the entire questionnaire was excellent. In order to assess the reliability of the questionnaire, a Cronbach alpha was computed in SPSS and results showed that the questionnaire was reliable as evidenced by a Cronbach alpha for North Cyprus is .953 and for the Democratic Republic of Congo is .864. Results uncovered that every thing had a mutuality esteem and a factor stacking more prominent than the basic limit (0.40) proposed by Field (2005). Cronbach's alpha coefficient is the coefficient that best reflects the general reliability structure compared to the other coefficients, when the statistical basis is consistent and calculated by considering all questions. Moreover, Cronbach's alpha dependability examination results demonstrated a decent homogeneity and unwavering quality among the things. Table 4.2 shows the reliability statistics of each country given below.

Table 4.2: Reliability of the entire questionnaire in the countries

Dimension	N of Items	North Cyprus	Democratic Republic of Congo
		Cronbach's Alpha	
Behavioral Intention (BI)	5	0.90	0.87
Attitudes (ATT)	6	0.88	0.99
Information Retrieval (IR)	4	0.82	0.83
Information Storage (IS)	3	0.79	0.79
Information Sharing (ISH)	3	0.85	0.79
Information Application (IA)	3	0.89	0.61
Total		**0.953**	**0.864**

4.4.2 Test of Normality

There are many tests to assess normality of the data, the most famous being Kolmogorov-Smirnov and Shapiro-Wilk. The below table presents the results from two well-known tests of normality, namely the Kolmogorov-Smirnov Test and the Shapiro-Wilk Test. As for significance results should be less than 0.05, and all the values presented in Table 4.3. are below 0.05 therefore, normalities of the test accepted.

Table 4.3: Tests of normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
North Cyprus	0.19	227	0	0.86	227	0
Democratic Republic of Congo	0.18	203	0	0.90	203	0

4.5 Data Analysis Methods

IBM SPSS (ver. 22) and IBM AMOS (ver. 26) were utilized to screen and dissect the information. The collected data analyzed using the Descriptive Statistics for demographic information and related data analysis method, and Parametric and/or non-parametric techniques for groups comparison data analysis method. On the other hand, Linear Regression Analysis was applied in estimating the model results. Correlation matrix also was used to analyse for dependencies between the dimensions of the research model.

4.7 Ethical Consideration

In order to conduct the research in North Cyprus (Near East University), an ethical approval letter was requested at the university ethical committee board in order to the research to be conducted in a fair manner without any discrimination. The Ethical committee for scientific research reviewed the proposal and questionnaire and granted the researcher an ethical approval letter which is attached on the appendix section of this study (Appendix 1). Confidentiality of data collected was preserved and kept confidential.

Ethical Committee approved the exploration and the strategies consented to the moral norms of the institutional board rules. All members were educated about the motivation behind the exploration after an educated assent was gotten. The investigation was directed during about two months.

4.8 Research Procedure

Figure 4.4 shows the different stages that the researcher went through during thesis writing as well as the duration it took for each phase to be completed. In summary, the steps followed are described below:

1. A literature review was done during the entire writing of the thesis to fully understand what has been done before and to monitor current trends in the mobile e-learning sector that might affect students' and lecturer's preferences of using teaching platforms.
2. A thesis proposal was submitted to the Computer Information System Department for review.
3. Feedback was constantly given by the supervisor on key areas.
4. Ethical committee conducted a review on the ethics covering the research area.
5. The researcher distributed the web-based questionnaires to the universities to collect data.
6. After a period of data collection, the results were entered into SPSS ready for analysis.
7. Data was analyzed using the most appropriate data analysis method and results were reported.
8. The supervisor was well informed during each phase and corrections and feedback obtained was taken into consideration.
9. The final version of the thesis was presented to the Jury board and further feedback and corrections were taken into consideration until the final thesis was approved.
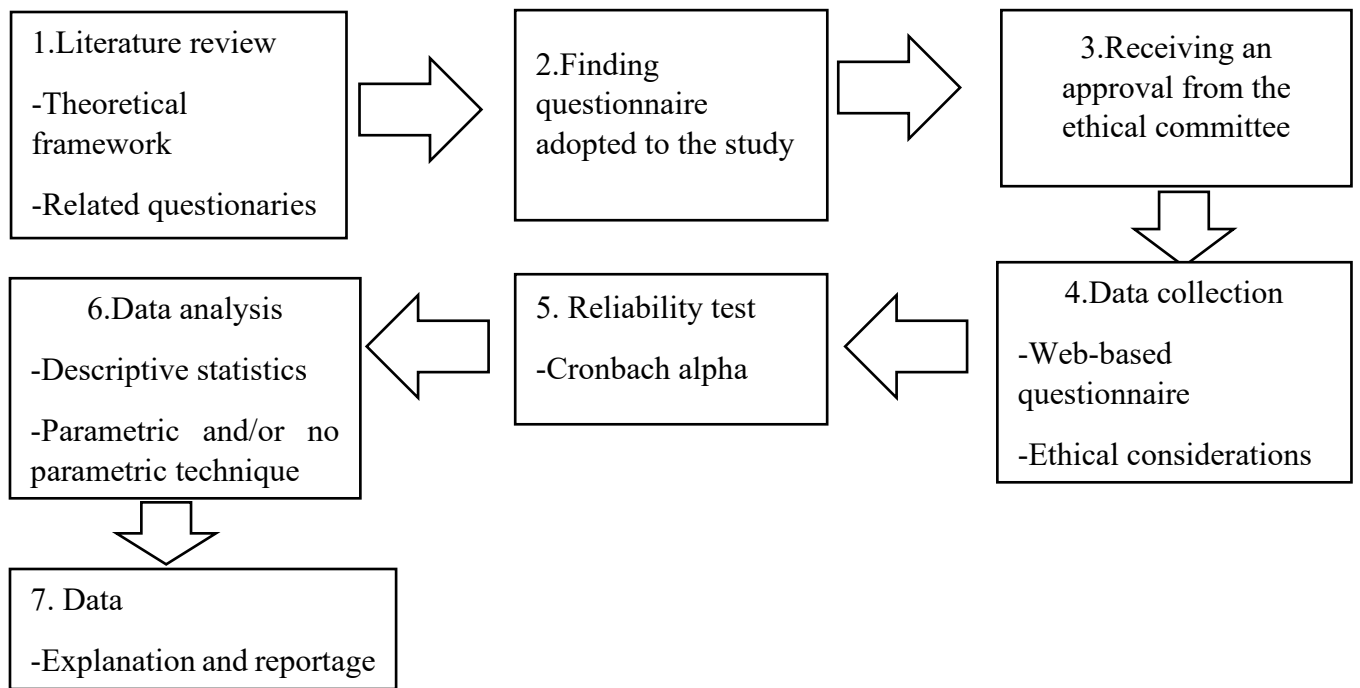
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┌─────────────────────┐      ┌─────────────────────┐      ┌─────────────────────┐
│ 1.Literature review │      │ 2.Finding           │      │ 3.Receiving an      │
│                     │  ⇒   │ questionnaire       │  ⇒   │ approval from the   │
│ -Theoretical        │      │ adopted to the study│      │ ethical committee   │
│ framework           │      │                     │      │                     │
│                     │      │                     │      │                     │
│ -Related questionaries│    │                     │      │                     │
└─────────────────────┘      └─────────────────────┘      └─────────────────────┘
                                                                     ⇓
┌─────────────────────┐      ┌─────────────────────┐      ┌─────────────────────┐
│ 6.Data analysis     │      │ 5. Reliability test │      │ 4.Data collection   │
│                     │  ⇐   │ -Cronbach alpha     │  ⇐   │                     │
│ -Descriptive statistics│   │                     │      │ -Web-based          │
│                     │      │                     │      │ questionnaire       │
│ -Parametric and/or no│      │                     │      │                     │
│ parametric technique│      │                     │      │ -Ethical considerations│
└─────────────────────┘      └─────────────────────┘      └─────────────────────┘
          ⇓
┌─────────────────────┐
│ 7. Data             │
│                     │
│ -Explanation and reportage│
└─────────────────────┘
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Figure 4.8: Research process

4.8 Research Schedule

The table given below shows the duration of each step taken during the study. The study started in April in the year 2020 and was completed in February 2021. Each stage was dependent on its latter in the scheduling. The following table shows the description of the task and duration of each parameter.

PROCEDURE	DURATION (WEEKS)
Literature review (until thesis defence)	10
Thesis proposal	5
Drafting questionnaire	1
Testing Questionnaire on a sample	1
Checking and analysing sample data	1
Drafting final questionnaire	2
Data collection, entering data into SPSS and data analysis	11
Writing chapter 4, 5 and 6	3
Thesis submission for review	2
Corrections of the thesis	1
Jury and Final corrections	1
Total	38 Weeks

CHAPTER 5

RESULTS AND DISCUSSIONS

For this chapter it tries to explain the study findings that was obtained after data analysis with reference to previous research in order to fully understand the study. Each research question is fully analyzed and results stated.

5.1 Dependencies between the Dimensions

This section wishes to explore all possible correlations between the constructs of the research model followed by the key findings on the influence of dimensions on e-learning adoption on mobile cloud computing. The accompanying table portrays the relationship lattice, which sums up the straight reliance between a various pair of measurements as indicated by every country:

Table 5.1: Correlation matrix

	Dimensions	IR	IS	ISH	IA
	IR	1			
North Cyprus	IS	.849	1		
	ISH	.785	.650	1	
	IA	.673	.718	.737	1
	IR	1			
Democratic Republic of Congo	IS	.066	1		
	ISH	.134	.286	1	
	IA	.535	.505	.441	1

Significant positive correlations existed between all the intersected dimensions for both country. It implies that with an increase in one dimension there will be an increase in the other corresponding dimension.

According to the results of North Cyprus, the strongest correlation was recorded on IS-IR (correlation coefficient = 0.849) followed by ISH-IR (correlation coefficient = 0.785) and also IA-IR (correlation coefficient = .673) in that order. These values indicate high dependence between the pairs. In other words, with a high increase in the perceived influence of IR there

will be a high increase in the perceived influence of IS, IA and ISH toward acquiring mobile cloud computing e-learning.

According to results of the Democratic Republic of Congo, the strongest correlation was recorded on ISH-IR (correlation coefficient = 0.535) followed by IS-IA (correlation coefficient = 0.505) and also IA-ISH (correlation coefficient = .441) in that order. These values indicate high dependence between the pairs. In other words, with a high increase in the perceived influence of IA there will be a high increase in the perceived influence of IS, IR and ISH toward acquiring mobile cloud computing e-learning.

From the above connection grid, we unmistakably comprehended the headings of conditions by thinking about the greatness and indications of the relationship coefficients. Subsequently, a portrayal of the noticed direct reliance between any two grouped measurements can either be positive or negative (for example immediate or roundabout reliance) and a solid one or frail.

Notwithstanding, this isn't sufficient to misrepresent the planned theories, we need to see all conceivable impacting connections from the primary free measurements toward the proposed subordinate measurement, such relations that can be considered in arrangement which measurement could fundamentally foresee versatile distributed computing in e-learning. Consequently, the scientist utilized relapse investigation in the ensuing segment.

5.2 Influence of Information Retrieval (IR), Information Storage (IS), Information Sharing (ISH), and Information Application (IA) on Behavioral Intention (BI) and Attitudes (A)

Linear Regression Analysis was applied in estimating the model results as categorically explained in the following table and subsequent subsection:

The researcher built relevant hypotheses based on the assumptions that; Influence of data recovery, data stockpiling, data sharing, data application on behaviotal intention and attitudes. Do all other dimensions have a significant influence on mobile e-learning? This is what the following hypotheses are made-up as a body of premises to structure the research model. The hypotheses are as follows:

H1: Information retrieval has a significant influence on behvaioral Intention and attitudes of the e-learning.

H2: Information storage has a significant influence on behvaioral Intention and attitudes of the e-learning.

H3: Information sharing has a significant influence on behvaioral Intention and attitudes of the e-learning.

H4: Information application has a significant influence on behvaioral Intention and attitudes of the e-learning.

H5: Attitude towards utilizing the MCC administrations would be emphatically connected with the conduct aim.

H6: Attitude towards utilizing the MCC administrations would anticipate the conduct aim.

After computing a Regression Analysis model, the following results were recorded:

Table 5.2: Regression weights

		Estimate	S.E.	C.R.	DECISION
North Cyprus	**Information Retrieval**	0.29	0.04	5.97	Accepted
	Information Storage	0.32	0.05	6.35	Accepted
	Information Sharing	0.37	0.06	6.36	Accepted
	Information Application	0.28	0.05	5.62	Accepted
	Attitudes	0.42	0.06	6.38	Accepted
	Behavioral Intention	0.52	0.07	7.08	Accepted
Democratic Republic of Congo	**Information Retrieval**	0.07	0.02	4.29	Accepted
	Information Storage	0.09	0.02	4.27	Accepted
	Information Sharing	0.07	0.01	4.10	Accepted
	Information Application	0.12	0.02	4.79	Accepted
	Attitudes	0.08	0.02	4.37	Accepted
	Behavioral Intention	0.09	0.02	4.21	Accepted

The Table 5.2 shows the results of a regression analysis on all dimensions showing an estimate and the positive stander error thus leading to the decision was to accept all the hypotheses for the two countries because all dimensions have a significant influence on monile e-learning.
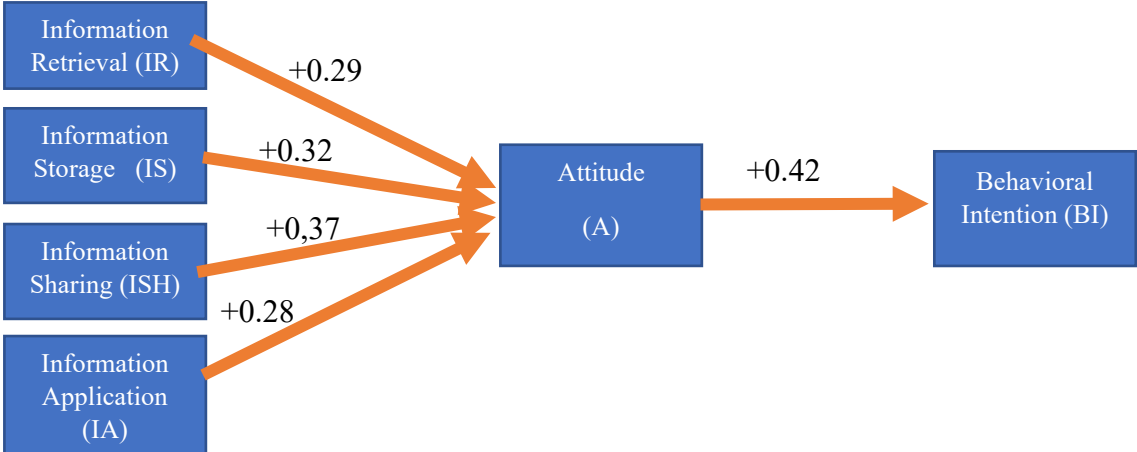

Figure 5.1: Overview of the results for North Cyprus

Figure 5.1 is an overview of the structural model of North Cyprus that showing the influence of IR, IS, ISH, IA on A as well as the influence of A on BI. This influence is shown by the estimate value which is positive for each dimension.
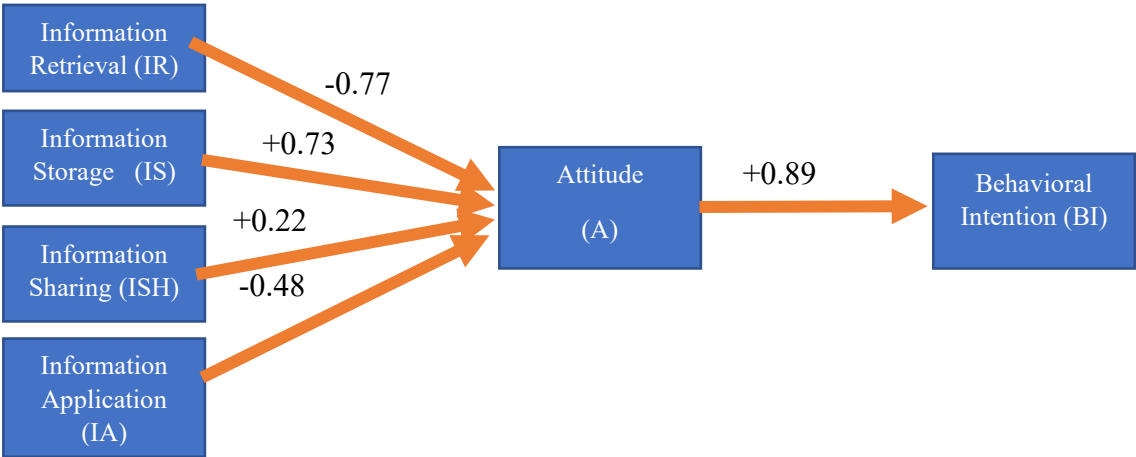

Figure 5.2: Overview of the results for Democratic Republic of Congo

Figure 5.2 is an overview of the structural model of the Republic Democratic of Congo that showing the influence of IR, IS, ISH, IA on A as well as the influence of A on BI. This influence is shown by the estimate value which is positive for each dimension.

5.3 The Difference Between All the Dimensions

Kaiser's (1970) "KMO proportion of inspecting sufficiency" and Bartlett's (1951) "trial of sphericity" recommended that directing a CFA on the information was suitable (See Table 2). KMO esteems were all above 0.65 and Bartlett's test esteems were all huge ($p < .001$). This proposed that measures for each build were related (Leech, Barrett & Morgan, 2005).

5.4 Hypothesis Testing

A SEM approach was utilized to investigate causal connections among the factors. The normalized way coefficients in the underlying model were all measurably critical. Results showed that data recovery, data stockpiling, data sharing, and data application were altogether connected with the perspectives toward utilizing the MCC administrations.

Figure 5.3 shows the structural equational model for the Nord Cyprus in which we can see by different coefficient including the sd and estimate obtained during the analysis of the linear regression that each dimensions has a significant influence on mobile e-learning and that indeed the IR, IS, ISH and IA have a significant influence on the attitude influencing the intention to continue using mobile cloud computing.
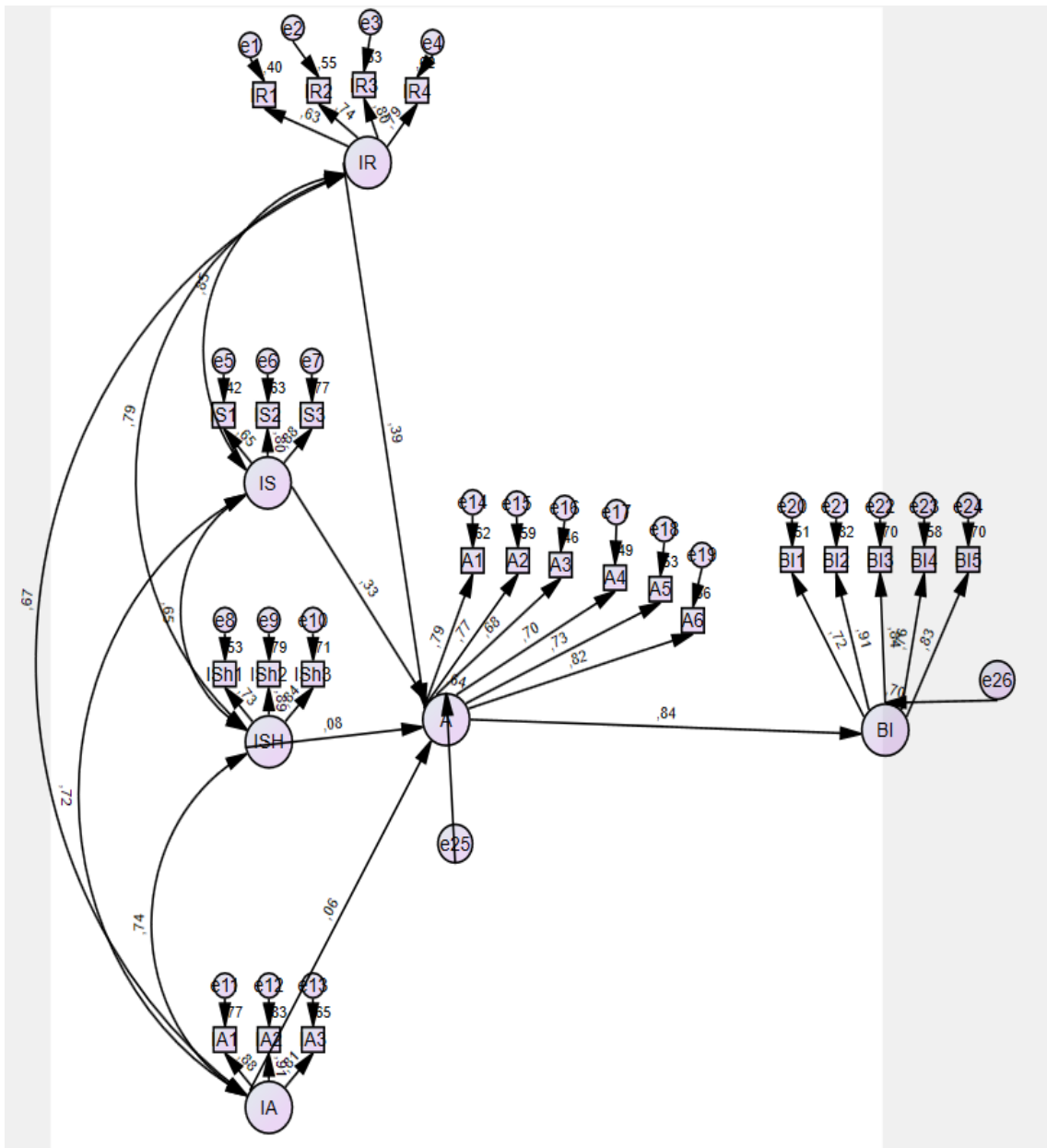
Figure 5.3: Structural Equation Model for North Cyprus

Figure 5.4 shows the estimates for the full structural model for the Democratic Republic of Congo in which we can see by different coefficient including the SD and estimate obtained during the analysis of the Linear Regression that each dimensions has a significant influence on mobile e-learning and that indeed the IR, IS, ISH and IA have a significant influence on the attitude influencing the intention to continue using mobile cloud computing.
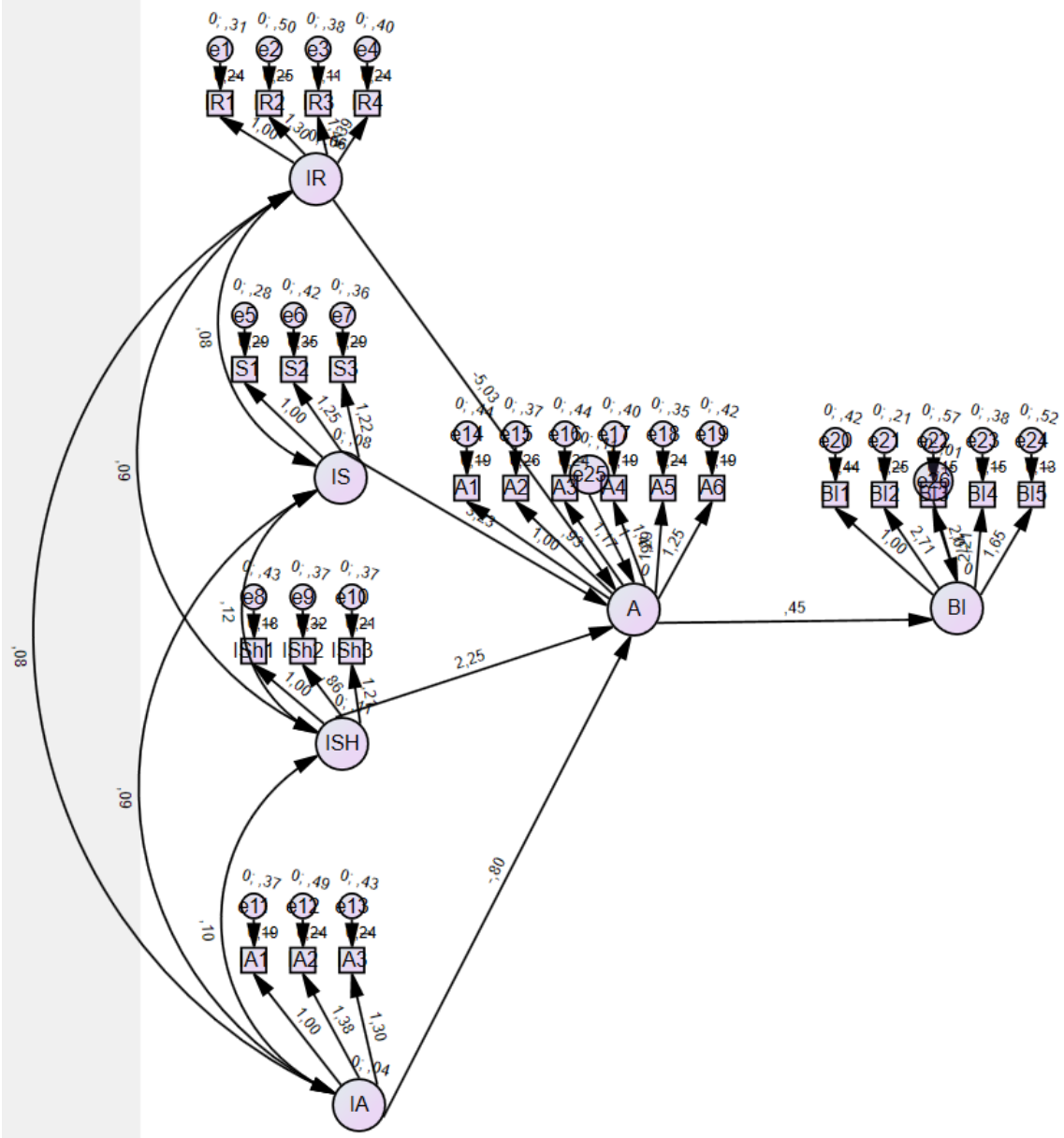

Figure 5.4: Structural Equation Model for Democratic Republic of Congo

DISCUSSION

The aim of the study, the researcher will find the relationship between independent variables (gender, age, participants, universities, e-learning platforms, purpose of using e-learning platforms) on the dependent variable (factors which affect usage of the mobile cloud computing systems) and compare them according to the geographical area (North Cyprus – Democratic Republic of Congo). The analysis also indicated how significant is the influence of individual dimensions on the usage of the mobile cloud computing systems at the university education.

By doing confirmative factor analysis on the factors influencing the decision to continue or not to use the MCC, we constructed a structural equation model for each country. We can thus see that for the two countries there is an association between the dimensions IR, IS, ISH and IA which is translated by a correlation between these dimensions. This means that if there is such an increase in a given dimension there will be the same increase in the associated dimension. According to this structure BI is influenced by attitude which in turn is influenced by the handling of information (Arpaci, 2019).

Given that until now there was no such work carried out on the Democratic Republic of Congo, the objective was to compare with Nordth Cyprus whether the educational system of the two countries facing the use of MCC were influenced by the same factor because as we know the Democratic Republic of Congo is an underdeveloped country compared to the North Cyprus. And our surveys and analyzes have shown that for the students and professors of these two nations the factors influencing their intentions are the same.

According to our analyzes on the experience with e-learning, we found that in northern Cyprus the most used e-learning platform was the Google Classroom. And on the other hand, in the DRC it is Moodle the most used and the two countries use e-learning for 90% courses against 10% for training.

According to our observations on the participants from north Cyprus, there was a reliable participation of the female gender (37.7%) against (47.3%) on behalf of the DRC but on the other hand there were more teachers who participated on behalf of north Cyprus.

In view of these results, we can see that students and teachers are looking for the same purpose of continuing to learn for students and to continue to teaching for teachers despite the global health crisis caused by Covid-19. Whether is for north Cyprus or the Republic Democratic of Congo the objective is the same as regards education.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

This part of the study tends to summarize the whole research with a focus on the results and recommendations for future research. The researcher outlines observations noted during research and how some limitations of this study could be rectified in future research.

6.1 Conclusion

In conclusion, in order to be able to investigate the perception of the adoption and use of mobile cloud computing on students and instructors at universities in Northern Cyprus and the Democratic Republic of the Congo, a comparative analysis was made between the independent variables and the dependent variables of the various dimensions selected. To achieve this, we used the survey method to collect information on the participants and we used the SPSS software to do our analyze to understand the acceptance by the participants of the mobile cloud computing in e-learning systems.

This work is of great importance because for the first time there is a comparative study between the Democratic Republic of Congo and Northern Cyprus which revealed to us that the two nations had a similarity in the results showing as well as the behavioral intentions of use MCC for learning purposes by students and teachers are all related to the attitude of the latter towards the manipulation of their information with the MCC. The results of this study showed that the two countries although being different in several areas have the same point of view regarding the intention of wanting to continue using mobile cloud computing as a learning tool in the field of education because the results obtained after analyzing the data collected on the two countries we were able to observe a similarity in the results obtained.

6.2 Recommendations

The world being affected today by a pandemic pushing the education sector to resort to e-learning unfortunately some underdeveloped countries or those in the process of development are still seen thousands of light years away from this mode of operation because the emphasis not being on them in a particular way there is very little work concerning them so future researchers could focus on them to bring them more clarity on the question of adoption of mobile cloud computing in their educational sectors.

On behalf of the Democratic Republic of Congo, future researchers could carry out more detailed studies on the integration of mobile cloud computing throughout the country, emphasizing its capital importance not only for universities but also for primary and high schools especially during this pandemic period which is disrupting the school curriculum in the DRC.

And for Northern Cyprus, future researchers who will look at the exclusive case of this country will be able to talk a little more about the issue of data security in mobile cloud computing.

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APPENDICES

ETHICAL APPROVAL LETTER:

YAKIN DOĞU ÜNİVERSİTESİ

BİLİMSEL ARAŞTIRMALAR ETİK KURULU

09.12.2020

Dear Anne Bakupa Mbombo,

Your application titled **"Comparative Analysis for the Educational Use of Cloud Computing Services in Mobile Learning Environment"** with the application number YDÜ/FB/2020/105 has been evaluated by the Scientific Research Ethics Committee and granted approval. You can start your research on the condition that you will abide by the information provided in your application form.

Assoc. Prof. Dr. Direnç Kanol

Rapporteur of theScientificResearchEthicsCommittee

Note: If you need to provide an official letter to an institution with the signature of the Head of NEU Scientific Research Ethics Committee, please apply to the secretariat of the ethics committee by showing this document.

APPENDIX 2

THE QUESTIONNAIRE

Dear Particiopants

The aim of this research is to compare the contribution of cloud-based mobile learning technologies to education in the Near East University in TRNC and some universities in the Democratic Republic of Congo. Accordingly. You are accepted to please complete this questionnaire (if you choose), honestly and accurately as possible, all responses will be kept confidential and only be used for scientific research purposes will not be shared with any person or institution. Thank you for your time and interest.

Please note that your participation in the study is voluntary and whether you agree to participate or not will have no impact on your grades for the courses you are/were enrolled in. Your identity will not be revealed in any case to third parties. The data collected during the course of this study will be used for academic research purposes only and may be presented at national/international academic meetings and/or publications. You may quit participating in this study at any time by contacting us. If you opt out of the study, your data will be deleted from our database and will not be included in any further steps of the study. In case you have any questions or concerns, please contact us using the information below. Thanks in advance for taking time to answer the questionnaire.

<div align="right">

Anne Bakupa Mbombo (Master Student)

Prof. Dr. Nadire Çavuş (Supervisor)

Asst. Prof. Dr. Selin Üzelaltınbulat (Co-Supervisor)

</div>

Section 1: **Demographic Information**

1. Gender: A.Male   B.Female

2. Age: A.18-20   B.21-23   C.24-26   D.Greater than 27

3. Participants' Status: A. Teacher   B. Student

4. Which university:

A. Near East university   B. Protestant University of Congo

C. University of Kinshasa   D. Free University of Kinshasa

E. National Pedagogical University   F. Catholic University of Congo

G. Institute of Commercial Sciences   H. Higher institute of computer science, programming and analysis

Section 2: Experience with the E-learning

1. **Until today which E-learning platform did you use?**

A. google classroom   B. Moodle   C. Canvas   D. Edmodo

B. E. Blackboard   F. Sakai   G. Other

2. **Purpose of using e-learning platforms?**

A. University Course   B. Training

Section 3: Factors which affect usage of the mobile cloud computing systems

Please respond to each statement below. It is essential to respond to each statement. Using a seven-point scale, strongly agree (7); strongly disagree (1), the variables are to be measured by asking students to rate their awareness on e-learning systems. Strongly agree 7-6-5-4-3-2-1 Strongly disagree.

Constructs	Indicators	Strongly Agree (7)	Agree (6)	Somewhat Agree (5)	Neither agree nor Disagree (4)	Somewhat Disagree (3)	Disagree (2)	Strongly Disagree (1)
Behavioral intention	I intend to continue to use mobile cloud services for educational purposes in the future.							
	I plan to continue to use mobile cloud services for personal information management in the future.							
	I predict that I would frequently use mobile cloud services in the future.							
	I predict that I would frequently use mobile cloud services for educational purposes.							
	I predict that I would frequently use mobile cloud services for personal information management.							
Attitude	Using mobile cloud services for educational purposes is a good idea.							
	Using mobile cloud services to create a retrievable archive of personal information is pleasant.							
	Using social media applications on my smartphone to exchange information is fun.							
	Using mobile cloud services for personal information management is a wise idea.							
	Using mobile cloud services for educational purposes makes learning more interesting.							
	I like the idea of using mobile cloud services for personal information management.							
Information retrieval	Using mobile Internet on my smartphone enables to retrieve learning materials and information anytime and anywhere.							

	I access course materials and information using mobile cloud services on my smartphone.							
	Using mobile cloud services on my smartphone enables quick access to learning materials and information resources.							
	Using mobile cloud services on my smartphone enables ubiquitous access to e-databases and e-journals.							
Information storage	Using mobile cloud services on my smartphone enables the retrievable storage of electronic information and documents.							
	I store course materials and documents using mobile cloud services on my smartphone.							
	Using mobile cloud services enables me to store learning materials and information with ubiquitous access.							
Information sharing	Using social media applications on my smartphone enables me to exchange information and documents with classmates.							
	I share course materials and information with classmates using mobile cloud services on my smartphone.							
	I share learning materials and documents with classmates using mobile cloud services on my smartphone.							
Information application	I apply knowledge and experience gained by using mobile cloud services to complete learning tasks.							
	I use knowledge obtained by using mobile cloud services in decision making processes.							
	I employ knowledge and intelligence gained from using mobile cloud services in problem-solving activities.							

APPENDIX 3

SIMILARITY REPORT

Anne Bakupa Mbombo   Prof. Dr. Selin Üzelaltınbulat