



Smart Education with Smart Phones: A Case Study of Bahawalpur

Vol. IV, No. II (Spring 2019) | Page: 215 – 223 | DOI: 10.31703/grr.2019(IV-II).23

p-ISSN: 2616-955X | e-ISSN: 2663-7030 | ISSN-L: 2616-955X

Dost Muhammad Khan*

Iqra Yaqoob[†]

Nadeem Akhtar[‡]

Abstract

Education plays a vital role in the development of every country in this world. Although, it is a fundamental right of every citizen of the country to acquire education and it is also the responsibility of the governments to provide and create such opportunities to obtain an education. But unfortunately, the governments of developing countries are failed to deliver a strong policy on “education for all”, due to their financial constraints and lack of infrastructural planning. In order to address this issue, Smartphones are used to spread education in these areas. In this research paper, we propose a solution based on the application of Information and Communication Technologies (ICT) such as ‘Smartphone’ which provides an opportunity to spread education sitting at distinct places where it is even difficult to establish a school. Moreover, a comparison is drawn between the traditional and the proposed model.

Key Words: Information and Communication Technologies (ICT), Smart Education, Smartphone, Cloud Computing (CC), E-Education, Distance-Education, Virtual-Education

Introduction

Education is a basic human right and an important factor in the development of any country, education means obtaining knowledge. Education not just provides a book’s knowledge but also aware hem of their rights and duties towards the development of the nation. Education makes the people independent, builds their confidence to move in every walk of life. Developed countries have strong agriculture and economy; reforms in this field can be brought by an educated society [10].

Education affects a person future. Not only young but also children should have an equal right to get the education to the right level. Education is one of the significant factors to build a modern nation, so the government should pay attention to it and should run such programs through which every citizen of the country becomes educated. Education not only increases the personality but also changes the behaviors, lifestyle, way of dressing and way of talking also. Education is the root of achievement. Education produces a skillful and intelligent generation that will be the future ruler of the country. Education is important not only for the developed countries but is more important for developing countries [8,10].

In a developing country like Pakistan, there is less literacy rate due to poverty and some other circumstances. If we talk about the specific area of Pakistan we can have a clear picture of these issues. As Bahawalpur, the city of Pakistan is mostly consisting of desert area and villages. People in these areas have fewer facilities and weak financial position, they face major problems of education as the schools, colleges and universities are too far from their place. The fees of private schools, colleges are not affordable for them. Due to convince problems and educational expenses children are not able to get an education.

Technology is growing fast and almost everyone is aware of it. Using this technology for getting an education is the most effective idea. Technology is the way, a process and knowledge to complete any task. Getting education through the use of technology has more impact on the learning process. Cellular and mobile

*Assistant Professor, Department of Computer Sciences and I.T, The Islamia University of Bahawalpur, Punjab, Pakistan.
Email: khan.dostkhan@gmail.com

[†]Visiting Lecturer, Department of Computer Sciences and I.T, The Islamia University of Bahawalpur, Punjab, Pakistan.

[‡]Assistant Professor, Department of Computer Sciences and I.T, The Islamia University of Bahawalpur, Punjab, Pakistan

communication are in existence for many years, since 1973, when the first handheld mobile phone was demonstrated by John F. Mitchell and Dr. Martin. In 1974, AT&T followed the next mobile phone and from 1990 to 2011 a series of smartphones and mobile phones began to grow with more featured functionalities.

In contrast to the conventional method of getting an education, in which a person may either borrow books or purchase books by visiting the nearest bookshop. All these involve time and convince problems for the majority of the people. By using the technology of smartphones, tablets this has become easier and cheaper. Now, no one needs to go to the nearest bookshop to buy books. Using the facility of the internet on their smartphones they can access any information on any topic while sitting at their place. The use of the internet has become part of the life of almost everyone. Almost all telecom service providers are offering internet at a very low rate. They have also offered different packages of 3G and 4G on different rates. One can enjoy services such as live streaming, multimedia, news, current affairs and many more. Students can easily connect their smartphones to the internet to access any information. Many ISP's like PTCL, WATEEN are also providing the facility of the internet. Anyone can connect their smartphones through Wi-Fi technology.

The rest of the paper is organized as follows; section 2 is about Smart Education and section 3 is about Modes of Education. In section 4 the Proposed Mode is discussed, section 5 draws a Comparison of Traditional and Proposed Model and finally, the conclusion is drawn in section 6.

Smart Education

According to ByeongGuk Ku, of South Korea,

“Smart Education is not a smart device, but rather an educational paradigm shift for digital natives. Teachers cannot imagine what our future will be like after 30 years, so they have to study 21st century skills and know-how to apply them to their traditional classrooms with ICT.”

The learners learn very effectively due to the development of new technologies and use smart devices to access digital resources. In this digital age, smart education is a concept that has gained much attention. It supports online and real-world learning. The word smart comes from rapid developing technologies. Smart implies to computer-assisted systems capable of observing, recording, and thinking themselves. Smart systems have been developed in almost all fields, in robotics, medical diagnosis, weather forecasting and in the education system to assist humans. Smart education has been developed to improve the education system at every level. Automation and artificial intelligence are replacing and enhancing the traditional educational system [7,16,21].

The rapid progress of mobile phones, wireless communication provides the real environment of learning. They provide information to the individual in the right place at the right time. Smart education is making the learning process interactive by using a tutorials system and by using artificial intelligence in the educational system. It is also providing tools to solve a problem at the right time. Now the classroom activities have been changed to the real world. Students can go beyond class room activities. They can easily collaborate, exchange information with other students throughout the world. Smart education is supported by diverse smart technologies like a laptop, e-readers, e-learning apps, smart boards, digital podium, smart class and visualizers that help students and learners to learn new skills and knowledge while sitting at their own place by using the internet.

The goal of smart education is to provide a self-learning, self-motivated environment. The world's smart means to complete a task efficiently and effectively. Smart devices are much smaller, portable and affordable on which learning can take place anywhere.

The learning process can be made more effective by using smart technology. As, Smartphones have Bluetooth, audio, video, SMS and many other applications that can have a great impact on education. In Pakistan and in other countries, smartphones are now available at different prices, ranging from low to high according to one's purchasing ability. Many companies like Samsung, Apple, HTC, Sony, Nokia, Blackberry, Motorola, Huawei and many more are offering different models of smartphones at reasonable prices. Fig. 1 depicts models of smartphones of different companies.



Figure 1: Models of Smartphones

The smartphone is a mobile phone with advanced Application Programming Interface (APIs) that allow third party applications to integrate with phone's operating system and hardware. These smartphones can be used for text, email, downloading, web surfing, social networking and many more. Students should have proper and clear directions to use smartphones positively for educational purpose. Inability to join schools, colleges and universities, smartphones provide an inexpensive way to educate the low income area people as well as others. These can allow students to access more knowledge on any topic and communicate with one another. Moreover, it can provide a better facility for classroom. Fig. 2 illustrates common APIs of smartphones [10-12,22].



Figure 2: The APIs of Smartphones

Studying through smartphones can allow students to do multitask. They can learn without any time constraint. As the students of often, areas used to learn and earn the same time. It will provide them a convenient way of learning anytime, anywhere.

Before the concept of smart education, different paradigms of learning without going to classrooms are E-learning and distance learning. Virtual universities are also providing the facility of distance learning.

Modes of Education

If distance education is carried out by the means of electronic media and Information and Communication Technologies (ICT), such as the Internet is called electronic or E-Learning. Text, recorded or live audio, simple and animated graphics or videos are being used as a teaching aid. More precisely an E-Learning is: "*The use of any kind of Internet or communication service or electronic device that supports the process of learning*" (Conole, et al., 2008). ICT plays a pivotal role in the process of the e-learning process. One can say e-learning is a blend of Educational Techniques and the Application of Technologies. Contemporary e-learning systems also use Artificial Intelligence (AI) to make it more efficient and productive. With the rapid growth of distance or e-learning or non-formal education, the universities are enabling to give knowledge to those people who are far away from their main campuses. In 1974, distance education was introduced in Pakistan through an Open University; an Institute which used Audio Visual Technology in implementing its distance education programs (Lam, et al., 2014).

By combining the World Wide Web (WWW) with distance education, learners can access lessons, books and other information without time and distance constraints. Use of computers and its peripherals to deliver

lectures, demonstrations or another teaching, learning activities is regarded as computer-aided instructions or sometimes called computer-assisted instructions. These types of systems also provide guides and simulation tools for practice. Virtual-Learning environments provide an artificial reality of physical classroom by virtualizing the traditional education system on the web. Virtual learning classrooms are widely used in the distance education system and can also be combined with formal educational institutions to take their advantages [9,18-20,23].

Proposed Model

A large population of Pakistan is using smartphones. To lessen the negativity of using mobile phones students should be learned to get an education while sitting at their homes using their smartphones. Smartphones also have many applications that can be downloaded on phones to get useful information like the GPS system, weather forecasting, news etc. Furthermore, the use of smartphones will enhance access to learning and empower several institutes to develop learner and administrative support and learning opportunities.

Cloud provides the services to the user through cloud providers, these are Google, Amazon, Microsoft and many others. Nowadays, almost everyone is using cloud technologies in an extensive variety. Google Drive to store the data, Skype to chat and web albums. Cloud architecture is classified as a front end which is visible to the client such as cloud applications, web browsers through which client interact with the cloud and back end is used by service providers such as data storage systems, servers and virtual network. Each client request is fulfilled by a dedicated server or application server. Different security protocols, traffic control protocols are applied to these servers to ensure secure data delivery [2-6,24].

Cloud providers offer three standard models of SaaS, PaaS, and IaaS. In SaaS applications delivered over the web and are designed for end-users. PaaS is the set of services and tools intended for coding and deploying those applications quick and efficient and IaaS is the software and hardware that powers it all i.e. storage, servers, operating systems and networks. Fig. 3 demonstrates the cloud model.

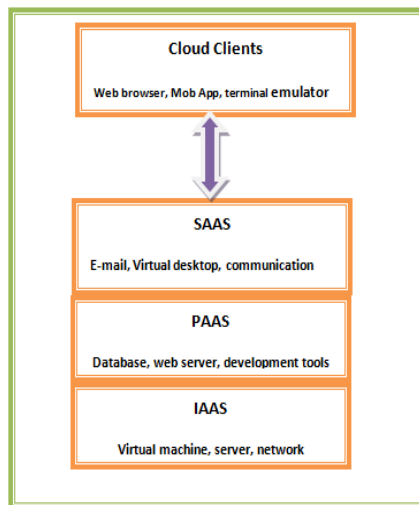


Figure 3: A Cloud Model

Application delivery network works with application delivery controller and optimization technologies within data centers to secure and improve the delivery of data. It also ensures that applications are always fast and available across the network. Cloud data center is the hardware that stores the data of any organization. Cloud services are outsourced by third party cloud providers. These providers are responsible to perform all updates and maintenance. Data centers are run by in house IT departments. Data centers store servers related to other data. Cloud service providers use data centers to house cloud services and cloud-based resources. Fig. 4 illustrates the proposed model.

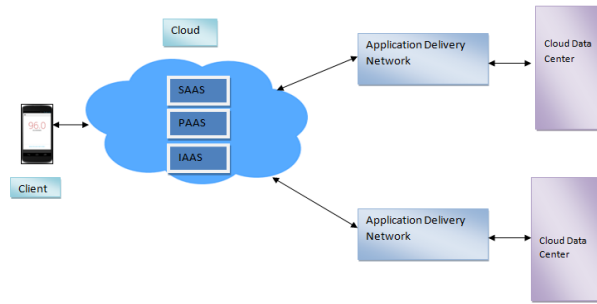


Figure 4: The Proposed Model

The remote client sends the request of any service using a web browser through software applications. These applications are accessed on smartphones using the internet. This request passes to the cloud where three layers of cloud entertain this request. Cloud forwards the request to the relevant application delivery network server. This server is protected by a secured network and ensures secure data delivery. The application delivery server holds all requests of clients and sends them to cloud data centers. These cloud data centers are at different locations, depending upon the area and accessibility. The cloud data centers have all the required data about the queries. It will match the query data with the data stored in it. When both results match, the searched query answer is then sent back to the client passing through the same layers in the cloud. The links between all the networks are bi-directional which ensures the delivery of data at both ends [2-6]. Fig. 5 shows the implementation of the proposed model.

Network Model

Fig. 5 represents the implementation of the proposed model, called Network Model.

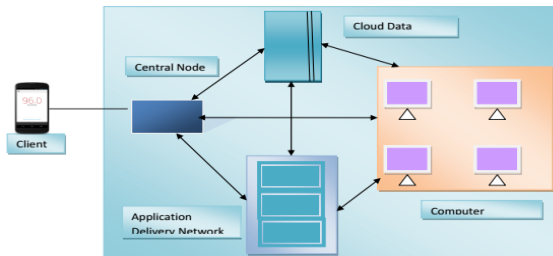


Figure 5: Implementation of the Proposed Model

Data communication from client to server and from server to the client takes place in the following order. The central node is located centrally and all the cloud data centers servers and application delivery networks are linked with this central node. Central node manages all the cloud data. These cloud data center servers are partitioned at different locations according to their use. The central node after receiving a request from the client sends it to its relevant cloud data center.

The client sent a request for any query through smartphones by interacting with application software. The request first goes to the central node of the network. The central node manages all the incoming queries. The query can be in any language. The network is partitioned at different locations as the query can be from any location. The central node transfers the request to the relevant cloud data center and application delivery network. The application delivery network ensures secure data transmission and translates the query in any language understandable by both user and computer. The application delivery network server after ensuring this sends the request to the relevant cloud data center. The cloud data center matches the query with the data stored

in it. When the data match, the answer of the query is sent back to the client passing through the cloud and application delivery network which makes the data communication fast and secure. Application servers and cloud data centers are supported by a strong backbone network that ensures the correct and safe data delivery to the client.

Query Translation

Clients by using their smartphones can access the application software. To access the services the user first needs to make their account on that application by using the internet. User ID and password are given to the user for authentication. The user can access the application and can send a request by verifying their authentication. After verification, the user can send a request in the form of a query and can ask any questions related to the material in any language. The request and query of the user go to the central node, which then checks the server after verifying location and forward the request to the relevant location cloud server.

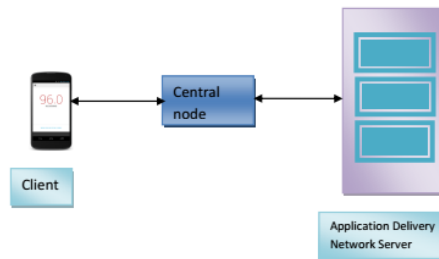


Figure 6: Query Translation

If the user sends a query in the form of any question in any language, this query is sent to the application delivery network server from the central node. This server has requested all the clients/ users which need to be translated in any language. This server is linked with Google translator which translates the query of the user, interprets it and sends the request to the cloud data center. Here the answer of the query is searched and relevant data is sent back to the user passing through the application delivery network and central node. As shown in Fig 6, the link between client, node and application delivery network is bi-directional which ensures the communication at both ends. Here in the application delivery network the answer is again translated to the user language, if needed, and send back to the user/client via the central node. Users can view the answer to the query after getting online and login to his account.

In case the application delivery network server is busy handling too many requests of the client and there is the possibility of late delivery of the message it will generate a message to the client to inform him of the late delivery. This server is made artificially intelligent to handle such queries efficiently.

A Comparison of Traditional and Proposed Model

It is understood that the cloud and network models proposed are at an infancy stage and probably not be validated within this research paper. Thus a comparative analysis is presented to show the advantageous of the proposed model compared to traditional modes of delivery or to other forms of educational technologies.

Table 1. A Comparison of Traditional and Proposed Model

Criteria /Approaches	E-Education	Distance-Education	Classroom-Education	Smart-Education
Overview	Learning by using electronic technologies to access educational courses outside of a traditional classroom.	The education of students who can get an education by sitting in distant places and may present physically.	The education in which student has to come to the classroom physically.	The smart way of getting education using smart technology at home.

Infrastructure	A lot of technological infrastructure needs to be maintained.	A lot of technological infrastructure needs to be maintained for recording lectures and mailing.	It also needs proper infrastructure and set up to create a classroom environment.	No special infrastructure required for this.
Flexibility	It is not flexible because instructors may not always available on demand.	It has no flexibility. As learner needs a computer and other materials to get an education.	It has no flexibility. As learners must have to come to the classroom.	It is flexible because the learner will get answers to their queries even without the presence of the tutor.
Cost	It involves cost because some courses are difficult to simulate.	A large amount of cost involves maintaining technology infrastructure.	A large amount of cost involves maintaining infrastructure.	It does not involve cost, as everyone has their smartphones and data packages in them.
Travel Considerations	Travelling may involve in search of proper infrastructure.	Travelling may involve in search of proper infrastructure.	The learner has to travel to go to the classroom.	It does not involve traveling.
Easiness	It involves the use of electronic technologies which is not easy to use for everyone.	Lectures delivered through mailing and post. To keep a record of all material is not an easy job.	The learner has to go to the classroom with proper gadgets, books, and notebooks which are not easy to carry everywhere.	It involves only a smartphone i.e. tab, mobile-phone and data package in it. It is easy to carry everywhere as it is portable.
Affordable	Buying electronic media is not affordable for all.	A high fee is often charged which is not affordable for everyone.	It includes more expenses for travelling, books and dressing.	Everyone nowadays has his own smartphone which is available at an economical price.
Language Translation	E-education does not provide the facility of language translation from one to another as there are diverse geographical areas and diverse languages.	It also does not provide language translation from one language to another.	It involves a language translation issue too. As people getting an education in other countries face language difficulties.	The proposed model of smart education has the ability to translate user queries into the desired language and replied to them in their language.

Table 1 presents the comparison of the traditional and proposed model, which shows the impact of using smart technology in getting education over traditional and conventional ways from a survey. Different modes of education have been discussed in the table. As mentioned in this table, in the E-Education system the learner gets education by using some technologies. If they do not have that device they won't be able to get an education in that particular course. Some traditional courses are difficult to simulate. For this first, there is a need to identify

learners' environment. The same is the scenario of Distance Education. Some students who do not have proper knowledge of using tools and software enrolled in distance education and they often face more difficulties. Such students must be provided pieces of training to use these tools which involve cost. Classroom Education is no doubt mostly used way of getting an education but it is observed that it is not affordable for everyone. For classroom education, learners have to travel from distant places, as mentioned at the start of the research paper that in cities like Bahawalpur, Pakistan which mainly consists of deserts traveling is a major issue. Classroom education also involves the cost of books, notebooks, dressings, tight and bounded timing schedules.

The smart education comparatively is the smart and easy way of getting an education at home place using smartphones. It is the most flexible and efficient way of getting an education. It reduces the problems faced in the traditional system of getting the education. It works on cloud computing. The user interacts with the cloud and database through their smartphones which include tablets, mobile phones etc. Due to advancements in technology, everyone nowadays has their own smartphones and data packages in them. The learner can get enrolled in any desired course, get the education and can ask queries using their smartphones. The proposed system is efficient enough to reply to user queries in the desired language as it also involves the feature of language translation. It is very easy to use as compared to other modes of education, due to advancement in technology almost everyone knows how to use an android and other OS smartphones.

From the survey, drawbacks of traditional modes of education and advantages of the proposed model of smart education have been discussed and clarified. Although the proposed model of smart education is not 100% efficient it reduces the shortcoming of traditional models to some extent if it is deployed properly with the proper setup.

Conclusion

In this research paper, we propose a model to provide education through an easy and innovative way through ICT like Smartphones. The proposed model is based on cloud computing where a central hub and cloud data centers are established to provide the solution of users' queries. Furthermore, the application delivery network responds to the relevant answer of the query in different languages. In this way, the user gets relevant material by interacting with the application software. The proposed model is deployed in a small area of Bahawalpur City. A comparison is drawn between traditional education and the proposed model. The proposed model is a smart way to get education using smart technology at home, no special infrastructure required for this. It is flexible because the learner will get answers to their queries even without the presence of the tutor. It does not involve cost, as everyone has their smartphones and data packages in them. It does not involve traveling. It involves only a smartphone i.e. a tablet or laptop, mobile phone, and data package in it. It is easy to carry everywhere as it is portable. Furthermore, the proposed model is capable to translate the queries. At this stage, it is concluded that the obtained results are consistent and satisfactory. However, further tests can be conducted in order to validate the proposed model.

References

- Ammar Khalid, Yasir Fayyaz, Dost Muhammad Khan (2012), "Cloud Computing: Deployment Issues for the Enterprise Systems", JOURNAL OF COMPUTING ISSN: 2151-9617, Volume 4 Issue 10, pp.: 61-65.
- Cathleen Norris, Akhlaq Hossain, Elliot Soloway (2011), "Using Smartphones as Essential Tools for Learning", EDUCATIONAL TECHNOLOGY/18.
- Dost Muhammad Khan, Najia Saher, Faisal Shahzad, Nawaz Mohamudally (2012), "The Human Resource Development (HRD) at the Higher Education and Research Institutions of Pakistan: The IUB Case Study", JOURNAL OF COMPUTING ISSN: 2151-9617, Volume 4 Issue 3, pp.: 120-124.
- Dost Muhammad Khan, Najia Saher, Faisal Shahzad, Nawaz Mohamudally (2012), "The Integration of Networking and Computerization towards e-Education and e-Learning at the Higher Education and Research Institutions of Pakistan", INTERNATIONAL JOURNAL OF COMPUTER SCIENCE ISSUES (IJCSI) ISSN: 1694-0814, Volume 9, Issue 2, pp.: 546-551.
- Dost Muhammad Khan, Nawaz Mohamudally (2011), "From Mainframe to Cloud Computing: A Study of Programming Paradigms with the Evolution of Client-Server Architecture", JOURNAL OF COMPUTING ISSN: 2151-9617, Volume 4 Issue 12, pp.: 21-27.
- El-Hussein, M. O. M., & Cronje, J. C. (2010), "Defining Mobile Learning in the Higher Education", Landscape. Educational Technology & Society, 13 (3), 12–21.
- Gegenfurtner, A., Veermans, K., & Vauras, M (2013), "Effects of computer support, collaboration, and time lag on performance self-efficacy and transfer of training: A longitudinal meta-analysis", Educational Research Review, 8, 75-89.
- H. Wang, Y. Zhang and J. Cao (2009), "Effective Collaboration with Information Sharing in Virtual Universities. In Proc. Knowledge and Data Engineering", IEEE Transactions 21 (6), 840-853, ISSN: 1041-4347.
- Harley, D., Winn, S., Pemberton, S., & Wilcox (2007), "Using texting to support students' transition to university", Innovations in Education and Teaching International, 44(3), 229-241.
- Hwang, G., Wu, T., & Chen, Y (2007), "Ubiquitous computing technologies in education", International Journal of Distance Education Technologies, 5(4), 1-4.
- Iqra Yaqoob, Dost Muhammad Khan, Najia Saher, Faisal Shahzad, Salman Qadri (2015), "An Innovative Theoretical Model for Humanoid Robots", International Journal of Natural and Engineering Sciences (IJNES) ISSN: 1307-1149, 9 (3), pp.: 28-38.
- J. D. Kibble et al. (2007), "Effective use of course management systems to enhance student learning: Experimental Biology 2007", Adv. Physiology Education, Vol. 31; pg 377-379.
- Jessica L. Buck, Elizabeth McInnis, Casey Randolph (2013), "The New Frontier of Education: The Impact of Smartphone Technology in the Classroom", ASEE Southeast Section Conference.
- Looi, C. K., Zhang, B. H., Chen W., Seow, P., Chia, G., Norris, C., & Soloway, E. (2010), "1:1 mobile inquiry learning experience for primary science students: A study of learning effectiveness", Journal of Computer Assisted Learning.
- Luisa, M., Sevillano-García and, E. Vázquez-Cano. (2015). "The Impact of Digital Mobile Devices in Higher Education", Educational Technology & Society, 18 (1), 106–118.
- M. Ramim, Y. Levy (2006), "Securing e-learning systems: A case of insider cyber attacks and novice IT management in a small university". Journal of Cases on Information Technology, 8(4), 24-34.
- Manoj Kumar (2011), "Impact of the Evolution of Smartphones in Education Technology and its Application in Technical and Professional Studies: Indian Perspective", International Journal of Managing Information Technology (IJMIT) Vol.3, No.3, pp.:4-8.
- Najia Saher, Dost Muhammad Khan, Faisal Shahzad, Nawaz Mohamudally (2012), "The Prospects of ERP Systems on Quality of Education and Research in Higher Education and Research Institutions of Pakistan", JOURNAL OF COMPUTING ISSN: 2151-9617, Volume 4 Issue 3, pp.: 115-119.
- V. Tan (2004), "Using IVLE to Teach Large Classes – A Personal Experience", TLHE Proceedings, p. 443-448
- Valentina Arkorful, Nelly Abaidoo (2014), "The role of e-learning, the advantages and disadvantages of its adoption in Higher Education", International Journal of Education and Research Vol. 2 No. 12.