Instructors' Perception on The Use of Cloud-based Learning Systems in Higher Education: The Case of Tehran Technical Universities

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ABSTRACT

Technology is changing every day and it forces the whole world to change with it. Nowadays all of our life is influenced by technology and our education system is not apart from it. Most of developed countries in world moved to cloud based platform in their personal, work and educational environment. Developing countries like Iran also start to move toward this technology. Despite the fact that business and governmental organization are already adopting this technology successfully in their system, the higher education institutions are quite new in it. Few universities in Iran are changing their traditional e-learning to cloud based system, but with the increase of demand of this technology are pushing all the educational institution forward.

This thesis is written to investigate the advantages of cloud based e-learning system in the educational institutions and the perception of instructors toward using this system in educational environment.

Keywords: Cloud computing, E-learning, Higher education.

ÖZ

Her geçen gün değişen teknoloji beraberinde dünyayı da değişmeye zorlamaktadır. Günümüzde hayatımızın tümü teknolojiden etkilenmekte ve eğitim sistemimiz de bu etkinin dışında kalmamaktadır. Dünyada gelişmiş ülkelerin çoğu kendi kişisel, iş ve eğitim ortamlarında bulut tabanlı platformlara taşınmıştır. İran gibi gelişmekte olan ülkeler de bu teknolojinin kullanımına yönelik hareket etmeye başlamıştır. Iş ve devlet kurumları bu teknolojinin kullanımında halihazırda başarılı bir şekilde adapte olmuş olmalarına rağmen, bulut tabanlı platformların yüksek öğretim kurumlarında kullanımı oldukça yenidir. İran'da az sayıda üniversite geleneksel e-öğrenme yöntemlerini bulut tabanlı sistemlere dönüştürmekteler, ve bu teknoloji için talebin artıyor oluşu diğer eğitim kurumlarının da bu teknolojinin kullanımıyla ilgili ilerlemesini sağlamaktadır. Bu tez, bulut tabanlı e-öğrenme sistemlerinin eğitim kurumlarında kullanımının avantajlarını ve bu sistemin eğitim ortamında kullanımının eğitmenler üzerindeki algısını araştırmak için yazılmıştır.

Anahtar Kelimeler: Cloud computing, E-öğrenme, Yükseköğretim.

DEDICATION

To my loving parents Noora & Pirooz …

Thank you for your unconditional support with my studies. I am honored to have you as my parents. Thank you for giving me a chance to prove and improve myself through all my walks of life.

And

To my dear husband Khadar…Thank you for believing in me; for helping me to further my studies. Please do not ever doubt my dedication and love for you.

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ABBREVIATION

ICT	Information communication technology
E-learning	Electronic learning
SAAS	Software as a service
PAAS	Platform as a service
IAAS	Infrastructure as a service
KMV	Kernel-based Virtual Machine
API	Application Program Interface

Chapter 1

INTRODUCTION

1.1 Background

Nowadays, education is one of the most important components of life and it is hard to imagine continuing life in twenty-first century without acquiring the primary education needed to live in that digital world. “Today’s students are no longer the audience of traditional educational system” (Sahin, 2009). With the rapid pace of development brought by Information Communication Technologies (ICT), students are enabled to access any sort of knowledge and information required in a compact and effective way and over a short span of time. As a result of this pedagogy of learning and teaching, it is going under a massive redefinition. They are being changed according to the needs of the development and evolution brought by this age.

In the first quarter of the 21st century, many countries are changing the way they provide education in their educational institutions through deploying new technologies and applications brought by such technologies. “In fact, technology is driving force behind most of development and innovations applied in educational environment” (Dahlman, 2007).

Technology can give educational institutions new opportunities for teaching and learning, it can bring about new platforms and paradigms to collaborate; this in turn, can create and save money.

As Spurlin said: “Technology interacts with many variables: student preparation and motivation, how the student or instructor uses technology, and how well the environment supports learning”(Spurlin, 2006).

In past few years, educational institutions were trying so hard to use technologies such as computers, the Internet broadcasting technologies (radio and television), and telephony to enhance the quality of their education, According to United Nations report, ICT has been the platform of this change (Noor-Ul-Amin, 2013).

“ICT regularly bring along diverse set of technological tools and resources that have an impact on the education system” (Tinio, 2015). In more general terms, ICTs are basically information-handling tools; a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information. They include the ‘old’ ICTs of radio, television and telephone, and the ‘new’ ICTs of computers, satellite and wireless technology and the Internet. These different tools are now able to work together, and combine to form the ‘networked world’ as a massive infrastructure of interconnected telephone services, standardized computing hardware, the internet, radio and television, which reaches into every corner of the globe (Talebian, Mohammadi & Rezvanfar, 2014).

Use of ICT in the education system has recently groundswell at all levels and in both formal and non-formal settings. Undoubtedly, ICT has impacted on the quality and

quantity of teaching, learning, and research in traditional and distance education institutions. “In concrete terms, ICT has enhanced teaching and learning through its dynamic, interactive, and engaging content; and it can provide real opportunities for individualized instruction” (Gaytos, 2012).

In addition, ICT provides opportunities for schools to communicate with one another through email, mailing lists, chat rooms, and so on. It also provides quicker and easier access to more extensive and current information. Furthermore, it provides researchers with a steady avenue for the dissemination of research reports and findings (Yusuf , 2005).

The use of ICT in education has intensely reformed learning and teaching processes. Moreover, it has expanded new opportunities for learning and accessing to educational resources beyond that traditional availability. “In prevailing paradigm, the use of ICT in education has created a new method of training called e-learning” (Vyasulu Reddi, 2015). E-learning is the most promising technology in educational environment. It utilizes technologies to access educational information and course curriculum outside of the classroom.

E-learning mostly refers to use of ICT in teaching and learning. There are many models of learning such as online learning, virtual learning, distributed learning, network learning and web-based learning. E-learning can be also described as one model of teaching and learning (Moore, Dickson-Deane & Galyen, 2011). E-learning has evolved through recent years, and new generations of e-learning have brought new applications and tools along. At its seventh generation now, it has combined

many features needed by an instructor to teach more efficient and a learner to learn better.

Today more and more academic institutions are using e-learning. The growth of e-learning is directly related to fast growing access of institutions and individuals to ICT. Although the cost of education is reduced through use of ICT, the fact remains that there are many new costs institutions are forced to pay. The biggest expense is the maintenance, upgrade, update, and renewing of the license in infrastructure (Chao et al., 2015).

But, amongst all the biggest advantage of using this technology is the time saved through the process. In e-learning, students can study anytime and anywhere. In such system students are not forced to be at the same place in a certain time to receive the teaching contents. The platform the technology provides them to easily download their educational materials with no limitation in the schedule, time and time-table or location. In addition to that in this way the communication between students (collaboration learning) and communication between instructor and students are more and faster (Shopova, 2015).

Although privileges and advantages of using technology in the education is not hidden to anyone, cost of acquiring and maintaining these technologies remains a determining factor in deciding on the depth and scope of their usage. Many universities are enthusiastic about using new technologies such as e-leaning in their educational environment, but the fear of the cost prevents them from doing so. Lack of facilities, resources, budget and IT specialists in colleges and universities were always serious challenges in developing countries (Tinio, 2015).

To address this challenge faced by governments and institutions and to help them overcome this problem, the cloud computing concept was introduced. Cloud computing has provided a solution to budgets, student management, infrastructure maintenance and resources shortcomings, especially in educational institutes (Bora & Ahmed, 2013).

As the cloud computing is internet based, it provides us with the ability to share the resources, software, application and information. Cloud-based services can be available free or with a quite lower-cost platform; students and staff can use it in their daily activities and because of the nature of cloud computing all the system is centralized and so much easier and faster to monitor and maintain.

In addition to that, cloud computing technology has given many advantages in their communication and learning strategies to students and academic staff. Cloud computing according to its terms is the most appropriate way to improve teaching and learning by reducing implementation and maintenance costs of computer laboratories, increasing mobility of classroom and teaching materials, quick access to learning materials, and IT department transformation because of the cloud's focus on innovation vs. a focus on maintenance and implementation (Bora & Ahmed, 2013), (Cenka, Anggun & Hasibuan, 2013), (Chunwijitra, 2013).

In developing countries, i.e. Iran, ICT is far behind the developed world, although Iranian people use technology in their daily life, almost non-stop; but, the level of technology and accessibility of it for public in some aspects are lower than standards in developed countries (Rahmanpoor, Liyaghatdar & Afshar, 2009).

Universities have to develop a system which can deliver ICT to provide more online resources and materials for their student, it should enable university and the instructors to monitor and control all the activities and frames of study of students. It should also help to reduce the costs and give an equal chance to students who live in far and remote places (Trucano, 2015). Abedi (2015) mentioned that although using ICT tools in education is a new approach in Iran the usage of these tools in past few years has increased rapidly.

Cloud computing is a new technology in Iran. Industries and government organizations are already using this technology in their system, although there are a lot of complains about the internet speed and availability of online materials in this system (Javan, 2015). However, educational institutions and universities are far behind than other organizations especially in practicing the cloud computing service. Although e-learning is functional and popular in most of renowned universities of Iran basing the e-learning system on cloud, it is still in its primary stages (Introduction to Virtual University, 2015), (Hossaini, 2015). Among Iranian universities only a few have cloud services in their campus and rest are reluctant to utilize financial and practical advantages of such system in educational industry (Javan, 2015).

In this thesis, cloud based e-learning of two Iranian renowned universities are assessed. The modalities and scope of utilizing this service by Amirkabir and Sharif University of Technology will be discussed. University of Amirkabir has done many researches about cloud computing services in recent years and has come up with a first functional cloud based e-learning services in higher education institutions of Iran (Javan, 2015). On the other hand Sharif University of Technology is equipped

with strongest e-learning services in Iran and newly they based some of their services on cloud environment. Although this system is not fully functional in all departments, researcher managed to do sampling and research on the functional parts of the system.

1.2 Problem Statement

The utilization of ICT by the universities, colleges and schools for imparting the online learning systems are gradually increasing. The need for the networks, servers, storage, applications and services are drastically growing. Currently most of educational institutions have already started investing on the infrastructure, platform and software, to provide suitable e-learning systems for their students (Lakshminarayanan et al., 2013). But, according to (Mendez and Gonzalez, 2011) "traditional e-learning model, needed system construction and maintenance which were all located inside of the educational institution, this was big challenge for many educational institutions". The cost of purchase, maintenance and upgrading could be burdensome and not possible for universities to comply (Kumar and Murthy, 2013). Using cloud computing will reduce the costs, gives universal access to data, more flexible, easier process of upgrading, maintenance, control of hardware and software (Amazon Web Services, 2015).

From other hand students and instructors were force to attend in the university for accessing their learning and teaching materials or using their needed software in computer laboratories. Specially heavy, complicated and expensive software were only limited to computer laboratories because it was not possible for all of students and instructors to be able to afford expenses of required hardware and licensing of these software (Ghazizadeh, 2012).

Even accessing to the library was challenge because they needed to present personally in the library building to get the resources that they want. This was making problem in for instructors and students when it came to case of rare and expensive or shortcoming books and journals which were not available in their university (or was borrowed and not returned before) and they had to look for it in other universities and resources (Ghazizadeh, 2012).

Managing, editing and storing student's e-portfolio and data was also a big challenge for instructors especially for whom didn't had backup and disaster recovery plan for this information. Unfortunately, without a functional antivirus software whole of instructor and students information could be crashed. Even the universities which offered schedule backup for their instructors were also facing the same problem since most academic institutions are professional in implementing security and recovery plan for their servers.

Moreover, from educational point of view traditional e-learning systems was not efficient enough, since it didn't considered different thinking styles, ways of processing information and facilities of students (Prensky, 2001). Students of 21st century use the technology constantly in their daily life, instructors can use this habit as way to gather their student's attention, more on their study. Although traditional e-learning limited students and instructors communication, collaboration and resources, cloud computing technology will be platform that can make this limitation disappear. Because by using this technology, instructors can be more involved with student's group activities, communications and controlling their real-time online work and by that it make it easier for the instructors to evaluate the students. (Huang & Liu, 2013)

In addition to that, cooperation is improved by using cloud computing because the hardware is not limited and there are internet connection for students and instructors to get strong multimedia capabilities such as video conferencing and group game-based competition with any device that they own. (Huang & Liu, 2013)

Cloud computing has taken colleges and universities by storm as university professors use e-learning resources to enhance their students education (Lili, 2015). By using cloud-based learning systems school-aged learners and instructor's benefits from the advantages of collaborative learning, virtual laboratories, virtual libraries, online storing, constant communication and most importantly equal educational chances.

At the end, by using cloud based e-learning students, instructors and other academic members in the university can access online file storage, e-mail, databases, educational applications and software(virtual laboratories) and e-resources, anywhere, any time and by any device (Nicholson, 2015). For all these reasons, it is suggested that higher education institutions should base their e-learning system on cloud.

1.3 Research Goal and Objectives

The main goal of this thesis is to argue and discuss the perception of instructors about using cloud based e-learning system in their courses curriculum and teaching environment. Moreover, the researcher will investigate the awareness of Iranian higher education institutions about cloud based e-learning and the benefits of it. As well as providing enough reasons and explanations to show why cloud computing is

the best solution for higher educational institution and why e-learning systems need to be based on cloud-based technology for more efficiency and quality.

The researcher also discusses the factors and forces that should be considered before and after implementing e-learning on the cloud.

1.4 Research Questions

The study will deal with the evaluation, concerns and challenges which affect adopting of such systems in higher education institutions. Hence, the research question will be:

1. To what extent higher education institution are aware of cloud-based learning systems with respect to age, department, years of experience and education?

2. What are the perceived benefits of using cloud-based learning systems as base for e-learning?

3. What is the instructor's perception regard to cloud-based learning system?

4. What are the factors which higher education institution takes into account when deciding about adopting cloud-based learning systems and how important are these factors?

1.5 Significance of the study

Cloud computing is almost the newest innovation in information technology area. It has many abilities such as processing, transmitting and storing data and for that it has considerable impact in delivery services. Cloud computing as a disruptive technology with major implications for markets, economies and societies is becoming increasingly important for countries at all levels of development. This technology has

significantly more flexible, cost worthy, accessible, efficient and agilite over traditional ways. Today's this new technology provides opportunity for anyone to access anything, anywhere, anytime. Utilizing such system can make a remarkable advantage for higher education institutions that advanced them to the new era of technology. However, the level of cloud adoption for organizations in developing countries looks very different from those in developed countries.

According to (Kshetri, 2010) the market for the cloud in developing countries is small but expanding rapidly. Cloud computing can be adsorbent technology in developing countries; cloud-base technology can be used in many industries such as e-health, e-commerce, e-business and e-learning. Although cloud computing is introduced to the Iran market three years ago, the demand and enthusiasm for it is significant. Companies, industries and educational institutes are moving forward to cloud-based services, but the infrastructure limitation and pessimism about security and privacy matter can be barrier in this way (Javan ,2015).

In this thesis, the researcher will investigate about concept of e-learning and the strength and weak point of using it in university level. The researcher will also discuss about cloud computing and the advantages that higher institution can gain by using it as platform for their e-learning systems. Moreover the current situation of cloud computing in Iranian university will be argued. The researcher also inquiry from instructors and instructor assistance about their base knowledge of technology, cloud computing and its benefits and effects on enhancing the learning and teaching process in the classrooms.

1.6 Limitations

Cloud computing is a new technology in educational industry of Iran, providing related materials, samples and information was a big challenge. Also current system due to some problems regarded to the sanction, is not fully functional in all departments but, the researcher managed to do sampling and research on the functional parts of the system. In addition to that, gathering information about some technology which is almost new in one country can be challenging. Also due to some national security policies it was really difficult for the researcher of this thesis to find enough instructors who know English and willing to be interviewed and questioned about implementation and utilization of cloud based e-learning in their university.

1.7 Key Definition

ICT: Information and communications technology (ICT) is often used as an extended synonym or as an umbrella term for information technology (IT), but is a more specific term (i.e. more broad in scope) that stresses the role of unified communications and the integration of telecommunications.

E-learning: learning conducted via electronic media, typically on the Internet.

SAAS: Software as a Service (SaaS) is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet.

PAAS: Platform as a service (PaaS) is a category of cloud computing services that provides a platform allowing customers to develop, run, and manage Web

applications without the complexity of building and maintaining the infrastructure typically associated with developing and launching an app.

IAAS: Infrastructure as a Service (IaaS) is one of the three fundamental service models of cloud computing alongside Platform as a Service (PaaS) and Software as a Service (SaaS).

KMV: KVM (Kernel-based Virtual Machine) is a virtualization infrastructure for the Linux kernel that turns it into a hypervisor. It was merged into the Linux kernel mainline in kernel version 2.6.20, which was released on February 5, 2007. KVM requires a processor with hardware virtualization extension.

API: a set of functions and procedures that allow the creation of applications which access the features or data of an operating system, application, or other service.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

Today's educational industry equips learning environment with new technologies and skills. Hence, the role of universities is to change the direction of the learning environment from the traditional classroom-based method into Internet-based learning (Chunwijitra, 2013). “One of the most promising paradigms for modern education is e-learning” (Bora & Ahmed, 2013). “E-learning can be simply explained as any kind of electronically supported learning and teaching” (Alshwaier, 2012). Moreover, it has to include all activities with different learning styles, so the learner has the choice to choose the most suitable style. There are three main strategies that can be used to teach the learner; “Behaviorist strategies can be used to teach the facts (what); cognitivist strategies to teach the principles and processes (how); and constructivist strategies to teach the real-life and personal applications and contextual learning” (Alzaghoul , 2012).

E-learning has a different impact on each of these learning theories; but theories which are more practical like constructivism are more applicable with this technology. However designing effective and meaningful e-Learning requires a grounded design approach (Alzaghoul, 2012). Nevertheless according to Sandhu & Sood, “Traditional e-learning platforms were less efficient and prone to sudden failures” (Sandhu & Sood, 2015). They needed investment on hardware and servers

inside the facility or the institute, experts to run and maintain it and a certain amount of space to locate the hardware and personnel involved. The concept of "Cloud Computing" has brought along a change in this paradigm. It has relieved the educational institutes of burdens related to buying storage and server facilities, recruiting experts to handle them and a department and space to be allocated for the purpose. As a result of that, recently, most e-learning systems are designed on cloud base environment which is able to run on a wide range of hardware devices, while storing data inside the cloud (Masud & Huang, 2012).

There are many research and studies conducted about adaptation of cloud computing in e-learning systems. Although in developing countries this technology is less popular, but recently, there was an opening light for using such technologies in industrial and governmental fields (Rahmanpoor, Liyaghatdar & Afshar, 2009). Adaptation of cloud computing in educational fields is new and at its early stages, there is still long way to go for making it fully functional and productive.

In this chapter, first the definition of e-learning and the educational approach of it in learning theories will be argued and after that, cloud computing fundamental will be explained. Moreover the researcher will specify cloud based e-learning systems. Finally similar works and projects will be investigate and discussed.

2.2 Definitions

2.2.1 Concept of E-learning

"E-learning means delivery of a learning, training or education program using computer or electronic device" (Stockley ,2003). Moreover, it is the process of knowledge building and knowledge confirming through asynchronous (which can be

done even if the student is offline) and synchronous (student has to be online) electronic communication. The two applications of e-learning are fully online learning, which is a form of distance education and blended learning, which is most common in traditional higher education institutes (Kanaganayagam & Fernando, 2013.

E-learning is based on the concept that different technologies could be used in order to improve the learning process; the use of such technologies may vary depending on the needs of the population and availability of resources i.e. budget and expertise. Hence, e-learning can be counted for the most recent method to carry out distance education by distributing learning material and processes over the Internet. Its “any time, any place” nature could be part of a winning strategy for particular needs, such as decongestion of overcrowded education facilities, support for students or teachers who live far away from schools and universities and adult education. (Kihara & Gichoya , 2014).

The most important parts of e-learning includes “Learning Management System(LMS)”, “Learning Content Management System(LCMS)”, “Production and content development tools and Authoring Tool”, “E-learning delivery systems” and “Assessment and evaluation.” (Lohmosavi, Nejad & Hosseini, 2013) Each of these subjects covers a vast area of concepts and subjects to be addressed. As an example production of content covers contracts with the professors (authors), assistant professors, digital content developers, infrastructure provider, and addressing other subjects such as revenue share model, marketing, etc.

In recent years, e-learning has become an increasingly important method in education. Under the prevailing paradigm created by rapid pace of developing new technologies and their impacts on creation of new sciences, the need to learn new concepts is rapidly increasing.

Like any other new paradigms, e-learning is facing some resistance from traditional paradigms. Old school of thoughts in educations and legacies in many faculties of different educational institutes tend to question the effectiveness and appropriateness of e-learning. Creating doubts on the validity of assessment methods, lack of live interaction and trust issues are amongst the critics raised by old school of educating against e-learning. Therefore, it is crucial to find simple and effective solutions to contain these critics, provide concrete evidences for the validity of evaluation method, and gain the trust of all users of e-learning systems (Tan et al, 2014). Therefore, cloud-based e-learning system was introduced and adapt to e-learning platform.

2.2.2 Higher education institutions and e-Learning

"Over the last two decades, many higher education institutions have adopted a wide range of e-Learning tools into their educational delivery and support processes" (Boezerooij, 2006). E-learning became an important instrument in the new Higher Educational Environment in the digital age and, changes the paradigm of learning as well. It creates student-centered learning and educational practice, offering new and more flexible learning methods which are much more suitable for higher educations. The structure of today's universities must be 'changeable' in order to integrate distance learning courses, and those institutions that will not or cannot change their structure to incorporate this technology that may be bypassed by other educational providers, such as virtual universities and independent educational services (Singh,

O'Donoghue & Worton, 2005). Rashty in his research mentioned that “the very use of technology for learning in higher education institutions have a positive effect on the student’s commitment to the learning process. Also, use of technology creates a greater commitment on the students’ part to learning.” (Rashty, 1995)

2.2.3 Cloud Computing

According to Ewuzie & Usoro, researchers have a different definition about cloud computing. “Some researchers believe that cloud computing is an evolution of various computing resources and technologies at different times, combined to deliver new possibilities through high speed internet works” (Ewuzie & Usoro, 2012). Other researchers like Lohmosavi, Nejad & Hosseini believe that “cloud computing refers to internet software as service , hardware , servers in data center which runs software computer services needs high reliability, scalability and autonomy to support accessibility everywhere” (Lohmosavi, Nejad & Hosseini ,2013).

Deploying cloud computing can differ depending on requirements, and following four deployment models have been identified each with specific characters that support the needs of the services and users of the clouds in particular four ways;:

Public: which allows systems and services to be easily accessible to general public, e.g., Google, Amazon; Microsoft offers cloud services via Internet (Tutorialspoint.com ,2015).

Private: which the cloud infrastructure has been deployed, and is maintained and operated for a specific organization. The operation may be in-house (dialogic, 2010).

Community: The Community Cloud allows system and services to be accessible by group of organizations. It shares the infrastructure between several organizations from a specific community. It may be managed internally or by the third-party (Tutorialspoint.com, 2015).

Hybrid: The Hybrid Cloud is a mixture of public and private cloud. Non-critical activities are performed using public cloud while the critical activities are performed using private cloud (Tutorialspoint.com, 2015).

Educational institution according to their budgeting and academic needs and privacy and security issues will choose any of these approaches.

2.2.3.1 Cloud Services

As it has been mentioned in (He & Yue, 2012) "cloud computing provides different services rather than a unit of product. These services put forwarded 3 models: software as a service (SAAS), platform as a Service (PAAS), and infrastructure as a Service (IAAS)."

SAAS (Software as a service): is software delivery method that provides access to software and its functions remotely as a Web-based service (Reese, 2009) (He & Yue, 2012).

This model is model gives the biggest advantages for the universities which have to implement and maintenance big computer laboratories. By using this model laboratories has high adoption and availability to any computer, any place, anytime. Also the maintenance and upgrades are easy and central. This will improve student and teacher's motivation and access e-learning materials and communication.

PAAS (Platform as a Service): is a platform that allows developers to build applications and services over the internet. PAAS services are hosted in the cloud and accessed by users simply via their web browser. Users can develop applications based on internet, for server space, data security and creative programming environment in order to share it to other users (Shirzad, Hoseinpanah, Ahmadipour & Rahimi, 2012). For many students and instructors it is impossible to be able to pay for such systems personally, however educational institution can help their teaching and learning process by giving PAAS services to their students.

IAAS (Infrastructure as a Service): IaaS is defined as computer infrastructure, such as virtualization, being delivered as a service (Shirzad, Hoseinpanah, Ahmadipour & Rahimi, 2012). Universities which are more critical about their privacy and security can use this model which able them to use shared pool of virtual, fully configured server, storage and network resources hosted in global network of data centers.

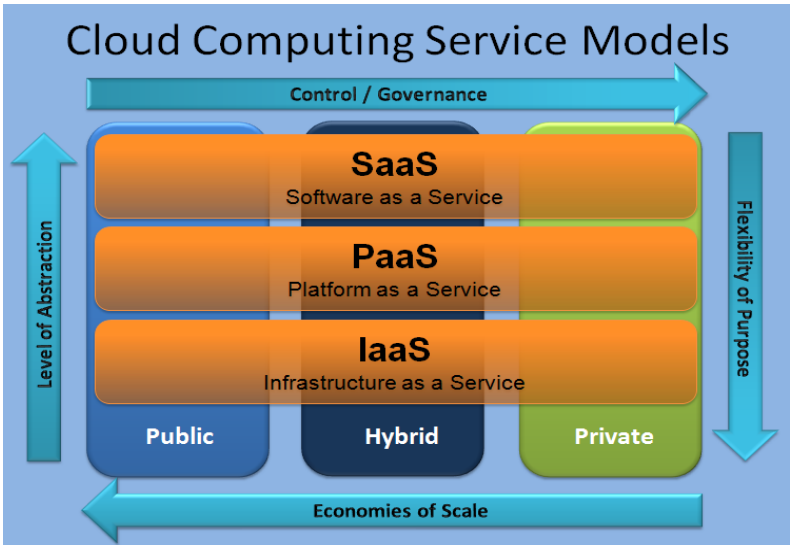

Figure 1: Cloud computing services (Lakshminarayanan, Kumar& Raju, 2013)

Figure 1 is the offering of cloud in three different models viz., Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) (Lakshminarayanan, Kumar& Raju, 2013).

2.2.4 Cloud in Higher Education

"In e-learning, most of the lecturers and students spend their time on the internet through virtual communication. Content delivered through the Internet emerged through dynamic communication by sharing them in the 'cloud'. It is important to have a place to store all information stated through their sharing session" (Hamidon, 2014). It seems that cloud computing can play its roles. Cloud computing offers an interoperable way of providing and sharing services such as computing and data storage over the Internet (Kang, 2011).

Cloud computing in education is seen as the next wave of information technology. Cloud-based education has become the impetus of innovating teaching model, learning style and learning environment. There are many cloud based applications, like Google Docs, SkyDrive, Evernote, and other educational applications that make it possible for everyone to learn whatever and whenever they want (Wu & Peng, 2014). Such public cloud based applications will deliver benefits to the educational institution. Its advantages may be even more pronounced in small colleges that have not yet achieved high levels of computerization, or have trouble recruiting people with adequate IT skills, or those worried about their ability to secure and protect data (Cisco, 2009).

Different renowned universities have established consortium for their e-learning platforms and content developments, since these universities are sharing their resources to minimize the costs, cloud computing can be of use for these consortiums

as well, because it can reduce the cost of dissemination and storage for all. Students and university staff use many of technologies in their personal life, so using cloud computing services such as applications based on cloud can improve their communicating while saving time. Teachers can prepare and upload and manage their teaching materials, (e.g. presentations, articles, documents, courses etc) into the cloud using the latest technologies. Also, computer technicians can provide, build and test cloud based applications directly on the cloud infrastructure and the servers. They will benefit from services 24/24, from everywhere at low costs (Ghazizadeh, 2012). As it can be seen in Figure 2, cloud computing will provides all kind of users to have access to documents, applications, information and etc.

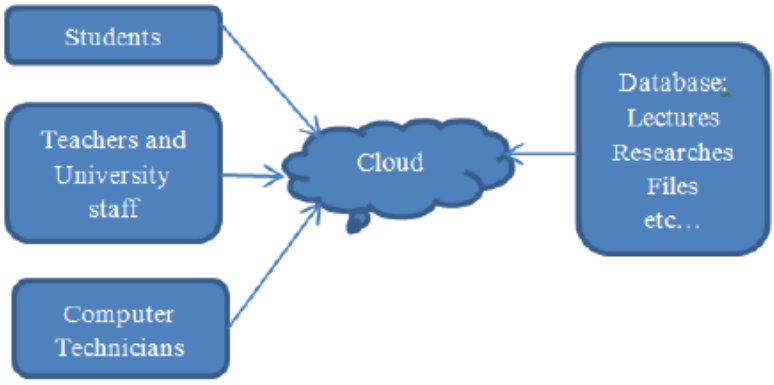

Figure 2: Structure of the main users of cloud computing in an educational environment (Ghazizadeh, 2012)

Higher education institutions are progressively turning to cloud computing for decreasing the cost and taking advantage of latest technology, in term of having positive effect on students learning process. “Using the cloud greatly rises IT agility and allows institutions to pay for only the IT services they use, enabling better resource tracking, more foreseeable costs, improved budget estimating, and faster return on investment”(Jenhani, 2007). This can also help universities to focus their investment, budgeting on improving educational procedures and management.

2.2.5 Cloud-Based E-learning System

As it mentioned by Méndez & González, e-learning is an Internet-based learning process, using Internet technology to design, implement, select, manage, support and extend learning, which will not replace traditional education methods, but will greatly improve the efficiency of education (Méndez & González, 2011).

On the other hand, e-learning cloud is a migration of cloud computing technology in the field of e-learning, which is a future e-learning infrastructure, including all the necessary hardware and software computing resources engaging in e-learning. After these computing resources are virtualized, they can be afforded in the form of services for educational institutions, students and businesses to rent computing resources (Huanying, 2010) & (Masud & Huang, 2012).

Cloud computing can promote a new era of learning taking the advantage of hosting the e-learning applications on a cloud and following its virtualization features of the hardware, which reduces the construction and maintenance cost of the learning resources, Moreover the availability of teaching materials, accessibility of needed software and constant connection of students and instructors are the most important educational approach of this technology (Fernandez, Peralta, Herrera & Benítez, 2012). At the present, the combination of cloud technologies and e-learning has been scarcely explored. Some relevant efforts to use IaaS cloud technologies in education focuses on the reservation of Virtual Machines to students for a specific time frame (Vouk et al ,2008).

As it mentioned by (Madhumathi & Ganapathy, 2013) (Nasr & Ouf, 2011), potential values of e-learning in cloud computing are as follows:

- Provide opportunity for ubiquitous computing

- No need for backing up everything to a thumb drive and transferring it from one device to another.

- No need to copy all stuff from one PC to another when buying a new one. It also means students can create a repository of information that stays with them and keeps growing as long as the students/faculty wants them.

- Crash recovery is nearly unneeded. If the client computer crashes, there are almost no data lost because everything is stored in the cloud.

- Allows students to work from multiple places (home, work, library, etc), find their files and edit them through the cloud and browser-based applications can also be accessed through various devices (mobile, laptop and desktop computers, provided internet access is available) and thus transforms e-learning to m-learning.

- Most software is free, available and ready-to-use.

- Students can have a richer and more diverse learning experience, even outside class hours.

- Allows students to create content through the browser, instead of only searching through the browser.

- It provides a low cost solution to academic institutions for their researchers, faculty and students.

- It provides flexible infrastructure to maximize investments. Cloud computing allows user to dynamically scale as demands fluctuate.

- It helps to make data and services publicly available without jeopardizing sensitive information.

It is almost impossible for any interested malicious student to determine where is located the machine that stores some wanted data (tests, exam questions, results) or to find out which is the physical component student needs to steal in order to get a digital asset.

2.2.6 Cloud computing in Iran

The speed of cloud computing adoption in Iran is not equal to world cloud adoption speed. Limited companies in Iran are working on cloud service provision. Cloud computing strengths and weaknesses can be generalized for Iranian organization and industries (Kiadehi & Mohammadi, 2012).

Many universities have already utilized the potential and efficiency of cloud computing in higher education. In Iran also despite all technical, governmental and cultural issues, some universities still managed to use cloud computing technology within the university. What we have to remember is that cloud computing is already being used professionally by public and private organizations and companies in Iran and just the educational sector is still novice in this technology (Introduction to Virtual University, 2015);(Hossaini, 2015).

Top universities in Iran, such as University of Tehran, Amirkabir University of Technology, Iran University of Science and Technology, Sharif University of Technology, Shiraz Virtual University already start implementing and offering distance education system to their students. But among these top universities only Amirkabir university was totally successful in giving fully functional cloud computing services to its student and even to student of other universities (Hossaini, 2015);(Javan, 2015).

2.3 Similar Research

Chunwijitra (2013) from The Graduate University for Advanced Studies (SOKENDAI) in his research “An Advanced Cloud-Based e-Learning Platform for Higher Education for Low Speed Internet” implements new online authoring tools for e-learning systems (WEBELS) using Flash technology. The designed system was able to improve performance of online meeting system in the developing countries with low and unstable internet speeds .The proposed system was achieved and optimized to support the cloud computing technology since the technology is implemented in a wide variety of architectures, services, models, and other technologies.

Attis (2014) of Liberty University, in its research on "an investigation of the variables that predict teacher e-learning acceptance" validate the technology acceptance model which make instructors have more tolerant in receiving new e-learning technologies. According to this research many teachers will not have a choice between teachings in traditional or e-learning format, the world is changing and the need of basing education on technology is essential and for that universities and governments should join their effort to increase e-learning technology

acceptance in universities. This study also suggest that traditional teachers and online teachers should support each other instruction and help to create better online learning environment for all students and instructors.

Abishek Gupta et al (2011) of Indian Institute of Technology, designed and implement an academic cloud based learning system. It specifies the virtualization stack with KVM (Kernel-based Virtual Machine) hypervisor and libvirt API (Application Program Interface) used to construct a community cloud above the university infrastructure. In this utilization of lab resources has been shifted from 1-10% to 40-50%.This workflow provides IaaS of the cloud to the academic institution. This framework also requires an efficient load balancing approach to address the performance issues of cloud.

Dhull (2013) of Pacific University, proposed e-cloud model which provides opportunity of flexibility and adaptation to use the computing resources on-demand without physical purchasing or installation at user site. According to Kamal for "small collages which do have in-house servers and expert staff to support their distance learning might better to use public cloud for their online courses, but for the large universities whom already invest on their IT infrastructure for years, planning on hybrid cloud is more efficient. In his research Kamal designed a model called cloud campus which empowers the student to learn on his own terms, at his own pace, wherever and whenever he wants it.

Atchariyachanvanich et al (2014) of King Mongkut's Institute of Technology in its research "What Makes University Students Use Cloud-based E-Learning?" mentioned that cloud based e-learning in an integration of both technologies that

evolve collaborative learning function and stable anytime, anywhere, any device, access to all students and academic staff. According to the institue “students who have used cloud based e-learning system have more motivation and interest in continue learning through this system for three main reasons: (collaboration, availability, notification). First reason is the ability of collaboration learning in this system which make it possible for two people or more, can study and work together in order to complete the assigned tasks. The second reason is availability of cloud system which establishes an anytime, anyplace, any device study environment. Finally this study proposes that notification characteristic of this platform is the most significance factor, it keeps users informed about events by delivering its information to the destination devices, such as the computer screen or mobile device.” Therefore, according to the findings of this study students prefer cloud platform in e-learning system because they feel more intrinsic and extrinsic motivation when the system is available to use all the time.

Mircea and andreescu (2011) mentioned in their research about cloud computing as an alternative way to IT provision, management and security. According to them for implementing cloud computing technology in a university one must consider benefits, risks and limitation of cloud computing. According to Mircea and Andreescu (2011), the main benefits of using cloud computing in higher education are: access to applications from anywhere, classroom support for teaching and learning, reduction of cost of software license, 24 hours access to infrastructure and teaching materials, increased openness of students to new technologies. In addition they mentioned that, it is important to think about the consequences of not using this new technology in institution. Moreover one should not forgot, cloud computing ads value with small capital expenses, assuring at the same time the protection of the

environment. In the end, universities may value the opportunities offered by cloud computing.

Razak (2009) in his article “Cloud computing in Malaysia universities” mentioned that students in the 21st century have different and vast learning needs which no longer can be satisfied with traditional teaching and learning methodologies. It is now a fact that traditional methods are insufficient to address the needs of universities especially academics and students. The kind of skills students need to develop to be prepared for the industry nowadays is different from their forefathers. Universities are emphasizing more on higher order learning experiences and outcomes which requires a significant change in knowledge and communication-based society. According to Razak (2009) cloud computing is emerging compute model for delivering IT capabilities as a service. By using cloud computing in university users can access resources and services and perform functions with dynamically changing needs. Furthermore, by adapting to cloud computing applications, students and staffs can now gradually move both their work and used tools into the cloud, making both accessible from any computer, using tools that are free or very inexpensive. Cloud-based applications can provide students and teachers with free or low-cost alternatives to expensive, proprietary productivity tools. Universities can take advantage of ready-made applications hosted on a dynamic, robust cloud that enable end users to perform tasks without having to acquire site licensing, installation, and maintenance of individual software packages. He also mentioned active communication and collaboration between academic researchers worldwide as another benefits of cloud computing in higher education system.

According to El-Seoud et al (2013) implementing information technology educational programs facing many obstacles in Egyptian universities, but in recent years an open source, cloud e-learning platforms like Moodle has been implemented in many universities and schools. Although many instructors only use this platform to upload educational materials and neglect the interactive activities offered by cloud base platforms. El-Seoud et al (2013) mentioned in his research that faculty can empower themselves by using technologies to facilitate a proven educational process of receiving and acting on feedback from learners. El-Seoud et al (2013) believes that when student seriously cooperate in the course assessment they will improve their skills and that is how self-assessment will occurs. Furthermore, student motivation is increased when realizing that faculty is interested in their success as learners. He also said view and preference of instructors and students on this technology dir3tly related to their major background, for example IT and computer engineering students are more willing and open to online learning platform than other students.

Selviandro et al (2014) from Telkom University of Indonesia believe that uneven distributed resources, limited service provider and concentration of qualified educator resources in only specific areas are the obstacle that students are facing in educational institution. Therefore he proposes architecture of cloud-based learning to solve this obstacle and limitations. This system is called as Indonesia Open Educational Resources (IOER). Selviandro et al (2014) designed his system personalized e-learning services and shared large storage and other programs and learning facilities between learners. Based on system testing results Selviandro et al (2014) conclude that cloud based learning can meet users need by presence of simple infrastructure and easy access for users. along with that his evaluation showed that

by implementing he cloud based open learning portal could decrease the infestations cost up to 59% in compares to non-cloud e-learning systems and showed that the results is 43,9% percentage that means by using cloud based system could give more benefits than using non cloud based system.

Karim& Goodwin (2013) in his article mentioned several challenges are face the efficient deployment of e-learning system but by using cloud computing solutions we can overcome these problems. According to Karim& Goodwin (2013) lack of a proper infrastructure, lack of curriculum, lack of maintenance and technical support and challenges of changing management, are the issues that traditional e-learning platforms are facing but with use of cloud-based platform it is easy to solve these problems. Karim believe by using cloud solutions we can centralize our infrastructure and reduce the repeated tasks, costs and time. Also Cloud computing can enhance readiness in two key ways by providing an easy to use platform for teachers and students to access from anywhere there is a device with an internet connection. Moreover technical support time is reduced with a cloud-based system because cloud technology utilizes a centralized infrastructure approach that reduces the need to spend time on issues such as service availability, and application compatibility by providing and delivering services through a browser. Finally With the use of clouds the managing of e-learning system can be deployed and spread over the organization more quickly, and people are more likely to identify the value of the system and to realize they need to utilize it in their daily lives. Karim conclude that since the speed and stability of internet is improving so popularity of cloud computing in e-learning will increase very much in future.

Lim et al (2015) in her article titled as “The beliefs and perceptions of Swedish school principals” explored the schools that adopting cloud services in their environment. In this research Lim did an online survey and response on Swedish primary and high schools. The survey comprises four sections: technology beliefs, perceived benefits of cloud computing, perceived obstacles of cloud computing, and demographics. In this research Lim indicate that many Swedish school teachers believe that it is feasible to incorporate such technology into the curriculum. Moreover, the research showed that, the use of cloud computing is expected to enhance student motivation to study. Principals were also asked to identify the most important cloud computing application in their schools and according to the answered Google Drive, DropBox, OneDrive, and iCloud where the most popular cloud applications. This study emphasizes the importance of understanding the beliefs and perceptions of the principals in the adoption decision. Data gathered from an online survey show that school principals in Sweden have strong positive beliefs toward cloud computing and they consider file storage systems to be the most useful. On the whole, the level of perceived benefits of cloud computing is rather high and the level of perceived obstacles is relatively low.

Huang, Liu & Liu (2013) in article titled as “collaborative learning based on cloud services” mentioned that, cloud-based collaborative learning is an extension of computer supported collaborative learning which compare to online collaboration learning the technology does not limit the teachers and learners by its technical issues like installation, maintenance and updates. It is also richer in learning resources for both students and the instructor for example a search engine service like google is a very powerful tool to search blog, scholar, books, web, map and academic resources. Cloud based services can also provide more effective way of collaborating learning

since it is free from constraints of hardware environment, the service is available as long as there is an internet connection. Moreover the relationship between students and teachers is stronger and teachers can monitor every activity of students regarded to their group projects, assignments and e-portfolios. In addition the biggest advantage of cloud service is their ability to store the data and materials without worrying about loss or damage. finally Huang and Liu did mentioned that cloud computing education will promote changes of the concept of education, change of education development mode, change of information technology and change of organizational structure and educational institutions.

Huang and Liu (2013) in their article about "construction of collaborative learning environment by cloud computing" mentioned that, In the field of education, cloud computing, as a basic environment and platform for the future network learning, will bring positive effect on construction of the learners' personal learning environment. Currently Google and Baihui are considered to be best teaching cloud platform. Google Sites is a pioneer in teaching applications, and now many teaching practice and researches supported by cloud computing are conducted on Google Sites. Many google application services such as google doc, google spreadsheet, google drive and google slide are used by students every day. Also Baihui Network, a leading enterprise cloud computing service provider, providing more than 20 models of cloud computing applications, has become an important platform for many SMEs, including Baihui Office, Cloud-mail, document-storage collaborative, instant messaging, calendar, forum, knowledge management, cloud development platforms and so on. In teaching, under specific circumstances, teachers and students can free combine Baihui cloud computing applications, creating opening and personalized teaching environment to bring to play a huge advantage in teaching. Baihui offers

educational services such as online editing document, storing, chatting, conference and many other interaction and communication tools to students and teachers. There are many other cloud based educational applications and services, adaptation of such technologies will be increase rapidly in future.

Dong et al., (2009) in his article about "An E-learning Ecosystem Based on Cloud Computing Infrastructure" mentioned that a cloud based e-learning ecosystem is the next generation of e-learning. According to Dong current models of e-learning lack the support of underlying infrastructures, which dynamically allocate the required computation and storage capacities for an e-learning ecosystem. Cloud computing from other hand can provide tremendous value to e-learning ecosystems, due to its abilities of delivering computation and storage resources as services. Dong designed an e-learning ecosystem based on cloud computing infrastructure composed of three layers: Infrastructure layer, content layer, and application layer. Dong explained that, Infrastructure layer is the resource pool of an e-learning ecosystem. This layer supply computation and storage capacities for higher layers, it is the energy source of an e-learning ecosystem. Content layer mainly consists of e-learning contents, such as web file systems, database systems, web services, and so on. Application layer consists of e-learning services, systems, tools, and so on. Monitoring module is keeping track of the executions of requests, the real-time configuration information and resource utilization levels of species, including the health of CPU, memory, I/O, and so on. Finally Dong concludes that such system will be more reliable, flexible, and cost-efficient and self-regulated than traditional e-learning systems.

Mathew (2012) in his article titled as “Implementation of cloud computing in education- Educational cloud” mentioned that, cloud computing is the next

generation platform for all institutions and organizations. In his paper Mathew showed that how cloud computing can be introduced to educational field for improving teaching, agility and cost effectiveness. Due to the higher accessibility, availability and efficiency of cloud services, many universities and businesses are trying to make use of these services. According to their needs universities can develop private or hybrid cloud systems which is called "educational cloud". Educational cloud can be accessible by many universities while private cloud is just accessible by one university. Educational cloud services can help the instructors to do their work on their web browsers. All of the information will be stored on cloud and that makes it easy to access from any place by any device. Also instructors will not worry about additional software licensing and backup and disaster recovery issues. Finally it can help instructors and students by increasing exposure to new IT technologies and having access to various universities and advanced researches.

Chapter 3

METHODOLOGY

3.1 Research Design

"The method is a tool to generate solutions to problems and to derive new knowledge" (Lekwall & Wahlbin, 2001). As Marshall & Rossman (1989) present three conditions to choose any strategy either experiment, survey, archival analysis, history or case studies; the researcher considered three main conditions first before choosing the strategy of this thesis:" a) The type of research questions posed, b) The extent of control an investigator has on actual behavioral events c) Degree of focus on contemporary events".

By considering all the conditions above, the researcher conducted the study based on a mixed method. The researcher has used both quantitative and qualitative methods for gathering information.

3.2 Participants

Context of this research was technical and professional; hence the researcher's focus will be on technology universities which already are familiar with the meaning of cloud based platform and its advantages in higher institutions. All participants were chosen from instructors, instructor assistants in summer academic year of 2014-2015 in Amirkabir and Sharif University. 109 people from the respondents were from Sharif University and 92 people were from Amirkabir University.

The instructors' demographic information is shown in Table 3.1.

Table 3.1: Instructor's Age Demographic

	Frequency (N)	%
18-22	2	1.0
23-29	86	42.8
30-37	61	30.3
38-49	34	16.9
50-60	7	3.5
60+	11	5.5
Total	201	100.0

According to Table 3.1, in participant's age range, only 1 percent of people were in range of 18-22 years old. 42.8 percent of people were between 23-29 years old. 30.3 percent of people were between 30-37 years old. 16.9 % of people were between 38-49 years old. 3.5 % of people were between 50-60 years old and finally 5.5 % of people were more than 60 years old.

Table 3.2, is showing the instructors gender demographic.

Table 3.2: Instructor's Gender Demographic

	Frequency (N)	%
Male	161	80.1
Female	40	19.9
Total	201	100.0

According to Table 3.2, 80.1 % of our participants were male and only 19.9 % of the population were female.

Moreover Table 3.3, is showing the instructor's status demographics.

Table 3.3: Instructor's Status Demographic

	Frequency (N)	%
Instructor-Assistant	121	60.2
Instructor	80	39.8
Total	201	100.0

According to Table 3.3, part time and tutorial instructors are categorized as instructor assistants and full time instructors are considered as instructor category. Academic status of participants, it is shown that 60.2 % of our population were instructor assistants and the other 39.9 %, were instructors.

Table 3.4, is showing instructor's educational level demographic.

Table 3.4: Instructor's Education Level Demographic

	Frequency (N)	%
Master	112	55.7
PHD	68	33.8
Post-PHD	21	10.4
Total	201	100.0

According to table 3.4, 55.7% of participant had master degree, while 33.8 % were with phd and only 10.4 % had post-phd.

Table 3.5, is showing instructor's major demographic.

Table 3.5: Instructor's Major Demographic

	Frequency (N)	%
Engineering /IT/Technical	64	31.8
Mechanical Engineering	17	8.5
Electrical Engineering	19	9.5
Nuclear Science and Engineering	9	4.5

Applied Science/Mathematics/Physics	20	10.0
Civil Engineering	34	16.9
Aerospace Engineering	10	5.0
Other	28	13.9
Total	201	100.0

According to this table 31.8 % of the participant study in engineering, IT and technical majors, 8.5 % major were mechanical engineering, 9.5 % were electrical engineering, 4.5 were nuclear science engineering, 10.0 were studding in applied Science, mathematics and physics area, 16.9 % major were applied civil engineering, 5.0 % were studding in aerospace engineering and finally 13.9 % had different major which was not mentioned in our questionnaire.

Table 3.6 is showing how many years each of our participants have experience in educational field.

Table 3.6: Instructor's Experience Demographic

	Frequency (N)	**%**
1-2 years	100	49.8
3-5 years	50	24.9
6-8 years	25	12.4
9-12 years	14	7.0
13+ years	12	6.0
Total	201	100.0

As it shown 49.8 % of instructors had between 1-2 years' experience. 24.9 % of instructors had 3-5 year experience. Around 12.4 % had 6-8 years' experience and 7 % of participants had experience between 9-12 years. Finally as it shown in table below only 6 % of instructors were in teaching field for more than 13 years.

3.3 Data Collection Instrument

Qualitative and quantitative method has been used for collecting the data from participants. Data were collected via direct interviews and questionnaires. In qualitative approach the researcher has interviewed 10 instructors from two chosen universities. With these interviews, the researcher has gained an understanding on reasons, opinions and suggestions of lecturers on the usage of cloud based e-learning in Iran. There were 10 open ended questions in the interview and author first described the goal and reason of the research to the instructors and then has started investigating relevant data by asking deep interview questions and recording the answers of the instructors.

For quantitative method, researcher got the questionnaire from (Lim, Grönlund& Andersson, 2015), article titled "The beliefs and perceptions of Swedish school principals". Questionnaires were distributed between instructors and instructor's assistants in two chosen universities. The collected data is analyzed and examined. The questions were likert scale to find awareness and perception of participants about cloud based e-learning and the benefits that can be accomplished by using it in our educational system.

3.4 Data Collection Procedure

3.4.1 Qualitative data collection: semi-structured interview

The semi-structured interview guide provides a clear set of instructions for interviewers and can provide reliable, comparable qualitative data. This method is useful for gathering data and information that are not in numerical form. Data that are obtained from this method are mainly descriptive data which are much harder to categories and analyses than numerical data (as collected using quantitative method).

The collected data may be gathered from audio recordings, face-to-face to on the phone interviews or from the written work (e.g. memo and observation notes) of other researchers (Mousavi Shoshtari, 2013).

According to the problem statement, research questions, questionnaire and main functionality and benefits of cloud-based e-learning, researcher has designed 10 open ended questions for interview part of the data collection. These questions were given to the instructors in higher education institutions in Iran and the answers were recorded. In these questions, first the researcher explained for the instructors about the subject of the thesis and followed by their acceptance, then researcher investigated the depth of knowledge of the instructor's to use cloud based e-learning system in that university, then the interviewees were asked about the current situation of cloud service and e-learning in that university and the limitations which it might have.

Next, the researcher asked some in depth questions about advantages of cloud system and why universities must use such systems in their institution and what are the steps each university should take before implementing this system. Finally instructor gave their idea about current situation of ICT and cloud computing in Iran especially in higher education institutions. The interview questions can be found in the appendix.

3.4.2 Quantitative data collection: Questions

This method of data collection usually deals with numerical and statistical data which can be measured in units or ranked in order. Data that are collected using this method are usually translated in terms of their range, average or percentage and can be presented using graphs (Mousavi Shoshtari, 2013). The questionnaire used in this thesis is from (Lim, Grönlund & Andersson, 2015) because of similarities of the

researches. The researcher divided the questions of the questionnaire into four parts: demographic information, current usage of the cloud, knowledge and perception on a cloud system, and finally their idea about benefits of cloud system in universities.

The general information part is about personal information of respondents such as: their institute's name, their gender, age, education and their experience in the university and also the free cloud based application which they were currently using in their daily and academic life.

The next parts of questionnaire designed based on Likert response scale. These group items were rated according to the level of their favorability. Usually scales of 1-to-5 are used where 1 is strongly unfavorable to the concept and 5 is strongly favorable to the concept. Rest of the scales between this two will be scaled accordingly (Trochim, 2015). Responses to the current usage of cloud computing technologies statements are based on a five-point Likert scale: 1 represents Never, 2 Rarely, 3 represents Sometimes, 4 represents Often, and 5 represents Agree.

By considering that, second part of the questionnaire was about the current usage of cloud computing services in that university by the participants. By showing the degree of usage of each service and system, the instructors and instructor's assistants could guide the researcher on the most popular and practical cloud service in that university.

The third part of the questionnaire was about instructors and instructors' assistant knowledge and idea about cloud computing technology and its services. Since the sample university were engineering and technical universities, most of the

respondents were familiar with the concepts of cloud computing; Hence the questions were mostly about the services that could be useful (in their idea) for the academic environment.

The fourth part of questionnaire was about the benefits of cloud based e-learning in the universities. Participants should give their idea about the degree of usefulness of cloud based e-learning system in higher education institutions.

3.5 Data Analysis

Data is one of the chief components of any research study and accordingly, it greatly affects the results of the research. Evidently, there are numbers of different resources that the researcher can refer to in order to collect relevant data about his/her research (Kumar, 2005)

The researcher collected the data which is needed through questionnaires and interviews. These interviews and questions were distributed in two top universities in Iran. The questionnaire distribution was random among instructors and instructor's assistants in Sharif and Amirkabir universities. But, the interview questions were just limited to the instructors. Researcher used SPSS software for analyzing the data.

Since cloud-based e-learning is still new technology in educational industry in Iran, the researcher had to choose the only two universities which actually are familiar with the concept of this technology and somehow use them in their teaching and learning environment (Hossaini, 2015); (Javan, 2015).

The University of Amirkabir was researcher's first choice and most of the focus of the researcher was on this university because the level of cloud computing in

learning and teaching process of this university was higher than other universities in Iran. In addition to that Amirkabir University is the only university in Iran which hosts cloud based services for other universities and educational institutions too (Hossaini, 2015); (Javan, 2015).

The second choice was Sharif University. Although this university is one of the best universities and there is a strong e-learning platform in it, but cloud computing services are still in early stages in this university and still needs lots of improvements (Hossaini, 2015); (Javan, 2015).

The researcher will analyze the data gathered from questionnaire inquires, via SPSS software using anova and post-hoc testing. Then researcher will mix and match this analysis with the answers she got from interviews and come up with the ultimate resolution about these findings.

3.6 Validity and Reliability

For validation purposes and time limitation, similar questionnaire designed by (Lim, Grönlund & Andersson, 2015) was used in this thesis. Moreover the content of the survey questionnaire will be examined to find out the reliability of the instrument. The irrelevant questions also will be excluded and will be changed to the words that would be simpler for respondents. It is important to remember this research was mainly based on two universities in Iran which actually have cloud based e-learning system; hence the findings of this research can't be used as a reference for all higher educational intuition of Iran.

3.7 Findings

As the responses were varied according to the methods which were chosen to collect them, they were grouped into two main categories of questionnaire, their relevant evaluations and interviews and finally the results and findings.

The file of survey was send to random instructors and instructor assistants in Amirkabir and Sahrif Universities. In Sharif University from 458 instructors and instructor assistants only 109 person accept to fill the questionnaire and in Amirkabir University out of 300 academic staff 92 people agreed to help the researcher in this project. The questionnaire used in this thesis is from Lim, Grönlund & Andersson, (2015) because of similarities of the researches. This survey comprises four sections: technology beliefs, perceived benefits of cloud computing, perceived obstacles of cloud computing, and demographics. In demographic section of questionnaire 54.2 % of the instructors were from Sharif University and 45.8 % were from Amirkabir.

Chapter 4

RESULTS AND DISCUSSIONS

4.1 Results

The researcher display and analyze the results of qualitative and quantitative research in fallowing sub chapters.

4.1.1 Instructors perception on important benefits of cloud computing adoption

Table 4.1, is showing the important benefits of cloud computing adaptation in higher educational institutions.

Table 4.1: Important benefits of cloud computing adoption

	Frequency (N)	%
It facilitates communication and collaboration between teachers and students	20	10.0
Users can assess data anywhere provided there is Internet access.	52	25.9
It supports classroom learning	30	14.9
It facilitates sharing of learning materials and data	80	39.8
It supports independent learning at home	19	9.5
Total	201	100.0

As it shown in Table 4.1, around 39.8 % of participants believe that the important benefits of cloud computing adoption is “It facilitates communication and

collaboration between teachers and students", around 25.9 % of instructors believe that "User can access data anywhere when there is an internet" is the most important benefit of cloud computing.14.9 % of participants said "it support classroom learning" is the most important part and 10.0 % mentioned "it facility communication and collaboration between teachers and students" is more important for them. Finally 9.5 % of instructors said "it supports independent learning at home". According to these results sharing the learning materials and its accessibility from anyplace anytime is the most important thing for instructors, this functionalities was also mentioned earlier by (Madhumathi & Ganapathy, 2013) (Nasr & Ouf, 2011), so it is possible to say that instructors are aware of most important benefits and usage of cloud system in their working environment.

4.1.2 Instructors perception on current usage of cloud computing technologies

The second part of the questionnaire is about current usage of cloud computing technologies by instructors.

Table 4.2: Current usage of cloud computing technologies

Part B		Never		Rarely		Sometimes		Often		Always		
		N	%	N	%	N	%	N	%	N	%	Mean
Q1.	Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)	23	11.4%	46	22.9%	40	19.9%	54	26.9%	38	18.9%	3.19
Q2.	Email (eg., Hotmail, Gmail)	5	2.5%	9	4.5%	26	12.9%	31	15.4%	130	64.7%	**4.35**
Q3.	Social networking (e.g., Facebook, Twitter, blogging)	16	8.0%	23	11.4%	20	10.0%	89	44.3%	53	26.4%	3.70
Q4.	Web conferencing (e.g., Skype, Adobe Connect, Google hangout)	17	8.5%	24	11.9%	55	27.4%	23	11.4%	82	40.8%	3.64

Q5.	File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)	3	1.5%	11	5.5%	23	11.4%	28	13.9%	136	67.7%	**4.41**
Q6.	Backup/security storage	30	14.9%	24	11.9%	53	26.4%	39	19.4%	55	27.4%	3.32
Q7.	Library system (e.g., Innovative Interfaces, Koha)	22	10.9%	23	11.4%	24	11.9%	41	20.4%	91	45.3%	3.78
Q8.	Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)	79	39.3%	12	6.0%	42	20.9%	23	11.4%	45	22.4%	**2.72**
Q9.	Anti-virus/spam filtering/anti-malware	39	19.4%	7	3.5%	38	18.9%	34	16.9%	83	41.3%	3.57
Q10.	Disaster recovery	70	34.8%	17	8.5%	53	26.4%	28	13.9%	33	16.4%	2.69
Q11.	Student management	23	11.4%	23	11.4%	42	20.9%	26	12.9%	87	43.3%	**3.65**
Q12.	Accounting/financial management	116	57.7%	41	20.4%	28	13.9%	8	4.0%	8	4.0%	**1.76**
	Average Mean											3.33

Table 4.2 shows the mean and percentage of instructors and instructor assistants' current usage of cloud computing technologies. As it shown in Table 4.2, the average mean of the Table 4.2 is 3.3 and by considering that, 64.7 % of instructors believed that they always use email services (M=4.35) and 67.7 % of instructors said that they always use file storage services (M=4.41). From other hand 57.7 % of instructors mentioned that they have never used accounting and financial management services (M=1.76). Moreover 39.3 % (M=2.72) of instructors state that they have never used office productivity services which can be due to the fact that copyright rules are not executing in Iran and as for that everyone preferring to use pirate office software. Student management got 43.3 % on the scale of "Always" usage (M=3.65) which shows that it is in its primary stage of usage by instructors.

As it shown in Table 4.2 the most popular cloud technologies used by instructors are email and file sharing storage. On the other hand the accounting and financial management has the lowest usage, since in both universities this function had the lowest mean, it is possible to say that this service is not functional properly. These result are match with what mentioned earlier by (Ghazizadeh, 2012), according to him, cloud technology make the communication and sharing materials easier for instructors and student.

4.1.2.1 Current usage of cloud computing technologies with respect to age

Table 4.3, is showing the current usage of cloud computing with regard to the age range of instructors.

Table 4.3: Current usage of cloud computing technologies with respect to age

Part B.		**N**	**Mean**	**SD**
Q1.Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)	18-22	2	5.00	.000
	23-29	86	3.26	1.285
	30-37	61	3.54	1.119
	38-49	34	2.71	1.426
	50-60	7	3.00	1.291
	60+	11	2.00	.775
	Total	201	3.19	1.298
Q2.Email (eg., Hotmail, Gmail)	18-22	2	5.00	.000
	23-29	86	4.79	.488
	30-37	61	4.52	.766
	38-49	34	4.09	.900
	50-60	7	2.00	.577
	60+	11	2.18	1.250
	Total	201	4.33	1.029
Q3.Social networking (e.g., Facebook, Twitter, blogging)	18-22	2	4.50	.707
	23-29	86	3.47	1.165
	30-37	61	4.34	.998
	38-49	34	3.47	1.080
	50-60	7	3.57	1.134
	60+	11	2.55	1.440
	Total	201	3.70	1.205
Q4.Web conferencing (e.g., Skype, Adobe Connect, Google hangout)	18-22	2	5.00	.000
	23-29	86	3.74	1.170
	30-37	61	3.72	1.240
	38-49	34	3.82	1.487
	50-60	7	3.00	2.000
	60+	11	2.00	1.265
	Total	201	3.64	1.342
Q5.File storage of teaching-related software and data (e.g., Dropbox,	18-22	2	5.00	.000
	23-29	86	4.34	.978

Box.net, Microsoft SkyDrive)	30-37	61	4.70	.691
	38-49	34	4.65	.691
	50-60	7	4.00	1.291
	60+	11	2.73	1.421
	Total	201	4.41	.991
Q6.Backup/security storage	18-22	2	3.00	.000
	23-29	86	3.36	1.328
	30-37	61	3.26	1.425
	38-49	34	4.12	.977
	50-60	7	2.00	.816
	60+	11	1.82	1.250
	Total	201	3.32	1.382
Q7.Library system (e.g., Innovative Interfaces, Koha)	18-22	2	5.00	.000
	23-29	86	3.83	1.449
	30-37	61	3.75	1.491
	38-49	34	4.00	.953
	50-60	7	3.00	1.000
	60+	11	3.09	1.814
	Total	201	3.78	1.405
Q8.Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)	18-22	2	5.00	.000
	23-29	86	2.60	1.489
	30-37	61	3.44	1.587
	38-49	34	2.24	1.499
	50-60	7	1.29	.756
	60+	11	1.55	1.293
	Total	201	2.72	1.604
Q9.Anti-virus/spam filtering/anti-malware	18-22	2	5.00	.000
	23-29	86	3.22	1.690
	30-37	61	3.62	1.462
	38-49	34	4.09	1.083
	50-60	7	4.57	1.134
	60+	11	3.55	1.214
	Total	201	3.57	1.522
Q10.Disaster recovery	18-22	2	4.00	.000
	23-29	86	2.57	1.538
	30-37	61	2.84	1.368
	38-49	34	4.29	1.475
	50-60	7	2.65	1.475
	60+	11	1.64	.488
	Total	201	2.69	1.479
Q11.Student management	18-22	2	2.50	.707
	23-29	86	2.84	1.405
	30-37	61	4.25	1.178
	38-49	34	4.59	.892
	50-60	7	3.57	.787
	60+	11	4.09	.944
	Total	201	3.65	1.421
Q12.Accounting/financial management	18-22	2	2.00	.000
	23-29	86	1.97	1.260
	30-37	61	1.64	1.001
	38-49	34	1.32	.684
	50-60	7	2.14	.378
	60+	11	1.91	1.136
	Total	201	1.76	1.088

According to Table 4.3, the age range of (18-22) is most of the times considered to have the highest mean between others but since there were only two participants in this range, it cannot show the accurate view toward usage of technology. From other hand the age ranges of (23-29) and (30-37) are the most populated groups. These groups considered to be the younger generation. Instructors with age range of (38-49) and (50-60) are the middle age population of our sample and lastly the (60+) whom are the elders. As it shown in Table below in most of cases the younger generation (18-22), (23-29) and (30-37) are the one who are more interested in using new technologies. "Email (eg., Hotmail, Gmail)", "Social networking (e.g., Facebook, Twitter, blogging)", "File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)" considered to be the most popular services between younger generations but elder instructors showed least interest into most cloud based technology and services except "Anti-virus/spam filtering/anti-malware" technology which was the only service that elder instructors had higher mean than other age groups. From other hand "Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)" had very low mean in all the groups which shows that free online office products are not popular in Iranian universities, this can be due to lack of copyright rule in Iran and the fact that all office products are accessible for everyone almost free. Finally the last most important changes were in "Accounting/financial management" which almost all of the means in this service were rather very low. As a result we can say that younger age instructors are more interested to the new technology than elder instructors. This could be because of the trend of new generation toward new technologies and the reluctance and resistance of older generation about it.

Table 4.4: Current usage of cloud computing technologies with respect to age

		Sum of Squares	DF	Mean Square	F	Sig	Meaningful Difference
Q1.Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)	Between Groups	38.237	5	7.647	4.995	.000	(18-22)-(60+), (23-29)-(60+), (30-37)-(38-49), (30-37)-(60+), (38-49)-(30-37)
	Within Groups	298.578	195	1.531			
	Total	336.816	200				
Q2.Email (eg., Hotmail, Gmail)	Between Groups	112.103	5	22.421	43.800	.000	(18-22)-(50-60), (18-22)-(60+), (23-29)-(38-49), (23-29)-(50-60), (23-29)-(60+), (30-37)-(60+), (30-37)-50-60), (38-49)-(23-29), (38-49)-(50-60), (38-49)-(60+)
	Within Groups	99.817	195	.512			
	Total	211.920	200				
Q.3Social networking (e.g., Facebook, Twitter, blogging)	Between Groups	47.910	5	9.582	7.703	.000	(18-22)-(60+), (23-29)-(30-37), (30-37)-(38-49),
	Within Groups	242.578	195	1.244			

	Total	290.488	200				(30-37)-(60+)
Q4.Web conferencing (e.g., Skype, Adobe Connect, Google hangout)	Between Groups	38.633	5	7.727	4.685	.000	(18-22)-(60+), (23-29)-(60+), (30-37)-(60+), (38-49)-(60+)
	Within Groups	321.576	195	1.649			
	Total	360.209	200				
Q5.File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)	Between Groups	40.691	5	8.138	10.182	.000	(18-22)-(60+), (23-29)-(60+), (30-37)-(60+), (38-49)-(60+), (50-60)-(60+)
	Within Groups	155.856	195	.799			
	Total	196.547	200				
Q6.Backup/security storage	Between Groups	59.185	5	11.837	7.151	.000	(23-29)-(38-49), (23-29)-(50-60), (23-29)-(60+), (30-37)-(38-49), (30-37)-(60+), (38-49)-(50-60)
	Within Groups	322.795	195	1.655			
	Total	381.980	200				
Q7.Library system (e.g., Innovative Interfaces, Koha)	Between Groups	14.321	5	2.864	1.467	.202	
	Within Groups	380.604	195	1.952			
	Total	394.925	200				
Q8.Office productivity (e.g., Microsoft Office 365, Google Docs,	Between Groups	80.955	5	16.191	7.277	.000	(18-22)-(50-60),

Splashup, SlideShare)	Within Groups	433.881	195	2.225		(18-22)-(60+), (23-29)-(30-37), (30-37)-(38-49), (30-37)-(60+), (50-60)-(30-37)
	Total	514.836	200			
Q9.Anti-virus/spam filtering/anti-malware	Between Groups	30.897	5	6.179	2.787 .019	
	Within Groups	432.307	195	2.217		
	Total	463.204	200			
Q10.Disaster recovery	Between Groups	36.073	5	7.215	3.507 .005	(3-29)-(50-60), (50-60)-(60+)
	Within Groups	401.181	195	2.057		
	Total	437.254	200			
Q11.Student management	Between Groups	113.231	5	22.646	15.207 .000	(23-29)-(30-37), (23-29)-(38-49), (23-29)-(60+), (30-37)-(23-29), (38-49)-(23-29)
	Within Groups	290.391	195	1.489		
	Total	403.622	200			
Q12.Accounting/financial management	Between Groups	12.369	5	2.474	2.152 .061	
	Within Groups	224.168	195	1.150		

	Total	236.537	200	

The mean difference is significant at the 0.05 level. Any sig value less than 0.05 considered to have high significance difference between variable and any sig value, more than 0.05 considered to have low significant difference between variable. According to the result in all of the questions except question 7, instructor's usage of the technology was with high significance difference between ages but in usage of "Library system" with (Sig= 0.202) there is no much difference. This shows that all instructors regardless of their age are using online library system in their university.

4.1.2.2 Current usage of cloud computing technologies with respect to education level

Table 4.5, is showing current usage of cloud computing with respect to educational level of instructors

Table 4.5: Current usage of cloud computing technologies with respect to education level

Part B.		**N**	**Mean**	**SD**
Q1.Q1.Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)	Master	112	3.33	1.269
	PHD	68	3.24	1.351
	Post-PHD	21	2.29	.902
	Total	201	3.19	1.298
Q2.Email (eg., Hotmail, Gmail)	Master	112	4.54	.837
	PHD	68	4.15	.966
	Post-PHD	21	3.81	1.123
	Total	201	4.33	.945
Q3.Social networking (e.g., Facebook, Twitter, blogging)	Master	112	3.71	1.175
	PHD	68	3.97	1.065
	Post-PHD	21	2.76	1.375
	Total	201	3.70	1.205
Q4.Web conferencing (e.g., Skype, Adobe Connect, Google hangout)	Master	112	3.87	1.189
	PHD	68	3.49	1.440
	Post-PHD	21	2.95	1.532
	Total	201	3.64	1.342
Q5.File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft	Master	112	4.51	.849
	PHD	68	4.53	.872
	Post-PHD	21	3.48	1.504

SkyDrive)	Total	201	4.41	.991
Q6.Backup/security storage	Master	112	3.60	1.248
	PHD	68	3.18	1.525
	Post-PHD	21	2.33	1.065
	Total	201	3.32	1.382
Q7.Library system (e.g., Innovative Interfaces, Koha)	Master	112	3.95	1.348
	PHD	68	3.76	1.426
	Post-PHD	21	2.90	1.375
	Total	201	3.78	1.405
Q8.Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)	Master	112	2.93	1.552
	PHD	68	2.78	1.691
	Post-PHD	21	1.38	.805
	Total	201	2.72	1.604
Q.9 Anti-virus/spam filtering/anti-malware	Master	112	3.47	1.627
	PHD	68	3.68	1.429
	Post-PHD	21	3.76	1.221
	Total	201	3.57	1.522
Q10.Disaster recovery	Master	112	2.79	1.514
	PHD	68	2.53	1.430
	Post-PHD	21	2.62	1.465
	Total	201	2.69	1.479
Q11.Student management	Master	112	3.30	1.500
	PHD	68	4.10	1.186
	Post-PHD	21	4.05	1.203
	Total	201	3.65	1.421
Q12.Accounting/financial management	Master	112	1.95	1.177
	PHD	68	1.51	.954
	Post-PHD	21	1.57	.811
	Total	201	1.76	1.088

According to Table 4.5, the instructors whom had master degree or phd are more interested in technology than post-phd instructors. According to our chart most instructors who have post-phd are elder instructors, so it can be understandable why the more educated instructors in this sampling are less into technology. From other hand the instructors with master degree have the biggest number (122), this can be because of the fact that most of these participants are instructor-assistance and having the more population in the universities. The significance of this table is instructors with master degree who use “Email (eg., Hotmail, Gmail)” with (M=4.54). From other hand “File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)” technology is also famous for master and

phd degree instructors, this can be due to the fact that this services in more popular than any other cloud services.

Table 4.6: Current usage of cloud computing technologies with respect to education level

		Sum of Squares	DF	Mean Square	F	Sig.	Meaningful Difference
Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)	Between Groups	19.518	2	9.759	6.090	.003	(master-post), (phd-post)
	Within Groups	317.298	198	1.603			
	Total	336.816	200				
Email (eg., Hotmail, Gmail)	Between Groups	62.486	2	31.243	41.396	.000	(master-phd), (post-master), (post-phd)
	Within Groups	149.435	198	.755			
	Total	211.920	200				
Social networking (e.g., Facebook, Twitter, blogging)	Between Groups	23.460	2	11.730	8.698	.000	(master-post), (post-phd)
	Within Groups	267.027	198	1.349			
	Total	290.488	200				
Web conferencing (e.g., Skype, Adobe Connect, Google hangout)	Between Groups	17.280	2	8.640	4.989	.008	(master-post), (phd-post)
	Within Groups	342.929	198	1.732			
	Total	360.209	200				
File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)	Between Groups	20.377	2	10.188	11.451	.000	(master-post), (phd-post)
	Within Groups	176.170	198	.890			
	Total	196.547	200				
Backup/security storage	Between Groups	30.511	2	15.256	8.594	.000	(master-post), (phd-post)
	Within Groups	351.469	198	1.775			
	Total	381.980	200				
Library system (e.g., Innovative Interfaces, Koha)	Between Groups	19.202	2	9.601	5.060	.007	(master-post), (phd-post)

	Within Groups	375.723	198	1.898			
	Total	394.925	200				
Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)	Between Groups	42.764	2	21.382	8.968	.000	(master-post), (phd-post)
	Within Groups	472.072	198	2.384			
	Total	514.836	200				
Anti-virus/spam filtering/anti-malware	Between Groups	2.592	2	1.296	.557	.574	
	Within Groups	460.612	198	2.326			
	Total	463.204	200				
Disaster recovery	Between Groups	3.083	2	1.542	.703	.496	
	Within Groups	434.170	198	2.193			
	Total	437.254	200				
Student management	Between Groups	30.712	2	15.356	8.153	.000	(master-phd)
	Within Groups	372.910	198	1.883			
	Total	403.622	200				
Accounting/financial management	Between Groups	8.731	2	4.365	3.794	.024	(master-phd)
	Within Groups	227.807	198	1.151			
	Total	236.537	200				

According to the result in all of the questions except question 9 and question 10, instructors usage of the technology was with high significance difference between educational level but in usage of “Anti-virus/spam filtering/anti-malware” with (Sig= 0.574) and “Disaster recovery” with (Sig= 0.486) there is no much difference. This shows that all instructors regardless of their educational level having the same idea about the usage of security and recovery of their system.

4.1.2.3 Current usage of cloud computing technologies with respect to major

Table 4.7, is showing the current usage of cloud computing technology with respect to major of participants.

Table 4.7: Current usage of cloud computing technologies respect to major

	Part B.	N	Mean	SD
Q1.Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)	Engineering /IT/Technical	64	3.70	.987
	Mechanical Engineering	17	2.76	1.393
	Electrical Engineering	19	3.00	1.491
	Nuclear Science and Engineering	9	3.44	.726
	Applied Science/Mathematics/Physics	20	2.80	1.281
	Civil Engineering	34	3.24	1.327
	Aerospace Engineering	10	2.60	1.265
	Other	28	2.75	1.531
	Total	201	3.19	1.298
Q2.Email (eg., Hotmail, Gmail)	Engineering /IT/Technical	64	4.41	.886
	Mechanical Engineering	17	3.71	1.213
	Electrical Engineering	19	4.44	.772
	Nuclear Science and Engineering	9	4.53	.527
	Applied Science/Mathematics/Physics	20	3.45	1.234
	Civil Engineering	34	4.85	.359
	Aerospace Engineering	10	4.60	.699
	Other	28	4.29	.897
	Total	201	4.33	.945
Q3.Social networking (e.g., Facebook, Twitter, blogging)	Engineering /IT/Technical	64	4.47	.616
	Mechanical Engineering	17	2.94	1.478
	Electrical Engineering	19	2.37	1.212
	Nuclear Science and Engineering	9	3.89	1.167
	Applied Science/Mathematics/Physics	20	3.45	.887
	Civil Engineering	34	3.94	1.229
	Aerospace Engineering	10	3.80	.632
	Other	28	3.07	1.052
	Total	201	3.70	1.205
Q4.Web conferencing (e.g., Skype, Adobe Connect, Google hangout)	Engineering /IT/Technical	64	3.55	1.272
	Mechanical Engineering	17	3.53	1.736
	Electrical Engineering	19	3.42	1.121
	Nuclear Science and Engineering	9	4.00	1.000
	Applied Science/Mathematics/Physics	20	4.00	.918
	Civil Engineering	34	3.94	1.347
	Aerospace Engineering	10	4.20	1.687
	Other	28	3.14	1.484
	Total	201	3.64	1.342
Q5.File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)	Engineering /IT/Technical	64	4.61	.789
	Mechanical Engineering	17	4.41	1.121
	Electrical Engineering	19	4.63	.955
	Nuclear Science and Engineering	9	5.00	.000
	Applied Science/Mathematics/Physics	20	4.30	.733
	Civil Engineering	34	4.18	1.029
	Aerospace Engineering	10	4.90	.316
	Other	28	3.79	1.397
	Total	201	4.41	.991
Q6.Backup/security storage	Engineering /IT/Technical	64	3.20	1.493
	Mechanical Engineering	17	4.06	1.249

	Electrical Engineering	19	3.16	1.537
	Nuclear Science and Engineering	9	3.44	.527
	Applied Science/Mathematics/Physics	20	3.60	1.273
	Civil Engineering	34	3.32	1.249
	Aerospace Engineering	10	4.30	.823
	Other	28	2.68	1.362
	Total	201	3.32	1.382
Q7.Library system (e.g., Innovative Interfaces, Koha)	Engineering /IT/Technical	64	3.78	1.431
	Mechanical Engineering	17	4.41	.795
	Electrical Engineering	19	4.00	1.414
	Nuclear Science and Engineering	9	4.67	.500
	Applied Science/Mathematics/Physics	20	4.40	.503
	Civil Engineering	34	4.00	1.371
	Aerospace Engineering	10	4.20	1.033
	Other	28	2.07	1.120
	Total	201	3.78	1.405
Q8.Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)	Engineering /IT/Technical	64	3.17	1.432
	Mechanical Engineering	17	2.76	1.954
	Electrical Engineering	19	2.84	1.642
	Nuclear Science and Engineering	9	3.44	1.014
	Applied Science/Mathematics/Physics	20	2.35	1.424
	Civil Engineering	34	2.44	1.779
	Aerospace Engineering	10	3.00	2.108
	Other	28	1.82	1.188
	Total	201	2.72	1.604
Q9.Anti-virus/spam filtering/anti-malware	Engineering /IT/Technical	64	4.16	1.275
	Mechanical Engineering	17	3.68	1.835
	Electrical Engineering	19	3.65	1.701
	Nuclear Science and Engineering	9	3.00	1.414
	Applied Science/Mathematics/Physics	20	3.25	1.618
	Civil Engineering	34	3.53	1.419
	Aerospace Engineering	10	3.60	.699
	Other	28	2.57	1.526
	Total	201	3.57	1.522
Q10.Disaster recovery	Engineering /IT/Technical	64	3.16	1.144
	Mechanical Engineering	17	3.82	1.629
	Electrical Engineering	19	2.63	1.606
	Nuclear Science and Engineering	9	4.00	1.225
	Applied Science/Mathematics/Physics	20	2.65	1.565
	Civil Engineering	34	2.18	1.381
	Aerospace Engineering	10	2.00	1.333
	Other	28	1.43	.836
	Total	201	2.69	1.479
Q11.Student management	Engineering /IT/Technical	64	3.78	1.442
	Mechanical Engineering	17	4.76	.664
	Electrical Engineering	19	2.42	1.465
	Nuclear Science and Engineering	9	4.33	1.118
	Applied Science/Mathematics/Physics	20	4.10	.912
	Civil Engineering	34	3.71	1.142
	Aerospace Engineering	10	3.90	1.197
	Other	28	2.82	1.565
	Total	201	3.65	1.421
Q12.Accounting/financial management	Engineering /IT/Technical	64	2.06	1.097
	Mechanical Engineering	17	1.29	.588
	Electrical Engineering	19	1.68	.671
	Nuclear Science and Engineering	9	1.67	.707
	Applied Science/Mathematics/Physics	20	1.25	.786
	Civil Engineering	34	1.74	1.377

	Aerospace Engineering	10	1.80	.919
	Other	28	1.82	1.307
	Total	201	1.76	1.088

According to Table 4.7 participants whom studied in “Engineering /IT/Technical” and “Nuclear Science and Engineering” were the instructors with most interested toward using cloud computing services in their work. As it shown the usage of email services with (M=4.53) for and “Nuclear Science and Engineering” and (M=4.41) for “Engineering /IT/Technical” is one of the most used cloud based services. In addition to that “File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)” is also highly used by instructors who had “Engineering /IT/Technical” (M=4.61) and “Nuclear Science and Engineering”(M=5.00). Meanwhile the instructors whom had “Mechanical Engineering” degree seems to have more interest than others toward “Backup/security storage” (M=4.06), “Anti-virus/spam filtering/anti-malware” (M=3.68),”disaster recovery” (M=3.82) and “student management” (M=4.76). Instructors who were grouped their degree as “others” are the least interested participants to usage of cloud computing in their work. As a result it seems that instructors with more background in IT and computer engineering field are more aware and more enthusiast about new technologies.

Table 4.8: Current usage of cloud computing technologies respect to major

		Sum of Squares	**DF**	**Mean Square**	**F**	**Sig.**	**Meaningful difference**
Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)	Between Groups	33.208	7	4.744	3.016	.005	(Engineering /IT/Technical-others)
	Within Groups	303.608	193	1.573			
	Total	336.816	200				
Email (eg., Hotmail, Gmail)	Between Groups	43.799	7	6.257	7.183	.000	(Engineering /IT/Technical-others),

	Within Groups	168.121	193	.871			(Engineering /IT/Technical-Mechanical Engineering), (Engineering Electrical Engineering-Mechanical Engineering),
	Total	211.920	200				
Social networking (e.g., Facebook, Twitter, blogging)	Between Groups	96.009	7	13.716	13.611	.000	(Engineering /IT/Technical-Mechanical Engineering), (Engineering /IT/Technical-Electrical Engineering)
	Within Groups	194.478	193	1.008			
	Total	290.488	200				
Web conferencing (e.g., Skype, Adobe Connect, Google hangout)	Between Groups	18.572	7	2.653	1.499	.170	
	Within Groups	341.637	193	1.770			
	Total	360.209	200				
File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)	Between Groups	22.019	7	3.146	3.478	.002	(Engineering /IT/Technical-others), (Engineering Nuclear-others)
	Within Groups	174.529	193	.904			
	Total	196.547	200				
Backup/security storage	Between Groups	33.483	7	4.783	2.649	.012	(Engineering Mechanical-others), (Engineering Aerospace-others)
	Within Groups	348.497	193	1.806			
	Total	381.980	200				
Library system (e.g., Innovative Interfaces, Koha)	Between Groups	107.613	7	15.373	10.327	.000	(Engineering /IT/Technical-others), (Engineering Nuclear-others)
	Within Groups	287.312	193	1.489			
	Total	394.925	200				
Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)	Between Groups	46.880	7	6.697	2.762	.009	(Engineering /IT/Technical-others)
	Within Groups	467.956	193	2.425			
	Total	514.836	200				
Anti-virus/spam filtering/anti-malware	Between Groups	55.301	7	7.900	3.738	.001	(Engineering /IT/Technical-others)
	Within Groups	407.903	193	2.113			
	Total	463.204	200				

Disaster recovery	Between Groups	109.576	7	15.654	9.220	.000	(Engineering /IT/Technical-others), (Engineering Nuclear-others), (Engineering Nuclear-Civil),
	Within Groups	327.677	193	1.698			
	Total	437.254	200				
Student management	Between Groups	79.128	7	11.304	6.723	.000	(Engineering Aerospace-Electrical), (Engineering /IT/Technical-Electrical), (Engineering Mechanical-others)
	Within Groups	324.494	193	1.681			
	Total	403.622	200				
Accounting/financial management	Between Groups	15.078	7	2.154	1.877	.075	
	Within Groups	221.459	193	1.147			
	Total	236.537	200				

According to the result in all of the questions except question 4, instructors usage of the technology was with high significance difference between majors but in usage of "Web conferencing" with (Sig= 0.170) there is no much difference. This shows that all instructors regardless of their major are using web conferencing application in their university.

4.1.2.4 Current usage of cloud computing technologies with respect to experience

Table 4.12 is showing current usage of cloud computing technologies with respect to participant's experience level.

Table 4.9: Current usage of cloud computing technologies with respect to experience

		N	Mean	SD
Q1.Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)	1-2 years	100	3.22	1.244
	3-5 years	50	3.46	1.297
	6-8 years	25	3.36	1.381
	9-12 years	14	2.79	1.311
	13+ years	12	1.92	.793
	Total	201	3.19	1.298
Q2.Email (eg., Hotmail, Gmail)	1-2 years	100	4.78	.524

	3-5 years	50	4.24	.847
	6-8 years	25	4.40	.866
	9-12 years	14	3.86	1.292
	13+ years	12	1.75	.754
	Total	201	4.35	1.029
Q3.Social networking (e.g., Facebook, Twitter, blogging)	1-2 years	100	3.85	1.184
	3-5 years	50	3.72	1.089
	6-8 years	25	3.76	1.200
	9-12 years	14	3.50	1.019
	13+ years	12	2.42	1.443
	Total	201	3.70	1.205
Q4.Web conferencing (e.g., Skype, Adobe Connect, Google hangout)	1-2 years	100	3.55	1.250
	3-5 years	50	4.22	1.075
	6-8 years	25	3.48	1.262
	9-12 years	14	3.86	1.875
	13+ years	12	2.08	1.240
	Total	201	3.64	1.342
Q5.File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)	1-2 years	100	4.48	.904
	3-5 years	50	4.62	.635
	6-8 years	25	4.36	1.075
	9-12 years	14	4.71	.726
	13+ years	12	2.67	1.371
	Total	201	4.41	.991
Q6.Backup/security storage	1-2 years	100	3.17	1.311
	3-5 years	50	4.14	1.050
	6-8 years	25	3.40	1.555
	9-12 years	14	2.71	1.326
	13+ years	12	1.75	.754
	Total	201	3.32	1.382
Q7.Library system (e.g., Innovative Interfaces, Koha)	1-2 years	100	3.86	1.457
	3-5 years	50	4.06	1.096
	6-8 years	25	3.32	1.626
	9-12 years	14	3.93	.997
	13+ years	12	2.67	1.497
	Total	201	3.78	1.405
Q8.Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)	1-2 years	100	2.76	1.512
	3-5 years	50	3.32	1.634
	6-8 years	25	2.72	1.696
	9-12 years	14	1.71	1.267
	13+ years	12	1.00	.000
	Total	201	2.72	1.604
Q9.Anti-virus/spam filtering/anti-malware	1-2 years	100	3.36	1.761
	3-5 years	50	3.46	1.232
	6-8 years	25	4.32	1.069
	9-12 years	14	4.29	.914
	13+ years	12	3.42	1.240
	Total	201	3.57	1.522
Q10.Disaster recovery	1-2 years	100	2.73	1.490
	3-5 years	50	2.52	1.474
	6-8 years	25	3.20	1.323
	9-12 years	14	2.29	1.490
	13+ years	12	2.42	1.621
	Total	201	2.69	1.479
Q11.Student management	1-2 years	100	3.13	1.548
	3-5 years	50	3.98	1.116
	6-8 years	25	4.48	1.046
	9-12 years	14	4.57	.646
	13+ years	12	3.83	1.030

	Total	201	3.65	1.421
Q12.Accounting/financial management	1-2 years	100	1.80	1.223
	3-5 years	50	1.90	1.015
	6-8 years	25	1.24	.523
	9-12 years	14	1.93	1.207
	13+ years	12	1.75	.622
	Total	201	1.76	1.088

As it shown in Table 4.9, instructors with more experience are less interested in using new technologies. It is understandable because most of these instructors are using their old ways for many years and they are interested in changing them. From other hand instructors with less experience and according to previous tables, younger ones are more motivated in using new technology in their work.

Table 4.10: Current usage of cloud computing technologies with respect to experience

		Sum of Squares	**DF**	**Mean Square**	**F**	**Sig.**	**Meaningful Difference**
Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)	Between Groups	26.202	4	6.551	4.133	.003	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+)
	Within Groups	310.614	196	1.585			
	Total	336.816	200				
Email (eg., Hotmail, Gmail)	Between Groups	103.676	4	25.919	46.932	.000	(1-2)-(3-5), (1-2)-(9-12), (1-2)-(13+),+), (3-5)-(13+), (6-8)-(13+)
	Within Groups	108.244	196	.552			
	Total	211.920	200				
Social networking (e.g., Facebook, Twitter, blogging)	Between Groups	22.681	4	5.670	4.150	.003	(3-5)-(13+), (6-8)-(13+)
	Within Groups	267.807	196	1.366			
	Total	290.488	200				
Web conferencing (e.g., Skype, Adobe Connect, Google hangout)	Between Groups	48.008	4	12.002	7.535	.000	(3-5)-(13+), (6-8)-(13+)
	Within Groups	312.201	196	1.593			

	Total	360.209	200				
File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)	Between Groups	40.523	4	10.131	12.727	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	156.024	196	.796			
	Total	196.547	200				
Backup/security storage	Between Groups	70.743	4	17.686	11.138	.000	(1-2)-(3-5), (1-2)-(13+) ,(6-8)-(13+)
	Within Groups	311.237	196	1.588			
	Total	381.980	200				
Library system (e.g., Innovative Interfaces, Koha)	Between Groups	25.030	4	6.258	3.316	.012	(1-2)-(13+), (3-5)-(13+)
	Within Groups	369.895	196	1.887			
	Total	394.925	200				
Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)	Between Groups	67.819	4	16.955	7.434	.000	(1-2)-(13+), (3-5)-(9-12), (3-5)-(13+), (6-8)-(13+)
	Within Groups	447.017	196	2.281			
	Total	514.836	200				
Anti-virus/spam filtering/anti-malware	Between Groups	26.530	4	6.633	2.977	.020	(1-2)-(6-8)
	Within Groups	436.674	196	2.228			
	Total	463.204	200				
Disaster recovery	Between Groups	11.290	4	2.822	1.299	.272	
	Within Groups	425.964	196	2.173			
	Total	437.254	200				
Student management	Between Groups	61.997	4	15.499	8.892	.000	(1-2)-(3-5), (1-2)-(6-8), (1-2)-(9-12)
	Within Groups	341.625	196	1.743			
	Total	403.622	200				
Accounting/financial management	Between Groups	8.299	4	2.075	1.782	.134	
	Within Groups	228.239	196	1.164			

	Total	236.537	200

According to the result in all of the questions except question 10 and 12, instructors usage of the technology was with high significance difference between experience levels but in usage of in "Disaster recovery" with (Sig=0.272) and "Accounting/financial management" with (Sig=0.134) there is no much difference. This shows that all instructors regardless of their experience level are having same idea about usage of disaster recovery and accounting and management system.

4.1.3 Instructors perception on technology beliefs

In regard to part C in research questions, Table 4.11 shows the mean and percentage on instructors and instructor assistant's technology beliefs. The last five questions in this part are more focused in negative aspects and for that the less mean is considered to be better value for them.

Table 4.11: Technology beliefs

Part		**Strongly Disagree**		**Disagree**		**Neutral**		**Agree**		**Strongly Agree**		**Mean**
C		**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
Q1.	I support the use of cloud computing technology in the classroom	2	1.0%	0	0.0%	11	5.5%	127	63.2%	61	30.3%	**4.22**
Q2.	The cloud computing technology is important to student learning	7	3.5%	2	1.0%	22	10.9%	87	43.3%	83	41.3%	4.18
Q3.	Incorporating cloud computing technology into instruction helps students learn	6	3.0%	0	0.0%	23	11.4%	93	46.3%	79	39.3%	4.19

Q4.	Knowledge about cloud computing technology will improve teaching in my school	1	0.5%	1	0.5%	22	10.9%	69	34.3%	108	53.7%	**4.40**
Q5.	Cloud computing technology facilitates the use of a wide variety of instructional strategies designed to maximize learning	0	0.0%	0	0.0%	45	22.4%	70	34.8%	86	42.8%	**4.20**
Q6.	Student motivation increases when cloud computing technology is integrated into the curriculum	2	1.0%	0	0.0%	36	17.9%	98	48.8%	65	32.3%	**4.11**
Q7.	Cloud computing technology helps teachers do things with their classes that they would not be able to do without it	0	0.0%	1	0.5%	22	10.9%	93	46.3%	85	42.3%	4.30
Q8.	Content knowledge should take priority over technology skills	37	18.4%	57	28.4%	49	24.4%	41	20.4%	17	8.5%	**2.72**
Q9.	Most students have so many other needs that technology is a low priority	23	11.4%	53	26.4%	43	21.4%	65	32.3%	17	8.5%	**3.00**
Q10.	Cloud computing technology might interfere with human interactions between teachers and students	29	14.4%	62	30.8%	53	26.4%	49	24.4%	8	4.0%	2.73
Q11.	There is not enough time to incorporate cloud computing technology into the curriculum	67	33.3%	29	14.4%	51	25.4%	47	23.4%	7	3.5%	2.49
Q12.	Teaching students how to use cloud computing technology is not my job	23	11.4%	6	3.0%	22	10.9%	104	51.7%	46	22.9%	3.72
	Average Mean										3.68	

As it shown in Table 4.11, the average mean of the table is 3.68, by considering that, 53.7% of instructors strongly agreed that “Knowledge about cloud computing technology will improve teaching in my school” (M=4.40). Fortunately 30.3 % and 63.2 % of instructors were strongly agree and agree with using of cloud computing in the classroom (M=4.22). This numbers shows that most instructors are agree with supporting their classroom with cloud based technologies. Moreover 42.8 % of instructors state that they are strongly agree with the fact that "Cloud computing technology facilitates the use of a wide variety of instructional strategies designed to maximize learning" (M=4.20). From other hand only 8.5 % of instructors strongly agreed that “Content knowledge should take priority over technology skills” (M=2.72). In case of "Most students have so many other needs that technology is a low priority" the answers were vary. 8.5 % were strongly agree with this state but only 11.4 % were strongly disagree with it. This make the percentage of middle stage selection, higher than what happens normally (M=3.00). This shows that student do have many prior needs but most instructors are not sure does this needs come first before technology or the technology can help them to achieve their needs. As the researcher quote before in literature review chapter from (Atchariyachanvanich et al., 2014); student’s learning and motivation will increase by using new technologies in the classroom. According to the findings of this thesis, the technology belief on “Student motivation increases when cloud computing technology is integrated into the curriculum” got (M=4.1) with 32.3 % strongly agree and 48.8% agree selection, also “knowledge about clod computing technology will improve teaching in my school” got the highest mean in the table (M=4.40) which also match with (Atchariyachanvanich et al., 2014) research.

Regarded to the interview answers, researcher found the fifth question in the interview more relevant to this part of questionnaire. In interview researcher asked instructors “Do you think cloud-computing has positive or negative effects to the learning outcomes of students? Why?”. Clearly in this question the interviewer wanted to know the advantages and disadvantages of using cloud services in educational environment.

Simply all the instructors believe that there is no negative effect of cloud computing in educational institution, what was concerning for some lecturers was the security and privacy challenges of cloud based services. Some of the instructors believe that there are some serious security problems in cloud services which although it might not be a fatal issue for educational centers but still can be an obstacle.

As for the benefits and advantages of this system they all mentioned about the usefulness of virtual laboratories for all students specially student with special needs. Some instructors believed that this system helps engineering student to have access to their expensive and heavy calculation software online, and some believe that they are able to share the materials with their students anytime, anywhere just by sending it to the cloud. Other instructors believed that by using cloud based services they can communicate their students from anywhere and anytime.

As instructor 2 stated:

> “I teach in three engineering departments, before it was difficult for me to manage the curriculum and materials for each department. Now I can easily make folder for each department put their materials there, control their study hours and give them lesson in simulators using virtual laboratories”.

According to the questionnaire and interview result it is possible to say that most of instructors believe that knowledge on functionalities and services of cloud computing can help both instructors and students in improving the quality of teaching and maximizing the learning in the classroom. (Karim& Goodwin, 2013) in their research also mentioned that best way of improving students learning is to change the traditional learning ways to newer technologies like cloud-learning. According to (Karim& Goodwin, 2013) cloud computing open new ways in communication, research, sharing which all lead to learning and teaching optimization.

4.1.3.1 Instructors perception on technology beliefs with respect to age

Table 4.12, is showing the instructor's perception on technology beliefs with respect to their age.

Table 4.12: Instructors perception on technology beliefs with respect to age

		N	Mean	SD
Q1.I support the use of cloud computing technology in the classroom	18-22	2	5.00	.000
	23-29	86	4.20	.505
	30-37	61	4.31	.564
	38-49	34	4.32	.475
	50-60	7	4.43	.535
	60+	11	3.27	1.348
	Total	201	4.22	.634
Q2.The cloud computing technology is important to student learning	18-22	2	5.00	.000
	23-29	86	4.00	.867
	30-37	61	4.44	.742
	38-49	34	4.56	.660
	50-60	7	3.98	.000
	60+	11	3.09	1.758
	Total	201	4.18	.921
Q3.Incorporating cloud computing technology into instruction helps students learn	18-22	2	5.00	.000
	23-29	86	3.99	.759
	30-37	61	4.54	.743
	38-49	34	4.41	.500
	50-60	7	4.00	.000
	60+	11	3.09	1.758
	Total	201	4.19	.863
Q4.Knowledge about cloud computing technology will improve teaching in my school	18-22	2	5.00	.000
	23-29	86	4.20	.733
	30-37	61	4.64	.684
	38-49	34	4.62	.493
	50-60	7	4.57	.535
	60+	11	3.82	1.168
	Total	201	4.40	.743

Q5.Cloud computing technology facilitates the use of a wide variety of instructional strategies designed to maximize learning	18-22	2	5.00	.000
	23-29	86	4.02	.782
	30-37	61	4.51	.744
	38-49	34	4.29	.524
	50-60	7	4.14	.900
	60+	11	3.55	.934
	Total	201	4.20	.783
Q6.Student motivation increases when cloud computing technology is integrated into the curriculum	18-22	2	5.00	.000
	23-29	86	4.13	.779
	30-37	61	4.18	.742
	38-49	34	4.00	.778
	50-60	7	4.14	.690
	60+	11	3.82	.751
	Total	201	4.11	.763
Q7.Cloud computing technology helps teachers do things with their classes that they would not be able to do without it	18-22	2	5.00	.000
	23-29	86	4.21	.635
	30-37	61	4.26	.728
	38-49	34	4.76	.431
	50-60	7	4.43	.535
	60+	11	3.64	.674
	Total	201	4.30	.680
Q8.Content knowledge should take priority over technology skills	18-22	2	2.00	.000
	23-29	86	2.98	1.447
	30-37	61	2.59	.920
	38-49	34	2.21	.946
	50-60	7	2.29	1.254
	60+	11	3.45	.820
	Total	201	2.72	1.221
Q9.Most students have so many other needs that technology is a low priority	18-22	2	2.00	.000
	23-29	86	3.34	1.204
	30-37	61	2.70	1.022
	38-49	34	2.65	1.125
	50-60	7	2.71	1.254
	60+	11	3.45	1.293
	Total	201	3.00	1.179
Q10.Cloud computing technology might interfere with human interactions between teachers and students	18-22	2	2.00	.000
	23-29	86	2.88	1.278
	30-37	61	2.70	.863
	38-49	34	2.29	.906
	50-60	7	2.29	1.254
	60+	11	3.36	.924
	Total	201	2.73	1.104
Q11.There is not enough time to incorporate cloud computing technology into the curriculum	18-22	2	1.00	.000
	23-29	86	2.74	1.276
	30-37	61	2.03	.966
	38-49	34	2.35	1.276
	50-60	7	2.29	1.254
	60+	11	3.91	1.300
	Total	201	2.49	1.265
Q12.Teaching students how to use cloud computing technology is not my job	18-22	2	4.00	.000
	23-29	86	3.87	.930
	30-37	61	3.36	1.379
	38-49	34	3.65	1.323
	50-60	7	3.57	1.512
	60+	11	4.73	.467
	Total	201	3.72	1.189

Table 4.12 has two parts, the first parts which are positive beliefs of instructors about cloud based technologies in classroom and second part is the negative effects of this technology. According to table 4.12 most younger instructors support using of this technology in their work and gave high value to it but elder instructors, especially the ones who have more than 60 years old seems like they are not so much believing on the effects of this technology in the classroom. From other hand the last three questions are more focusing on the negative effects that cloud computing might have on instructors work. According to the values in Table 4.12 most elder instructors believe that this technology can "interfere with human interaction between students and teachers", "there is not enough time for adding this technology to their curriculum" and "teaching of how to use this technology to students is not their job".

Table 4.13: Instructors perception on technology beliefs with respect to age

		Sum of Squares	**DF**	**Mean Square**	**F**	**Sig.**	**Meaningful Difference**
I support the use of cloud computing technology in the classroom	Between Groups	12.309	5	2.462	7.054	.000	(18-22)-(60+), (23-29)-(60+), (30-37)-(60+), (38-49)-(60+), (50-60)-(60+)
	Within Groups	68.059	195	.349			
	Total	80.368	200				
The cloud computing technology is important to student learning	Between Groups	27.258	5	5.452	7.471	.000	(18-22)-(60+), (23-29)-(60+), (30-37)-(60+), (38-49)-(60+), (50-60)-(60+)
	Within Groups	142.294	195	.730			
	Total	169.552	200				
Incorporating cloud computing technology into instruction helps students learn	Between Groups	27.536	5	5.507	8.855	.000	(18-22)-(60+), (23-29)-(60+), (30-37)-(60+), (38-49)-(60+), (50-60)-(60+)
	Within Groups	121.280	195	.622			
	Total	148.816	200				
Knowledge about cloud computing technology will improve teaching	Between Groups	13.273	5	2.655	5.332	.000	(23-29)-(30-37), (38-49)-(23-29),

in my school	Within Groups	97.085	195	.498			(30-37)-(60+)
	Total	110.358	200				
Cloud computing technology facilitates the use of a wide variety of instructional strategies designed to maximize learning	Between Groups	14.794	5	2.959	5.350	.000	(23-29)-(30-37), (30-37)-(60+)
	Within Groups	107.843	195	.553			
	Total	122.637	200				
Student motivation increases when cloud computing technology is integrated into the curriculum	Between Groups	3.265	5	.653	1.126	.348	
	Within Groups	113.103	195	.580			
	Total	116.368	200				
Cloud computing technology helps teachers do things with their classes that they would not be able to do without it	Between Groups	14.074	5	2.815	7.000	.000	(23-29)-(60+) (30-37)-(60+), (38-49)-(60+)
	Within Groups	78.413	195	.402			
	Total	92.488	200				
Content knowledge should take priority over technology skills	Between Groups	23.976	5	4.795	3.407	.006	(23-29)-(38-49), (38-49)-(60+)
	Within Groups	274.422	195	1.407			
	Total	298.398	200				
Most students have so many other needs that technology is a low priority	Between Groups	24.170	5	4.834	3.714	.003	(23-29)-(38-49)
	Within Groups	253.830	195	1.302			
	Total	278.000	200				
Cloud computing technology might interfere with human interactions between teachers and students	Between Groups	15.392	5	3.078	2.626	.025	(23-29)-(38-49), (38-49)-(60+)
	Within Groups	228.559	195	1.172			
	Total	243.950	200				
There is not enough time to incorporate cloud computing technology into the curriculum	Between Groups	45.830	5	9.166	6.514	.000	(23-29)-(60+) (30-37)-(60+), (38-49)-(60+)
	Within Groups	274.409	195	1.407			
	Total	320.239	200				
Teaching students how to use cloud computing technology is not my	Between Groups	21.516	5	4.303	3.211	.008	(30-37)-(60+)

job	Within Groups	261.319	195	1.340		
	Total	282.836	200			

According to the result in all of the questions except question 6, instructors technology beliefs was with high significance difference between ages but in usage of "Student motivation increases when cloud computing technology is integrated into the curriculum" with (Sig= 0.348) there is no much difference. This shows that all instructors regardless of their age are using technology in their university.

4.1.3.2 Instructors perception on technology beliefs with respect to education level

Table 4.14 shows the instructors perception technology beliefs with respect to educational level of participants.

Table 4.14: Instructors perception technology beliefs with respect to education

		N	Mean	SD
Q1.I support the use of cloud computing technology in the classroom	Master	112	4.25	.475
	PHD	68	4.29	.600
	Post-PHD	21	3.81	1.167
	Total	201	4.22	.634
Q2.The cloud computing technology is important to student learning	Master	112	4.21	.874
	PHD	68	4.29	.754
	Post-PHD	21	3.62	1.396
	Total	201	4.18	.921
Q3.Incorporating cloud computing technology into instruction helps students learn	Master	112	4.25	.800
	PHD	68	4.29	.692
	Post-PHD	21	3.52	1.327
	Total	201	4.19	.863
Q4.Knowledge about cloud computing technology will improve teaching in my school	Master	112	4.39	.740
	PHD	68	4.53	.657
	Post-PHD	21	4.05	.921
	Total	201	4.40	.743
Q5.Cloud computing technology facilitates the use of a wide variety of instructional strategies designed to maximize learning	Master	112	4.23	.794
	PHD	68	4.34	.704
	Post-PHD	21	3.62	.740
	Total	201	4.20	.783
Q6.Student motivation increases when cloud computing technology is	Master	112	4.19	.777
	PHD	68	4.07	.739
	Post-PHD	21	3.86	.727

integrated into the curriculum	Total	201	4.11	.763
Q7.Cloud computing technology helps teachers do things with their classes that they would not be able to do without it	Master	112	4.28	.618
	PHD	68	4.32	.722
	Post-PHD	21	4.38	.865
	Total	201	4.30	.680
Q8.Content knowledge should take priority over technology skills	Master	112	2.85	1.337
	PHD	68	2.47	1.014
	Post-PHD	21	2.86	1.108
	Total	201	2.72	1.221
Q9.Most students have so many other needs that technology is a low priority	Master	112	3.19	1.174
	PHD	68	2.60	1.148
	Post-PHD	21	3.29	1.007
	Total	201	3.00	1.179
Q10.Cloud computing technology might interfere with human interactions between teachers and students	Master	112	2.82	1.210
	PHD	68	2.53	.889
	Post-PHD	21	2.86	1.108
	Total	201	2.73	1.104
Q11.There is not enough time to incorporate cloud computing technology into the curriculum	Master	112	2.58	1.235
	PHD	68	2.16	1.128
	Post-PHD	21	3.10	1.578
	Total	201	2.49	1.265
Q12.Teaching students how to use cloud computing technology is not my job	Master	112	3.82	1.024
	PHD	68	3.56	1.297
	Post-PHD	21	3.67	1.592
	Total	201	3.72	1.189

According to Table 4.14, in most of sections the master degree and Phd instructors are more supportive about using of cloud computing in education. Post-phd instructors are again the group that their beliefs in cloud technology are not strong enough. From other hand the last three questions which are more focused on negative side of cloud technology got the highest value from post-phd instructors which again show that there more worried about negative part of this technology rather than positive parts.

Table 4.15: Instructors perception on technology beliefs with respect to education level

		Sum of Squares	**DF**	**Mean Square**	**F**	**Sig.**	**Meaningful Difference**
I support the use of cloud computing technology in the classroom	Between Groups	4.012	2	2.006	5.202	.006	(master-post), (post-phd)

	Within Groups	76.356	198	.386			
	Total	80.368	200				
The cloud computing technology is important to student learning	Between Groups	7.625	2	3.813	4.662	.011	(master-post), (post-phd)
	Within Groups	161.927	198	.818			
	Total	169.552	200				
Incorporating cloud computing technology into instruction helps students learn	Between Groups	10.460	2	5.230	7.485	.001	(master-post), (post-phd)
	Within Groups	138.356	198	.699			
	Total	148.816	200				
Knowledge about cloud computing technology will improve teaching in my school	Between Groups	3.750	2	1.875	3.483	.033	(post-phd)
	Within Groups	106.608	198	.538			
	Total	110.358	200				
Cloud computing technology facilitates the use of a wide variety of instructional strategies designed to maximize learning	Between Groups	8.500	2	4.250	7.372	.001	(master-post), (post-phd)
	Within Groups	114.137	198	.576			
	Total	122.637	200				
Student motivation increases when cloud computing technology is integrated into the curriculum	Between Groups	2.102	2	1.051	1.821	.165	
	Within Groups	114.266	198	.577			
	Total	116.368	200				
Cloud computing technology helps teachers do things with their classes that they would not be able to do without it	Between Groups	.233	2	.117	.250	.779	
	Within Groups	92.254	198	.466			
	Total	92.488	200				
Content knowledge should take priority over technology skills	Between Groups	6.466	2	3.233	2.193	.114	
	Within Groups	291.932	198	1.474			
	Total	298.398	200				
Most students have so many other needs that technology is a low priority	Between Groups	16.372	2	8.186	6.195	.002	(master-post), (post-phd)

	Within Groups	261.628	198	1.321			
	Total	278.000	200				
Cloud computing technology might interfere with human interactions between teachers and students	Between Groups	4.009	2	2.005	1.654	.194	
	Within Groups	239.941	198	1.212			
	Total	243.950	200				
There is not enough time to incorporate cloud computing technology into the curriculum	Between Groups	15.932	2	7.966	5.183	.006	(master-post), (post-phd)
	Within Groups	304.307	198	1.537			
	Total	320.239	200				
Teaching students how to use cloud computing technology is not my job	Between Groups	2.976	2	1.488	1.053	.351	
	Within Groups	279.860	198	1.413			
	Total	282.836	200				

According to the result in all of the questions except question 6, 7,8, 10 and 12 instructors technology beliefs with high significance difference between experience levels but in usage of in “Student motivation increase when cloud computing technology is integrated into the curriculum” with (Sig=0.165) and “cloud computing technology helps teachers do things with their classes that they would not be able to do without it” with (Sig=0.779) and “Content knowledge should take priority over technology skills” with (Sig=0.114) and “Cloud computing technology might interfere with human interactions between teachers and students” with (Sig=0.194) and “Teaching students how to use cloud computing technology is not my job” with (Sig=0.351) there is no much difference. This shows that all instructors regardless of their education level are having same beliefs about these technologies.

4.1.3.3 Instructors perception on technology beliefs with respect to experience

Table 4.16, is showing the instructor's perception and technology beliefs with respect to their experience.

Table 4.16: Instructors perception technology beliefs with respect to experience

		N	Mean	SD
Q1.I support the use of cloud computing technology in the classroom	1-2 years	100	4.17	.514
	3-5 years	50	4.38	.490
	6-8 years	25	4.32	.557
	9-12 years	14	4.71	.469
	13+ years	12	3.17	1.115
	Total	201	4.22	.634
Q2.The cloud computing technology is important to student learning	1-2 years	100	4.11	.875
	3-5 years	50	4.46	.762
	6-8 years	25	4.28	.737
	9-12 years	14	4.57	.514
	13+ years	12	2.92	1.443
	Total	201	4.18	.921
Q3.Incorporating cloud computing technology into instruction helps students learn	1-2 years	100	4.15	.796
	3-5 years	50	4.46	.676
	6-8 years	25	4.28	.737
	9-12 years	14	4.43	.514
	13+ years	12	2.92	1.443
	Total	201	4.19	.863
Q4.Knowledge about cloud computing technology will improve teaching in my school	1-2 years	100	4.34	.742
	3-5 years	50	4.64	.631
	6-8 years	25	4.32	.690
	9-12 years	14	4.79	.426
	13+ years	12	3.67	.985
	Total	201	4.40	.743
Q5.Cloud computing technology facilitates the use of a wide variety of instructional strategies designed to maximize learning	1-2 years	100	4.17	.792
	3-5 years	50	4.38	.697
	6-8 years	25	4.24	.779
	9-12 years	14	4.64	.497
	13+ years	12	3.17	.389
	Total	201	4.20	.783
Q6.Student motivation increases when cloud computing technology is integrated into the curriculum	1-2 years	100	4.11	.751
	3-5 years	50	4.30	.763
	6-8 years	25	4.00	.764
	9-12 years	14	3.93	.730
	13+ years	12	3.83	.835
	Total	201	4.11	.763
Q7.Cloud computing technology helps teachers do things with their classes that they would not be able to do without it	1-2 years	100	4.22	.613
	3-5 years	50	4.42	.673
	6-8 years	25	4.44	.821
	9-12 years	14	4.57	.514
	13+ years	12	3.92	.900
	Total	201	4.30	.680
Q8.Content knowledge should take priority over technology skills	1-2 years	100	2.73	1.302
	3-5 years	50	2.82	1.224
	6-8 years	25	2.72	.792
	9-12 years	14	1.50	.760
	13+ years	12	3.67	.492

	Total	201	2.72	1.221
Q9.Most students have so many other needs that technology is a low priority	1-2 years	100	3.01	1.202
	3-5 years	50	3.06	1.168
	6-8 years	25	3.00	.913
	9-12 years	14	2.14	1.512
	13+ years	12	3.67	.492
	Total	201	3.00	1.179
Q10.Cloud computing technology might interfere with human interactions between teachers and students	1-2 years	100	2.72	1.138
	3-5 years	50	2.88	1.081
	6-8 years	25	2.72	.792
	9-12 years	14	1.43	.646
	13+ years	12	3.67	.492
	Total	201	2.73	1.104
Q11.There is not enough time to incorporate cloud computing technology into the curriculum	1-2 years	100	2.51	1.185
	3-5 years	50	2.46	1.313
	6-8 years	25	2.04	1.098
	9-12 years	14	1.86	1.099
	13+ years	12	4.17	.835
	Total	201	2.49	1.265
Q12.Teaching students how to use cloud computing technology is not my job	1-2 years	100	3.67	1.164
	3-5 years	50	3.76	1.205
	6-8 years	25	3.44	1.294
	9-12 years	14	3.57	1.284
	13+ years	12	4.67	.492
	Total	201	3.72	1.189

As it shown in Table 4.16, the instructors with more experience than 13 years are less believing in technology than fresh instructors. Again this could be regarded to the fact that elder instructors are resting against new technologies and prefer their old ways. Moreover elder instructors with more experience that content knowledge has priority over technology skills (M=3.62) which shows that, they are more interested in the curriculum itself and are not looking for new way to enhance or change their teaching in classroom.

Table 4.17: Instructor's perception on technology beliefs with respect to experience level

		Sum of Squares	**DF**	**Mean Square**	**F**	**Sig.**	**Meaningful Difference**
I support the use of cloud computing technology in the classroom	Between Groups	18.514	4	4.629	14.667	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	61.854	196	.316			

	Total	80.368	200				
The cloud computing technology is important to student learning	Between Groups	25.957	4	6.489	8.857	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	143.595	196	.733			
	Total	169.552	200				
Incorporating cloud computing technology into instruction helps students learn	Between Groups	24.261	4	6.065	9.544	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	124.555	196	.635			
	Total	148.816	200				
Knowledge about cloud computing technology will improve teaching in my school	Between Groups	11.934	4	2.984	5.942	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	98.424	196	.502			
	Total	110.358	200				
Cloud computing technology facilitates the use of a wide variety of instructional strategies designed to maximize learning	Between Groups	17.306	4	4.326	8.051	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	105.331	196	.537			
	Total	122.637	200				
Student motivation increases when cloud computing technology is integrated into the curriculum	Between Groups	3.483	4	.871	1.512	.200	
	Within Groups	112.885	196	.576			
	Total	116.368	200				
Cloud computing technology helps teachers do things with their classes that they would not be able to do without it	Between Groups	4.642	4	1.161	2.589	.038	
	Within Groups	87.845	196	.448			
	Total	92.488	200				
Content knowledge should take priority over technology skills	Between Groups	32.101	4	8.025	5.907	.000	(1-2)-(9-12), (6-8)-(9-12)
	Within Groups	266.297	196	1.359			
	Total	298.398	200				
Most students have so many other needs that technology is a low priority	Between Groups	15.809	4	3.952	2.955	.021	(9-12)-(13+)
	Within Groups	262.191	196	1.338			
	Total	278.000	200				

Cloud computing technology might interfere with human interactions between teachers and students	Between Groups	35.375	4	8.844	8.311	.000	(1-2)-(9-12), (6-8)-(9-12), (1-2)-(13+)
	Within Groups	208.575	196	1.064			
	Total	243.950	200				
There is not enough time to incorporate cloud computing technology into the curriculum	Between Groups	44.488	4	11.122	7.905	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	275.751	196	1.407			
	Total	320.239	200				
Teaching students how to use cloud computing technology is not my job	Between Groups	13.351	4	3.338	2.428	.049	(1-2)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	269.485	196	1.375			
	Total	282.836	200				

According to the result in all of the questions except question 6, instructors technology beliefs of instructors was with high significance difference between experience level but in usage of "Student motivation increases when cloud computing technology is integrated into the curriculum" with (Sig= 0.200) there is no much difference. This shows that all instructors regardless of their experience level having the same beliefs on the idea that this technology will increase student's motivation.

4.1.4 Instructors perception on perceived benefits of cloud computing adoption for university

In regard to third section of research questions, Table 4.18 shows the mean and standard deviation on instructors and instructor assistants' principals' and technology beliefs.

Table 4.18: Perceived benefits of cloud computing adoption for University

Part D		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean
		N	%	N	%	N	%	N	%	N	%	
Q1.	It supports classroom learning	4	2.0%	0	0.0%	12	6.0%	95	47.3%	90	44.8%	**4.33**
Q2.	It supports independent learning at home	6	3.0%	0	0.0%	11	5.5%	100	49.8%	84	41.8%	4.27
Q3.	It supports virtual laboratories	0	0.0%	4	2.0%	7	3.5%	39	19.4%	151	75.1%	**4.68**
Q4.	It supports self-learning	4	2.0%	0	0.0%	11	5.5%	96	47.8%	90	44.8%	4.33
Q5.	It supports peer-to-peer learning	4	2.0%	0	0.0%	17	8.5%	88	43.8%	92	45.8%	4.31
Q6.	It supports students with special needs	0	0.0%	0	0.0%	24	11.9%	49	24.4%	128	63.7%	**4.52**
Q7.	It supports assessment of students	8	4.0%	0	0.0%	26	12.9%	80	39.8%	87	43.3%	4.18
Q8.	It facilitates sharing of learning materials and data	0	0.0%	0	0.0%	13	6.5%	99	49.3%	89	44.3%	**4.38**
Q9.	Users can access software anywhere provided there is Internet access	0	0.0%	0	0.0%	9	4.5%	55	27.4%	137	68.2%	**4.64**
Q10.	Users can access data anywhere provided there is Internet access	0	0.0%	0	0.0%	14	7.0%	67	33.3%	120	59.7%	4.53
Q11.	It facilitates communication and collaboration between students	3	1.5%	5	2.5%	34	16.9%	74	36.8%	85	42.3%	4.16
Q12.	If facilitates communication and collaboration between teachers and students	0	0.0%	2	1.0%	29	14.4%	88	43.8%	82	40.8%	4.24

Q13.	It facilitates communication and collaboration between staff	1	0.5%	0	0.0%	31	15.4%	71	35.3%	98	48.8%	4.32
Q14.	It is easy to scale up or down amount of services required	4	2.0%	7	3.5%	61	30.3%	61	30.3%	68	33.8%	**3.91**
Q15.	The cloud has large and flexible storage capacity	8	4.0%	0	0.0%	33	16.4%	48	23.9%	112	55.7%	4.27
Q16.	It reduces expenses on purchasing software (e.g., learning management, teaching-related games, anti-virus software etc.)	4	2.0%	3	1.5%	22	10.9%	80	39.8%	92	45.8%	4.26
Q17.	It reduces expenses on purchasing new computing devices	5	2.5%	1	0.5%	17	8.5%	87	43.3%	91	45.3%	4.28
Q18.	It extends the use of existing computing devices	4	2.0%	1	0.5%	16	8.0%	92	45.8%	88	43.8%	4.29
Q19.	It simplifies the IT management process	12	6.0%	2	1.0%	23	11.4%	97	48.3%	67	33.3%	**4.02**
Q20.	It reduces costs on IT maintenance such as managing different versions of software	8	4.0%	0	0.0%	35	17.4%	71	35.3%	87	43.3%	4.14
Q21.	It reduces reliance on school IT staff	23	11.4%	0	0.0%	31	15.4%	63	31.3%	84	41.8%	3.92
Q22.	The school can take advantage of the IT expertise of cloud service providers	6	3.0%	1	0.5%	24	11.9%	49	24.4%	121	60.2%	4.38
Q23.	It facilitates central management of IT resources and avoid corruption	0	0.0%	0	0.0%	51	25.4%	71	35.3%	79	39.3%	4.14

Q24.	It reduces operating costs of administrative systems	8	4.0%	0	0.0%	46	22.9%	75	37.3%	72	35.8%	4.01
Q25.	It enhances productivity of staff	41	20.4%	22	10.9%	45	22.4%	37	18.4%	56	27.9%	**3.22**
Q26.	It simplifies data backup and disaster recovery process	5	2.5%	0	0.0%	26	12.9%	64	31.8%	106	52.7%	4.32
Q27.	It is easy to adopt new applications quickly	16	8.0%	0	0.0%	24	11.9%	52	25.9%	109	54.2%	4.18
Q28.	It enhances students' openness to new technologies	0	0.0%	0	0.0%	41	20.4%	71	35.3%	89	44.3%	4.24
Q29.	It reduces power consumption	8	4.0%	0	0.0%	26	12.9%	69	34.3%	98	48.8%	4.24
Q30.	It allows access to applications that the school otherwise would not be aware of or able to afford	0	0.0%	0	0.0%	19	9.5%	33	16.4%	149	74.1%	4.65
Q31.	It enhances IT security in the school	5	2.5%	1	0.5%	28	13.9%	60	29.9%	107	53.2%	4.31
	Average Mean											3.72

As it shown in Table 4.18, the average mean of the table is 3.72, by considering that, 75.1 % of instructors strongly agreed that the biggest benefit of cloud computing in universities is “its support on virtual laboratories” (M=4.68) and 68.2 % of them strongly agreed the other benefit of clod computing is that “users can access software anywhere provided internet access” (M=4.64). In case of supporting students with special needs, cloud based e-learning got 63.7 % strongly agree selection (M=4.52), which shows that most instructors believe that disable students can benefit from this system. In addition "It supports assessment of students" got 43.3 % strongly agree

and 39.8 % agree (M=4.18) which shows that majority of instructors are gaining benefit from this service. Another benefit that most instructors are strongly agreed on with 60.2 % (M4.38), is that the school can take advantage of the IT expertise of cloud service providers. Also the question which mentioned "It allows access to applications that the school otherwise would not be aware of or able to afford" got 74.1 % of strongly agree selection (M=4.65) from instructors which showed that although the copyright rules are not applicable in Iran but there are still some software's or simulators that their pirate versions are not in the Iranian market and because of that their prices are extremely expensive for instructors and students. Because of this reason using cloud services will help the school academic staff and the students to benefit from accessing all software that they might need.

Meanwhile only 27.9 % of instructors strongly agreed that "It enhances productivity of staff" (M=3.22) which shows most instructors and instructor assistants are not agree with it. The state which mentioned "it simplifies the IT management process got only 33.3 % strongly agree selection (M=4.2) which shows that not all the instructors are agree with the fact that cloud based services can simplify IT management and process. As the researcher will mentioned in following, this problem is mostly because of current situation of Iranian universities and not the cloud computing technology itself. These results are supported with (Mircea and andreescu, 2011) research which was mentioned in literature review chapter. According to (Mircea and andreescu, 2011) the main benefits of cloud computing in higher education institution were: ability to access materials and data from any place at any time, support for classroom teaching and learning, reducing the cost of software license purchasing, improving student's openness to new technologies. These benefits all were considered in table 4.18 and their entire mean is higher than

average mean (M=3.72). This shows that although cloud technology is new in Iran, the benefits of is not hidden for Iranian instructors.

Moreover in the interview that the researcher had with instructors in Sharif and Amirkabir University, they told their perception on perceived benefits of cloud computing adaptation in university. Regarded to the interview answers the researcher found answers to the third question of interview (What cloud computing services are available in this university? Which one of these services you find the most useful for teaching/learning?" relevant to this part of questionnaire.

According to instructor 1:

> "Our university has the biggest cloud services research center and laboratories. In this research center they not only give cloud virtual lab services to the students and staff of this university but also to the students all over Iranian universities. This system gives a service to the engineering students by hosting big and heavy engineering and calculating application on the cloud servers of the universities and makes it simple for everybody the process of teaching and learning. By this way even if student are not rich enough to buy expensive hardware and software, they can easily connect to university virtual labs and use any software or any simulator application that they need".

He added in his interview that:

> "The e-learning of this university is host on cloud and it makes it possible for students and staff to share, edit and view the courses material, curriculum and exam of each course any time from anyplace as long as they have internet".

Instructor (9) mentioned:

> "I was personally in the process of implementing this system, I don't say it is perfect but it works, if all of our students had access to internet with at least 1Mb speed, it was easy for them to connect to the system and work with it. Many of my students use this system from their house, they download their course materials and see the notices that I post for them. Sometimes we have discussion and I ask some questions from them, It helps me to decide for their exam questions".

On the other hand the instructors (10) & (2) were not satisfied with the cloud services they had in their university, although they have claimed that their cloud services are just like Amirkabir University and they have SAAS services in their computer laboratories but they were had many complain about the management of system.

Instructor 10 state that

> ”It is good that they made this system, now I can share all the materials with my students easily, but just designing a system is not enough, it needs updates, enhancements, debugging and management which unfortunately is not happening here”.

Instructor 2 mentioned that:

> “I always use public cloud services in my class for sharing materials with my students, university provides private cloud services but I do not trust them, I prefer to use Dropbox or SugarSync”.

According to these statements it is possible to say that sharing learning materials and virtual labs were the most important benefits for instructors both in questionnaire and interview.

Researcher also found the answers to question 2 in interview “What was your motive in using cloud computing in education?”, Relevant to this part of questionnaire.

This question was asked to understand the technologic demands and needs which either instructors or students might have in the classroom. For answering to these needs instructors find enough motivation to migrate from traditional ways to the more advance and technological ways.

The answers were varying for these questions. Some of the instructors like instructor (1) said they just used this technology because it was new and they like to use the newest and most advance technology in their classroom to motivate their students.

But Instructor (9) mentioned:

> " we are in digital age , we have to move with the technology so I always say to my students don't scare to try new technologies … as engineers it is our duty to create new technologies and for that we have to try and understand the structure of current technologies"

Some of the instructors were more interested in this technology because of many services that can be delivered via cloud based e-learning platform mostly the application services which can deliver freely for students to use in their home or computer laboratories.

Instructor (5):

> "It's a relief, really! Many of my students does not have a strong computer devices in the home, so when I wanted them to do some homework and project with Gaussian software always half of my students complain that their system hangs in the middle of calculations. I couldn't say anything to them because computer laboratories are not always available especially in exam time. But now with could system, they can register to the cloud center of university and work with any software they want. It is easier for me too; I can monitor their work, edit and correct their assignment and project for them even if I'm not in that Tehran or even Iran".

According to questionnaire and interview results, and proved by (Fernandez, Peralta, Herrera & Benítez, 2012) research, most important benefits of cloud system in universities are virtual laboratories and its support for student with disability and special needs. In addition as it mentioned earlier by (Madhumathi & Ganapathy, 2013) (Nasr & Ouf, 2011) the ability to share materials, anytime anyplace access to all software's that might be needed by instructors and students were essential

benefits of cloud computing which was also achieved by both questionnaire and interview . It is important to remember all of these facilities and benefits are there to improve the classroom learning for students.

4.1.4.1 Instructors perception on perceived benefits of cloud computing adoption for university with respect to age

Table 4.19, is showing the instructor's perception on perceived benefits of cloud computing adaptation for university with respect to age.

Table 4.19: Instructors perception on perceived benefits of cloud computing adoption for university with respect to age

Part C.		**N**	**Mean**	**SD**
Q1.It supports classroom learning	18-22	2	5.00	.000
	23-29	86	4.37	.614
	30-37	61	4.38	1.019
	38-49	34	4.18	.626
	50-60	7	4.57	.535
	60+	11	3.91	.539
	Total	201	4.33	.763
Q2.It supports independent learning at home	18-22	2	5.00	.000
	23-29	86	4.34	.606
	30-37	61	4.43	.921
	38-49	34	3.82	1.058
	50-60	7	4.57	.535
	60+	11	4.00	.447
	Total	201	4.27	.818
Q3.It supports virtual laboratories	18-22	2	5.00	.000
	23-29	86	4.57	.805
	30-37	61	4.80	.477
	38-49	34	4.88	.327
	50-60	7	4.57	.535
	60+	11	4.18	.405
	Total	201	4.68	.640
Q4.It supports self-learning	18-22	2	5.00	.000
	23-29	86	4.37	.614
	30-37	61	4.36	1.017
	38-49	34	4.09	.570
	50-60	7	4.57	.535
	60+	11	4.36	.674
	Total	201	4.33	.757
Q5.It supports peer-to-peer learning	18-22	2	5.00	.000
	23-29	86	4.36	.612
	30-37	61	4.41	1.023
	38-49	34	4.24	.654
	50-60	7	4.43	.535
	60+	11	3.45	.688
	Total	201	4.31	.791
Q6.It supports students with	18-22	2	5.00	.000

special needs	23-29	86	4.51	.715
	30-37	61	4.31	.786
	38-49	34	4.74	.511
	50-60	7	5.00	.000
	60+	11	4.64	.505
	Total	201	4.52	.701
Q7.It supports assessment of students	18-22	2	5.00	.000
	23-29	86	4.26	.706
	30-37	61	4.31	.992
	38-49	34	4.18	.716
	50-60	7	4.43	.787
	60+	11	2.64	1.629
	Total	201	4.18	.944
Q8.It facilitates sharing of learning materials and data	18-22	2	5.00	.000
	23-29	86	4.35	.609
	30-37	61	4.51	.595
	38-49	34	4.26	.618
	50-60	7	4.57	.535
	60+	11	4.00	.447
	Total	201	4.38	.605
Q9.Users can access software anywhere provided there is Internet access	18-22	2	5.00	.000
	23-29	86	4.57	.624
	30-37	61	4.72	.452
	38-49	34	4.68	.589
	50-60	7	5.00	.000
	60+	11	4.27	.647
	Total	201	4.64	.568
Q10.Users can access data anywhere provided there is Internet access	18-22	2	5.00	.000
	23-29	86	4.42	.694
	30-37	61	4.64	.484
	38-49	34	4.59	.609
	50-60	7	5.00	.000
	60+	11	4.18	.751
	Total	201	4.53	.625
Q11.It facilitates communication and collaboration between students	18-22	2	5.00	.000
	23-29	86	4.13	.647
	30-37	61	3.92	1.144
	38-49	34	4.82	.387
	50-60	7	4.71	.756
	60+	11	3.18	.751
	Total	201	4.16	.897
Q12.If facilitates communication and collaboration between teachers and students	18-22	2	5.00	.000
	23-29	86	4.07	.732
	30-37	61	4.23	.783
	38-49	34	4.82	.387
	50-60	7	4.14	.378
	60+	11	3.82	.405
	Total	201	4.24	.732
Q13.It facilitates communication and collaboration between staff	18-22	2	5.00	.000
	23-29	86	4.49	.628
	30-37	61	4.16	.711
	38-49	34	4.24	1.046
	50-60	7	4.43	.787
	60+	11	3.91	.831
	Total	201	4.32	.767
Q14.It is easy to scale up or down amount of services required	18-22	2	5.00	.000
	23-29	86	4.06	.725
	30-37	61	3.62	.952

	38-49	34	4.06	1.413
	50-60	7	3.57	.976
	60+	11	3.82	.982
	Total	201	3.91	.978
Q15.The cloud has large and flexible storage capacity	18-22	2	5.00	.000
	23-29	86	4.16	1.027
	30-37	61	4.39	.988
	38-49	34	4.32	1.065
	50-60	7	4.86	.378
	60+	11	3.82	.874
	Total	201	4.27	1.005
Q16.It reduces expenses on purchasing software (e.g., learning management, teaching-related games, anti-virus software etc.)	18-22	2	5.00	.000
	23-29	86	4.40	.619
	30-37	61	3.95	1.161
	38-49	34	4.53	.507
	50-60	7	4.43	.976
	60+	11	3.82	.874
	Total	201	4.26	.862
Q17.It reduces expenses on purchasing new computing devices	18-22	2	5.00	.000
	23-29	86	4.33	.727
	30-37	61	4.11	1.034
	38-49	34	4.53	.507
	50-60	7	4.43	.976
	60+	11	3.91	1.044
	Total	201	4.28	.839
Q18.It extends the use of existing computing devices	18-22	2	5.00	.000
	23-29	86	4.38	.738
	30-37	61	4.23	.956
	38-49	34	4.38	.493
	50-60	7	3.86	.690
	60+	11	3.73	.905
	Total	201	4.29	.798
Q19.It simplifies the IT management process	18-22	2	5.00	.000
	23-29	86	4.19	.775
	30-37	61	4.28	.799
	38-49	34	3.65	1.323
	50-60	7	2.71	1.380
	60+	11	3.09	1.136
	Total	201	4.02	1.015
Q20.It reduces costs on IT maintenance such as managing different versions of software	18-22	2	5.00	.000
	23-29	86	4.27	.710
	30-37	61	3.98	.991
	38-49	34	4.38	1.101
	50-60	7	3.57	1.397
	60+	11	3.45	1.508
	Total	201	4.14	.975
Q21.It reduces reliance on school IT staff	18-22	2	5.00	.000
	23-29	86	3.99	1.222
	30-37	61	4.03	1.016
	38-49	34	4.06	1.324
	50-60	7	3.14	1.676
	60+	11	2.64	1.748
	Total	201	3.92	1.266
Q22.The school can take advantage of the IT expertise of cloud service providers	18-22	2	5.00	.000
	23-29	86	4.31	.756
	30-37	61	4.46	1.119
	38-49	34	4.59	.783
	50-60	7	4.29	.951

	60+	11	3.82	1.328
	Total	201	4.38	.931
Q23.It facilitates central management of IT resources and avoid corruption	18-22	2	5.00	.000
	23-29	86	3.73	.758
	30-37	61	4.33	.747
	38-49	34	4.62	.493
	50-60	7	5.00	.000
	60+	11	4.09	.701
	Total	201	4.14	.794
Q24.It reduces operating costs of administrative systems	18-22	2	5.00	.000
	23-29	86	3.79	.995
	30-37	61	3.95	1.007
	38-49	34	4.53	.706
	50-60	7	5.00	.000
	60+	11	3.64	.674
	Total	201	4.01	.975
Q25.It enhances productivity of staff	18-22	2	4.00	1.414
	23-29	86	3.53	1.224
	30-37	61	2.80	1.579
	38-49	34	3.24	1.827
	50-60	7	3.71	1.254
	60+	11	2.64	1.120
	Total	201	3.22	1.478
Q26.It simplifies data backup and disaster recovery process	18-22	2	5.00	.000
	23-29	86	4.27	.789
	30-37	61	4.57	.562
	38-49	34	4.26	1.238
	50-60	7	3.43	1.397
	60+	11	4.00	1.000
	Total	201	4.32	.883
Q27.It is easy to adopt new applications quickly	18-22	2	4.00	.000
	23-29	86	3.99	1.333
	30-37	61	4.34	.772
	38-49	34	4.59	.988
	50-60	7	4.86	.378
	60+	11	3.18	1.601
	Total	201	4.18	1.162
Q28.It enhances students' openness to new technologies	18-22	2	5.00	.000
	23-29	86	4.02	.735
	30-37	61	4.16	.860
	38-49	34	4.82	.459
	50-60	7	4.57	.535
	60+	11	4.18	.405
	Total	201	4.24	.770
Q29.It reduces power consumption	18-22	2	5.00	.000
	23-29	86	4.31	.756
	30-37	61	3.75	1.234
	38-49	34	4.82	.459
	50-60	7	4.43	.976
	60+	11	4.27	.647
	Total	201	4.24	.961
Q30.It allows access to applications that the school otherwise would not be aware of or able to afford	18-22	2	5.00	.000
	23-29	86	4.62	.689
	30-37	61	4.66	.629
	38-49	34	4.82	.521
	50-60	7	4.71	.488
	60+	11	4.18	.751
	Total	201	4.65	.648

Q31.It enhances IT security in the school	18-22	2	5.00	.000
	23-29	86	4.15	.914
	30-37	61	4.75	.675
	38-49	34	4.21	1.008
	50-60	7	3.57	.535
	60+	11	3.73	.905
	Total	201	4.31	.908

As it shown in Table 4.19, the perception of instructors toward cloud computing is almost steady and high. Unlike previous tables, this table shows that most of the participants except the instructors more than 60 years old, are believe that cloud computing has many benefits in classroom learning. According to Table 4.19, the support of this technology on virtual labs is important for all age groups of instructors that show how much successfully this technology is used in virtual labs in Iranian universities. Moreover the "Users can access software anywhere provided there is Internet access" benefit is also having very high mean by all the age groups. The significant part of this table is that "It simplifies the IT management process" and "enhancing staff productivity" got very low mean from elder instructors, as a result of that we can say although elder instructors know about the benefits of cloud computing but they are still not trusting it and do not believe that this technology can enhance performance and ease the management issues. The accessibility of software in anywhere anytime and simplifying the management process was also mentioned by (Madhumathi & Ganapathy, 2013) (Nasr & Ouf, 2011), this shows that although unlike earlier researches, mostly younger generation are interested to new technologies but the advantages that push them toward cloud technology is same.

Table 4.20: Instructor's perception on perceived benefits of cloud computing adaptation for university with respect to age

		Sum of Squares	DF	Mean Square	F	Sig.	Meaningful Difference
Q1.It supports classroom learning	Between Groups	4.343	5	.869	1.512	.188	(30-37)-(38-49), (38-49)-(23-29)
	Within Groups	111.985	195	.574			
	Total	116.328	200				
Q2.It supports independent learning at home	Between Groups	11.156	5	2.231	3.543	.004	(30-37)-(60+), (38-49)-(60+)
	Within Groups	122.794	195	.630			
	Total	133.950	200				
Q3.It supports virtual laboratories	Between Groups	6.379	5	1.276	3.291	.007	(23-29)-(60+), (30-37)-(60+)
	Within Groups	75.601	195	.388			
	Total	81.980	200				
Q4.It supports self-learning	Between Groups	3.513	5	.703	1.233	.295	
	Within Groups	111.154	195	.570			
	Total	114.667	200				
Q5.It supports peer-to-peer learning	Between Groups	10.115	5	2.023	3.426	.005	(23-29)-(60+), (30-37)-(60+)
	Within Groups	115.139	195	.590			
	Total	125.254	200				
Q6.It supports students with special needs	Between Groups	6.456	5	1.291	2.745	.020	(30-37)-(38-49)
	Within Groups	91.733	195	.470			
	Total	98.189	200				
Q7.It supports assessment of students	Between Groups	29.534	5	5.907	7.748	.000	(23-29)-(60+), (30-37)-(60+), (38-49)-(60+)
	Within Groups	148.655	195	.762			
	Total	178.189	200				
Q8.It facilitates sharing of learning materials and data	Between Groups	4.151	5	.830	2.342	.043	

	Within Groups	69.113	195	.354			
	Total	73.264	200				
Q9.Users can access software anywhere provided there is Internet access	Between Groups	3.521	5	.704	2.252	.051	
	Within Groups	60.967	195	.313			
	Total	64.488	200				
Q10.Users can access data anywhere provided there is Internet access	Between Groups	5.232	5	1.046	2.800	.018	
	Within Groups	72.867	195	.374			
	Total	78.100	200				
Q11.It facilitates communication and collaboration between students	Between Groups	32.716	5	6.543	9.953	.000	(23-29)-(60+), (30-37)-(60+), (38-49)-(60+)
	Within Groups	128.189	195	.657			
	Total	160.905	200				
Q12.If facilitates communication and collaboration between teachers and students	Between Groups	17.252	5	3.450	7.492	.000	(23-29)-(38-49), (38-49)-(30-37)
	Within Groups	89.803	195	.461			
	Total	107.055	200				
Q13.It facilitates communication and collaboration between staff	Between Groups	7.032	5	1.406	2.480	.033	
	Within Groups	110.590	195	.567			
	Total	117.622	200				
Q14.It is easy to scale up or down amount of services required	Between Groups	10.934	5	2.187	2.365	.041	
	Within Groups	180.270	195	.924			
	Total	191.204	200				
Q15.The cloud has large and flexible storage capacity	Between Groups	7.737	5	1.547	1.554	.175	
	Within Groups	194.213	195	.996			
	Total	201.950	200				
Q16.It reduces expenses on purchasing software (e.g., learning	Between Groups	13.315	5	2.663	3.840	.002	(23-29)-(38-49), (38-49)-(30-37)

management, teaching-related games, anti-virus software etc.)	Within Groups	135.232	195	.693			
	Total	148.547	200				
Q17.It reduces expenses on purchasing new computing devices	Between Groups	6.661	5	1.332	1.936	.090	
	Within Groups	134.174	195	.688			
	Total	140.836	200				
Q18.It extends the use of existing computing devices	Between Groups	7.071	5	1.414	2.294	.047	
	Within Groups	120.192	195	.616			
	Total	127.264	200				
Q19.It simplifies the IT management process	Between Groups	34.532	5	6.906	7.858	.000	(18-22)-(50-60), (38-49)-(30-37), (50-60)-(30-37)
	Within Groups	171.388	195	.879			
	Total	205.920	200				
Q20.It reduces costs on IT maintenance such as managing different versions of software	Between Groups	13.796	5	2.759	3.052	.011	
	Within Groups	176.303	195	.904			
	Total	190.100	200				
Q21.It reduces reliance on school IT staff	Between Groups	26.519	5	5.304	3.515	.005	(30-37)-(60+), (38-49)-(60+)
	Within Groups	294.208	195	1.509			
	Total	320.726	200				
Q22.The school can take advantage of the IT expertise of cloud service providers	Between Groups	6.531	5	1.306	1.526	.183	
	Within Groups	166.971	195	.856			
	Total	173.502	200				
Q23.It facilitates central management of IT resources and avoid corruption	Between Groups	30.870	5	6.174	12.642	.000	(23-29)-(38-49), (38-49)-(30-37)
	Within Groups	95.230	195	.488			
	Total	126.100	200				
Q24.It reduces operating costs of administrative systems	Between Groups	23.879	5	4.776	5.607	.000	(23-29)-(38-49), (38-49)-(30-37),

	Within Groups	166.101	195	.852			(50-60)-(60+)
	Total	189.980	200				
Q25.It enhances productivity of staff	Between Groups	25.799	5	5.160	2.447	.035	(23-29)-(30-37)
	Within Groups	411.126	195	2.108			
	Total	436.925	200				
Q26.It simplifies data backup and disaster recovery process	Between Groups	11.881	5	2.376	3.216	.008	(30-37)-(50-60)
	Within Groups	144.099	195	.739			
	Total	155.980	200				
Q27.It is easy to adopt new applications quickly	Between Groups	24.701	5	4.940	3.924	.002	(30-37)-(60+), (38-49)-(60+)
	Within Groups	245.488	195	1.259			
	Total	270.189	200				
Q28.It enhances students' openness to new technologies	Between Groups	17.931	5	3.586	6.951	.000	(38-49)-(30-37)
	Within Groups	100.606	195	.516			
	Total	118.537	200				
Q29.It reduces power consumption	Between Groups	27.865	5	5.573	6.936	.000	(38-49)-(30-37), (38-49)-(30-37)
	Within Groups	156.672	195	.803			
	Total	184.537	200				
Q30.It allows access to applications that the school otherwise would not be aware of or able to afford	Between Groups	3.807	5	.761	1.853	.104	
	Within Groups	80.114	195	.411			
	Total	83.920	200				
Q31.It enhances IT security in the school	Between Groups	23.074	5	4.615	6.346	.000	(23-29)-(30-37), (30-37)-(60+), (30-37)-(50-60)
	Within Groups	141.801	195	.727			
	Total	164.876	200				

According to the result in all of the questions except question 1,4,15, 22 and 30, instructors perception on perceived benefits of cloud computing adaptation was with high significance difference between experience levels but in “it support classroom learning” with (Sig=0.188), “it support self-learning” with (Sig=0.295), “The cloud has large and flexible storage capacity) with (Sig=0.175) and “the school can take advantages of the IT expertise of cloud services” with (Sig=0.183) and “it allows access to applications that the school otherwise would not be aware of or able to afford” with (Sig=0.104) there is no much difference. This shows that all instructors regardless of their age are having same idea the benefits of using such technologies in their higher education systems.

4.1.4.2 Instructors perception on perceived benefits of cloud computing adoption for university with respect to education level

Table 4.21, is showing instructors perception on perceived benefits of cloud computing adoption for university regarded to participant’s education level.

Table 4.21: Instructors perception on perceived benefits of cloud computing adoption for university regarded to education level

Part C.		**N**	**Mean**	**SD**
Q1.It supports classroom learning	Master	112	4.46	.552
	PHD	68	4.22	1.020
	Post-PHD	21	4.00	.632
	Total	201	4.33	.763
Q2.It supports independent learning at home	Master	112	4.35	.779
	PHD	68	4.24	.932
	Post-PHD	21	4.00	.548
	Total	201	4.27	.818
Q3.It supports virtual laboratories	Master	112	4.72	.674
	PHD	68	4.60	.626
	Post-PHD	21	4.67	.483
	Total	201	4.68	.640
Q4.It supports self-learning	Master	112	4.45	.551
	PHD	68	4.22	1.020
	Post-PHD	21	4.10	.625
	Total	201	4.33	.757
Q5.It supports peer-to-peer learning	Master	112	4.47	.553
	PHD	68	4.25	1.028
	Post-PHD	21	3.67	.658
	Total	201	4.31	.791

Q6.It supports students with special needs	Master	112	4.63	.585
	PHD	68	4.24	.848
	Post-PHD	21	4.81	.402
	Total	201	4.52	.701
Q7.It supports assessment of students	Master	112	4.34	.679
	PHD	68	4.24	.964
	Post-PHD	21	3.19	1.436
	Total	201	4.18	.944
Q8.It facilitates sharing of learning materials and data	Master	112	4.45	.551
	PHD	68	4.37	.667
	Post-PHD	21	4.05	.590
	Total	201	4.38	.605
Q9.Users can access software anywhere provided there is Internet access	Master	112	4.67	.560
	PHD	68	4.59	.579
	Post-PHD	21	4.62	.590
	Total	201	4.64	.568
Q10.Users can access data anywhere provided there is Internet access	Master	112	4.51	.644
	PHD	68	4.54	.584
	Post-PHD	21	4.57	.676
	Total	201	4.53	.625
Q11.It facilitates communication and collaboration between students	Master	112	4.21	.740
	PHD	68	4.06	1.091
	Post-PHD	21	4.19	.981
	Total	201	4.16	.897
Q12.If facilitates communication and collaboration between teachers and students	Master	112	4.21	.776
	PHD	68	4.25	.677
	Post-PHD	21	4.38	.669
	Total	201	4.24	.732
Q13.It facilitates communication and collaboration between staff	Master	112	4.43	.681
	PHD	68	4.21	.856
	Post-PHD	21	4.10	.831
	Total	201	4.32	.767
Q14.It is easy to scale up or down amount of services required	Master	112	4.10	.759
	PHD	68	3.68	1.126
	Post-PHD	21	3.62	1.284
	Total	201	3.91	.978
Q15.The cloud has large and flexible storage capacity	Master	112	4.20	1.056
	PHD	68	4.44	.937
	Post-PHD	21	4.14	.910
	Total	201	4.27	1.005
Q16.It reduces expenses on purchasing software (e.g., learning management, teaching-related games, anti-virus software etc.)	Master	112	4.43	.596
	PHD	68	4.04	1.139
	Post-PHD	21	4.05	.865
	Total	201	4.26	.862
Q17.It reduces expenses on purchasing new computing devices	Master	112	4.38	.688
	PHD	68	4.18	1.007
	Post-PHD	21	4.10	.944
	Total	201	4.28	.839
Q18.It extends the use of existing computing devices	Master	112	4.43	.694
	PHD	68	4.21	.907
	Post-PHD	21	3.81	.750
	Total	201	4.29	.798
Q19.It simplifies the IT management process	Master	112	4.18	.872
	PHD	68	3.96	1.028
	Post-PHD	21	3.38	1.396
	Total	201	4.02	1.015
Q20.It reduces costs on IT maintenance such as managing different versions of	Master	112	4.30	.837
	PHD	68	3.96	1.028

software	Post-PHD	21	3.86	1.315
	Total	201	4.14	.975
Q21.It reduces reliance on school IT staff	Master	112	4.13	1.095
	PHD	68	3.78	1.314
	Post-PHD	21	3.24	1.670
	Total	201	3.92	1.266
Q22.The school can take advantage of the IT expertise of cloud service providers	Master	112	4.49	.710
	PHD	68	4.29	1.080
	Post-PHD	21	4.10	1.338
	Total	201	4.38	.931
Q23.It facilitates central management of IT resources and avoid corruption	Master	112	4.04	.793
	PHD	68	4.21	.802
	Post-PHD	21	4.48	.680
	Total	201	4.14	.794
Q24.It reduces operating costs of administrative systems	Master	112	4.03	.972
	PHD	68	3.87	1.006
	Post-PHD	21	4.38	.805
	Total	201	4.01	.975
Q25.It enhances productivity of staff	Master	112	3.29	1.468
	PHD	68	3.29	1.436
	Post-PHD	21	2.62	1.596
	Total	201	3.22	1.478
Q26.It simplifies data backup and disaster recovery process	Master	112	4.41	.665
	PHD	68	4.26	1.074
	Post-PHD	21	4.05	1.161
	Total	201	4.32	.883
Q27.It is easy to adopt new applications quickly	Master	112	4.29	1.061
	PHD	68	4.18	1.105
	Post-PHD	21	3.67	1.683
	Total	201	4.18	1.162
Q28.It enhances students' openness to new technologies	Master	112	4.25	.753
	PHD	68	4.09	.824
	Post-PHD	21	4.67	.483
	Total	201	4.24	.770
Q29.It reduces power consumption	Master	112	4.36	.708
	PHD	68	4.01	1.287
	Post-PHD	21	4.33	.796
	Total	201	4.24	.961
Q30.It allows access to applications that the school otherwise would not be aware of or able to afford	Master	112	4.64	.642
	PHD	68	4.74	.614
	Post-PHD	21	4.38	.740
	Total	201	4.65	.648
Q31.It enhances IT security in the school	Master	112	4.30	.928
	PHD	68	4.46	.871
	Post-PHD	21	3.86	.793
	Total	201	4.31	.908

As it shown in Table 4.21, there is almost no big difference between means in educational levels; the only difference is in low mean value in all educational levels in “it enhances productivity of staff”. According to this table most of participants

regarded to their educational difference all believe that cloud computing technology does not enhance the productivity of staff, Since the value for benefits regarded to reducing reliance on school IT-staff is not so high, we can say that there is a serious problem in giving cloud based services in universities of Iran. This can be due to the fact that internet speed is not fast enough for these services and also it is a new technology which might need more time to develop and learned by university staff.

Table 4.22: Instructor's perception on perceived benefits of cloud computing adaptation for university with respect to education

		Sum of Squares	DF	Mean Square	F	Sig.	Meaningful Difference
It supports classroom learning	Between Groups	4.860	2	2.430	4.317	.015	
	Within Groups	111.468	198	.563			
	Total	116.328	200				
It supports independent learning at home	Between Groups	2.295	2	1.148	1.726	.181	
	Within Groups	131.655	198	.665			
	Total	133.950	200				
It supports virtual laboratories	Between Groups	.614	2	.307	.748	.475	
	Within Groups	81.366	198	.411			
	Total	81.980	200				
It supports self-learning	Between Groups	3.487	2	1.744	3.105	.047	
	Within Groups	111.179	198	.562			
	Total	114.667	200				
It supports peer-to-peer learning	Between Groups	11.917	2	5.959	10.410	.000	(Post-master), (post-phd)
	Within Groups	113.336	198	.572			
	Total	125.254	200				

It supports students with special needs	Between Groups	8.725	2	4.362	9.655	.000	(phd-master), (post-phd)
	Within Groups	89.464	198	.452			
	Total	98.189	200				
It supports assessment of students	Between Groups	23.609	2	11.804	15.120	.000	(post-master) ,(post-phd)
	Within Groups	154.581	198	.781			
	Total	178.189	200				
It facilitates sharing of learning materials and data	Between Groups	2.824	2	1.412	3.969	.020	(post-master)
	Within Groups	70.440	198	.356			
	Total	73.264	200				
Users can access software anywhere provided there is Internet access	Between Groups	.288	2	.144	.444	.642	
	Within Groups	64.200	198	.324			
	Total	64.488	200				
Users can access data anywhere provided there is Internet access	Between Groups	.098	2	.049	.124	.883	
	Within Groups	78.002	198	.394			
	Total	78.100	200				
It facilitates communication and collaboration between students	Between Groups	1.046	2	.523	.647	.524	
	Within Groups	159.860	198	.807			
	Total	160.905	200				
If facilitates communication and collaboration between teachers and students	Between Groups	.495	2	.248	.460	.632	
	Within Groups	106.560	198	.538			
	Total	107.055	200				
It facilitates communication and collaboration between staff	Between Groups	3.266	2	1.633	2.828	.062	
	Within Groups	114.356	198	.578			
	Total	117.622	200				

It is easy to scale up or down amount of services required	Between Groups	9.450	2	4.725	5.147	.007	(post-master), (master-phd)
	Within Groups	181.754	198	.918			
	Total	191.204	200				
The cloud has large and flexible storage capacity	Between Groups	2.936	2	1.468	1.460	.235	
	Within Groups	199.015	198	1.005			
	Total	201.950	200				
It reduces expenses on purchasing software (e.g., learning management, teaching-related games, anti-virus software etc.)	Between Groups	7.299	2	3.649	5.116	.007	(master-phd)
	Within Groups	141.249	198	.713			
	Total	148.547	200				
It reduces expenses on purchasing new computing devices	Between Groups	2.653	2	1.326	1.901	.152	
	Within Groups	138.183	198	.698			
	Total	140.836	200				
It extends the use of existing computing devices	Between Groups	7.479	2	3.740	6.182	.002	(post-master)
	Within Groups	119.784	198	.605			
	Total	127.264	200				
It simplifies the IT management process	Between Groups	11.672	2	5.836	5.949	.003	
	Within Groups	194.249	198	.981			
	Total	205.920	200				
It reduces costs on IT maintenance such as managing different versions of software	Between Groups	6.982	2	3.491	3.775	.025	(post-master)
	Within Groups	183.118	198	.925			
	Total	190.100	200				
It reduces reliance on school IT staff	Between Groups	16.235	2	8.117	5.278	.006	(post-master)
	Within Groups	304.492	198	1.538			
	Total	320.726	200				

The school can take advantage of the IT expertise of cloud service providers	Between Groups	3.584	2	1.792	2.088	.127	
	Within Groups	169.918	198	.858			
	Total	173.502	200				
It facilitates central management of IT resources and avoid corruption	Between Groups	3.887	2	1.943	3.148	.045	
	Within Groups	122.213	198	.617			
	Total	126.100	200				
It reduces operating costs of administrative systems	Between Groups	4.299	2	2.150	2.292	.104	
	Within Groups	185.681	198	.938			
	Total	189.980	200				
It enhances productivity of staff	Between Groups	8.579	2	4.289	1.983	.140	
	Within Groups	428.347	198	2.163			
	Total	436.925	200				
It simplifies data backup and disaster recovery process	Between Groups	2.685	2	1.343	1.734	.179	
	Within Groups	153.295	198	.774			
	Total	155.980	200				
It is easy to adopt new applications quickly	Between Groups	6.783	2	3.391	2.549	.081	
	Within Groups	263.406	198	1.330			
	Total	270.189	200				
It enhances students' openness to new technologies	Between Groups	5.400	2	2.700	4.725	.010	
	Within Groups	113.137	198	.571			(post-phd)
	Total	118.537	200				
It reduces power consumption	Between Groups	5.171	2	2.586	2.854	.060	
	Within Groups	179.366	198	.906			
	Total	184.537	200				

It allows access to applications that the school otherwise would not be aware of or able to afford	Between Groups	2.018	2	1.009	2.440	.090	
	Within Groups	81.902	198	.414			
	Total	83.920	200				
It enhances IT security in the school	Between Groups	5.758	2	2.879	3.583	.030	
	Within Groups	159.118	198	.804			(phd-post)
	Total	164.876	200				

According to the result in all of the questions except question 15, 22, 24 and 26 instructors perception on perceived benefits of cloud computing adaptation was with high significance difference between experience levels but in "the cloud has large and flexible capacity" with (Sig=0.235) and "the school can take advantages of the IT expertise of cloud services providers" with (Sig=0.127) and "it reduce operating costs of administrative systems" with (Sig=0.104) and "it simplifies data backup and disaster recovery process" with (Sig=0.179) there is no much difference. This shows that all instructors regardless of their education level are having same idea the benefits of using such technologies in their higher education systems.

4.1.4.3 Instructors perception on perceived benefits of cloud computing adoption for university with respect to experience

Table 4.23, is showing instructors perception on perceived benefits of cloud computing adoption for university with respect to experience.

Table 4.23: Instructors perception on perceived benefits of cloud computing adoption for university with respect to experience

		N	Mean	SD
Q1.It supports classroom learning	1-2 years	100	4.43	.607
	3-5 years	50	4.48	.544
	6-8 years	25	3.92	1.412
	9-12 years	14	4.14	.663

	13+ years	12	3.92	.515
	Total	201	4.33	.763
Q2.It supports independent learning at home	1-2 years	100	4.37	.597
	3-5 years	50	4.34	1.002
	6-8 years	25	3.96	1.241
	9-12 years	14	4.14	.663
	13+ years	12	4.00	.426
	Total	201	4.27	.818
Q3.It supports virtual laboratories	1-2 years	100	4.62	.763
	3-5 years	50	4.86	.452
	6-8 years	25	4.68	.476
	9-12 years	14	4.64	.497
	13+ years	12	4.42	.515
	Total	201	4.68	.640
Q4.It supports self-learning	1-2 years	100	4.41	.605
	3-5 years	50	4.50	.544
	6-8 years	25	3.80	1.354
	9-12 years	14	4.29	.726
	13+ years	12	4.17	.577
	Total	201	4.33	.757
Q5.It supports peer-to-peer learning	1-2 years	100	4.38	.599
	3-5 years	50	4.66	.519
	6-8 years	25	3.68	1.282
	9-12 years	14	4.50	.760
	13+ years	12	3.42	.515
	Total	201	4.31	.791
Q6.It supports students with special needs	1-2 years	100	4.37	.761
	3-5 years	50	4.60	.639
	6-8 years	25	4.60	.707
	9-12 years	14	5.00	.000
	13+ years	12	4.67	.492
	Total	201	4.52	.701
Q7.It supports assessment of students	1-2 years	100	4.32	.695
	3-5 years	50	4.42	.673
	6-8 years	25	4.00	1.291
	9-12 years	14	4.00	.784
	13+ years	12	2.67	1.557
	Total	201	4.18	.944
Q8.It facilitates sharing of learning materials and data	1-2 years	100	4.39	.601
	3-5 years	50	4.54	.542
	6-8 years	25	4.32	.690
	9-12 years	14	4.14	.663
	13+ years	12	4.00	.426
	Total	201	4.38	.605
Q9.Users can access software anywhere provided there is Internet access	1-2 years	100	4.66	.555
	3-5 years	50	4.60	.571
	6-8 years	25	4.56	.651
	9-12 years	14	5.00	.000
	13+ years	12	4.33	.651
	Total	201	4.64	.568
Q10.Users can access data anywhere provided there is Internet access	1-2 years	100	4.48	.643
	3-5 years	50	4.62	.567
	6-8 years	25	4.40	.645
	9-12 years	14	5.00	.000
	13+ years	12	4.25	.754
	Total	201	4.53	.625
Q11.It facilitates communication and collaboration between students	1-2 years	100	3.89	.920
	3-5 years	50	4.52	.735

	6-8 years	25	4.52	.510
	9-12 years	14	4.64	.929
	13+ years	12	3.58	.900
	Total	201	4.16	.897
Q12.If facilitates communication and collaboration between teachers and students	1-2 years	100	4.10	.759
	3-5 years	50	4.36	.776
	6-8 years	25	4.60	.500
	9-12 years	14	4.50	.519
	13+ years	12	3.92	.515
	Total	201	4.24	.732
Q13.It facilitates communication and collaboration between staff	1-2 years	100	4.35	.702
	3-5 years	50	4.36	.693
	6-8 years	25	4.32	1.030
	9-12 years	14	4.43	.852
	13+ years	12	3.75	.754
	Total	201	4.32	.767
Q14.It is easy to scale up or down amount of services required	1-2 years	100	3.89	.852
	3-5 years	50	4.12	.940
	6-8 years	25	3.72	1.173
	9-12 years	14	3.86	1.512
	13+ years	12	3.58	.900
	Total	201	3.91	.978
Q15.The cloud has large and flexible storage capacity	1-2 years	100	4.29	.988
	3-5 years	50	4.18	1.063
	6-8 years	25	4.48	1.122
	9-12 years	14	4.43	.756
	13+ years	12	3.92	.900
	Total	201	4.27	1.005
Q16.It reduces expenses on purchasing software (e.g., learning management, teaching-related games, anti-virus software etc.)	1-2 years	100	4.24	.854
	3-5 years	50	4.46	.646
	6-8 years	25	4.04	1.207
	9-12 years	14	4.64	.497
	13+ years	12	3.58	.793
	Total	201	4.26	.862
Q17.It reduces expenses on purchasing new computing devices	1-2 years	100	4.23	.827
	3-5 years	50	4.46	.542
	6-8 years	25	4.16	1.214
	9-12 years	14	4.79	.426
	13+ years	12	3.67	.985
	Total	201	4.28	.839
Q18.It extends the use of existing computing devices	1-2 years	100	4.37	.706
	3-5 years	50	4.50	.505
	6-8 years	25	3.96	1.338
	9-12 years	14	4.29	.469
	13+ years	12	3.42	.669
	Total	201	4.29	.798
Q19.It simplifies the IT management process	1-2 years	100	4.22	.746
	3-5 years	50	4.06	1.038
	6-8 years	25	3.88	1.201
	9-12 years	14	3.71	1.326
	13+ years	12	2.83	1.267
	Total	201	4.02	1.015
Q20.It reduces costs on IT maintenance such as managing different versions of software	1-2 years	100	4.23	.802
	3-5 years	50	4.08	1.122
	6-8 years	25	4.36	.810
	9-12 years	14	4.00	1.177
	13+ years	12	3.33	1.371

	Total	201	4.14	.975
Q21.It reduces reliance on school IT staff	1-2 years	100	3.98	1.214
	3-5 years	50	4.08	1.226
	6-8 years	25	4.08	.997
	9-12 years	14	4.07	1.207
	13+ years	12	2.25	1.422
	Total	201	3.92	1.266
Q22.The school can take advantage of the IT expertise of cloud service providers	1-2 years	100	4.27	.962
	3-5 years	50	4.74	.443
	6-8 years	25	4.36	.995
	9-12 years	14	4.50	1.160
	13+ years	12	3.75	1.288
	Total	201	4.38	.931
Q23.It facilitates central management of IT resources and avoid corruption	1-2 years	100	3.90	.823
	3-5 years	50	4.36	.631
	6-8 years	25	4.20	.816
	9-12 years	14	4.93	.267
	13+ years	12	4.17	.718
	Total	201	4.14	.794
Q24.It reduces operating costs of administrative systems	1-2 years	100	3.78	1.050
	3-5 years	50	4.22	.887
	6-8 years	25	4.16	.746
	9-12 years	14	4.57	.852
	13+ years	12	4.08	.793
	Total	201	4.01	.975
Q25.It enhances productivity of staff	1-2 years	100	3.32	1.392
	3-5 years	50	3.26	1.562
	6-8 years	25	2.64	1.578
	9-12 years	14	4.07	1.385
	13+ years	12	2.50	1.168
	Total	201	3.22	1.478
Q26.It simplifies data backup and disaster recovery process	1-2 years	100	4.34	.755
	3-5 years	50	4.48	.839
	6-8 years	25	4.60	.500
	9-12 years	14	3.86	1.512
	13+ years	12	3.50	1.168
	Total	201	4.32	.883
Q27.It is easy to adopt new applications quickly	1-2 years	100	3.92	1.253
	3-5 years	50	4.70	.614
	6-8 years	25	4.52	.586
	9-12 years	14	4.36	1.447
	13+ years	12	3.33	1.614
	Total	201	4.18	1.162
Q28.It enhances students' openness to new technologies	1-2 years	100	4.09	.780
	3-5 years	50	4.38	.780
	6-8 years	25	4.24	.831
	9-12 years	14	4.64	.497
	13+ years	12	4.42	.515
	Total	201	4.24	.770
Q29.It reduces power consumption	1-2 years	100	4.14	.954
	3-5 years	50	4.44	.733
	6-8 years	25	4.00	1.414
	9-12 years	14	4.86	.535
	13+ years	12	4.00	.739
	Total	201	4.24	.961
Q30.It allows access to applications that	1-2 years	100	4.63	.646

the school otherwise would not be aware of or able to afford	3-5 years	50	4.64	.693
	6-8 years	25	4.84	.554
	9-12 years	14	4.93	.267
	13+ years	12	4.08	.669
	Total	201	4.65	.648
Q31.It enhances IT security in the school	1-2 years	100	4.40	.829
	3-5 years	50	4.28	1.031
	6-8 years	25	4.56	.961
	9-12 years	14	4.07	.730
	13+ years	12	3.42	.515
	Total	201	4.31	.908

As it shown in Table 4.23, instructors whom had more than 13 years of experience do not believe in benefits of cloud computing as other instructors. Although the table shows a steady means in most of the cases but again reduction of reliance on IT staff and enhancing productivity got the lowest mean here from elder instructors which shows that there is trusting and knowledge issue in this instructors about the benefits of this technology.

Table 4.24: Instructor's perception on perceived benefits of cloud computing adaptation for university with respect to experience

		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**	**Meaningful Difference**
It supports classroom learning	Between Groups	8.867	4	2.217	4.043	.004	(1-2)-(6-8), (3-5)-(6-8)
	Within Groups	107.461	196	.548			
	Total	116.328	200				
It supports independent learning at home	Between Groups	4.746	4	1.186	1.800	.130	
	Within Groups	129.204	196	.659			
	Total	133.950	200				
It supports virtual laboratories	Between Groups	2.829	4	.707	1.751	.140	
	Within Groups	79.151	196	.404			
	Total	81.980	200				
It supports self-learning	Between Groups	9.453	4	2.363	4.402	.002	(1-2)-(6-8), (3-5)-(6-8)
	Within Groups	105.214	196	.537			
	Total	114.667	200				
It supports peer-to-peer learning	Between Groups	26.617	4	6.654	13.223	.000	(1-2)-(6-8),(3-5)-(6-8)
	Within Groups	98.637	196	.503			

	Total	125.254	200				
It supports students with special needs	Between Groups	6.212	4	1.553	3.310	.012	(1-2)-(9-12)
	Within Groups	91.977	196	.469			
	Total	98.189	200				
It supports assessment of students	Between Groups	33.582	4	8.396	11.379	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	144.607	196	.738			
	Total	178.189	200				
It facilitates sharing of learning materials and data	Between Groups	3.899	4	.975	2.755	.029	(3-5)-(13+)
	Within Groups	69.364	196	.354			
	Total	73.264	200				
Users can access software anywhere provided there is Internet access	Between Groups	3.221	4	.805	2.576	.039	(9-12)-(13+)
	Within Groups	61.267	196	.313			
	Total	64.488	200				
Users can access data anywhere provided there is Internet access	Between Groups	5.110	4	1.277	3.430	.010	(9-12)-(1-2), (9-12)-(6-8), (9-12)-(13+)
	Within Groups	72.990	196	.372			
	Total	78.100	200				
It facilitates communication and collaboration between students	Between Groups	24.265	4	6.066	8.701	.000	(1-2)-(3-5), (1-2)-(6-8), (1-2)-(9-12)
	Within Groups	136.641	196	.697			
	Total	160.905	200				
If facilitates communication and collaboration between teachers and students	Between Groups	8.118	4	2.030	4.021	.004	(1-2)-(6-8)
	Within Groups	98.937	196	.505			
	Total	107.055	200				
It facilitates communication and collaboration between staff	Between Groups	4.233	4	1.058	1.829	.125	
	Within Groups	113.389	196	.579			
	Total	117.622	200				
It is easy to scale up or down amount of services required	Between Groups	4.463	4	1.116	1.171	.325	
	Within Groups	186.741	196	.953			
	Total	191.204	200				
The cloud has large and flexible storage capacity	Between Groups	3.395	4	.849	.838	.503	
	Within Groups	198.555	196	1.013			
	Total	201.950	200				
It reduces expenses on purchasing software (e.g., learning management, teaching-related games, anti-virus software etc.)	Between Groups	10.796	4	2.699	3.840	.005	(3-5)-(13+), (9-12)-(13+)
	Within Groups	137.751	196	.703			
	Total	148.547	200				
It reduces expenses on purchasing new computing	Between Groups	10.322	4	2.581	3.875	.005	(3-5)-(13+)
	Within Groups	130.514	196	.666			

devices	Total	140.836	200				
It extends the use of existing computing devices	Between Groups	14.720	4	3.680	6.409	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	112.544	196	.574			
	Total	127.264	200				
It simplifies the IT management process	Between Groups	22.777	4	5.694	6.094	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	183.144	196	.934			
	Total	205.920	200				
It reduces costs on IT maintenance such as managing different versions of software	Between Groups	10.283	4	2.571	2.802	.027	(1-2)-(13+), (6-8)-(13+)
	Within Groups	179.817	196	.917			
	Total	190.100	200				
It reduces reliance on school IT staff	Between Groups	36.068	4	9.017	6.209	.000	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+), (9-12)-(13+)
	Within Groups	284.659	196	1.452			
	Total	320.726	200				
The school can take advantage of the IT expertise of cloud service providers	Between Groups	12.662	4	3.166	3.858	.005	(1-2)-(3-5), (3-8)-(13+)
	Within Groups	160.840	196	.821			
	Total	173.502	200				
It facilitates central management of IT resources and avoid corruption	Between Groups	16.984	4	4.246	7.627	.000	(1-2)-(3-5), (6-8)-(9-12)
	Within Groups	109.115	196	.557			
	Total	126.100	200				
It reduces operating costs of administrative systems	Between Groups	12.535	4	3.134	3.461	.009	(1-2)-(9-12)
	Within Groups	177.445	196	.905			
	Total	189.980	200				
It enhances productivity of staff	Between Groups	25.857	4	6.464	3.082	.017	(6-8)-(9-12)
	Within Groups	411.069	196	2.097			
	Total	436.925	200				
It simplifies data backup and disaster recovery process	Between Groups	14.346	4	3.586	4.963	.001	(1-2)-(13+)
	Within Groups	141.634	196	.723			
	Total	155.980	200				
It is easy to adopt new applications quickly	Between Groups	32.208	4	8.052	6.632	.000	(1-2)-(3-5), (3-5)-(13+), (6-8)-(13+)
	Within Groups	237.981	196	1.214			
	Total	270.189	200				
It enhances students' openness to new technologies	Between Groups	5.876	4	1.469	2.556	.040	
	Within Groups	112.661	196	.575			
	Total	118.537	200				
It reduces power consumption	Between Groups	10.463	4	2.616	2.945	.021	
	Within Groups	174.074	196	.888			
	Total	184.537	200				

It allows access to applications that the school otherwise would not be aware of or able to afford	Between Groups	5.885	4	1.471	3.695	.006	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+)
	Within Groups	78.035	196	.398			
	Total	83.920	200				
It enhances IT security in the school	Between Groups	12.790	4	3.198	4.121	.003	(1-2)-(13+), (3-5)-(13+), (6-8)-(13+)
	Within Groups	152.085	196	.776			
	Total	164.876	200				

According to the result in all of the questions except question 2,4,14 and 15 instructors perception on perceived benefits of cloud computing adaptation was with high significance difference between experience levels but in “it support independent learning at home” with (Sig=0.130) and “it supports virtual laboratories” with (Sig=0.140) and “the cloud has large and flexible storage capacity” with (Sig=0.503) and “it is easy to scale up or down amount of services required” with (Sig=0.325) there is no much difference. This shows that all instructors regardless of their experience level are having same idea the benefits of using such technologies in their higher education systems.

4.1.5 Summary of questionnaires and interviews

Collection and analysis of result of this survey showed that although cloud computing is a new technology in Iran and only few university implement this technology in their educational environment (javan, 2015). But the students and instructors are motivated and ready to use this system. Although elder instructors did not participate enough with using this technology but according to results above, they know about the benefits of this technology but just do not want to change their old ways. From other hand younger instructors showed that they are really interested about new technologies and with good implementation and design of this system, all instructors in Iran can benefit from many advantages of this system.

Moreover there were more questions which were asked from instructors in the interview part, since researcher has mentioned interview question 2, 3, 5 earlier, in below there are the answers and analysis of rest of questions.

In first question, the researcher asked the interviewees, how long have they used cloud computing in their university and what was their first impression of using it and if this impression changed over time. This question was asked to know about the background and experience of the interviewee on working with cloud systems. In each interview it is important to know how well the interviewee know the subject and as a result how much his/her explanation and remarks are valid and right. The second part of the question was asked to have a deeper understanding on assumption of the interviewee about the cloud system and what service they actually had received for that assumption.

According to the answers of all instructors the history of using such system in Iranian universities is not long and they just started to use this system for 3-4 years. According to Instructor (3) and (4) their first impression of cloud system was doubtful and pessimistic.

Instructor (3) said:

> "As I know cloud computing needs a good internet connection, we don't have that in Iran .I don't think using this way will solve any of our problems"

Rest of instructors believed that cloud computing can help them improve the level of teaching and expand e-learning in the university so much more than before. After implementing this system almost all of the interviewees had unpleasant experience using this system on their e-learning system. What they were mostly complaining

about was not the actual problem of cloud computing or even e-learning system but the wrong implementation and managing of such system in developing countries like Iran also the internet speed was the biggest concern of all instructors.

As instructor (8) said:

> "They try to change a system to something better, but the make even more problems. Lack of management, cooperation and knowledge makes a big problem. The infrastructure is there, they spend so much for it but when it comes to control and monitoring it they don't spend enough for an expert developer… When I want to upload next week materials for my students, I take around 5 minutes for each file and this is really time consuming …"

Instructor (3) believed the problem is the internet speed:

> "The system is good, not perfect but it can be better in time … Internet speed is the biggest problem here, I was at a conference last month in Dubai, I could easily connect to my account there and share take home exam paper with my students; but in Iran I have to wait long time for a page to come up …"

Although some of instructors used public cloud based systems like Dropbox and Google drive or Sugersync but most of them ignore the universities cloud services simply because they were unware of these systems, had problem with internet speed and performance of this system or they didn't trust the university cloud based e-learning . In addition most of the instructors believe that this situation can be changed in future and these problems are just happening because cloud services are new in Iran and it needs a time to grow and be part of the academic body in all universities.

According to instructor (1):

> "This technology is still new in Iran, because of the sanctions and some security issues it was so difficult for companies to use public cloud and because of that, now some IT companies start to give this service to big organization like RAZI who needs this most because they have many branch all over the Iran but their database was same … for universities I think just

> our university is the only one in Iran who has its own cloud servers… they are new in implementation and managing it , in future they can make a great system , I'm sure … "

In fourth question the researcher asked interviews about how much this cloud system is user-friendly and applicable as a learning environment for them and their students in the university. Being user-friendly is one of the most important features that a service or application should have, if the user does not find the environment of program understandable and simple he/she would lose the interest to use that program, So in this question the interviewer wanted to know whether the designer of cloud services in that university was successful in delivering such system or not.

According to almost all the interviewees the system had user friendly interface but it did not consider the current situation of Iran specially the internet speed problem. What is important is that students and staff might be able to use these application and files when they are in the university and use the internet in the computer laboratories and classes. The internets in these places are so much faster than outside of the university. Though internet is available in almost all over Iran, but the speed can be a challenge for students. The maximum internet speed given to personal use in Iran is 4mb/s for firms (for houses it is 256 Kb/s). There are companies which offer faster internet services but the problem is the price of such services which are almost triple than a normal price.

Instructor (6) mentioned:

> "If by user friendly you just mean the interface, it is okay. It is simple but it takes too much time for this system to connect to university cloud system and it is not stable, it just cuts and hangs in the middle of the process "

Another complaint that instructor had about the cloud services of the university was the limitation in given services, unprofessional interface and incomplete system which all were a result of weak management and budgeting problem of the university.

In sixth question the researcher asked about the reasons which higher educational institutions use cloud computing in their systems. Higher education systems might not willingly want to change their teaching methods, usually educational institution, unlike business organizations, are the last group who migrate to newer technologies , mostly because the competition between business organization is so much more than educational institutions. As education is becoming a business in new paradigm of 4th Generation Universities, they are being forced to comply with changes because after all higher educational institutions are not needless from newer technologies. This question focused on finding the reason that educational institutions have to migrate to cloud services in their classrooms.

According to instructor (5):

> "If you implement it accurately and if you manage it professionally it will be great method to use all over country, we can even connect all the universities of Iran by this way. It helps to share our information and resources with our students, they don't have to buy software license anymore…"

Instructor (7) said:

> "Think about all the power and money we can save, we don't have to buy hardware for long time, and students can have updated software they need. As Instructor I can connect to my students any time I want, I think it is a great technology …"

According to all instructors, the most important reason that universities should use cloud computing is to provide a better services to their students. With cloud based e-

learning system students are able to access all the curriculum information, application and platform that they need anywhere, anytime and by any smart device that they have.

Interviewees (8), (7) and (1) believed that higher education systems can reduce their cost by using these systems. They taught using cloud based infrastructure will help the university to pay less for the computer laboratories and ease up the way for maintenance and upgrading the hardware and software. Although other instructors did not mentioned about cost reduction benefits of cloud systems but they were sure the maintenance will be so much easier in this way. The head of research committee of Amirkabir University believed that this service helped a lot of students whom are not able to purchase expensive software or their PC/laptop is not good enough to run such a heavy applications. He said some of our programs need really strong machinery for calculation and analysis and it is impossible for a student to be able to pay for such a system but with cloud services these students are just easily connect to the cloud services and do this calculation online with university cloud servers.

In seventh question the researcher asked about the actions or activities that universities should do before using cloud computing in education system. For any new infrastructure or management there are steps that we should take. Interviewer want to have a deeper understanding on what are the steps which we should take before changing our traditional educational system to cloud base system.

All of the instructors in Sharif University were more focusing on the financial and budgeting issues that they already are struggling with, they believed changing traditional systems to the new and high-tech systems cost too much and although this

cost will be compensating later by using cloud services in computer but the first Implementation of this systems are costly and therefore most of Iranian higher education systems are not willing to pay.

Instructor (1) said:

> "They want to be the best university in Iran but they don't want to pay for it, I gave a proposal for a professional cloud service about five years ago, it took them four years to accept it but the budget is less than half … new technologies need investing, maybe at the same they cannot see the result, this kind of projects needs time … but after three to five years they can see how much money they can save just because they don't have to change the IT infrastructure all the time ".

But the instructors in Amirkabir University already had such system implemented in their university and the finance was not an issue for them, but what was important was the barrier and limitations which students might have outside of the university. The internet speed nowadays is a challenging problem in Iran. The governmental policies limits the speed that internet providers can give to the personal users and for having fast and unlimited internet speed one most have special permission and pay a heavy bill each month. Although there are some companies which provide cheap limited internet service but the speed and reliability of these services are not enough for connecting to cloud based services online. What the instructors of Amirkabir University suggest was a fast, cheap unlimited internet inside and outside campus for students and academic staff. In addition to that some of the instructors mentioned that managing and controlling such system needs experience and specialist plus the authority from the highest level of university to make sure everyone will use this system as they should and also they will receive the needed training and guidance in how to work with cloud based e-learning systems and introducing them to educational cloud environment. Instructors in both university believed that it is

necessary to plan a workshop and training for instructors, academic staff and also students to learn how to act and react to the environment and services of educational cloud.

The eighth question was about the status of ICT facilities in the university which that instructor is teaching. The facilities that each university has, shows how advance is that university is in technological approach. The more ICT tools university has, the more it is near to fulfill the need of 21st century student's needs. It is important to know what are our strength and what are our shortages in educational tools of a university, because when we are aware of the shortage we are able to plan for compensation of it.

Considering all the answers that the researcher got from the instructors in previous questions, it was not strange that there were so many complaints as answer to this question. According to the instructors in Sharif University, the ICT facilities which are given to students and instructors is not good enough. Especially because this university is considered to be the best and highest ranked university of whole Iran. These instructors believe the poor management of the university, lack of funding and unawareness of the authority are the biggest problem of ICT in Sharif University. As they mentioned in their interview Although Teaching/ Learning Tools (such as: Interactive whiteboard, computer, projector, Presentation Tools and E-learning), Resources (such as :online library , E-books and internet) are accessible for students and instructors but the quality of these services are not in world highest standard levels and there are too many upgrades and improvements that should take a place.

According to instructor (7):

> "ICT situation overly in whole Iran is not so good, because of the sanction the price of high-tech products and digital infrastructure is heavy. That is why not all of the universities can handle these expenses. Most universities have computer laboratories and IT structure but most of their hardware and software are so old …. And that is not the only problem…"

Instructors in Amirkabir University from the other hand had different experience and ideas about the ICT status of their university. The believed that the management of the university is willing to pay for highest level of ICT tools for that university , they even give permission to students to establish a technology research center which is also responsible for cloud computing services of the university. But what was a problem in that university was lack of compulsion on academic staff and students to migrate from old ways to technology era. Even some of the interviewee instructors themselves admit that they still prefer the old ways and do not trust on the technologies which are available nowadays. They said although the university provides for them a cloud based e-learning system, but they do not use it simply because they find it hard to change their old ways. Fortunately the younger instructors had better approach when it comes to ICT use, almost all of the younger instructors of Amirkabir University said they are so enthusiastic to use the new technologies but they think their university should put more strict roles for students and instructors to force them of using this technology in their study and work.

In ninth question the researcher has asked "What are the barriers and limitation of cloud-computing system in this university?" question to have a deeper understanding about the barriers and limitation that might be in the way of cloud based computing in Iranian universities.

According to most of instructors sanction and security rules of country had make a serious problem for developing this system. Although some universities like Amirkabir and Sharif managed to implement this services but both of their cloud based e-learning systems are not complete.

As instructor (2) mentioned:

> " we had to buy all the infrastructure for making private cloud inside our university, so it was expensive and many academic staff that time believed that we have to use all this money in academic field and not just for changing our e-learning a platform".

Instructors (1) mentioned that:

> "We faced too many barriers for implementing this service in our university, expenses and management was the most important one, But what made it even more difficult the resistance of some instructors to use this system…maybe because they don't want to try new ways… cloud e-learning make it easier in many aspects but still they are not want to move from their old ways, they still believe that paper and whiteboard is the best way".

On the last interview question, interviewer asked about implementation and usage status of cloud computing in Iranian universities regarding to learning perspectives. As a developing country it is important to know what is ICT place of Iranian universities. Interviewer wants to know what are the steps we already took in this country for cloud based services and what are the steps we have to take in future, because for achieving the international standards and world class education it is necessary to have cloud based e-learning in our educational system.

According to all of interviewed instructors, except for few top universities in Iran all other universities are so far from the practical implementation of this system in their educational environment. The financial and unawareness were the main reasons of this problem. But what was obvious from remarks of all of these interviewees is that

they are optimistic and hopeful that in the time this kind of technology will capture over traditional ways which are still using in these universities.

Instructor (8) state that:

> "Right now the only popular service in cloud is file sharing between students and instructors but other instructor in same university said students and instructors are willing to use cloud computing if the internet speed be faster, cheaper and more assessable for all students."

On the other hand head of science committee of Sharif University believe that poor management in most universities in Iran is the biggest barrier for implementation of ICT. He believe the cloud computing is not popular in educational institution in Iran because of weak management of university specially in IT department of each university but with correct management and generous budgeting in this technology we will be able to siege all the educational institutions in Iran.

4.2 Discussion

After analyzing the results of questionnaires and interviews, the researcher was having enough information to discuss and answer the research questions of this thesis.

Regarded to first question about, to what extent higher education institutions are aware of cloud-based learning systems, It is possible to say that the benefits of this platform is obvious for instructors and institution itself , but this technology is still new, unfamiliar and expensive in Iran due to sanctions and shortage of experts in this field. As such we can say the institution is aware of this platform but there are many limitations and barriers that hold them from changing to this system or making this system fully functional and acceptable in their educational environment.

Regarded to second research question about, what are the benefits of using cloud-based learning systems as base for e-learning; it is possible to say that there are many benefits that university, students and instructors will achieve from using this technology. The accessibility, availability and sharing of teaching materials, ease of the communication between students and instructors, ease of students evaluation, increasing the opportunity of students to access any complex and heavy software that they need and the expenses reduction in new hardware , software license and power, are the most important benefits that instructors mentioned .

Regarded to third question, what are the factors which higher education institution takes into account when deciding about adopting cloud-based learning systems and how important are these factors, it is possible to say according to the instructors the Iran situation is little bit different from other developing countries, the sanction made to many barriers for Iranian universities to implement this technology to their learning system. Also the internet speed was another problem that universities had to consider. Most instructors admit that this system can make so much cost deduction in time but with current situation they have to accept some limitation in this system. According to the interviews instructors believe that the fist factor that higher education in Iran considers for this adaptation is the expenses that it will make for implementing such infrastructure and how much financial benefits it will make by changing to this system. Secondly they have to consider the policies and regulation and limitation of the country in using this system and finally how much benefits this system can make for students, academic and administration staff in university

Chapter 5

CONCLUSION

5.1 Conclusion

Although using cloud based e-learning could be the best way of using technology in learning environment but in developing countries there are still few universities who really implement this technology in their curriculum. Our findings show that in Iranian universities this problem was mostly because of barriers and limitations that sanctions put in purchasing new technologies for the country. Most of top service providers of the world too, have been facing the barriers in providing these services to Iran. As a consequence, Iranian universities and education institutes had to invest on creating a pseudo type of cloud computing system servers, which in turn, enforced these institutes to have to invest highly on creating the platform.

On the other hand, many security and political issues too, forced our educational institutes to refrain from absorbing these technologies from outside. Massive cyber-attacks on our IT infrastructure (the case of such attacks on our nuclear facility by stock net virus is a famous one), created a new approach for developing these technologies locally. Although this approach has somehow bypassed the main idea of economic viability and scalability of cloud computing, but it had its own advantages as well, i.e. not to be unfamiliar with the new technology and the power to develop it internally.

As a result of this approach, the cost of developing cloud computing internally increase and hence it was not affordable for all universities to adopt it. With this we come to our second finding which is the main reason for unpopularity of cloud systems in Iran. Due to the cost associated with preparing the infrastructures for such technology, not every university is able to invest on it. Most of Iranian universities are state owned and state funded and therefore facing with budgeting issues.

The last reason the research has found was that there is not enough knowledge and expertise to maintain these technologies with optimum utility. That is why many instructors, especially the elder ones are not willing and trust enough to change their old ways. Cloud computing can be economically viable if the knowledge sources are shared and could be used for business purposes. It should provide a platform for knowledge creation and knowledge based fortune. To create fortune out of knowledge, we need a special system of knowledge extraction and accumulation, which is a highly sophisticated expertise.

At the end it can be added that despite the barriers involved, certain Iranian universities managed to develop and adopt such systems. Although these systems have their own shortfalls and limitations and are mainly in their early stages of development, but these pioneer universities have shown that they are on the path to catch up with these new technologies and endure the high investment needed for their adoption with a hope to evolve and grow in future.

5.2 Future Work

The researcher will focus on designing and implementing a cloud e-learning application which is suitable for countries with low speed internet connection. The

future system also will try to include all generations regardless of their age, experience and education background into cloud e-learning environment.

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APPENDICES

Appendix A: Current usage of cloud computing technologies with respect to status

According to Table below, except "Anti-virus/spam filtering/anti-malware" and "student management" service, teacher assistance (instructor-assistance) using the cloud based technologies more than instructors. There are two explanations for this matter; first it can be because the more population of instructor's assistance (121) than instructors (80) or due to the fact those most Full instructors are elder ones and are less interested on new technologies.

Current usage of cloud computing technologies respect to status

		N	Mean	SD
Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)	Instructor-Assistant	121	3.27	1.238
	Instructor	80	3.06	1.381
	Total	201	3.19	1.298
Email (eg., Hotmail, Gmail)	Instructor-Assistant	121	4.52	.848
	Instructor	80	4.05	1.018
	Total	201	4.33	.945
Social networking (e.g., Facebook, Twitter, blogging)	Instructor-Assistant	121	3.73	1.211
	Instructor	80	3.65	1.202
	Total	201	3.70	1.205
Web conferencing (e.g., Skype, Adobe Connect, Google hangout)	Instructor-Assistant	121	3.81	1.227
	Instructor	80	3.39	1.471
	Total	201	3.64	1.342
File storage of teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)	Instructor-Assistant	121	4.60	.802
	Instructor	80	4.13	1.173
	Total	201	4.41	.991
Backup/security storage	Instructor-Assistant	121	3.58	1.283
	Instructor	80	2.94	1.444
	Total	201	3.32	1.382
Library system (e.g., Innovative Interfaces, Koha)	Instructor-Assistant	121	3.95	1.347
	Instructor	80	3.51	1.458
	Total	201	3.78	1.405
Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)	Instructor-Assistant	121	2.80	1.531
	Instructor	80	2.59	1.711
	Total	201	2.72	1.604
Anti-virus/spam filtering/anti-malware	Instructor-Assistant	121	3.46	1.659
	Instructor	80	3.74	1.280

	Total	201	3.57	1.522
Disaster recovery	Instructor-Assistant	121	2.70	1.504
	Instructor	80	2.66	1.449
	Total	201	2.69	1.479
Student management	Instructor-Assistant	121	3.27	1.506
	Instructor	80	4.23	1.055
	Total	201	3.65	1.421
Accounting/financial management	Instructor-Assistant	121	1.90	1.193
	Instructor	80	1.55	.870
	Total	201	1.76	1.088

Instructors perception technology beliefs with respect to status

The difference of mean is almost steady in Table below. In most cases Instructor assistance are more supportive of cloud based technologies but according to the last four option Instructor assistance also believe that there is not enough time to adopt this technology in their curriculum and students have more priority needs than technology. The value of mean is less than others in this last four parts which is because of the negative points that it is focused on and the lower shows that that group of participants are less agree with this believe.

Instructors perception technology beliefs with respect to status

		N	Mean	SD
I support the use of cloud computing technology in the classroom	Instructor-Assistant	121	4.24	.533
	Instructor	80	4.19	.765
	Total	201	4.22	.634
The cloud computing technology is important to student learning	Instructor-Assistant	121	4.21	.865
	Instructor	80	4.14	1.003
	Total	201	4.18	.921
Incorporating cloud computing technology into instruction helps students learn	Instructor-Assistant	121	4.25	.799
	Instructor	80	4.10	.949
	Total	201	4.19	.863
Knowledge about cloud computing technology will improve teaching in my school	Instructor-Assistant	121	4.39	.735
	Instructor	80	4.43	.759
	Total	201	4.40	.743
Cloud computing technology facilitates the	Instructor-Assistant	121	4.23	.783
	Instructor	80	4.16	.787

use of a wide variety of instructional strategies designed to maximize learning	Total	201	4.20	.783
Student motivation increases when cloud computing technology is integrated into the curriculum	Instructor-Assistant	121	4.20	.770
	Instructor	80	3.99	.738
	Total	201	4.11	.763
Cloud computing technology helps Instructors do things with their classes that they would not be able to do without it	Instructor-Assistant	121	4.24	.619
	Instructor	80	4.40	.756
	Total	201	4.30	.680
Content knowledge should take priority over technology skills	Instructor-Assistant	121	2.63	1.324
	Instructor	80	2.79	1.048
	Total	201	2.72	1.221
Most students have so many other needs that technology is a low priority	Instructor-Assistant	121	3.08	1.201
	Instructor	80	2.88	1.140
	Total	201	3.00	1.179
Cloud computing technology might interfere with human interactions between teachers and students	Instructor-Assistant	121	2.66	1.196
	Instructor	80	2.77	.954
	Total	201	2.73	1.104
There is not enough time to incorporate cloud computing technology into the curriculum	Instructor-Assistant	121	2.53	1.218
	Instructor	80	2.44	1.339
	Total	201	2.49	1.265
Teaching students how to use cloud computing technology is not my job	Instructor-Assistant	121	3.69	1.063
	Instructor	80	3.75	1.364
	Total	201	3.72	1.189

Instructors perception on perceived benefits of cloud computing adoption for university with respect to status

According to Table below, in almost all the categories instructor-assistance have higher mean than instructors. This can be due to the fact that the number of instructor assistance is higher than instructors and also the fact that they are much younger generation that instructors and because of that are more interested in technology.

Instructors perception on perceived benefits of cloud computing adoption for university regarded to status

	N	Mean	SD

It supports classroom learning	Instructor-Assistant	121	4.45	.577
	Instructor	80	4.14	.951
	Total	201	4.33	.763
It supports independent learning at home	Instructor-Assistant	121	4.34	.781
	Instructor	80	4.18	.868
	Total	201	4.27	.818
It supports virtual laboratories	Instructor-Assistant	121	4.69	.693
	Instructor	80	4.65	.553
	Total	201	4.68	.640
It supports self-learning	Instructor-Assistant	121	4.45	.577
	Instructor	80	4.16	.947
	Total	201	4.33	.757
It supports peer-to-peer learning	Instructor-Assistant	121	4.45	.577
	Instructor	80	4.11	1.006
	Total	201	4.31	.791
It supports students with special needs	Instructor-Assistant	121	4.53	.672
	Instructor	80	4.50	.746
	Total	201	4.52	.701
It supports assessment of students	Instructor-Assistant	121	4.34	.690
	Instructor	80	3.95	1.200
	Total	201	4.18	.944
It facilitates sharing of learning materials and data	Instructor-Assistant	121	4.45	.577
	Instructor	80	4.28	.636
	Total	201	4.38	.605
Users can access software anywhere provided there is Internet access	Instructor-Assistant	121	4.65	.573
	Instructor	80	4.61	.562
	Total	201	4.64	.568
Users can access data anywhere provided there is Internet access	Instructor-Assistant	121	4.51	.647
	Instructor	80	4.55	.593
	Total	201	4.53	.625
It facilitates communication and collaboration between students	Instructor-Assistant	121	4.15	.782
	Instructor	80	4.18	1.053
	Total	201	4.16	.897
If facilitates communication and collaboration between Instructors and students	Instructor-Assistant	121	4.17	.771
	Instructor	80	4.35	.658
	Total	201	4.24	.732
It facilitates communication and collaboration between staff	Instructor-Assistant	121	4.39	.675
	Instructor	80	4.21	.882
	Total	201	4.32	.767
It is easy to scale up or down amount of services required	Instructor-Assistant	121	4.07	.824
	Instructor	80	3.66	1.136
	Total	201	3.91	.978
The cloud has large and flexible storage capacity	Instructor-Assistant	121	4.20	1.069
	Instructor	80	4.39	.893
	Total	201	4.27	1.005
It reduces expenses on purchasing software (e.g., learning management, teaching-related games, anti-virus software etc.)	Instructor-Assistant	121	4.37	.765
	Instructor	80	4.09	.970
	Total	201	4.26	.862
It reduces expenses on purchasing new computing devices	Instructor-Assistant	121	4.39	.675
	Instructor	80	4.13	1.023
	Total	201	4.28	.839
It extends the use of existing computing	Instructor-Assistant	121	4.45	.683
	Instructor	80	4.04	.892

devices	Total	201	4.29	.798
It simplifies the IT management process	Instructor-Assistant	121	4.19	.850
	Instructor	80	3.76	1.183
	Total	201	4.02	1.015
It reduces costs on IT maintenance such as managing different versions of software	Instructor-Assistant	121	4.29	.811
	Instructor	80	3.91	1.150
	Total	201	4.14	.975
It reduces reliance on school IT staff	Instructor-Assistant	121	4.12	1.144
	Instructor	80	3.61	1.382
	Total	201	3.92	1.266
The school can take advantage of the IT expertise of cloud service providers	Instructor-Assistant	121	4.41	.823
	Instructor	80	4.34	1.078
	Total	201	4.38	.931
It facilitates central management of IT resources and avoid corruption	Instructor-Assistant	121	4.02	.796
	Instructor	80	4.33	.759
	Total	201	4.14	.794
It reduces operating costs of administrative systems	Instructor-Assistant	121	3.98	1.004
	Instructor	80	4.06	.932
	Total	201	4.01	.975
It enhances productivity of staff	Instructor-Assistant	121	3.28	1.433
	Instructor	80	3.14	1.549
	Total	201	3.22	1.478
It simplifies data backup and disaster recovery process	Instructor-Assistant	121	4.42	.668
	Instructor	80	4.18	1.123
	Total	201	4.32	.883
It is easy to adopt new applications quickly	Instructor-Assistant	121	4.19	1.128
	Instructor	80	4.18	1.220
	Total	201	4.18	1.162
It enhances students' openness to new technologies	Instructor-Assistant	121	4.21	.774
	Instructor	80	4.29	.766
	Total	201	4.24	.770
It reduces power consumption	Instructor-Assistant	121	4.34	.770
	Instructor	80	4.09	1.182
	Total	201	4.24	.961
It allows access to applications that the school otherwise would not be aware of or able to afford	Instructor-Assistant	121	4.60	.664
	Instructor	80	4.71	.620
	Total	201	4.65	.648
It enhances IT security in the school	Instructor-Assistant	121	4.28	.959
	Instructor	80	4.35	.828
	Total	201	4.31	.908

Instructors Perception principals' technology beliefs with respect to major

As it shown in Table below, the instructors who study in the IT and engineering filed are more believing in usage of technology in their classrooms. From other hand instructors who study in “other” fields are less likely to have beliefs on using cloud based services in their classrooms.

Instructor's perception on technology beliefs with respect to major

		N	Mean	SD
Q1.I support the use of cloud computing technology in the classroom	Engineering /IT/Technical	64	4.70	.582
	Mechanical Engineering	17	4.00	.000
	Electrical Engineering	19	4.21	.419
	Nuclear Science and Engineering	9	3.89	.333
	Applied Science/Mathematics/Physics	20	4.25	.444
	Civil Engineering	34	4.00	.348
	Aerospace Engineering	10	4.10	.316
	Other	28	3.64	.826
	Total	201	4.22	.634
Q2.The cloud computing technology is important to student learning	Engineering /IT/Technical	64	4.69	.500
	Mechanical Engineering	17	4.71	.470
	Electrical Engineering	19	4.05	.621
	Nuclear Science and Engineering	9	4.00	.000
	Applied Science/Mathematics/Physics	20	4.40	.821
	Civil Engineering	34	4.15	.657
	Aerospace Engineering	10	3.80	.632
	Other	28	2.86	1.208
	Total	201	4.18	.921
Q3.Incorporating cloud computing technology into instruction helps students learn	Engineering /IT/Technical	64	4.64	.515
	Mechanical Engineering	17	4.71	.470
	Electrical Engineering	19	4.05	.621
	Nuclear Science and Engineering	9	4.00	.000
	Applied Science/Mathematics/Physics	20	4.10	.641
	Civil Engineering	34	4.18	.673
	Aerospace Engineering	10	4.40	.516
	Other	28	3.00	1.186
	Total	201	4.19	.863
Q4.Knowledge about cloud computing technology will improve teaching in my school	Engineering /IT/Technical	64	4.77	.463
	Mechanical Engineering	17	4.76	.437
	Electrical Engineering	19	4.11	.567
	Nuclear Science and Engineering	9	4.11	.601
	Applied Science/Mathematics/Physics	20	4.40	.821
	Civil Engineering	34	4.53	.706
	Aerospace Engineering	10	4.50	.527
	Other	28	3.46	.744
	Total	201	4.40	.743
Q5.Cloud computing technology facilitates the use of a wide variety of instructional strategies designed to maximize learning	Engineering /IT/Technical	64	4.70	.554
	Mechanical Engineering	17	4.53	.800
	Electrical Engineering	19	4.05	.621
	Nuclear Science and Engineering	9	4.33	.707
	Applied Science/Mathematics/Physics	20	3.75	.639
	Civil Engineering	34	4.21	.687
	Aerospace Engineering	10	4.40	.516
	Other	28	3.18	.390
	Total	201	4.20	.783
Q6.Student motivation increases when cloud computing technology is integrated into the curriculum	Engineering /IT/Technical	64	4.48	.563
	Mechanical Engineering	17	4.18	.728
	Electrical Engineering	19	4.05	.229
	Nuclear Science and Engineering	9	4.44	.527
	Applied Science/Mathematics/Physics	20	4.15	.875
	Civil Engineering	34	3.97	.797
	Aerospace Engineering	10	4.10	.994
	Other	28	3.32	.670

	Total	201	4.11	.763
Q7.Cloud computing technology helps teachers do things with their classes that they would not be able to do without it	Engineering /IT/Technical	64	4.61	.553
	Mechanical Engineering	17	4.35	.493
	Electrical Engineering	19	4.05	.229
	Nuclear Science and Engineering	9	4.44	.527
	Applied Science/Mathematics/Physics	20	4.80	.410
	Civil Engineering	34	4.15	.657
	Aerospace Engineering	10	4.80	.422
	Other	28	3.36	.488
	Total	201	4.30	.680
Q8.Content knowledge should take priority over technology skills	Engineering /IT/Technical	64	1.95	.452
	Mechanical Engineering	17	2.94	.429
	Electrical Engineering	19	2.84	1.01
	Nuclear Science and Engineering	9	4.22	.667
	Applied Science/Mathematics/Physics	20	2.65	1.18
	Civil Engineering	34	3.76	1.25
	Aerospace Engineering	10	2.80	1.68
	Other	28	2.54	1.47
	Total	201	2.72	1.22
Q9.Most students have so many other needs that technology is a low priority	Engineering /IT/Technical	64	2.22	.845
	Mechanical Engineering	17	2.88	.781
	Electrical Engineering	19	3.26	.991
	Nuclear Science and Engineering	9	3.89	.333
	Applied Science/Mathematics/Physics	20	3.15	1.04
	Civil Engineering	34	3.85	1.15
	Aerospace Engineering	10	2.60	1.50
	Other	28	3.39	1.22
	Total	201	3.00	1.17
Q10.Cloud computing technology might interfere with human interactions between teachers and students	Engineering /IT/Technical	64	2.03	.397
	Mechanical Engineering	17	3.00	.500
	Electrical Engineering	19	2.89	.994
	Nuclear Science and Engineering	9	3.89	.333
	Applied Science/Mathematics/Physics	20	2.70	1.12
	Civil Engineering	34	3.74	.963
	Aerospace Engineering	10	2.80	1.31
	Other	28	2.43	1.47
	Total	201	2.73	1.10
Q11.There is not enough time to incorporate cloud computing technology into the curriculum	Engineering /IT/Technical	64	1.53	.689
	Mechanical Engineering	17	2.76	1.03
	Electrical Engineering	19	2.74	.991
	Nuclear Science and Engineering	9	3.89	.601
	Applied Science/Mathematics/Physics	20	3.10	1.16
	Civil Engineering	34	2.91	1.26
	Aerospace Engineering	10	2.80	1.47
	Other	28	2.86	1.45
	Total	201	2.49	1.26
Q12.Teaching students how to use cloud computing technology is not my job	Engineering /IT/Technical	64	4.71	1.42
	Mechanical Engineering	17	2.83	.470
	Electrical Engineering	19	3.74	.733
	Nuclear Science and Engineering	9	4.44	.527
	Applied Science/Mathematics/Physics	20	4.40	.503
	Civil Engineering	34	4.09	.712
	Aerospace Engineering	10	3.80	.632
	Other	28	3.93	1.01
	Total	201	3.72	1.18

Instructors perception on perceived benefits of cloud computing adoption for university with respect to major

According to table below, The value of mean in most of the parts is steady and near to each other , most instructors who had background major in IT and engineering field, have more believe on benefits of cloud computing than instructors who study in “Applied Science/Mathematics/Physics” or “others”. This can be understandable since the instructors who have engineering and IT background are more aware of concepts of technology and computers.

Instructor’s perception on perceived benefits of cloud computing adoption for university with respect to major

		N	Mean	SD
Q1.It supports classroom learning	Engineering /IT/Technical	64	4.88	.378
	Mechanical Engineering	17	4.41	.507
	Electrical Engineering	19	4.00	.471
	Nuclear Science and Engineering	9	4.89	.333
	Applied Science/Mathematics/Physics	20	4.15	.745
	Civil Engineering	34	3.76	1.156
	Aerospace Engineering	10	4.10	.316
	Other	28	3.96	.331
	Total	201	4.33	.763
Q2.It supports independent learning at home	Engineering /IT/Technical	64	4.80	.443
	Mechanical Engineering	17	4.53	.514
	Electrical Engineering	19	4.00	.471
	Nuclear Science and Engineering	9	4.44	.527
	Applied Science/Mathematics/Physics	20	3.65	1.348
	Civil Engineering	34	3.91	1.083
	Aerospace Engineering	10	4.10	.316
	Other	28	4.00	.272
	Total	201	4.27	.818
Q3.It supports virtual laboratories	Engineering /IT/Technical	64	4.83	.490
	Mechanical Engineering	17	5.00	.000
	Electrical Engineering	19	4.58	.507
	Nuclear Science and Engineering	9	3.67	1.581
	Applied Science/Mathematics/Physics	20	4.90	.447
	Civil Engineering	34	4.62	.652
	Aerospace Engineering	10	5.00	.000
	Other	28	4.32	.476
	Total	201	4.68	.640
Q4.It supports self-learning	Engineering /IT/Technical	64	4.84	.407
	Mechanical Engineering	17	4.41	.507
	Electrical Engineering	19	4.00	.471
	Nuclear Science and Engineering	9	4.78	.441
	Applied Science/Mathematics/Physics	20	4.15	.745

	Civil Engineering	34	3.79	1.175
	Aerospace Engineering	10	4.10	.316
	Other	28	4.07	.378
	Total	201	4.33	.757
Q5.It supports peer-to-peer learning	Engineering /IT/Technical	64	4.80	.443
	Mechanical Engineering	17	4.41	.618
	Electrical Engineering	19	4.16	.602
	Nuclear Science and Engineering	9	4.11	.333
	Applied Science/Mathematics/Physics	20	4.30	.801
	Civil Engineering	34	3.88	1.225
	Aerospace Engineering	10	4.50	.527
	Other	28	3.79	.418
	Total	201	4.31	.791
Q6.It supports students with special needs	Engineering /IT/Technical	64	4.47	.776
	Mechanical Engineering	17	4.53	.624
	Electrical Engineering	19	4.47	.772
	Nuclear Science and Engineering	9	5.00	.000
	Applied Science/Mathematics/Physics	20	4.85	.366
	Civil Engineering	34	4.41	.783
	Aerospace Engineering	10	5.00	.000
	Other	28	4.21	.630
	Total	201	4.52	.701
Q7.It supports assessment of students	Engineering /IT/Technical	64	4.86	.432
	Mechanical Engineering	17	4.00	1.000
	Electrical Engineering	19	4.11	.567
	Nuclear Science and Engineering	9	4.44	.527
	Applied Science/Mathematics/Physics	20	4.15	.813
	Civil Engineering	34	3.65	1.070
	Aerospace Engineering	10	4.10	.568
	Other	28	3.43	1.103
	Total	201	4.18	.944
Q8.It facilitates sharing of learning materials and data	Engineering /IT/Technical	64	4.88	.378
	Mechanical Engineering	17	4.41	.507
	Electrical Engineering	19	4.11	.459
	Nuclear Science and Engineering	9	4.33	.500
	Applied Science/Mathematics/Physics	20	4.25	.786
	Civil Engineering	34	4.09	.668
	Aerospace Engineering	10	4.00	.000
	Other	28	4.00	.272
	Total	201	4.38	.605
Q9.Users can access software anywhere provided there is Internet access	Engineering /IT/Technical	64	4.97	.250
	Mechanical Engineering	17	4.82	.529
	Electrical Engineering	19	4.47	.612
	Nuclear Science and Engineering	9	5.00	.000
	Applied Science/Mathematics/Physics	20	4.65	.489
	Civil Engineering	34	4.35	.646
	Aerospace Engineering	10	4.20	.789
	Other	28	4.25	.518
	Total	201	4.64	.568
Q10.Users can access data anywhere provided there is Internet access	Engineering /IT/Technical	64	4.94	.302
	Mechanical Engineering	17	4.59	.618
	Electrical Engineering	19	4.21	.535
	Nuclear Science and Engineering	9	4.44	.527
	Applied Science/Mathematics/Physics	20	4.60	.503
	Civil Engineering	34	4.26	.618
	Aerospace Engineering	10	4.50	.850
	Other	28	4.07	.716
	Total	201	4.53	.625

Q11.It facilitates communication and collaboration between students	Engineering /IT/Technical	64	3.80	1.115
	Mechanical Engineering	17	4.65	.606
	Electrical Engineering	19	4.05	.524
	Nuclear Science and Engineering	9	4.78	.441
	Applied Science/Mathematics/Physics	20	4.40	.821
	Civil Engineering	34	4.26	.710
	Aerospace Engineering	10	5.00	.000
	Other	28	3.96	.744
	Total	201	4.16	.897
Q12.If facilitates communication and collaboration between teachers and students	Engineering /IT/Technical	64	4.16	.801
	Mechanical Engineering	17	4.59	.507
	Electrical Engineering	19	3.95	.405
	Nuclear Science and Engineering	9	4.89	.333
	Applied Science/Mathematics/Physics	20	4.65	.587
	Civil Engineering	34	4.15	.744
	Aerospace Engineering	10	4.50	.972
	Other	28	3.96	.637
	Total	201	4.24	.732
Q13.It facilitates communication and collaboration between staff	Engineering /IT/Technical	64	4.27	.782
	Mechanical Engineering	17	4.35	.786
	Electrical Engineering	19	4.11	1.049
	Nuclear Science and Engineering	9	5.00	.000
	Applied Science/Mathematics/Physics	20	4.70	.657
	Civil Engineering	34	4.41	.701
	Aerospace Engineering	10	4.20	.789
	Other	28	4.00	.544
	Total	201	4.32	.767
Q14.It is easy to scale up or down amount of services required	Engineering /IT/Technical	64	3.95	.999
	Mechanical Engineering	17	4.00	1.225
	Electrical Engineering	19	3.58	.607
	Nuclear Science and Engineering	9	4.22	.972
	Applied Science/Mathematics/Physics	20	4.00	1.522
	Civil Engineering	34	3.91	.830
	Aerospace Engineering	10	4.10	.994
	Other	28	3.71	.600
	Total	201	3.91	.978
Q15.The cloud has large and flexible storage capacity	Engineering /IT/Technical	64	4.86	.432
	Mechanical Engineering	17	4.76	.562
	Electrical Engineering	19	4.05	1.079
	Nuclear Science and Engineering	9	4.22	.972
	Applied Science/Mathematics/Physics	20	3.85	1.040
	Civil Engineering	34	3.91	1.190
	Aerospace Engineering	10	3.50	1.354
	Other	28	3.82	.983
	Total	201	4.27	1.005
Q16.It reduces expenses on purchasing software (e.g., learning management, teaching-related games, anti-virus software etc.)	Engineering /IT/Technical	64	4.23	1.050
	Mechanical Engineering	17	4.76	.664
	Electrical Engineering	19	4.37	.496
	Nuclear Science and Engineering	9	4.56	.527
	Applied Science/Mathematics/Physics	20	4.30	.571
	Civil Engineering	34	4.29	1.031
	Aerospace Engineering	10	4.50	.527
	Other	28	3.68	.476
	Total	201	4.26	.862
Q17.It reduces expenses on purchasing new computing devices	Engineering /IT/Technical	64	4.42	.887
	Mechanical Engineering	17	4.59	.712
	Electrical Engineering	19	4.32	.478
	Nuclear Science and Engineering	9	4.56	.527

	Applied Science/Mathematics/Physics	20	4.15	.489
	Civil Engineering	34	4.21	.978
	Aerospace Engineering	10	4.80	.422
	Other	28	3.68	.905
	Total	201	4.28	.839
Q18.It extends the use of existing computing devices	Engineering /IT/Technical	64	4.50	.617
	Mechanical Engineering	17	4.53	.717
	Electrical Engineering	19	4.37	.496
	Nuclear Science and Engineering	9	5.00	.000
	Applied Science/Mathematics/Physics	20	4.20	.523
	Civil Engineering	34	4.18	1.141
	Aerospace Engineering	10	4.40	.516
	Other	28	3.54	.744
	Total	201	4.29	.798
Q19.It simplifies the IT management process	Engineering /IT/Technical	64	4.28	.701
	Mechanical Engineering	17	3.59	1.121
	Electrical Engineering	19	3.79	1.032
	Nuclear Science and Engineering	9	4.00	.866
	Applied Science/Mathematics/Physics	20	3.80	1.361
	Civil Engineering	34	4.65	.485
	Aerospace Engineering	10	3.50	1.509
	Other	28	3.43	1.069
	Total	201	4.02	1.015
Q20.It reduces costs on IT maintenance such as managing different versions of software	Engineering /IT/Technical	64	4.33	.818
	Mechanical Engineering	17	4.59	.795
	Electrical Engineering	19	4.16	.688
	Nuclear Science and Engineering	9	5.00	.000
	Applied Science/Mathematics/Physics	20	4.05	1.050
	Civil Engineering	34	4.00	1.181
	Aerospace Engineering	10	4.10	1.197
	Other	28	3.39	.875
	Total	201	4.14	.975
Q21.It reduces reliance on school IT staff	Engineering /IT/Technical	64	4.31	.924
	Mechanical Engineering	17	4.24	.831
	Electrical Engineering	19	4.05	.621
	Nuclear Science and Engineering	9	5.00	.000
	Applied Science/Mathematics/Physics	20	3.55	1.504
	Civil Engineering	34	3.74	1.463
	Aerospace Engineering	10	4.10	1.197
	Other	28	2.82	1.517
	Total	201	3.92	1.266
Q22.The school can take advantage of the IT expertise of cloud service providers	Engineering /IT/Technical	64	4.81	.467
	Mechanical Engineering	17	4.71	.686
	Electrical Engineering	19	4.37	.496
	Nuclear Science and Engineering	9	5.00	.000
	Applied Science/Mathematics/Physics	20	4.25	1.020
	Civil Engineering	34	3.59	1.282
	Aerospace Engineering	10	5.00	.000
	Other	28	3.86	.932
	Total	201	4.38	.931
Q23.It facilitates central management of IT resources and avoid corruption	Engineering /IT/Technical	64	4.17	.846
	Mechanical Engineering	17	4.88	.332
	Electrical Engineering	19	4.00	.000
	Nuclear Science and Engineering	9	3.89	1.054
	Applied Science/Mathematics/Physics	20	4.05	.605
	Civil Engineering	34	4.18	.936
	Aerospace Engineering	10	4.80	.422
	Other	28	3.57	.573

	Total	201	4.14	.794
Q24.It reduces operating costs of administrative systems	Engineering /IT/Technical	64	3.91	1.003
	Mechanical Engineering	17	4.53	.717
	Electrical Engineering	19	4.05	.229
	Nuclear Science and Engineering	9	5.00	.000
	Applied Science/Mathematics/Physics	20	4.15	1.089
	Civil Engineering	34	3.94	1.013
	Aerospace Engineering	10	4.40	1.265
	Other	28	3.43	.879
	Total	201	4.01	.975
Q25.It enhances productivity of staff	Engineering /IT/Technical	64	3.00	1.514
	Mechanical Engineering	17	2.94	1.713
	Electrical Engineering	19	3.58	1.071
	Nuclear Science and Engineering	9	4.89	.333
	Applied Science/Mathematics/Physics	20	3.90	1.165
	Civil Engineering	34	3.18	1.660
	Aerospace Engineering	10	3.40	1.838
	Other	28	2.84	1.018
	Total	201	3.22	1.478
Q26.It simplifies data backup and disaster recovery process	Engineering /IT/Technical	64	4.67	.619
	Mechanical Engineering	17	4.35	1.115
	Electrical Engineering	19	4.00	.000
	Nuclear Science and Engineering	9	4.78	.441
	Applied Science/Mathematics/Physics	20	4.70	.733
	Civil Engineering	34	4.21	.946
	Aerospace Engineering	10	3.40	1.838
	Other	28	3.79	.568
	Total	201	4.32	.883
Q27.It is easy to adopt new applications quickly	Engineering /IT/Technical	64	4.33	.818
	Mechanical Engineering	17	4.94	.243
	Electrical Engineering	19	4.05	1.177
	Nuclear Science and Engineering	9	4.56	1.333
	Applied Science/Mathematics/Physics	20	4.10	1.619
	Civil Engineering	34	4.12	1.297
	Aerospace Engineering	10	5.00	.000
	Other	28	3.21	1.166
	Total	201	4.18	1.162
Q28.It enhances students' openness to new technologies	Engineering /IT/Technical	64	4.39	.791
	Mechanical Engineering	17	4.88	.485
	Electrical Engineering	19	4.05	.229
	Nuclear Science and Engineering	9	4.11	1.054
	Applied Science/Mathematics/Physics	20	4.60	.821
	Civil Engineering	34	4.24	.741
	Aerospace Engineering	10	4.60	.843
	Other	28	4.39	.567
	Total	201	4.24	.770
Q29.It reduces power consumption	Engineering /IT/Technical	64	4.52	.666
	Mechanical Engineering	17	4.71	.588
	Electrical Engineering	19	4.42	.507
	Nuclear Science and Engineering	9	4.00	1.000
	Applied Science/Mathematics/Physics	20	4.95	.224
	Civil Engineering	34	3.38	1.477
	Aerospace Engineering	10	4.40	.843
	Other	28	3.75	.518
	Total	201	4.24	.961
Q30.It allows access to applications that the	Engineering /IT/Technical	64	4.67	.619
	Mechanical Engineering	17	4.76	.562

school otherwise would not be aware of or able to afford	Electrical Engineering	19	4.68	.582
	Nuclear Science and Engineering	9	5.00	.000
	Applied Science/Mathematics/Physics	20	4.90	.447
	Civil Engineering	34	4.53	.861
	Aerospace Engineering	10	4.80	.422
	Other	28	4.29	.659
	Total	201	4.65	.648
Q31.It enhances IT security in the school	Engineering /IT/Technical	64	4.61	.657
	Mechanical Engineering	17	4.71	.588
	Electrical Engineering	19	4.42	.692
	Nuclear Science and Engineering	9	3.67	.707
	Applied Science/Mathematics/Physics	20	3.85	1.137
	Civil Engineering	34	4.15	1.077
	Aerospace Engineering	10	4.20	1.229
	Other	28	4.07	.940
	Total	201	4.31	.908

Appendix B: Questionnaire

Dear Participant,

I am currently undertaking a Master Degree in Information Communication Technology at Eastern Mediterranean University. In fulfilment of my dissertation I am required to research a topic area. The topic I have chosen is the 'Instructors Perception on The Use of Cloud-based Learning Systems in Higher Education': The Case of Iran Universities' the questionnaire is structured to research the perceptions of cloud-based learning in Iran.

The questionnaire only will take several minutes of your time. I would be very grateful if you could complete within one working week. The information obtained from the questionnaire will construct the basis of the scientific work and will not be used for any other purpose.

Yours Faithfully

Talayeh Ghofrani

Part A.

1.Institution: ……

2.Age: 18-22 ( ) 23-29 ( ) 30-37 ( ) 37-49 ( ) 50-59 ( ) 60+ ( )

3.Sex: Female ( ) Male ( )

4.Status: Instructor ( ) Instructor-Assistant ( )

5.Education Level :

Master ( ) PHD ( ) Post-PHD ( )

6.Major :

Engineering /IT/Technical ( ) Applied Science/Mathematics/Physics ( )

Mechanical engineering ( ) Civil engineering ( )

Electrical Engineering ( ) Aerospace engineering ( )

Nuclear Science and Engineering ( ) Others ( )

7.Number of Years Having Experience as Teacher:

1-2years ( ) 3-5years ( ) 6-8years ( ) 9-12years ( ) 13+ ( )

8.The most important benefits of cloud computing adoption. (choose Only one)

( ) It facilitates communication and collaboration between teachers and students.

( ) Users can assess data anywhere provided there is Internet access.

( ) It supports classroom learning.

( ) It facilitates sharing of learning materials and data.

( ) It supports independent learning at home.

Part B.

Please answer the following question by selecting the appropriate level of agreement on the following statements. **lways = 5, Often = 4, Sometimes = 3, Rarely = 2, Never = 1,**

Q	**Current usage of cloud computing technologies.**	Always	Often	Sometimes	Rarely	Never
1	Cloud learning environment that assists learning in any form (e.g., OpenLearn, ArcGIS, VizZle)					
2	Email (eg., Hotmail, Gmail)					
3	Social networking (e.g., Facebook, Twitter, blogging)					
4	Web conferencing (e.g., Skype, Adobe Connect, Google hangout)					
5	File storage of					

	teaching-related software and data (e.g., Dropbox, Box.net, Microsoft SkyDrive)					
6	Backup/security storage					
7	Library system (e.g., Innovative Interfaces, Koha)					
8	Office productivity (e.g., Microsoft Office 365, Google Docs, Splashup, SlideShare)					
9	Anti-virus/spam filtering/anti-malware					
10	Disaster recovery					
11	Student management					
12	Accounting/financial management					

Part C.

Please answer the following question by selecting the appropriate level of agreement on the following statements. Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, Strongly Disagree = 1,

Q	**Principals' technology beliefs.**	**Strongly agree**	**Agree**	**Neutral**	**Strongly Disagree**	**Disagree**
1	I support the use of cloud computing technology in the classroom.					
2	The cloud computing technology is important to student learning.					
3	Incorporating cloud computing technology into instruction helps students learn.					
4	Knowledge about					

	cloud computing technology will improve teaching in my school.					
5	Cloud computing technology facilitates the use of a wide variety of instructional strategies designed to maximize learning					
6	Student motivation increases when cloud computing technology is integrated into the curriculum					
7	Cloud computing technology helps teachers do things with their classes					

	that they would not be able to do without it.					
8	Content knowledge should take priority over technology skills.					
9	Most students have so many other needs that technology is a low priority.					
10	Cloud computing technology might interfere with human interactions between teachers and students.					
11	There is not enough time to incorporate cloud computing					

	technology into the curriculum.					
12	Teaching students how to use cloud computing technology is not my job.					

Part D.

Please answer the following question by selecting the appropriate level of agreement on the following statements. **Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, Strongly Disagree = 1,**

Q	**Perceived benefits of cloud computing adoption for University**	Strongly agree	Agree	Neutral	Strongly Disagree	Disagree
1	It supports classroom learning.					
2	It supports independent learning at home.					

3	It supports virtual laboratories.					
4	It supports self-learning.					
5	It supports peer-to-peer learning.					
6	It supports students with special needs.					
7	It supports classroom learning.					
8	It supports assessment of students.					
9	It facilitates sharing of learning materials and data.					
10	Users can access software anywhere provided there is Internet access.					
11	Users can access data anywhere provided					

	there is Internet access.					
12	It facilitates communication and collaboration between students.					
13	If facilitates communication and collaboration between teachers and students.					
14	It facilitates communication and collaboration between staff.					
15	It is easy to scale up or down amount of services required.					
16	The cloud has large and flexible storage capacity.					
17	It reduces expenses on purchasing					

	software (e.g., learning management, teaching-related games, anti-virus software etc.).					
18	It reduces expenses on purchasing new computing devices.					
19	It extends the use of existing computing devices.					
20	It simplifies the IT management process.					
21	It reduces costs on IT maintenance such as managing different versions of software.					
22	It reduces reliance on school IT staff.					
23	The school can take advantage of the IT expertise of cloud					

	service providers.					
24	It facilitates central management of IT resources and avoid corruption.					
25	It reduces operating costs of administrative systems.					
26	It enhances IT security in the school					
27	It enhances productivity of staff.					
28	It simplifies data backup and disaster recovery process.					
29	It is easy to adopt new applications quickly.					
30	It enhances students' openness to new technologies					

31	It allows access to applications that the school otherwise would not be aware of or able to afford.					
32	It reduces power consumption.					

Appendix C: Interview Questions

1. How long you're using Cloud Computing in the university? What was your first impression of using Cloud Computing in the university? Has it changed over the time?

2. What was your motive in using cloud computing in education?

3. What cloud computing services are available in this university? Which one of these services you find the most useful for teaching/learning?

4. Do you find the structure, functionality and usage of this implemented cloud system user-friendly and applicable as a learning environment? Why?

5. Do you think cloud-computing has positive or negative effects to the learning outcomes of students? Why?

6. Why should higher educational institutions use cloud computing?

7. What are the actions or activities that you took before using cloud computing in education?

8. What is the status of ICT facilities this university?

9. What are the barriers and limitation of cloud-computing system in this university?

10. What is the implementation and usage status of cloud computing in Iranian universities regarding to learning perspectives? And why?