Evaluating IT use in Saudi Secondary schools, to suggest appropriate strategies for improving IT use in education

by

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DECLARATION

I declare that to the best of my knowledge, this report does not contain any material previously published or any material written by another person, except where due reference is made in the text.

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ABSTRACT

In recent decades, Information and Communication Technology (ICT) has been widely utilized across countries in educational institutions at all levels as an effective tool to facilitate high quality teaching. Unfortunately, developing countries like Saudi Arabia have not yet been able to address teaching and learning challenges effectively through the use of ICT; therefore the role of ICT in the education system in Saudi Arabia is still limited. This is largely because of the complexity involved in integrating ICT into the education system. While the inadequacy of technological infrastructure is one of the major impediments of integrating ICT in education, the absence of strategic direction is also a significant barrier. Secondary education is an important stage for students as it has the potential to enable the acquisition of preliminary but crucial knowledge about future careers. Considering the importance of secondary education, the principal concern of this study is to evaluate IT use in Saudi secondary schools and to suggest appropriate strategies for improving IT use in education.

This study has identified that both students and teachers face various types of challenges in using ICT in the educational arena. Some challenges faced by students include lack of skills, lack of English language proficiency; lack of availability of technology; poor Internet infrastructure; and cultural, religious and attitude related barriers. While some of the major challenges faced by teachers include inadequacy of IT resources; lack of motivation; old IT infrastructure.

Some of the major findings of this study include private schools have better ICT infrastructure; students at private schools are well informed about computer technologies; private schools make higher IT investments; students in private schools are taught using ICT aids; teachers at private schools are given training on latest IT updates; students in private schools are encouraged to use IT tools in projects and assignments.

Finally, the study has concluded that some measures and steps are required to improve the quality of ICT usage in secondary education, such as the development of online training modules; online publication and availability of lectures for students; online publication of assignments; online submission of assignments and online grades/results submission.

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CHAPTER 1 INTRODUCTION

1.1 Research background

In recent decades, the advancement in computer technology has benefited almost all sectors including education. Information and communication technology (ICT) in particular has been an integral part of the education system in many countries including some developing countries (White 2008). The computer is an important tool for both learners as well as educators. Some general forms ICT use includes lesson preparation; researching information on various topics; printing documents; gathering ideas from colleagues, counselors and trainers; word processing; preparing multimedia presentations (White 2008). For the last decade, the Internet has opened a vista of opportunities to source important information and to keep teachers up to date about the latest advancement in knowledge; also teachers can open online learning forums and use blogs as part of their teaching practices (Williams 2005; Kozma 2008)

The use of computers or ICT by students can also open a large array of opportunities. Students can see benefit through using computers and the Internet in many ways, such as word processing; drawing charts; preparing presentations; solving complex mathematical problems; accessing educational websites; gathering information about any subject (Selwyn & Husen 2010).

Interestingly, as with time, ICT evolves, teachers and students also develop dynamic capabilities. For example, users of ICT can update software packages and use advanced features. Creative teachers can constantly explore new ways to integrate lessons to ICT to promote learning for their students.

Although, the computer is a complex device and training is required to develop a user's capability to use computers, the advantages associated with the use of ICT are enormous. Interestingly, while the computer is suitable to be used by teachers to improve their teaching process, it is also capable to help students in their learning process. Solimano

(2008) has asserted that the use of computers has the potential to enhance talent and skills of both teachers and learners. It saves a lot of time and also improves users' problem-solving skills. In addition, it improves motivation for learning as well as teaching.

In all developed countries and many developing countries, education policy has placed high importance on promoting the use of ICT in the education sector irrespective of the level (e.g. primary, secondary and tertiary) (Kozma 2008; Hinostroza, Hepp & Cox 2009). Huge investments have been made in recent decades to ensure a strong ICT infrastructure and providing training to teachers and students to develop their computer skills; also, various types of computer education programs have been tailored for particular levels of the educational hierarchy (Kozma, 2008). Unfortunately, such emphasis on fostering the integration of ICT into the education system is non-existent in the Kingdom of Saudi Arabia (KSA) (Maroun et al. 2008; Oyaid 2009). Several, current articles provide strong evidence about the limited use of ICT in the educational arena of the KSA

Therefore, considering the importance of ICT in modern day education, especially in promoting high quality education, this research will first identify the reasons for the low integration of ICT into the KSA's education system in general and at the secondary level in particular. Based on these finding the report will suggest possible strategies required to promote the use of ICT by teachers and learners in the secondary level educational institutions. This researcher has chosen the secondary level as a unit of analysis as it is the most important level for students to develop the base of their future human capital.

1.2 Major aims and objectives

This study aims to find out the existing usage of ICT in secondary schools in Saudi Arabia based on demographic characteristics, such as gender, age group and types of schools, which will facilitate developing a set of tailored strategies to promote the usage of ICT in secondary schools in the KSA. The main objectives of the study are the followings:

1. To analyse the extent to which ICT has been used by teachers and students in secondary schools in Saudi Arabia based on the type of school (public/private);
2. To analyze and evaluate the barriers that impede the use of ICT in secondary schools; and
3. To recommend various strategies, that can be adopted by education policy to support the Saudi Arabian secondary education.

1.3 Significance of the Study

The importance of this research stems from its contribution to knowledge, particularly its generation of useful information to support future development in the use of computers in the educational system in Saudi Arabia. After analysing the data, it is hoped that the results of this study will:

1) Provide Saudi educators with a new understanding of, and insights into secondary school teachers' usage of ICT in the classroom and modify their perceptions regarding ICT. Identify enablers and obstacles of full integration of ICT in the field of education. In addition, presenting teachers' views on current ICT policy and its influence on their teaching style will enable policy makers to make decisions based on informed judgments rather than intuition.

2) Provide the Ministry of Education (MoE) and Ministry of Communication (MoC) in Saudi Arabia with new information relating to issues which need to be considered in addressing future educational policies; as described in (MoC 2003).

3) Give insight into teachers' views on probable/preferable future utilisation of ICT in the teaching and learning process. This will inform policy makers about the extent of their awareness of such utilisation and their expectations of new policies, reforms, or initiatives launched by the Ministry of Education (MoE).

4) Open the way for future research on education in the Saudi context.

1.4 Limitations of the Study

This research has a few limitations. Firstly, it has adopted a cross-sectional study design, which is not able to portray a dynamic trend in the usage of ICT in secondary education in the KSA. Secondly, the study has used a small sample size (70). Thirdly, the student participants in the sample are from two schools in the city of Jeddah, and the teachers are from a public school in the same city. Lastly, there is not a sufficient amount of existing literature on the research topic, which has made it difficult to make a comparison of the research findings with other concurrent empirical studies.

CHAPTER 2 Literature Review

2.1 Introduction

ICT has brought a revolution in every field of life. The increasing pace of advances in technology is breaking its own records. There is increasing availability of latest technologies to teachers, i.e. personalized learning environments (Harmelen 2006; Dolog et al. 2004), multimedia streaming, blogs, wikis, and RSS feeds and teachers are now expected to make routine use of ICT in their teaching. This research has sought to obtain deeper insight into the ICT usage by the secondary school teachers in the Kingdom of Saudi Arabia and its relation with national ICT educational policy. An important element of this research is to outline perceptions and attitudes in teaching staff regarding the use of ICT in their teaching, which will facilitate making solid recommendations regarding an increased usage of ICT in education in the future. The following literature review provides important insights related to the importance of ICT in education in general and the past and present picture of the role of ICT in Saudi education system.

2.2 Importance of ICT in education

Today, knowledge of computer technologies has become one of the fundamental skills that everyone should adopt, and formal education is an important source for such knowledge. From primary school to university ICT has been integrated in educational process. We use computers in schools to improve students' knowledge about ICT, and to enhance the educational process (Nabil & Molouk 2002). The research has shown that an important factor in effective acceptance of ICT is user's attitude towards computers (Afnan 2009).

There is no doubt that advances in technology have dramatically changed the learning environment in many ways (Farid, Roys & Dolores 2009). This trend is not only manifested in a dramatic increase in the number of computers used in schools, but also in diversification of their use (Khalid 2009). Computers can be integrated into many school activities to help with the creation of satisfying and productive learning environments for the benefit of students. But during this process students' perspectives should be taken into account too. Students perceptions play a significant role in successful implementation of

new technologies, and can lead to transformations of the educational environment (Khalid 2009).

Although, computers have been used in education for the past two decades in many parts of the world, this has not been the case in Saudi Arabia. Here, after the teaching of computer skills as a subject had been introduced in schools in the 1980s, teaching using computers and applying them in the context of teaching and the learning of other subjects commenced in the 1990s (Mohammad 2011). Such expansion has been driven by government educational policy, and involves not only the provision of the necessary hardware and software to schools, but also the training of policy executers, i.e. teachers and head teachers. This training is crucially important because it helps schools manage change to their teaching and learning practices.

Successful incorporation of ICT in education requires teachers to change their pedagogical approach. Some teachers have not welcomed such change; since it necessitates more directed usage of ICT in teaching practice and changing their current teaching practice (Ihmeideh 2009). The use of ICT changes the learning situation from a teacher-centred one, in which teacher's set educational targets and aims, to a more personalised learning situation in which students have a greater role in shaping their teaching and learning experience (Dolog et al. 2004).

Teachers have varied behaviour towards ICT, which ranges from merely small enhancements in using computers in their teaching to more fundamental changes (Alkhawaldeh 2010). Those teachers who resist the change are thought to be underestimating the potential of using ICT in education. Such resistance is viewed as being due to the ambiguity and lack of clarity of governmental ICT policies, which state aims and set targets without providing training, assistance or suitable guidance as to how to achieve the targets or fulfil the aims, as in the case of UK ICT policy, which refers to computers as "learning tools" but does not focus on how they should be used to serve this purpose (British Delegation 2006).

To reassure teachers who are reluctant to use computers, their training should focus not only on ICT skills but also on raising their awareness of the advantages of using ICT in their teaching (Khalid 2009), because if they do not think this way then they are likely to

continue to resist usage of ICT in teaching practice (Ihmeideh 2009). The inadequacies of existing training holds Saudi teachers back from actively using ICT in their teaching, even though the hardware and software are available. A study based on data collected internationally relating to the appropriate and creative utilisation of ICT stated the following, "It is known from previous research that educational innovations usually do not succeed if teachers are not provided with the skills and knowledge needed to carry them out" (Pelgrum 2001, p.165).

Insufficient teacher training results in teachers' low confidence in using a wide range of ICT resources. Not feeling confident to use different ICT applications inevitably affects teachers' delivery of lessons, and prevents them from making use of available resources (Khalid 2009). Saudi teachers' lack of training in ICT skills and low awareness of their advantages in their teaching practice are also likely to hinder the successful introduction of educational innovations. If more appropriate training is given, their attitude towards ICT usage in teaching is likely to change. A study by (Ibrahim 2010) found that after some encouragement to teachers, they had successful experiences of using ICT in teaching and were able to overcome many obstacles due to their confidence in the promised advantages of using computers in education.

From the above discussion, it can be seen that teachers play a crucial role in promoting or hindering the usage of ICT in the classroom. Moreover, since teachers can easily transmit their beliefs and values to their students and influence their attitudes towards ICT usage in the learning environment, it is important to understand and appreciate their attitudes towards and perceptions of computers to ensure that all students have equal and unprejudiced ICT experience during their learning process (Ibrahim 2010).

2.3 The Saudi Arabian Education System

In Saudi Arabia, all education policies are subject to government control. The curriculum, syllabus and textbooks are uniform throughout the country. The administration of education is controlled through two main agencies, namely the Ministry of Education (MoE) and the Ministry of Higher Education (MoHE). Though there are other governmental agencies which have some educational responsibilities, these two are the main service providers.

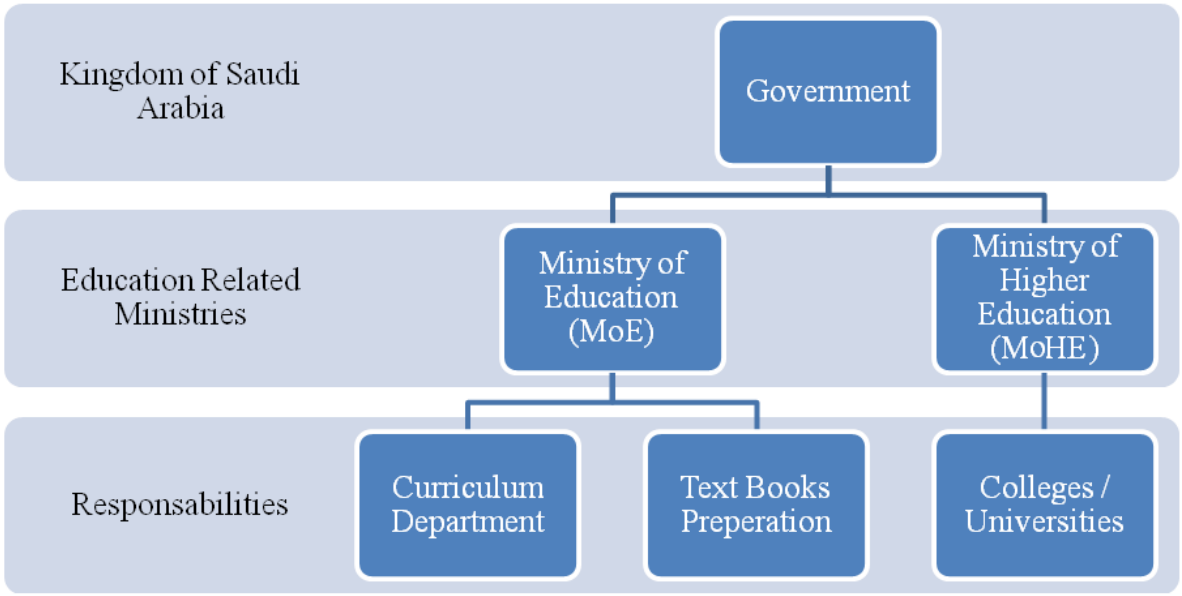

Figure 1. The Saudi Arabian Education System

2.3.1 Organization of Education in Saudi Arabia

The administration of the general education system in Saudi Arabia is highly centralised. Curricula are unified throughout the kingdom and there is a curriculum department in the Ministry of Education (MoE). This department is responsible for curriculum development and the preparation of subject textbooks. For each subject and for every grade there is a textbook which must be used in all the kingdom's schools, including private schools. The academic year is divided into two semesters, each of 18 weeks duration. The first 16 weeks are for teaching and learning activities and the last two for the final examinations. Students prepare and study for these examinations from the textbooks and teachers are expected to devise exam questions from them and not to cover any topic not included in the textbooks. The assessment of the student is comprised of the student's work during the semester (40% of the total mark) and the mark in the final examination (60% of the total mark). In order for the student to advance to the next grade s/he must pass exams in all subjects and there are reset examinations for those who do not pass the first time. However, in accordance with the Ministry of Education's newly developed and improved curriculum, students in primary education are constantly evaluated and assessed during the academic year and do not sit final year examinations. Education is compulsory in Saudi Arabia for all children

between the ages of 6 to 15 years. Most children study in state schools. In recent years, however, many private schools have been established in the larger cities within the kingdom.

General education in Saudi Arabia is divided into four stages.

I. The pre-school stage is optional and serves children between the ages of three to six.

II. The primary stage, which is of six years duration, provides education for children between the ages of six and twelve.

III. The intermediate stage for adolescents is three years in length between the ages of twelve and fifteen.

IV. The secondary stage lasts for three years between the ages of fifteen to eighteen.

This study focuses on teachers of secondary school students, therefore the fourth stage of education is considered in more detail below.

2.3.2 Secondary Stage of Education

Secondary stage of education prepares students for studying in higher education institutions. It is considered to be the most important stage in the general education system in Saudi Arabia and consists of three grades (Oyaid 2009). All students follow the same curriculum elements during the first year, then, in the second and the third year they pursue their study in one of the following areas: Islamic and Arabic studies, Management and Social Sciences, Natural Sciences or Technological Sciences. However, Islamic and Arabic studies and Natural Sciences are the only pathways available for girls. The final examinations for these subjects are usually prepared by the teachers of individual schools under the supervision of the head teacher of the school. Students must pass examinations in all the subjects they are pursuing to get the Secondary School Certificate (SSC). High marks in such examinations give a student priority in university and college admission. The secondary stage of education has benefited from the improved and developed curricula, part of "The General Project of Curriculum Development" which aims to utilise specialised human resources, technical capabilities, and instructional design strategies to design and develop high quality educational curriculum.

The new curricula aim to integrate ICT use in education and develop students' skills and encourage creativity and analytical thinking to fulfil the needs of all students (Alshumaim & Alhassan 2010). Students now have the choice between the traditional secondary schools or the modernised secondary schools in which students are exposed to an educational environment similar to that of universities. Here, students can arrange their timetables and choose their modules and can even enrol for the summer semester. In addition, secondary school teachers in modernised schools are given more freedom of choice in their teaching practice. The major objectives for secondary education are as follows:

- Strengthening faith in God, making all deeds pleasing to God, and complying in all their aspects with that which he loves.
- Strengthening loyalty to the Islamic nation, as well as aspirations for the highest social standing and developing a strong physical constitution, suitable for the students' age.
- Developing students' abilities and directing them in a manner suitable for them.
- Providing opportunities for students and preparing them to pursue their studies at various levels in higher education.
- Preparing students to work in various fields of activity.
- Taking care of young people according to Saudi culture, addressing their intellectual and emotional problems, and helping them towards a successful future.
- Developing in students a positive consciousness so that they can confront subversive ideas and misleading trends.
- Instilling in students the virtue of useful reading and the desire to broaden their scope of knowledge and fruitful work and to use their leisure time in activities that improve their character and the conditions of their community.
- Establishing the feeling of family solidarity in order to construct the solid Islamic family.
- Developing students' scientific thinking and entrenching in them the spirit of research, systematic analysis, the use of reference sources, and the practice of academic methods.

Colleges offer training courses for students to teach in schools. College graduates who complete the four years of study are awarded a Bachelor of Education degree. Teacher training is seen as very important. Teacher training programmes aim to provide teachers with appropriate training in teaching methods and develop teachers qualified in specialist subjects. The Ministry of Education (MoE) considers that the well-trained teacher is crucial to the learning process and can maximise the use of varied facilities available, such as the curricula, textbooks, educational technologies, audio-visual aids, laboratories, and so on. Quality teacher training programmes play an essential role in the development of the education system. The Directorate in charge of teacher training aims to upgrade the skills of teachers both by improvements in the training of new entrants to the profession and by in-service programmes for existing teachers (Aldraehim & Watson 2012).

2.4 ICT in the Saudi Educational System

Saudi Arabia, like other developing countries, has a relatively short experience with ICT use in education, because it was officially implemented throughout secondary schools less than a decade ago. ICT was introduced into education after numerous calls for the development and reform of education. Saudi policy makers in the rush to catch up with developed countries introduced ICT related policies which were borrowed from those developed countries without conducting their own locally based research which would have assisted them in the initial phase of ICT introduction. Therefore, the role of the study, which is conducted in the local context of Saudi Arabia, is to try to fill the gap which exists in the locally based literature (Al-Gahtani 2003).

This literature review of ICT in the Saudi education system is organised in relation to the research questions. During the literature review, the research questions remained the central focus and literature relevant to them will be presented. Because of the limited amount of research in this particular field in Saudi Arabia, the literature review is a combination of relevant literature from different countries and Saudi studies (Ihmeideh 2009; British Delegation 2006; British Council 2007).

Analysis of relevant studies investigating issues related to ICT in education revealed the following. First, most Saudi studies were small scale, unpublished research projects conducted to fulfil degree requirements (i.e. Master and PhD dissertations). Second, most

studies had focused on the impact of ICT on specific subjects, such as Mathematics, Science, and Geography. In addition to the lack of Saudi based ICT related studies, most of those which had been carried out had been based on Western theoretical frameworks. The use of socio-cultural theory in this study implies reviewing and discussing local Saudi studies, however, the theoretical aspects of this study are mainly discussed using Western based literature (Farid, Roya & Dolores 2009; Pelgrum 2001), still practical Saudi studies are discussed as well (Afnan 2009; Ibrahim 2010; MoC & IT 2003; Oyaid 2009; Alshumaim & Alhassan; Aldraehim & Watson 2012; Hend 2010; Nabil & Molouk 2002; Mohammed 2011a; Mohammed 2011b; Sulaimani 2010; Bingimlas 2010; Gahtani 2003).

It is important to note that in this study, the words "perceptions" and "feeling" are used interchangeably and considered to be synonyms, therefore, studies in this review include ones exploring perceptions and attitudes in the sense of feelings rather than behaviour or state of mind. The review of the literature commenced by physically searching library books, journals, and abstracts, and electronically by using key words 'ICT and education', 'secondary education', 'teachers perceptions', 'policy and future education' in search engines, academic databases, such as the Web of Knowledge, Google Scholar, ACM Portal, and ERIC, and electronic journals. Perusal of the first book and article led to other books and articles referenced in them, which references continued to grow like a trundling snowball. During the literature search, a log was kept with all references using Reference Manager 10 software.

ICT as a subject was introduced to Saudi special advanced secondary schools in 1985 through three subjects: an introduction to computer sciences, programming in BASIC, and systems programming and the use of information systems. The success of the programme encouraged the Ministry of Education (MoE) in 2003 to introduce computer studies as part of the curriculum of secondary schools. It was a compulsory subject with two classes per week, lasting in total two hours. It should be noted that computer studies were already being included in the curriculum in private schools at both primary and secondary stages as an optional subject at that time.

Since 1999, the subjects being taught are: Information Technology, Computer Science, Computer Applications, Information Systems, and the Information Age. Various computer training programmes have been organised for both teachers and students, although they are

mostly aimed at those students at secondary school. The foregoing was the first phase of the utilisation of computers in the Saudi educational system. The second phase has witnessed integration of computers in the teaching and learning of many subjects in the curriculum as a result of the increased commitment of the Ministry of Education to develop the infrastructure of information and communication technology and its employment in education and learning. There are a number of projects that exemplify the MoE's commitment, for example, the development of school libraries into Learning Resources Centers (LRCs) that contain information sources both in print and non-print forms, including ICT, and their integration in the teaching and learning process to create rich learning environments. Computer labs are another MoE initiative that has been introduced to give students first-hand experience through experimentation and hands-on activities. They represent a positive change from traditional educational methods which are based on memorization, as students are given the opportunity to learn through experimenting, observation, and induction using interactive software applications associated with computer sensors. Digital Technical Centres (DTCs) are another new project. They have been established in various educational regions of Saudi Arabia with the aim to meet educational needs in the areas of digital content and educational application of ICT. These centres are equipped with a unit for the production of digital interactive educational aids to support school curricula.

As a result of the government's inactivates towards increased integration of ICT in education, two further steps have been taken. First, ICT was introduced as a compulsory subject to girls' schools and to the primary stage of education in the 2003 academic year and, second, a National Project (Watani) has recently been launched. Its aim is to further promote the use of computers as an educational technology as explained in the following quotation taken from its website (http://www.wataninet.com/): "The Schools' Net Project will connect all Saudi Schools and Educational Directorate Districts by means of a wide area network covering the entire Kingdom of Saudi Arabia and local area networks within every educational directorate and school. The Schools' Net Project will provide every student, teacher, parent and educator with a multitude of services and a huge source of reference information. The services of Schools' Net project include (but are not limited to) the curricula of all courses, references of educational material, e-books and more, Teachers' Guides, services for students and other users with special needs, course syllabuses,

interactive multimedia, teacher training, school management systems, web design tools for schools, e-mail, chatting, announcements, Internet links, a students' magazine, a teachers' magazine, educational statistics, students' training, students' sites, information technology skills for all, and a Q&A bank. These contents and applications will be mostly in Arabic. The first phase of the School's Net Project will provide one million students with their IT requirements in a ratio of one PC to ten students' as mentioned on Watani website. There are six objectives of this Project:

I. To develop skills of students by exploiting and using information technology (IT) in education and, thereby, prepare students in an effective manner for the future.

II. To improve teachers' potential by employing information technology in all educational activities.

III. To provide an information rich environment, scientific content, and direct educational sources for students and teachers.

IV. To improve the outcome of the educational process by graduating outstanding future generations of students who have mastered the use of information technology.

V. To partake in the creation of a nucleus for an advanced information technology industry in the kingdom.

VI. To create a comprehensive awareness of the benefits of employing information technology in education and disseminating knowledge of information technology throughout the society at large.

Saudi ICT educational policy covers not only students under the supervision of the Ministry of Education (MoE), but also members of the society through the Ministry's ICT clubs. Initially 25 school clubs started offering their services in 1996 and are based in secondary schools' computer labs. Since they make use of schools' existing computers and latest technology, this saves the expense of establishing new computer labs. Such community based PC labs can help to raise ICT awareness among students, teachers and community members through affordable training courses, offering courses to improve teachers' technological competence, and making use of youths' spare time in fruitful activities. The ICT clubs play an important role in raising technological awareness among the community,

as well as extend students and teachers encounter with computers beyond the school day. In addition, these assist in overcoming the inequalities in computer access among students as a result of the digital divide between those who have access to computers and the Internet and those who do not (Ibrahim 2010).

Saudi ICT educational policy takes into consideration all stakeholders involved in the usage of computers in education, including teachers as major stakeholders. The policy therefore gives attention to teacher computer training as much as it emphasises its importance for students and offers them a number of opportunities to gain or improve their ICT skills. The latest opportunity is the Jehazi project (http://www.jehazi.org/), which is a new scheme run by the Ministry of Education (MoE) which enables all teachers to possess their own laptop and other equipment such as printers and scanners, at a reasonable price, no deposit required, and easy to pay settlements. This project has three main objectives: first, to raise technological awareness among Saudi teachers; second, to increase the number of teachers trained to use ICT; and, third, to increase the number of Internet users among teachers and prepare them to make use of the electronic government. The advantages of this scheme include a laptop, free memory stick (flash drive), free laser mouse, one year free Internet subscription, one year free subscription to a specialist computer magazine, a free six-hour training course at a New horizon computer training centre, free training to obtain International Computer Driving Licence ICDL, and after sale services.

The future of ICT in Saudi Arabia is promising since raising ICT awareness and promoting ICT usage in all aspects of daily life, including education, is now a national policy rather than an educational one only. An example of this change in policy is the Home Computer Initiative sponsored by the Communications and Information Technology Commission (http://www.citc.gov.sa/english/Pages/default.aspx) in association with The National Commercial Bank. The initiative aims to enable one million Saudi families to buy a new PC in simple and easy to pay instalments within the coming five years. The initiative includes the provision of a high quality PC working in the Microsoft Windows environment and Microsoft Office Professional, free one year maintenance, 15 hours Internet subscription per month, free educational CDs, and computer training offered at low affordable prices.

2.5 Integration of ICT in Education

Hend (2010) argues that to successfully integrate computer technology into language learning classrooms, institutions need to understand the issues that most strongly affect technology use, and to provide their faculties with the support required to blend the technology into their teaching methods. In addition, teachers need to be informed of the role that technology can play in their classrooms.

Interestingly, school administrators all over the world are recognizing some basic classroom technology requirements. Afnan (2009) noted that all instructors should have a computer for use in the classroom, and their offices and classrooms must have telecommunication capabilities so that they and their students can have easy access to e-mail and the internet. He recommends that institutions should consider technology use as a central component in promotion and tenure decisions, and that teachers should be encouraged to attend technology related conferences in order to learn from other's experiences (Alshumaim & Alhassan 2010).

2.5.1 Integration Barriers of ICT into Education

For the last two decades, the integration of ICT within the educational system has been the major milestone. The availability of dynamic teaching tools like personalised teaching, video streaming, and blogs have revolutionized the educational system. It has direct impact on the learning of students and overall, positive impact on national development. Abdulkafi (2011) stated that, in future, it will be an important measurement for the success of any country that how much ICT is used in education. Intuitively, the information age is causing education, media, business and industry to become more reliant on computers.

It is evident that integration of ICT into teaching and learning is a complex process and it is surrounded by numerous difficulties, termed as barriers. In this literature review, the definition of barrier is adopted from (Khalid 2009) as “any condition that makes it difficult to make progress or to achieve an objective”. The objective being analysed in this research is successful ICT integration in science education.

2.5.2 Classification of Barriers

Researchers and educators have classified the ICT barriers in education (specifically in classrooms) into two different groups: extrinsic and intrinsic barriers. However, what they meant by extrinsic and intrinsic differed. In one study, Ihmeideh (2009) referred to extrinsic barriers as first-order and cited access, time, support, resources and training and intrinsic barriers as second-order and cited attitudes, beliefs, practices and resistance; whereas, Khalid (2009) saw extrinsic barriers as pertaining to organisations rather than individuals and intrinsic barriers as pertaining to teachers, administrators, and individuals. Another classification found in the literature is teacher-level barriers versus school-level barriers. Alkhawaldeh (2010) classified the ICT barriers as per the major entities involved in education i.e. teacher and school. The teacher level barriers include lack of time, lack of confidence, and opposition to change. The school level barriers include lack of effective training in solving technical problems and lack of access to resources.

2.5.3 Teacher Level Barriers

Like many fields, it is noticed in the field of education that the reactions of teachers to the ICT innovations are influenced by their cultural views (Aldraehim & Watson 2012). Another factor that influences the teachers' reaction is the school regulations along with the national norms and values (Oyaid 2009). Many studies agree on this point that cultural perceptions for different ICT related tools are the key factors that influence the acceptance/rejection of these tools and as well as teachers' behaviour towards new technologies.

Hence, it becomes very important to study and analyse the cultural perceptions of the teachers. Especially in developing countries where ICT is not usually part of the culture. As it is becoming evident that the novel presence of ICT society at large and in school in particular is at most necessary for national development, so the study of teachers' perception is equally important (Abdulkafi 2006).

2.5.3.1 Lack of Confidence in Teachers

A number of researchers identified the lack of confidence in teachers as one major barrier that prevents teachers from using ICT in their teaching. Afnan (2009) sees this as a contextual factor which can act as a barrier and much of the research proposes that this is a

major barrier to the uptake of ICT by teachers in the classroom. In Khalid's survey of barriers (2009), the issue of lack of confidence was the area that attracted most responses from those that took part.

In Khalid's survey (2009), many of the teacher respondents who identified their lack of confidence as a barrier reported being particularly afraid of entering the classroom with limited knowledge in the area of ICT with their students knowing that this was the case. It was argued that lack of confidence and experience with technology influence teachers' motivation to use ICT in the classroom.

On the other side of the picture, it is found that those teachers who frequently employ the ICT tools in their classrooms and teaching overall have a better understanding of the importance of ICT in teaching. Ibrahim (2010) deduced that once teachers become confident in using ICT teaching tools, they agree that these tools are helpful in their classes and teaching related work overall. Moreover, they also want to extend ICT usage in future.

2.5.3.2 Lack of Teacher Competence

Continuing the teacher related barriers, another major barrier is the lack of competence in teachers in integrating ICT into their pedagogical practice (Oyaid 2009). Researchers also elicit that various teachers lacked the knowledge and competence to use computers and, on top of that, were not enthusiastic in learning new ICT practices associated with bringing computers into their teaching practices (Sulaimani 2010). This finding was also illustrated earlier by Khalid (2009).

A study conducted by Ihmeideh (2006), based in Jordan, have elicited that a majority of teachers intentionally do not use ICT and latest teaching-aid tools due to their ICT inability instead of pedagogical/didactics reasons. Hence, lack of teacher competence may be one of the strong barriers to the integration of technologies into education. It may also be one of the factors involved in resistance to change.

2.5.3.3 Opposition to Change and Negative Attitudes

A common result in various studies on teacher attitudes is the inherent opposition to change and it contributes as a major barrier to the integration of ICT in education. From analysis of the questionnaires, Khalid (2009) found that science teachers' resistance to change

concerning the use of new strategies is an obstacle to ICT integration in science teaching. At a broader level, it is argued that (natural) opposition to change and negative attitude is the important barrier in the integration of ICT in the education.

Watson (2012) concluded that an 'accept change' attitude of teachers is necessary for the successful integration of new technologies. Watson also noted that different teachers react to ICT differently and it is important to consider the attitude of teachers towards technology because this is what influences them to use or not to use ICT in the classrooms.

Resistance to change seems not to be a barrier itself; instead, it is an indication that something is wrong. In other words, there are reasons why resistance to change occurs. According to Khalid (2009), the change from a present level to a desired level of performance is facilitated by driving (encouraging) forces such as the power of new developments, rapid availability, creativity, Internet access, or ease of communication, while it is delayed by resisting (discouraging) forces such as lack of technical support, teacher expertise, or time for planning.

Obviously, not all communities have this barrier. In Europe, for example, Korte and Hüsing (2007) state that only very few teachers can be regarded as fundamentally opposing the use of ICT in the classroom. Only a fifth of European teachers believe that using computers in class does not have significant learning benefits for pupils (Korte & Hüsing, 2007).

2.5.4 School Level Barriers

In contrary to the teacher level barriers, the school level barriers are related to the school administration. These barriers are not limited to a single entity (i.e. teacher) rather they represent the whole school that mainly include administration and management issues.

2.5.4.1 Lack of Time

An important result of recent studies is that many teachers have the competency and the confidence of using the ICT and new technology tools in their teaching, but they still use ICT rarely due to having limited time. This finding is observed by a large number of researchers that difficulty to find reasonable computer time as one of the major barriers of ICT use in teaching. It is interesting because overall people are spending more time on computers but spending time on a computer to prepare for teaching is still difficult.

All ICT tools for education require some time to learn and users may also need to explore different websites and explore different aspects of these tools. The lack of time for these learning activities was reported as the most common issue by teachers (Khalid 2009)

Recent studies show that lack of time is an important factor affecting the application of new technologies in science education (Bingimlas 2010). According to Bingimlas (2010), lack of time is a barrier affecting the application of ICT in Saudi Arabia because of busy schedules. He indicated that because Saudi teachers work from about 7.00 a.m. until 2.00 p.m. and the average number of class sessions taught by science teachers is 18 per week, both teachers and students have a limited number of hours during the day to work on integrating ICT into science education.

2.5.4.2 Lack of Effective Training

The barrier most frequently referred to in the literature is lack of effective training (Korte & Hüsing 2007). The use of new ICT tools for education requires some training and a study found that there are insufficient training opportunities for the teachers and it restricts them in using ICT in classroom. This lack of training is among the top three barriers reported by (Oyaid 2009).

According to Watson (2012), teachers need training in technology education (focusing on the study of technologies themselves) and educational technology (support for teaching in the classroom) and, although, teachers are eager to put their hands on new technologies, they see a lack of opportunities for professional development and feel it is a hurdle that stops them integrating ICT in certain courses like science and mathematics.

Other problematic issues related to professional development in ICT is that training courses are not differentiated to meet the specific learning needs of teachers and the sessions are not regularly updated (Khalid 2009). Also pre-service teacher education can play a significant role in providing opportunities for experimentation with ICT before using it in the classroom. Lack of an ICT focus in initial teacher education is a barrier to teachers' use of what is available in the classroom during teaching practice. Where training is ineffective, teachers may not be able or willing to access ICT resources (Khalid 2009).

2.5.4.3 Lack of Accessibility

Smooth and easy access is desirable for any technology to become popular. The same is true for ICT tools for education. Different researchers elicited that the difficult access to ICT resources, especially in homes, is another reason that teachers avoid technology altogether. This is evident because teachers already have limited time to learn and if they get some time for it then the accessibility issue reduces their enthusiasm.

In Hends' study (2010), teachers explained the difficulty of accessing the computers. The author gave reasons like "computers had to be booked in advance and the teachers would forget to do so, or they could not book them for several periods in a row when they wanted to work on several projects with the students" (Hend 2010). In other words, a teacher would have no access to ICT materials because most of these were shared with other teachers.

According to (Al-Zuabi & Mahmud 2011), the lack of access of ICT technologies to teachers is caused by many reasons and it is not always due to apparent reasons like non-availability of hardware and/or software or other related resources. It may be other non-obvious reasons that contribute to it like mismanagement of ICT resources, low standard hardware, poorly configured software and restricted personal access for teachers. These types of non-obvious barriers vary from country to country (Khalid 2009).

Understanding the levels in this study at which these barriers prevent teachers from using ICT may help educators to decide how the barriers can be tackled. In other words, teachers should be convinced of the importance of using ICT in the classroom. Then, they should be provided with access to resources. After that, teachers need to be able to use these resources successfully. Access to ICT and the ability to use it cannot be possible without sufficient time, effective training, and technical support (Khalid 2009).

2.6 Future of ICT Education

Having discussed issues related to teachers ICT use, perceptions, and the impact of educational policy, it is important to extend the discussion to cover issues related to the future of education. Governments are aiming to increase ICT usage among teachers and fulfil their objective of preparing students for the new century's labour market. Policy makers must have some vision of the future of education and formulate policies that assist

in meeting the targets necessary to ensure we are preparing students for their future not our past.

The future of education is based on the general principle of futures studies which states that although the future is unknown its development can be influenced (Farid, Roya & Dolores 2009). The aim of futures studies of education is to facilitate individuals' formulation, implementation, and envisioning of their preferred futures. Alkhawaldeh (2010) views future education as education that has a more holistic view of the world and its problems and promotes the development of students who are politically, socially, and environmentally aware and capable of independent decision-making. However, it is common to read in the futures related literature an association between the future of education and technological developments. Harmelen (2006) underlined this by explaining that education will not be changed simply as a result of introducing new technology, "but by the ways in which these developments are incorporated into social life (changing our values and goals for education) or into educational practice (changing the methods and tools we have available to education). It is only by developing a complex picture of the potential relationships between technological, scientific and socio-cultural development, that we will develop a picture of possible educational futures that is robust and which avoids the realms of science fiction".

The futuristic vision of education is referred to in the Arabic literature in general and in the Saudi literature specifically as the "Futures School", since the school is the centre of all educational activities. In two different studies one researcher defined the futures school as the developed school that all educationalists seek to establish to fulfil learners varied needs, to provide them with required skills to continue higher education, and to effectively interact with and adapt to their societies. The other researchers defined it as the school that is based on the immense capabilities of ICT. It encourages self education, therefore, it is an advanced school in using ICT and provides learners with opportunities to access varied learning resources, and mainly ICT based ones. However, Pelgrum (2001) contended that both educationalists and technologists try to form the future school according to their views. Even though most educational reform proposals agree on utilising ICT to create change in the educational paradigm, the change is limited to the introduction of technology rather than a systemic change in pedagogy due to considering ICT alone as being capable

of producing change and tangible results in the core of education, i.e. teaching and learning activities.

The future vision of information and communication technology in the Kingdom includes references to the educational system as the plan is to teach ICT as a subject in all school years, employ ICT for distance learning, and in all schools provide ICT centres connected to the Internet. The overall future vision views Saudi Arabia as an information society that produces information and knowledge and is capable of benefiting from and making use of this flow of information to improve proficiency, increase productivity, and improve the quality of products and services.

2.7 Literature gap

The above literature review has provided important insights into various issues related to the importance of ICT in education in general; the attitudes of teachers and students towards ICT; the importance of training in improving motivation towards improving the use of ICT; importance of investment in ICT infrastructures; the picture of ICT use in the education system in Saudi Arabia; Saudi ICT educational policy; the barriers towards integration of ICT in Saudi education system; and the future of ICT education in the KSA. However, in most cases, the findings of the current literature highlight various issues in a broader spectrum; none of the recent studies has focused on the integration of ICT in secondary education in the KSA. Therefore, this study aims to fill that gap through analyzing the problems in the integration of ICT in the context of secondary education, and will suggest possible strategies to overcome those problems.

CHAPTER 3 METHODOLOGY

3.1 Study design

This study has explored the current picture related to the use of ICT in secondary education in the KSA through an extensive review of the current literature and conducting questionnaire survey.

A quantitative study design has been employed. Considering time and cost-related constraints, a cross-sectional study design has been adopted in this research as it will provide multiple advantages in terms of costs, practicality as well as convenience; however a cross-sectional study cannot provide conclusive inference (Creswell, 2009). This method enables the researcher to analyze information quickly, and take a snapshot of the population under study; although there are some limitations of a cross-sectional study, such as it only provides a picture of the population characteristics in a particular point in time, and is unable present any dynamic picture (Creswell, 2009).

3.2 Participants and sampling

The participants in this study include 50 secondary school students from two schools in the city of Jeddah, Saudi Arabia (a public school and a private school), and 20 teachers from a public school. They have been invited personally via email to take part in the study. The schools have been sampled through convenience sampling method, as it can save time as well as cost (Creswell, 2009). However, convenience sampling method has some disadvantages; for example, the research results may be biased as it is unable to examine important characteristics of a large sample (Creswell, 2009).

3.3 Data collection

In this study, data has been gathered through two self-administered questionnaires; one for students and the other teachers (Appendix A & B). The questionnaire used to collect information from both types of participants (students and teachers) contains 13 questions:

there are 4 questions related to personal information; 5 multiple choice questions on the use of electronic devices including computers; and 4 questions about the use of Internet. The participants were advised to spend about ten minutes to complete a questionnaire.

The use of questionnaires to collect data is convenient as information can be collected from various types of respondents in a standardized way within short period of time (Creswell, 2009). However, some likely limitations include the misinterpretation of questions by participants; and some participants may not complete the questionnaire upon reading the questions carefully (Creswell, 2009).

3.4 Data analysis and statistical tools used

In this study, this researcher has used SPSS to analyse the data. A wide range of statistical techniques have been employed including percentage, frequency, mean, standard deviation and percentage to analyse and interpret the data. The results from different groups of the participants have been compared through using statistical analysis tools, such as chi-square test.

3.5 Ethical implications

In recent decades, meeting ethical standards by academic researchers has been given much emphasis to encourage participants to take part in studies without much concern (Creswell, 2009).This research has been conducted upon following ethical procedures as set by Flinders University. The participants have been provided with enough information to help them decide to take part in the study. Flinders University has been providing to the participants to provide information on this research as well as about the confidentiality of personal information. The participants will not be identified under any circumstances. An information sheet was provided to help in making decision about the participation in the research. The participants were informed that they could withdraw from the study at any time. Besides, they were provided with information about how they can inform the university about their concern related to the study in the future.

CHAPTER 4 DATA ANALYSIS

4.1 Introduction

This chapter presents the results of data analysis. Firstly, an overview of data collected using the questionnaires has been provided. Then descriptive analysis has been performed as well as a comparison has been made between observed frequencies and expected frequencies of sample members (students and teachers) using chi-square test. In this study, the results have been considered statistically significant if the p value is less than .05.

4.2 Overview of data collected

In this study data was collected from two groups of participants; 50 secondary students from two schools and 20 teachers working in a secondary school. All participants are located in Jeddah, Saudi Arabia. In the students group 19 are from Khaled Ben Sultan School (a public school) and 31 are from Dar Alzekr School (a private school). The response rate was significant and the respondents answered all three sections of the questionnaire, i.e. 4 questions related to personal information; 5 multiple choice questions on the use of electronic devices including computers; and 4 questions about the use of Internet.

4.3 Descriptive analysis and the comparison between observed frequencies and expected frequencies of sample members (students)

4.3.1 First Sample Description (students):

Table 4.1: The distribution of sample members (students) according to studying place

City	Frequency	Valid Percent
Jeddah	**50**	**100**
Total	**50**	**100**

Table 4.1 illustrates the distribution of sample members (students) according to studying place as the total of sample number is (50) persons of Jeddah residents by 100%.

Table 4.2: The distribution of sample members (students) according to the school in which they study

School	Frequency	Valid Percent
1- Khaled Ben Sultan	19	38
2- Dar Alzekr	31	62
Total	50	100

Table 4.2 distributes members of sample (students) according to the school in which they study as the total of sample number is (50) persons of which 19 persons at 38% study in Khaled Ben Sultan School and 31 persons at 62% study in Dar Alzekr School

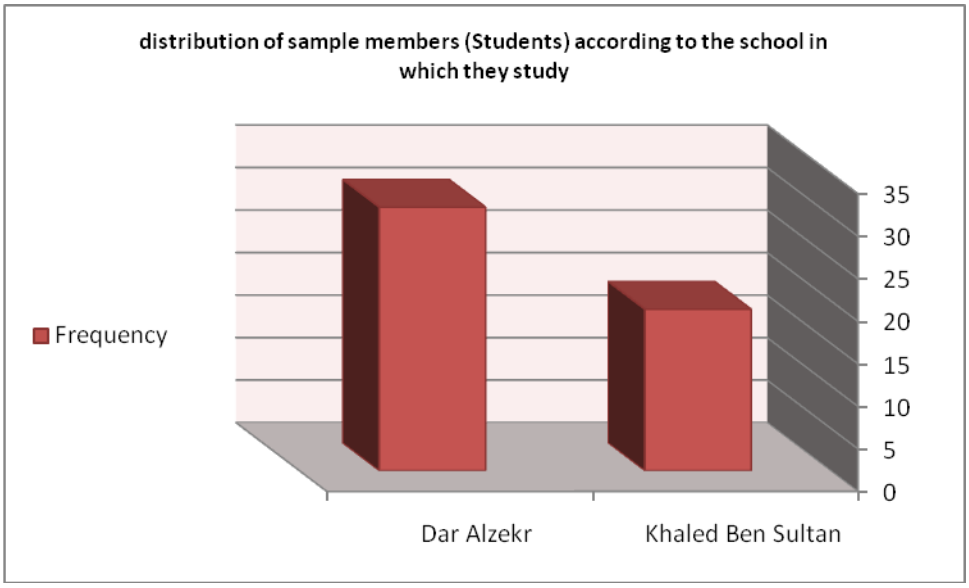

Figure 2. The distribution of sample members (students) according to the school in which they study

Table 4.3: The distribution of sample members (Teachers) according to their sex (Male – Female)

Sex	Frequency	Valid Percent
1- Male	50	100
2- Female	0	0
Total	50	100

Table 4.3 divides the sample members (Teachers) according to their sex as the total of sample number is (50) persons all of them males at 100%.

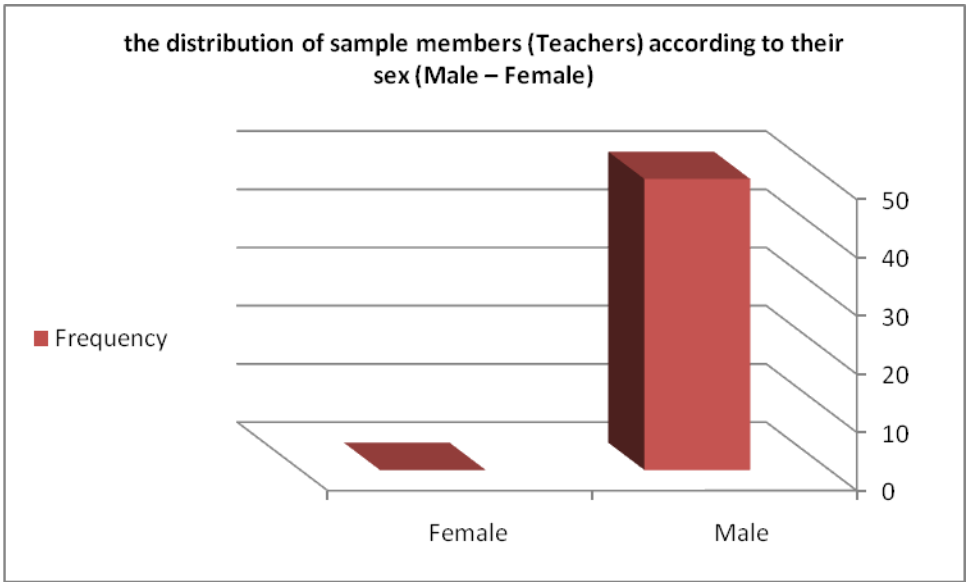

Figure 3. The distribution of sample members (Teachers) according to their sex (Male – Female)

Table 4.4: The quantitative, relative and standard measurements distribution and value of χ^2 sentences (Information about used and owned devices)

n	items	yes		N0		M	SD	χ^2
		f	%	f	%			
1	No	4	8	46	92	0.08	0.274	35.28
2	Desktop	28	56	22	44	0.56	0.501	0.720
3	Laptop	31	62	19	38	0.62	0.490	2.88
4	Smartphone	27	54	23	46	0.54	0.503	0.320
5	Tablet computers	0	0	50	100	0.00	0.000	50.00

****Significance level of 0.05 * Significance level of 0.01**

Table 4.4 refers to the devices owned by students, with 62% sample members owning laptop computers, while 56% of students own a desktop computer. The results also revealed that 54% of students have smart mobiles and no one of the sample members has a tablet computer. The results also pointed to 4 members of the sample at 8% do not have computers at all, which is a better picture than many other developing countries; however this is still not expected in an urban setting and in a country like Saudi Arabia. Interestingly, it can be related to the problem with the acceptance of computer and IT use among Saudi families due to cultural reason (Al-Ghatani, Hubona &Wang 2007)

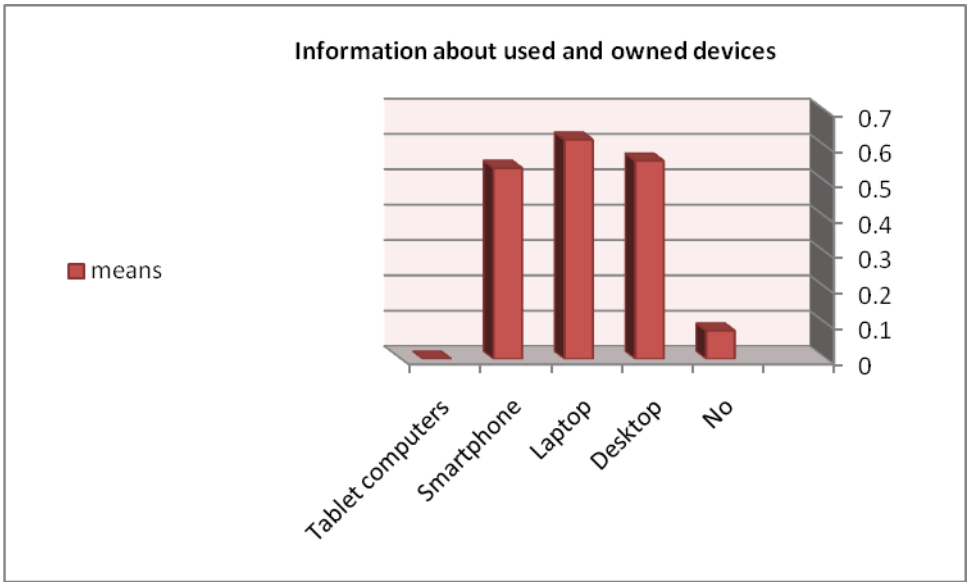

Figure 4. Information about used and owned devices

Table 4.5: The quantitative, relative and standard measurements distribution and value of χ^2 second axis sentences (determination of places where computers are used)

n	items	yes		N0		M	SD	χ^2
		f	%	f	%			
1	use a computer at home	43	86	7	14	0.86	0.351	25.00
2	use a computer at school	2	4	48	96	0.04	0.198	42.32
3	I have access to a computer that I use away from School/Home	30	60	20	40	0.60	0.495	2.00
4	I do not use a computer	5	10	45	90	0.10	0.302	32.00

****Significance level of 0.05 * Significance level of 0.01**

Table 4.5 displays that the ratio of computer use at home is 86%, followed by the ratio of use out of home and university which is 60%, and the ratio of students who do not use computers is 10%, while the ratio of students who use a computer in school is 4% of the sample members.

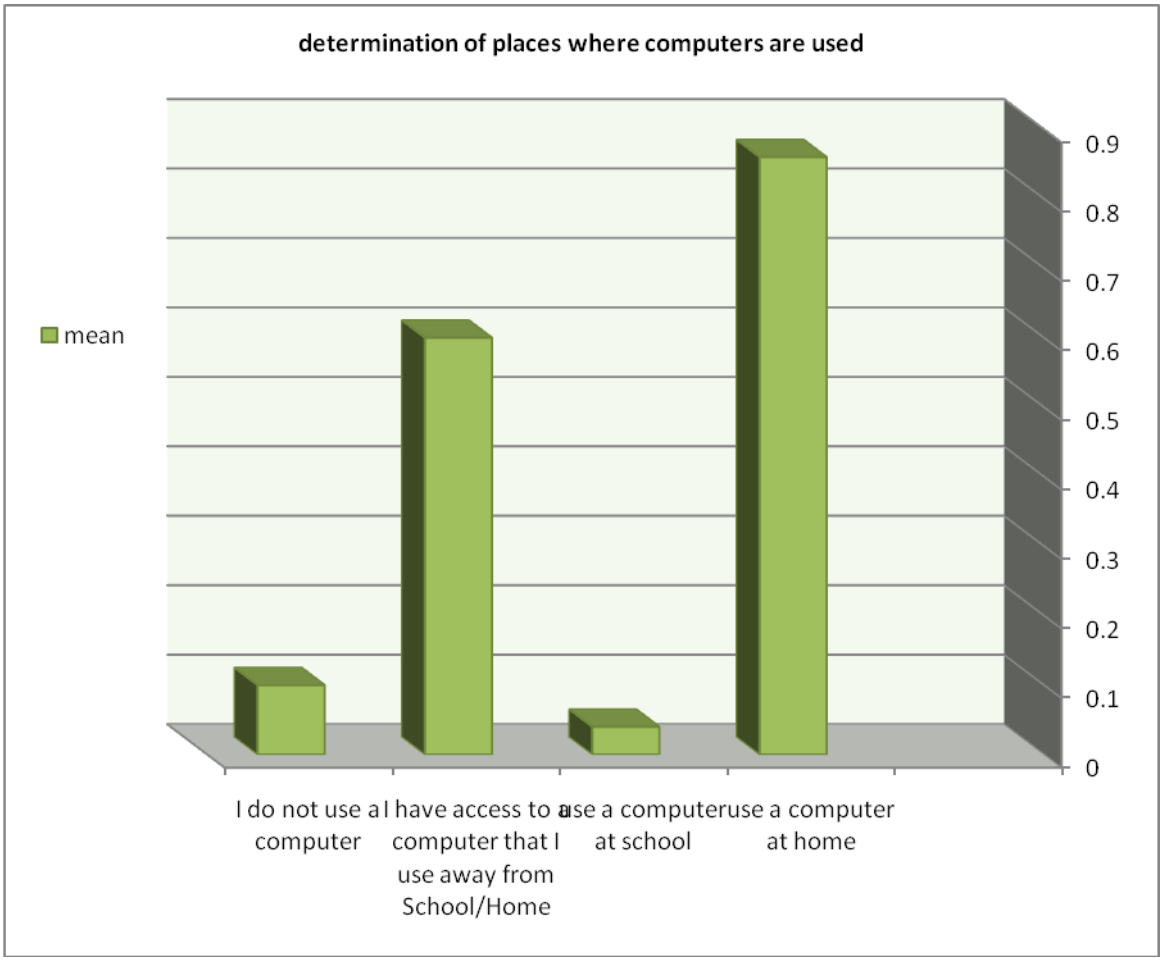

Figure 5. Determination of places where computers are used

Table 4.6: The quantitative, relative and standard measurements distribution and value of χ^2 sentences (Do you have your own email?)

➢ n	items	yes		N0		M	SD	χ^2
		f	%	f	%			
1	email	41	82	9	18	1.82	0.388	20.48

****Significance level of 0.05 * Significance level of 0.01**

Table 4.6 states that 41 members of the sample with a ratio of 82% own private email while there are 8 members of the sample with a ratio of 18% do not own email, Also the previous table states that the calculated value of χ^2 is more than that of tabled value of (3.84) at the significance level of 0.05 and with 1 degree of freedom, which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

Table 4.7: The quantitative, relative and standard measurements distribution and value of χ^2 sentences (Do you use search engine)

N	items	Responses		M	SD	Fd	χ^2
		f	%				
1	I do not have any idea about search engine	6	12	2.54	0.706	3	49.680
2	I have information on this engine, but did not use it before	11	22				
3	Use the search engine for doing research and assignments	33	66				
4	Use the search engine for.....	0	0				

**** Statistical Significance level of 0.05**

Table 4.7 illustrates that 6 members of the sample with a ratio of 12% confirmed that they do not have any information about search engine, while 11 members of the sample with a ratio of 22% confirmed having information about search engine but they did not use it. While 33 members of the sample with a ratio of 66% revealed that they use search engine in doing their homework and research. No student of the sample stated using the search engine for any other purposes, Also the previous table revealed the calculated value of χ^2 (49.68) is more than that of tabled value of (7.82) at the significance level of 0.05 and with 3 degrees of freedom, which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

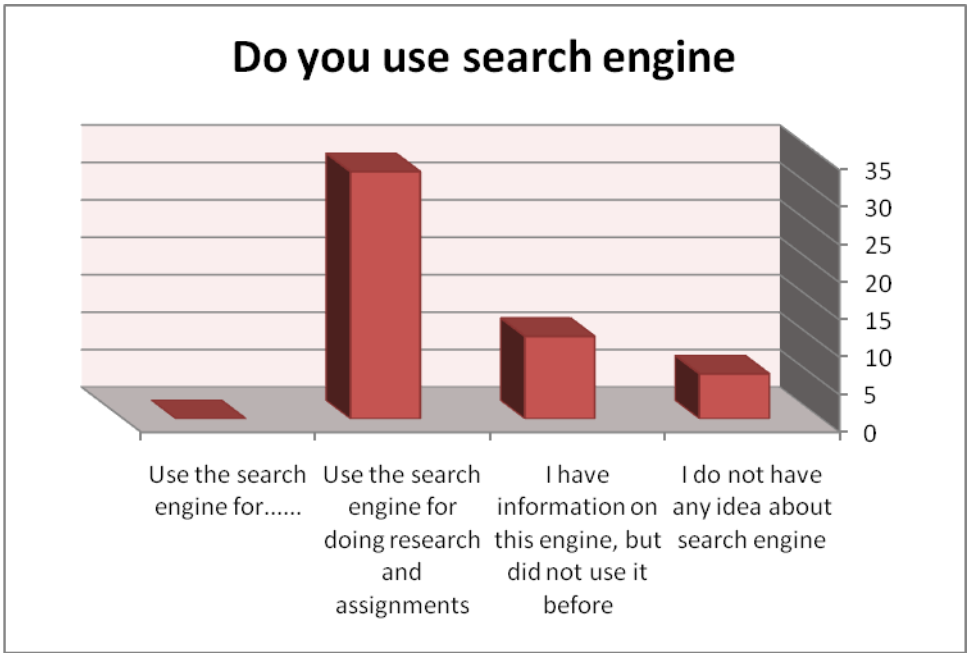

Figure 6. Information on the use of search engine

Table 4.8: The quantitative, relative and standard measurements distribution and value of χ^2 first axis sentences (how many hours spent with the computers at school per one week)

N	items	Responses		M	SD	Fd	χ^2
		f	%				
1	0 hours	18	36	2.82	1.4224	3	39.44
2	4 hours	1	2				
3	6 hours	3	6				
4	More than 6 hours	28	56				

**** Statistical Significance level of 0.05**

Table 4.8 states that 18 members of the sample with a ratio of 36% do not use computer at school during the week and do not spend any hours during the school day using the computer, while the results pointed that 1 member of the sample with a ratio of 2% uses computers in school for 4 hours per one week and that 3 members of the sample with a ratio of 6% uses computers in school for 6 hours per one week, also 28 members of the sample with a ratio of 56% use computers for more than 6 hours per week which is a result of increased emphasis by the school on technology implementation, especially through encouraging students to use computers in the campus setting (Al-Alwani 2005; Bingimlas 2009). Also the previous table states that the calculated value of χ^2 (39.44) is more than that of tabled value of (7.82) at the significance level of 0.05 and with 3 degrees of

freedom, which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

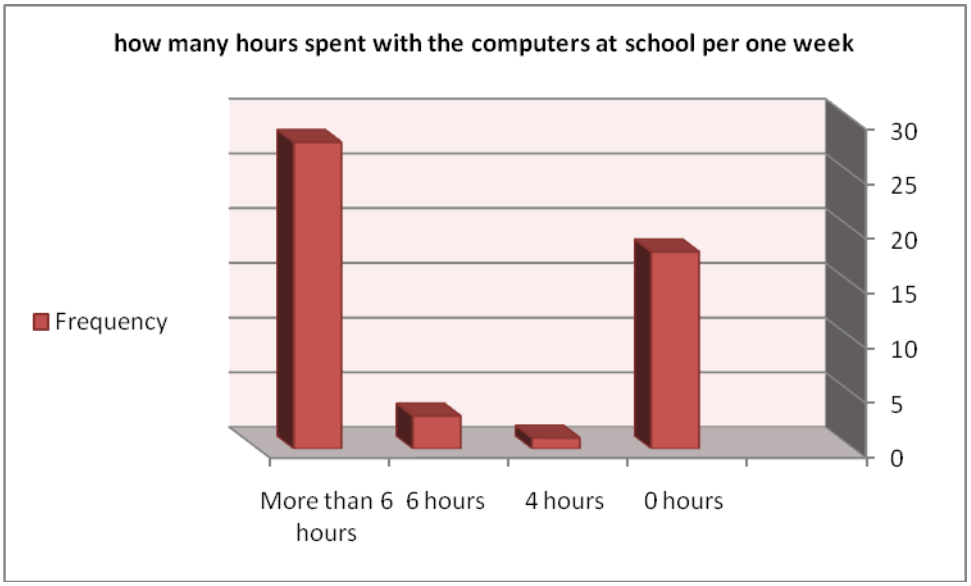

Figure 7. Information on the number of hours spent with the computers at school per one week

Table 4.9: The quantitative, relative and standard measurements distribution and value of χ^2 first axis sentences (number of hours spent with computer at home per one week)

n	items	Responses		M	SD	Fd	X^2
		f	%				
1	0 hours	4	8	2.96	0.989	3	9.36
2	4 hours	13	26				
3	6 hours	14	28				
4	More than 6 hours	19	38				

**** Statistical Significance level of 0.05**

Table 4.9 displays that 13 members of the sample at 26% use computer at home for 4 hours per a week and the results revealed that 14 members of the sample at 28% use computer for 6 hours per a week and also revealed that 19 member of the sample at 38% use computer for more than 6 hours per a week and there are only 8% of the sample members who do not use computer at home at all, which may be a result of negative attitude of the family towards computer and information technology (Sait & Al-Tawil 2007). Also the previous table revealed that the calculated value of χ^2 (9.36) is more than that of tabled value of (7.82) at the significance level of 0.05 and with 3 degrees of freedom there is statistical

function, which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

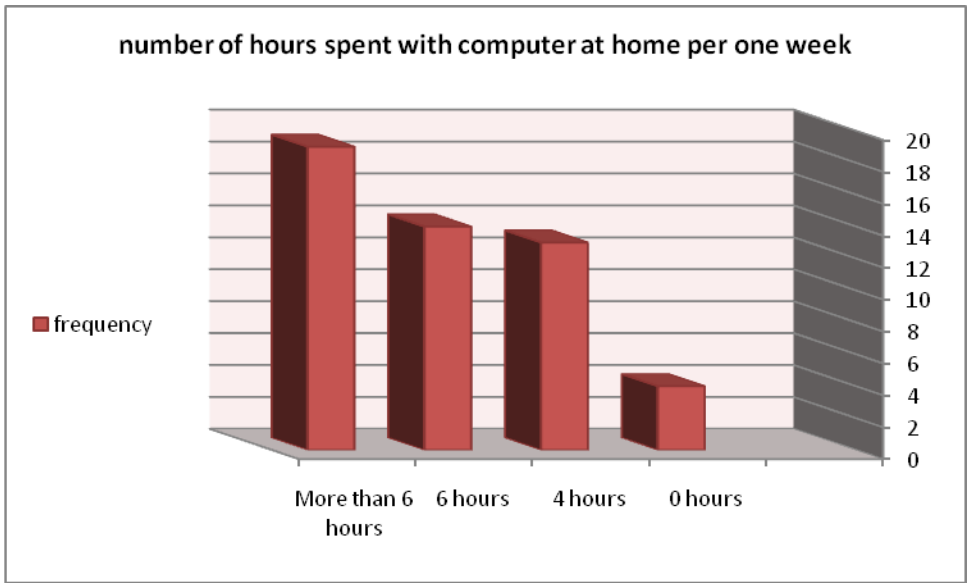

Figure 8. Information on the number of hours spent with computer at home per one week)

Table 4.10: The quantitative, relative and standard measurements distribution and value of χ^2 first axis sentences (Range of computer use inside the classroom to perform tasks, school homework and other projects)

n	items	Responses		M	SD	Fd	χ^2
		f	%				
1	Extensive Use	4	8	3.94	1.31	4	30.20
2	Moderate	4	8				
3	Limited Use	8	16				
4	Hardly used at all	9	18				
5	Never Use	25	50				

**** Statistical Significance level of 0.05**

Table 4.10 states that 4 members of the sample with a ratio of 8% use computer at school on constant basis, while the results pointed that 4 members of the sample with a ratio of 8% use computer in school at moderate basis and that 8 members of the sample with a ratio of 16% have limited use of computers at school and there are 9 members of the sample with a ratio of 18% that hardly use computers at school. Also the results revealed that 25 members of the sample with a ratio of 50% do not use computer in school at all which may be a result of lack of IT resources in the school and also absence of supportive policy and incentive mechanism to motivate students to use computers (Al-Alwani 2005). Also the

previous table states that the calculated value of χ^2 (30.20) is more than that of tabled value of (9.49) at the significance level of 0.05 and with 4 degrees of freedom, which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

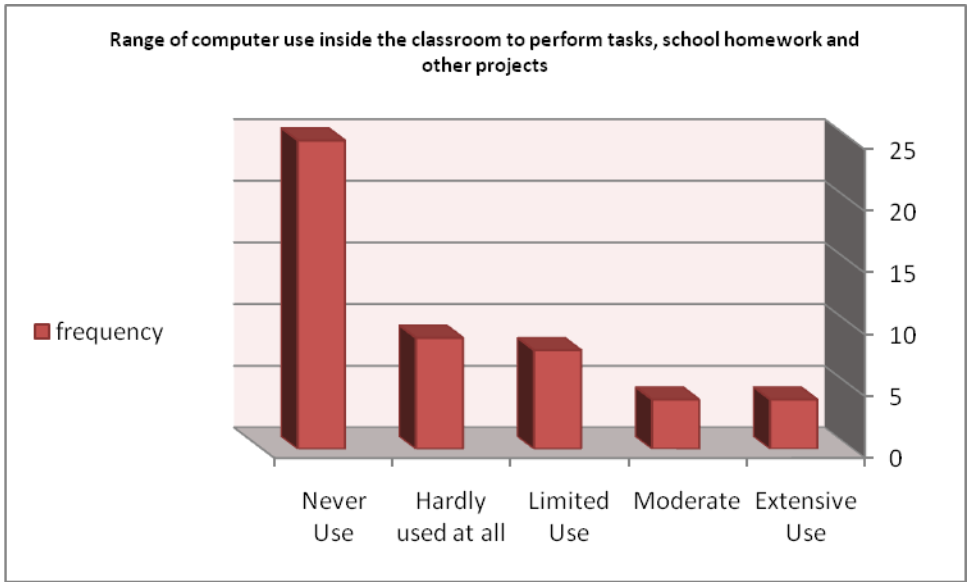

Figure 9. Range of computer use inside the classroom to perform tasks, school homework and other projects

Table 4.11: The quantitative, relative and standard measurements distribution and value of χ^2 axis sentences (type of internet connection used at home)

n	items	yes		N0		M	SD	X^2
		f	%	f	%			
1	DSL	31	62	19	38	0.62	0.490	2.880
2	Dial-up	6	12	44	88	0.12	0.328	28.88
3	Wi-Fi	15	30	35	70	0.30	0.463	8.00
4	Other	2	4	38	96	0.04	0.198	42.32
5	I Do not have	0	0	50	100	0.00	0.000	50.00

****Significance level of 0.05**

Table 4.11 displays that 31 members of the sample (students) at 62% uses DSL internet connection at home and the results revealed that 6 members of the sample at 12% use dial-up internet connection and also revealed that 15 members of the sample at 30% use Wi-Fi internet connection and there are no members of the sample that do not have internet connection at home and there are other connection methods used by students such as USB modem. Also the previous table revealed that at the significance level of 0.05 and with 4 degrees of freedom there is statistical function which indicates that the difference between

the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

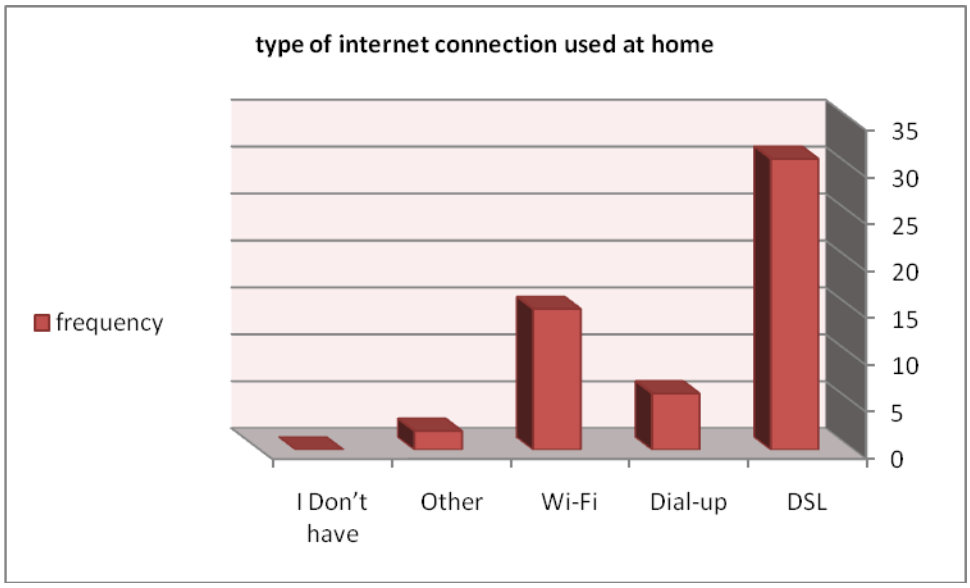

Figure 10. Type of internet connection used at home

Table 4.12: The quantitative, relative and standard measurements distribution and value of (X^2) first axis sentences (Range of internet use inside the classroom to perform tasks, school homework and other projects)

n	items	Responses		M	SD	Fd	X^2
		f	%				
1	Extensive Use	3	6	4.22	1.217	4	62.60
2	Moderate	2	4				
3	Limited Use	8	16				
4	Hardly used at all	5	10				
5	Never Use	32	64				

**** Statistical Significance level of 0.05**

Table 4.12 states that 3 members of the sample with a ratio of 6% use internet at school extensively, while the results pointed that 2 members of the sample with a ratio of 4% use the internet in school at a moderate basis. Results showed that 8 members of the sample with a ratio of 16% have limited use of the internet at school and there are 5 members of the sample with a ratio of 10% hardly use computer at school also the results revealed that 32 members of the sample with a ratio of 64% do not use internet in school at all which is a result of lack of IT resources in the school and also the absence of supportive policy and incentive mechanism to motivate students to use computers (Al-Alwani 2005). Also the previous table states that the calculated value of χ^2 (62.60) is more than that of tabled value

of (9.49) at the significance level of 0.05 and with 4 degrees of freedom, which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

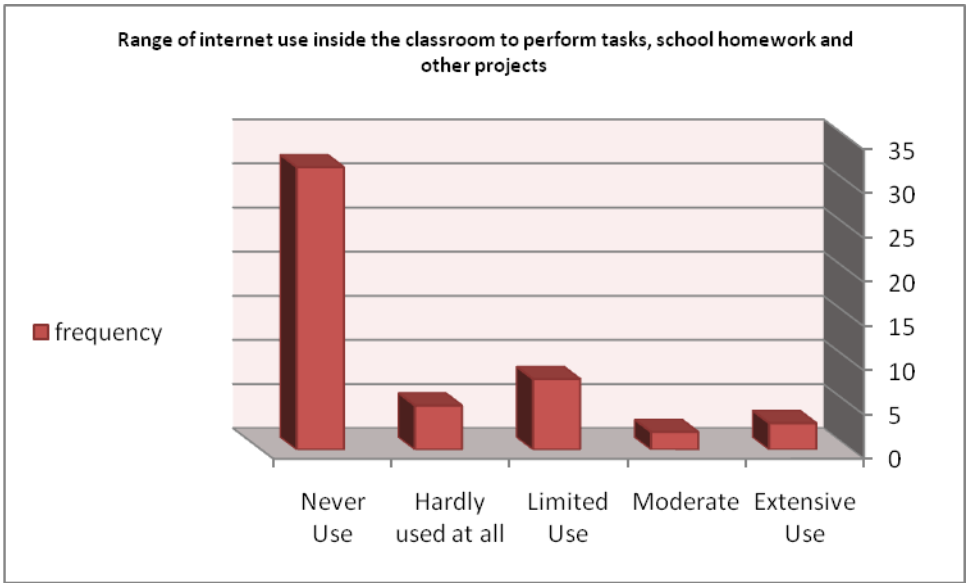

Figure 11. Range of internet use inside the classroom to perform tasks, school homework and other projects

Table 4.13 the quantitative, relative and standard measurements distribution and value of χ^2 axis sentences (Range of internet use in pleasure, games and films)

n	items	Responses		M	SD	Fd	χ^2
		f	%				
1	Extensive Use	3	6	3.96	1.087	4	32.20
2	Moderate	2	4				
3	Limited Use	6	12				
4	Hardly used at all	22	44				
5	Never Use	17	34				

**** Statistical Significance level of 0.05**

Table 4.13 illustrates that 3 members of the sample with a ratio of 6% use internet for pleasure, games and films extensively and that 2 members of the sample with a ratio of 4% use internet for pleasure, games and films at moderate level. The results pointed that 6 members of the sample with a ratio of 12% have limited use of internet for pleasure, games and films and that 22 members of the sample with a ratio of 44% hardly use the internet for this purpose; also, the results revealed that 17 member of the sample with a ratio of 34% do not use internet for pleasure, games and films which may be a result of cultural barriers

towards internet use as well as parental restriction arising from health concerns, such as obesity, low vision and hyperactivity (Mobley and Wilson 1998; Cordesman 2002; Bener et al. 2010). Also the previous table states that the calculated value of χ^2 (32.20) is more than that of tabled value of (9.49) at the significance level of 0.05 and with 4 degrees of freedom, which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

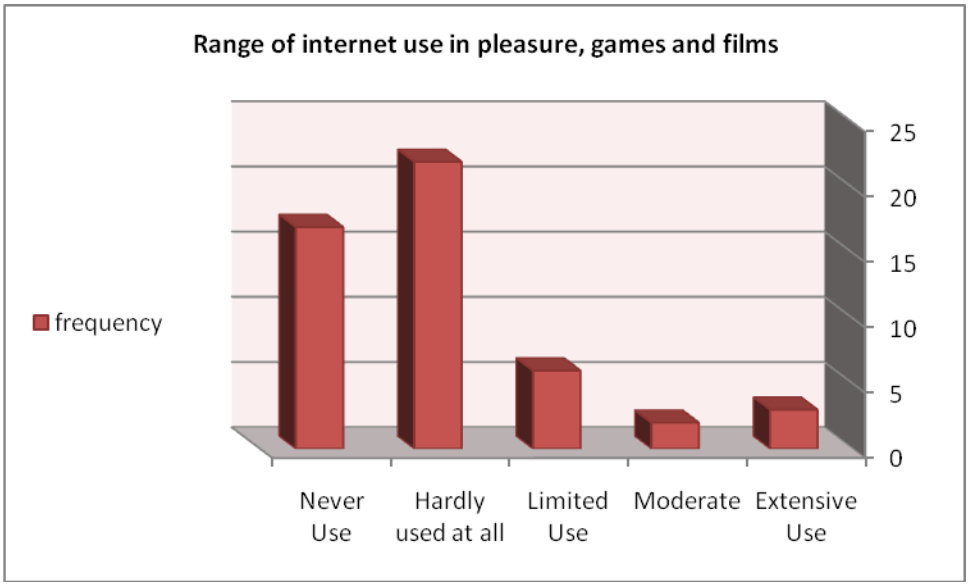

Figure 12. Range of internet use in pleasure, games and films

➢ **Table 4.14: The quantitative, relative and standard measurements distribution and value of χ^2 special axis sentences of (Range of how obstacles and challenges affect the current and the future use of internet)**

n	items	Very effective		Effective		Not effective		M	SD	χ^2	Weighted Average	Rank
		f	%	f	%	f	%					
1	a. Security or privacy concerns (Viruses & loss of personal info.)	13	26	11	22	26	52	1.74	0.853	7.960	58	1
2	b. Technology not user friendly/difficult to use	10	20	10	10.75	30	32.26	1.60	0.808	16.00	53.333	2
3	c. Too Busy	7	14	10	10.31	33	34.02	1.48	0.735	24.28	49.333	3
4	d. Do not have a computer at home	7	14	3	3.529	40	47.06	1.34	0.717	49.48	44.667	7
5	e. Internet connection cost too much	3	6	11	14.86	36	48.65	1.34	0.593	35.56	44.667	8
6	f. Internet connection unreliable	5	10	7	4.487	38	24.36	1.34	0.658	41.08	44.667	9
7	g. Not interested in technology	7	14	5	4	38	30.40	1.38	0.725	41.08	46.00	6
8	h. I do not have the technical support I need	7	14	8	6.015	35	26.32	1.44	0.733	30.28	48.00	4
9	i. Family or culture reasons	4	8	13	16.88	33	42.86	1.42	0.642	26.44	47.333	5
10	j. Other……..	0	0	0	0.613	3	1.84	0.10	0.364	3.50	3.333	10

**** Significance level of 0.05**

It is clear from the previous table 4.14 that the value of χ^2 for all options related to all members of the sample responses (who are students) towards the range of how obstacles and challenges affect the current and the future use of internet represents a statistical function at the significance level of 0.05 and with 2 degrees of freedom, which evidences that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

It is also clear that the most important responses for this question are: Familial reasons followed by issues related to privacy and safety (Viruses – loss of personal files), and internet connection prices (I can't get enough technical support that I need in learning and use). The average of ratings ranged between 1.74 and 0.10 with importance ranged between 58% and 3.33% and all values nearly reached 50%.

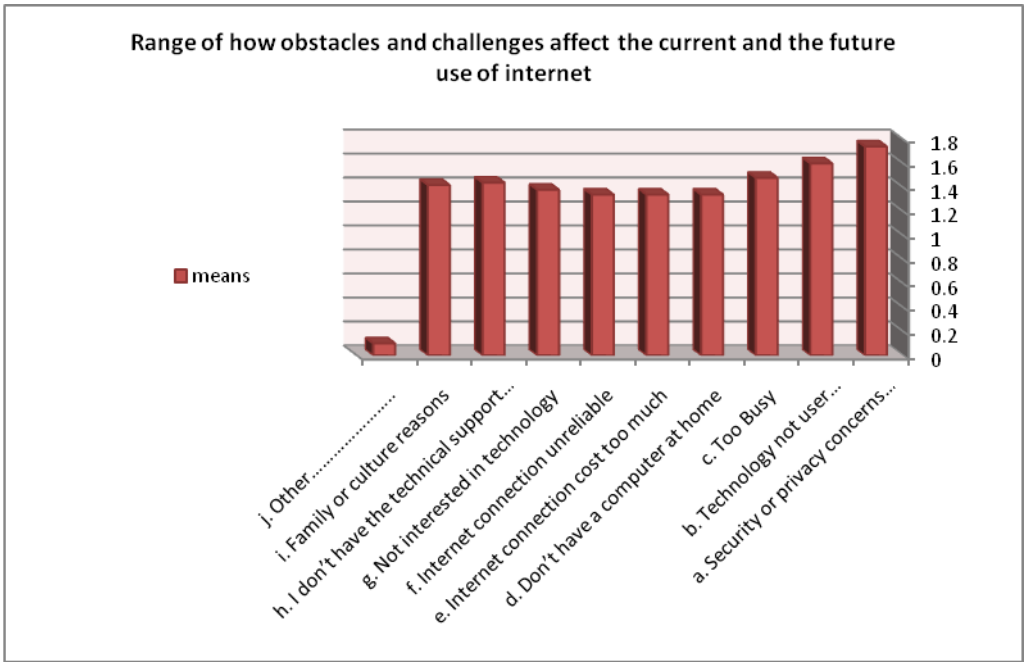

Figure 13. Range of how obstacles and challenges affect the current and the future use of internet

The results also pointed to:

- Sentence (1) shows that 26 members of the sample at ratio of 52% stated that there is no influence on their internet use caused by issues related to privacy and safety such as: viruses and files loss.

- Sentence (2) reveals that 30 members of the sample at ratio of 32.26% stated that they have no difficulty in technology use at all.
- Sentence (3) clarifies that 33 members of the sample at ratio of 34.02% confirmed that they find themselves very occupied to use the technology.
- Sentence (4) states that 40 members of the sample at ratio of 47.06% confirmed that they are not very attracted to the use of the technology.
- Sentence (5) revealed that 36 members of the sample at ratio of 48.65% witnessed that the prices of using the technology are very high which greatly affect its use.
- Sentence (6) pointed to: 38 members of the sample at ratio of 24.36% said that the internet connection is not available at their region.
- Sentence (7) illustrated that 38 members of the sample at ratio of 30.04% said that they are not attracted to the technology or the use of internet.
- Sentence (8) expressed that 35 members of the sample at ratio of 26.32% stated that they lack for enough technical support needed to learn and use the internet which affects the use of the technology.
- Sentence (9) describes that 33 members of the sample at ratio of 42.86% said that there are no familial reasons cause their use of internet.

And the members of the sample have other reasons such as cultural barriers and language barriers.

4.3.2 Second Sample Description (teachers):

Table 4.15: The distribution of sample members (teachers) according to working place

City	Frequency	Valid Percent
Jeddah	20	100
Total	20	100

Table 4.15 illustrates the distribution of sample members (teachers) according to working place as the total of sample number is (20) persons of Jeddah residents by 100%

Table 4.16: The distribution of sample members (teachers) according to the school in which they work

School	Frequency	Valid Percent
3- Khaled Ben Sultan	20	100
Total	20	100

Table 4.16 distributes members of sample (teachers) according to the school in which they work as the total of sample number is (20) persons of a ratio of 100%.

Table 4.17: The distribution of sample members (teachers) according to the subject they teach

Subject	Frequency	Valid Percent
1- Arabic	5	25
2- Regulation	4	20
3- Science	5	25
4- Social studies	2	10
5- Math	2	10
6- Artistic education	2	10
Total	20	100

Table 4.17 clarifies the distribution of sample members (teachers) according to the subject they teach as the total of sample number is (20) persons of which 5 persons at 25% teach the subject Arabic. The number of teachers who teaches the regulation subject (4) at 20%, while the teacher who teaches the unification subject are (5) at 25%, and there are (2) science teacher at 10%, also there are (2) social studies teachers at 10% and finally there are (2) artistic education teachers at 10%.

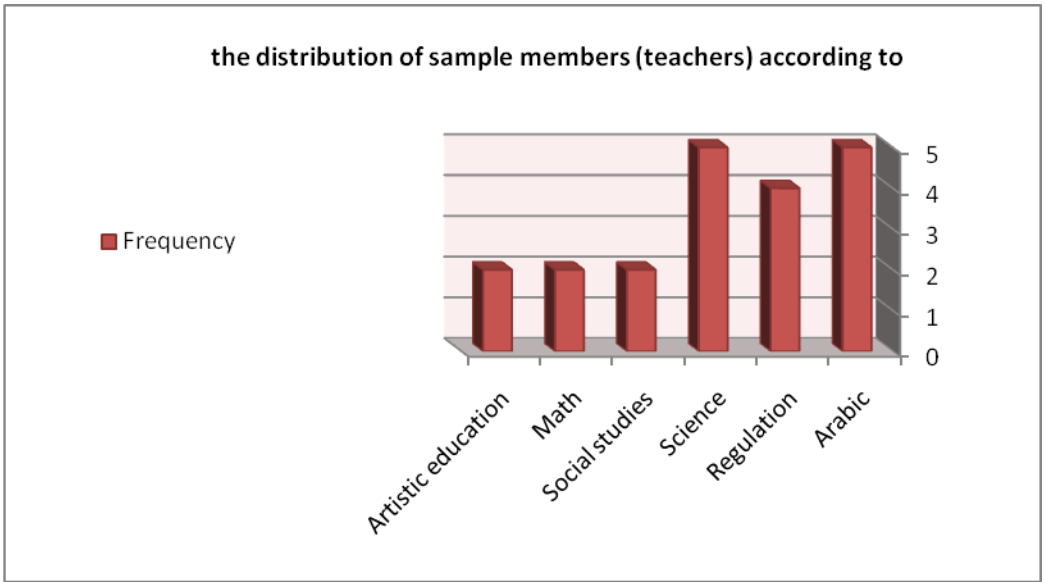

Figure 14. The distribution of sample members (teachers) according to the subject they teach

Table 4.18: The distribution of sample members (Teachers) according to their sex (Male – Female)

Sex	Frequency	Valid Percent
3- Male	20	100
4- Female	0	0
Total	20	100

Table 4.18 divides the sample members (Teachers) according to their gender as the total of sample number is (20) persons all of them males at 100%.

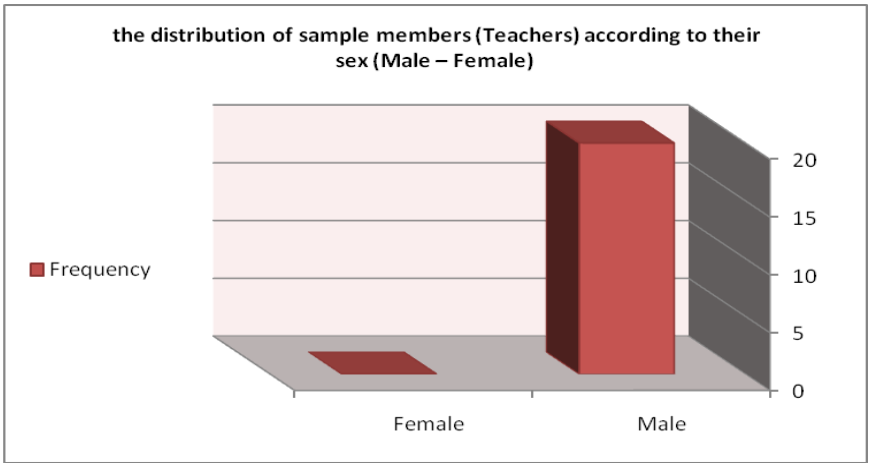

Figure 15. The distribution of sample members (Teachers) according to their sex (Male – Female)

Table 4.19: The quantitative, relative and standard measurements distribution and value of χ^2 sentences (Information about used and owned devices)

n	Items	yes		N0		M	SD	χ^2
		f	%	f	%			
1	Do not have computer	0	0	20	100	.000	.000	20
2	Office computer	13	65	7	35	.065	0.489	1.80
3	Portable computer	16	80	4	20	0.80	0.410	7.20
4	Smart Mobile	12	60	8	40	0.40	0.503	0.800
5	Tablet computer	8	40	12	60	0.40	0.503	0.800

**Significance level of 0.05 * Significance level of 0.01

Table 4.19 shows that 80% of teachers (the sample members) own a portable computers while 65% of teachers make use of office computers . The results also revealed that 60% of teachers have smart mobiles and 40% have tablet computers. However, there were no members of the sample who do not have a computer. The results point the great interest which the teachers have towards possession and use of computer devices in accomplishing their office, home, and all work related to their daily life.

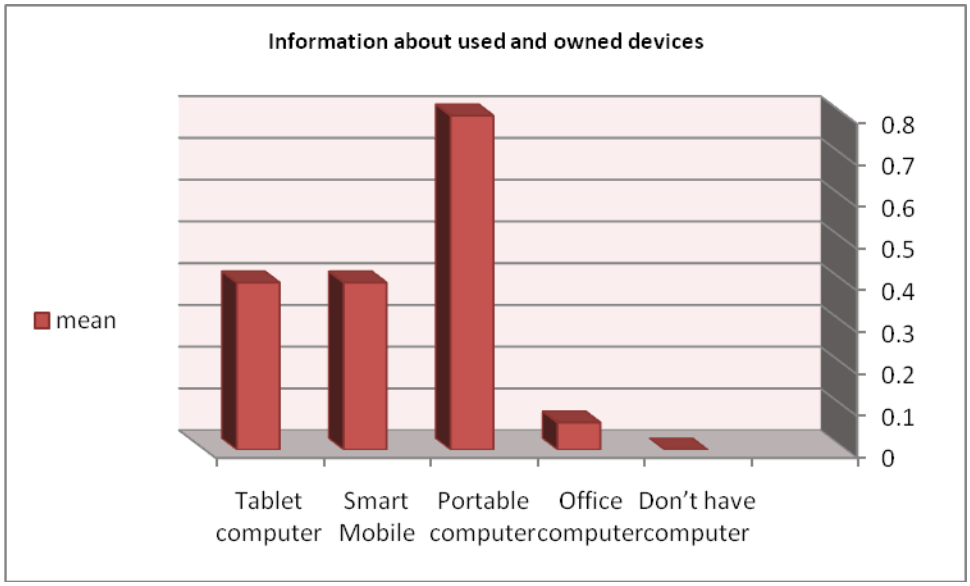

Figure 16. Information about used and owned devices

Table 4.20: The quantitative, relative and standard measurements distribution and value of (X^2) second axis sentences (determination of places where computers are used)

n	items	yes		N0		M	SD	χ^2
		f	%	f	%			
1	At home	20	100	20	100	1.00	0.00	20
2	At university	0	0	100	20	0.00	0.00	20
3	Out of home and university	13	65	35	7	0.65	0.489	1.80
4	Do not use computer	0	0	100	20	0.00	0.00	20

**Significance level of 0.05 * Significance level of 0.01

Table 4.20 displays that 100% of teachers use computers at home, while the use out of home and university is 65%. The results also revealed that teachers do not use computers in university while there is no one that does not use a computer at all which suggests the great importance of the computer for the sample members.

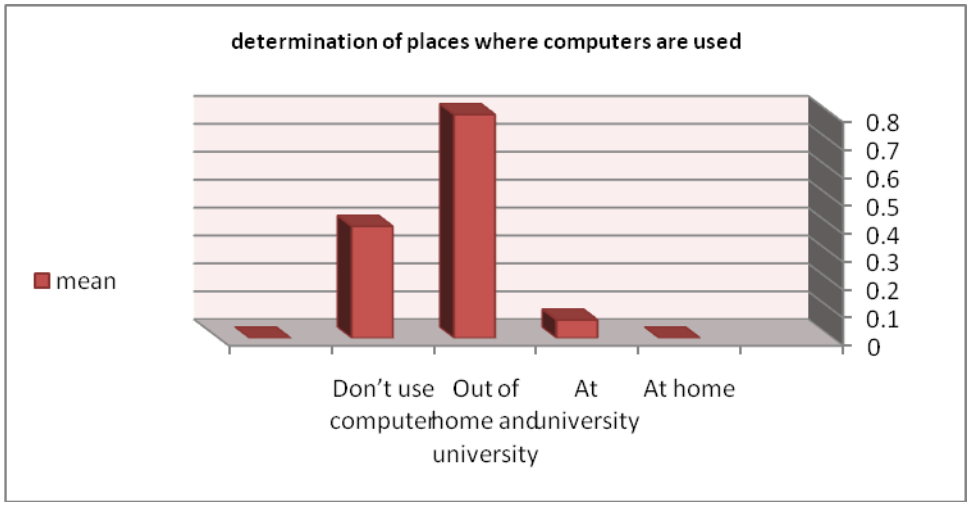

Figure 17. Determination of places where computers are used

Table 4.21: The quantitative, relative and standard measurements distribution and value of χ^2 first axis sentences (Number of hours spent with computer at school per a week)

n	items	Responses		M	SD	Fd	χ^2
		f	%				
1	0 Hours	13	65	1.35	0.489	3	**23.00
2	8 Hours	7	35				
3	16 Hours	0	0				
4	More than 16 hours	0	0				

** Statistical Significance level of 0.05

Table 4.21 states that 13 members of the sample with a ratio of 65% do not use computers at school during the week, while the results pointed that 13 members of the sample with a ratio of 35% use computers in school for 8 hours per week which is linked to teachers' free time; orientation with IT; curriculum goals; subjects they teach; overall e-environment in the school (Al-Khaldi & Olusegun Wallace 1999; Albirini 2006; Al-Fakhri et al. 2008; Alshumaim & Alhassan 2010). Also the previous table states that the calculated value of χ^2 is more than that of tabled value of (7.82) at the significance level of 0.05 and with 3 degrees of freedom which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

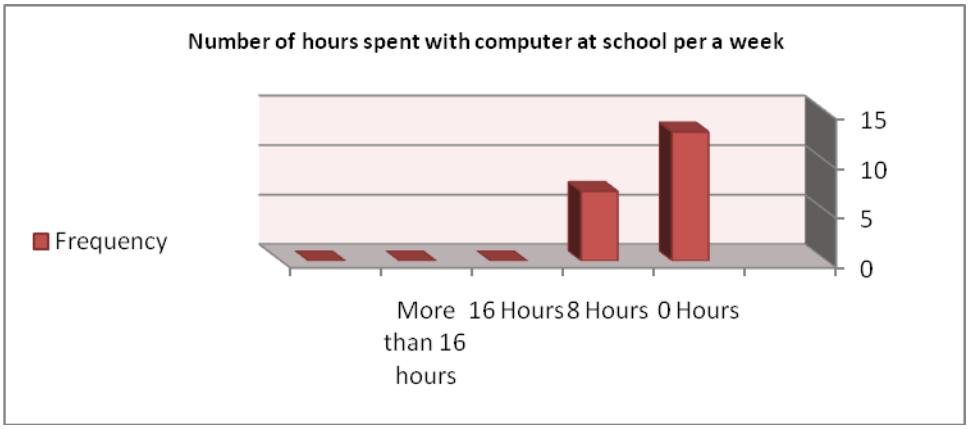

Figure 18. Number of hours spent with computer at school per a week

Table 4.22: The quantitative, relative and standard measurements distribution and value of χ^2 first axis sentences (Number of hours spent with computer at Home per a week)

n	Items	Responses		M	SD	Fd	χ^2
		f	%				
1	0 Hours	0	0	2.75	0.786	3	9.20
2	4 Hours	9	45				
3	10 Hours	7	35				
4	More than 10 hours	4	20				

** Statistical Significance level of 0.05

Table 4.22 illustrates that 9 members of the sample with a ratio of 45% use computers at home for four hours during a week, while the results stated that 7 members of the sample with a ratio of 35% use computers at home for 10 hours per week. The results revealed that there is no member of the sample that does not use the computer at home at all which may be the impact of recent reformation in the education system in Saudi Arabia that has placed

increased emphasis on the use of computers and information technology by teachers. This result may suggest an increased awareness among educated people across countries regarding the use of computers and the Internet considering their pedagogical usefulness and conveniences in other sectors of life (Altowjry 2005; Yushau 2006; Al-Ghaith, Sanzogni & Sandhu, 2010). Also the previous table revealed the calculated value of χ^2 is more than that of tabled value of (9.20) at the significance level of 0.05 and with 3 degrees of freedom which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

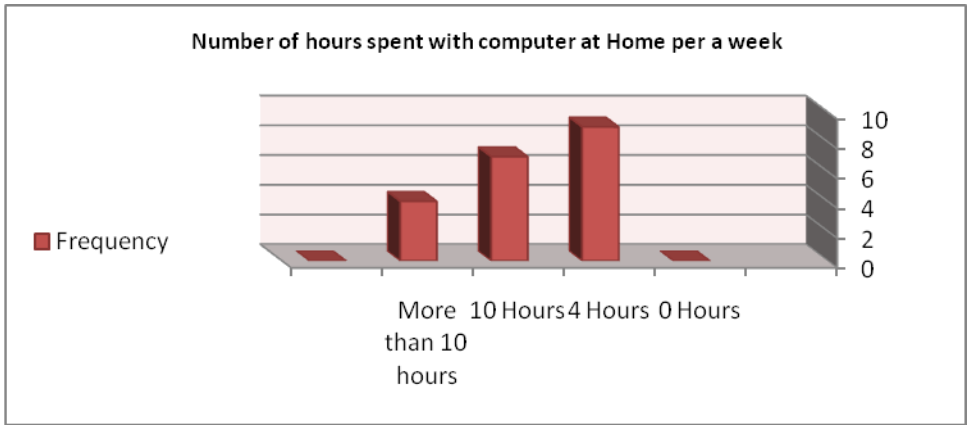

Figure 19. Number of hours spent with computer at Home per week

Table 4.23: The quantitative, relative and standard measurements distribution and value of χ^2 first axis sentences (Range of computer use inside the class to support education process)

n	Items	Responses		M	SD	Fd	χ^2
		f	%				
1	Constant use	1	5	2.40	0.821	4	27.00
2	Moderate	13	65				
3	Limited use	3	15				
4	Hardly use	3	15				
5	Do not use computer	0	0				

** Statistical Significance level of 0.05

Table 4.23 states that 1 member of the sample with a ratio of 5% uses computers at school on a constant basis, while the results pointed that 13 members of the sample with a ratio of 65% use computers in school at moderate basis and that 3 members of the sample with a ratio of 15% have limited use of computers. Three members of the sample with a ratio of 15% hardly use computers also the results revealed that no member of the sample does not

use computers in school at all which again may be a result of increased awareness of the pedagogical usefulness of computers and the internet (Altowjry 2005; Yushau 2006). Also the previous table states that the calculated value of χ^2 (27) is more than that of tabled value of (9.49) at the significance level of 0.05 and with 4 degrees of freedom, which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

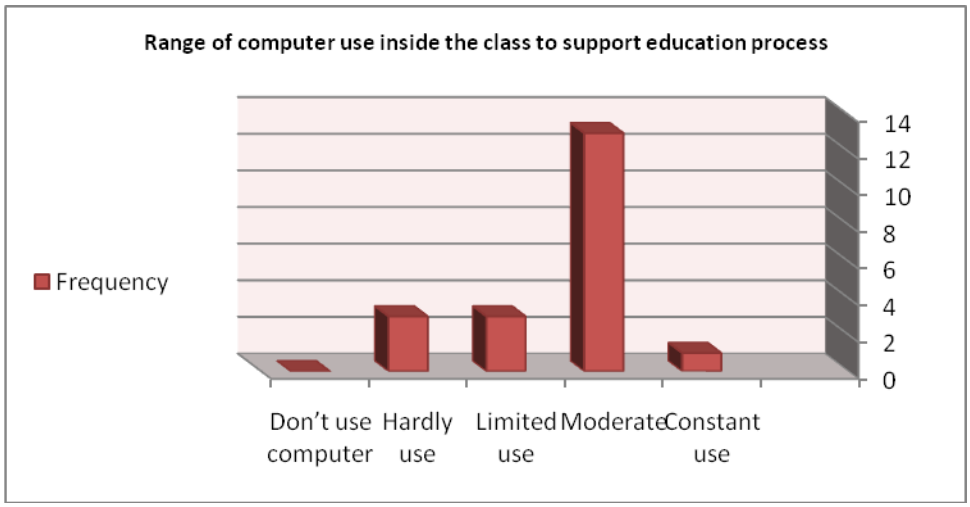

Figure 20. Range of computer use inside the class to support education process

Table 4.24: The quantitative, relative and standard measurements distribution and value of (X^2) first axis sentences (type of internet connection used at home)

n	Items	yes		N0		M	SD	χ^2
		F	%	f	%			
1	DSL	11	55	9	45	0.55	0.510	0.200
2	Dial-up	2	10	18	90	0.10	0.308	12.80
3	Wi-Fi	7	35	13	65	0.35	0.489	1.80
4	Other	0	0	20	100	0.00	0.00	20
5	I Do not have	0	0	20	100	0.00	0.00	20

****Significance level of 0.05**

Table 4.24 displays that 11 members of the sample at 55% uses DSL internet connection at home, while 7 members of the sample at 35% use Wi-Fi internet connection. Also no member of the sample does not have internet connection at home and there are no other connection methods used except for the already mentioned ones, Also the previous table revealed that at the significance level of 0.05 and with 4 degrees of freedom there is

statistical function which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

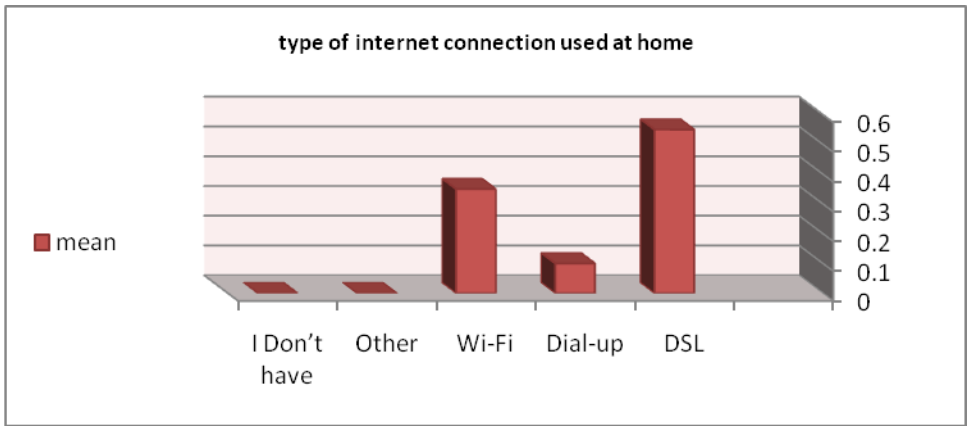

Figure 21. Type of internet connection used at home

Table 4.25: The quantitative, relative and standard measurements distribution and value of χ^2 first axis sentences (Range of internet use inside the classroom to support education process)

n	Items	Responses		M	SD	Fd	X^2
		f	%				
1	Extensive use	5	25	2.10	0.912	4	14.50
2	Moderate	10	50				
3	Limited use	3	15				
4	Hardly use at all	2	10				
5	Never use	0	0				

**** Statistical Significance level of 0.05**

Table 4.25 states that 5 members of the sample with a ratio of 25% use the internet at school extensively, while the results pointed that 10 members of the sample with a ratio of 50% use the internet in school on a moderate basis and that 3 members of the sample with a ratio of 15% have limited use of internet in the classroom. However, there are 2 members of the sample with a ratio of 10% that hardly use the internet in the classroom; thus, the results revealed that members of the sample use (computer not internet) in school although few of them use it rarely, which may be a result of increased importance by the government to integrate ICT into teaching and the change of perceptions and attitude of teachers in relation to the use of computers and ICT (Oyaid 2009; Al-Sulaimani 2010). Also the previous table states that the calculated value of χ^2 (14.50) is more than that of tabled value of (9.49) at the significance level of 0.05 and with 4 degrees of freedom which indicates

that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

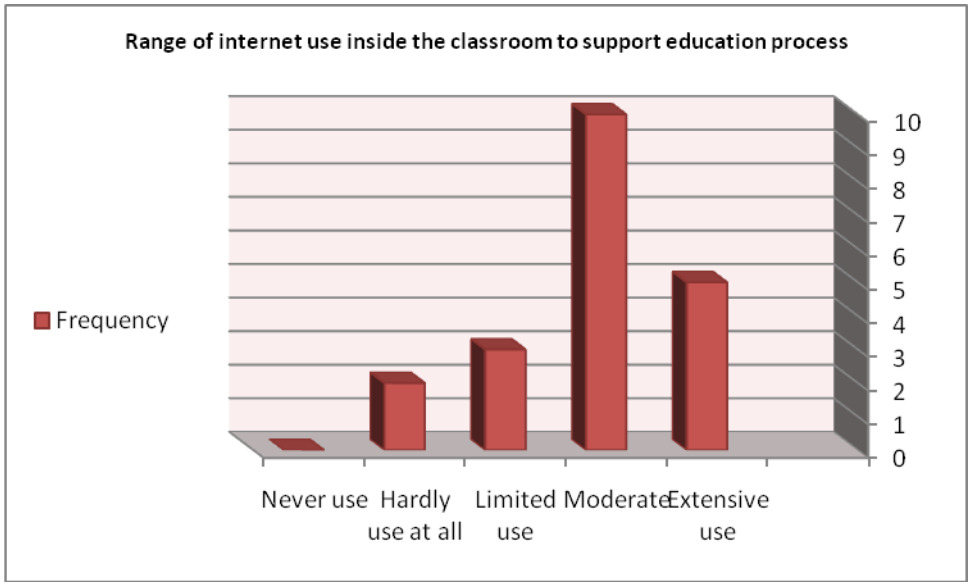

Figure 22. Range of internet use inside the classroom to support education process

Table 4.26: The quantitative, relative and standard measurements distribution and value of χ^2 first axis sentences (Range of internet use in reading newspapers and others)

n	Items	Responses		M	SD	Fd	χ^2
		f	%				
1	Extensive use	0	0	4.35	0.745	4	19.50
2	Moderate	0	0				
3	Limited use	3	15				
4	Hardly use at all	7	35				
5	Never use	10	50				

** Statistical Significance level of 0.05

Table 4.26 illustrates that no member of the sample uses internet in reading newspapers and magazines at an extensive nor moderate basis. The results showed that 3 members of the sample with a ratio of 15% have limited use of internet in reading newspapers and magazines and that 7 members of the sample with a ratio of 35% hardly use the internet in reading newspapers and magazines. The results also revealed that 10 members of the sample with a ratio of 50% do not use internet in reading newspapers and magazines at school which may be a result of lack of awareness among teachers to the broader spectrum of the use of the internet (Alshumaim & Alhassan 2010; Al-Solbi & Mayhew 2005) Also the previous table states that the calculated value of χ^2 (19.50) is more than that of tabled

value of (9.49) at the significance level of 0.05 and with 4 degrees of freedom, which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

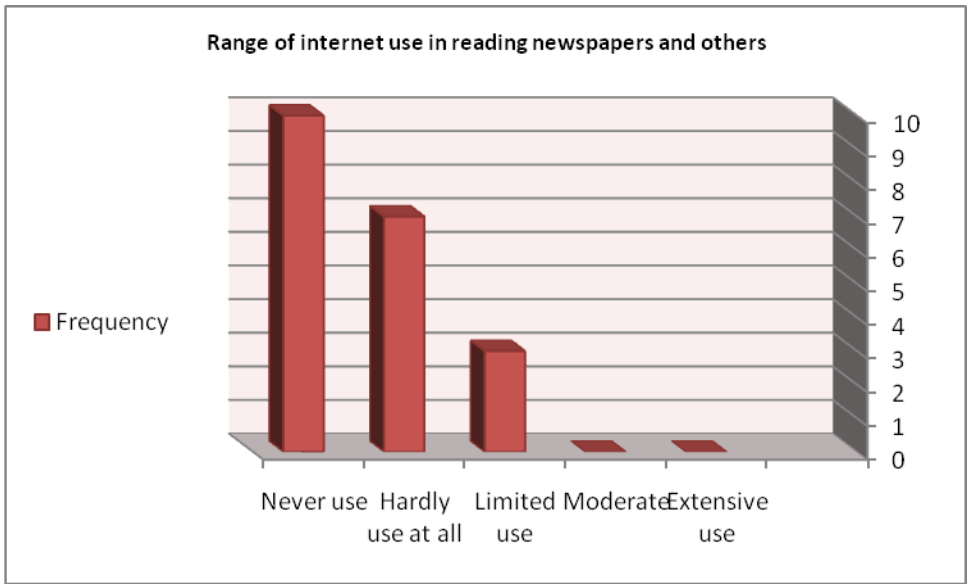

Figure 23. Range of internet use in reading newspapers and others

Table 4.27: The quantitative, relative and standard measurements distribution and value of χ^2 special axis sentences of (Range of how obstacles and challenges affect the current and the future use of internet)

n	items	Very effective		Effective		Not effective		M	SD	χ^2	Weighted Average	Rank
		f	%	f	%	f	%					
1	a. Security or privacy concerns (Viruses & loss of personal info.)	6	30	8	40	6	30	2.00	0.795	0.400	66.66	2
2	b. Technology not user friendly/difficult to use	10	50	6	30	3	15	1.55	0.826	3.895	51.66	9
3	c. Too Busy	7	35	10	50	3	15	1.80	0.696	3.700	60	5
4	d. Do not have a computer at home	11	55	3	15	6	30	1.75	0.910	4.900	58.33	6
5	e. Internet connection cost too much	6	30	8	40	6	30	2.00	0.795	0.44	66.66	3
6	f. Internet connection unreliable	10	50	5	25	5	25	1.75	0.851	2.500	58.33	8
7	g. Not interested in technology	7	35	8	40	5	25	1.90	0.788	0.700	63.33	4
8	h. I do not have the technical support I need	5	25	12	60	2	10	1.75	0.716	8.316	58.33	7
9	i. Family or culture reasons	3	15	13	65	4	20	2.05	0.605	9.1	68.33	1
10	j. Other……..	0	0	0	0	0	0	0.00	0.000	0.000	0	10

** Significance level of 0.05 *Significance level of 0.01

It is clear from the previous table 4.27 that the value of χ^2 for all options related to all members of the sample responses (who are teaching staff) towards the range of how obstacles and challenges affect the current and the future use of internet represents a statistical function at the significance level of (0.05) and (2) freedom degrees which evidences that the difference between the anticipated and witnessed repetition of responses is a statistical function and does not happen accidentally.

It is also clear that the most important responses were familial reasons followed by issues related to privacy and safety (Viruses – loss of personal files), and Internet connection prices (I can't get enough technical support that I need in learning and use). The average of responses ranged between 2.05 and 0 with importance ranged between 51.66% and 66.33% and all sentences nearly reached 50%.

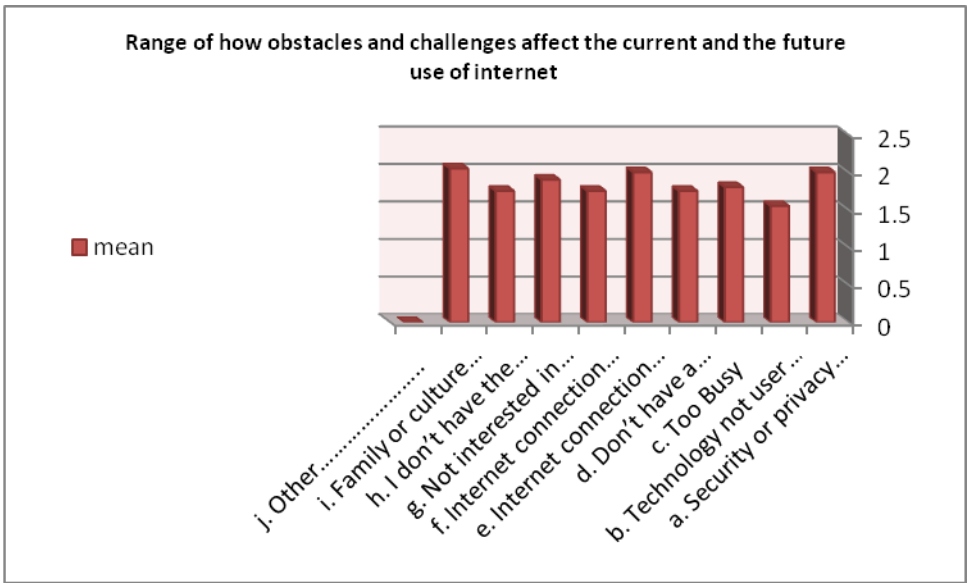

Figure 24. Range of how obstacles and challenges affect the current and the future use of internet

The results have also pointed to:

- Sentence(1) shows: 8 members of the sample at ratio of 40% stated that there is an influence on their internet use caused by issues related to privacy and safety such as: viruses and file loss.
- Sentence(2) points to: 10 members of the sample at ratio of 50% stated that they have no difficulty in technology use at all.
- Sentence(3) clarifies that 10 members of the sample at ratio of 50% confirmed that they find themselves overly occupied to use technology.

- Sentence(4) states that 11 members of the sample at ratio of 55% confirmed that they are not very attracted to the use of the technology.
- Sentence(5) has revealed that 8 members of the sample at a ratio of 40% witnessed that the prices of using the technology are very high which greatly affect its use.
- Sentence(6) points to: 10 members of the sample at a ratio of 50% said that the internet connection is not available at their region.
- Sentence(7) illustrated that 8 members of the sample at a ratio of 40% said that they are not attracted to the technology or the use of internet.
- Sentence(8) expressed that 12 members of the sample at a ratio of 60% stated that they lack sufficient technical support needed to learn and use the internet which affects the use of the technology.
- Sentence(9) describes that 13 members of the sample at ratio of 65% said that the familial reasons are the cause of their limitations in the use of the internet.

And the members of the sample have no other reasons.

Table 4.28: The quantitative, relative and standard measurements distribution and value of (X^2) axis sentences (Do you use electronic mail to contact with colleagues and teachers?)

N	yes		N0		M	SD
	f	%	f	%		
1	10	50	10	50	1.50	0.513

**Significance level of 0.05 * Significance level of 0.01

Table 4.28 displays that 10 members of the sample with a ratio of 50% use electronic mail to connect with colleagues and teachers at work. The results also revealed that 10 members of the sample with a ratio of 50% do not use electronic mail in connecting with colleagues and teachers at work.

Table 4.29: The quantitative, relative and standard measurements distribution and value of (X^2) sentences (How contact with students takes place outside the classroom?)

n	items	Responses		M	SD	χ^2
		f	%			
1	Email	1	5	2.90	0.447	34.30
2	Phone	0	0			
3	Face to face/ Personal meeting	19	95			

** Statistical Significance level of 0.05

Table 4.29 shows that 19 members of the sample with a ratio of 95% confirmed that contact with students outside the classroom is done through confrontation (face to face basis or personal meetings), while there was no indication for contact with students outside the classroom through email except for one member with a ratio of 5% also the results revealed that no contact through phone. Also the previous table states that the calculated value of χ^2 (34.30) is more than that of tabled value of (3.84) at the significance level of 0.05 and with degree of freedom 1 which indicates that the difference between the anticipated and witnessed repetition of responses is statistical function and does not happen accidentally.

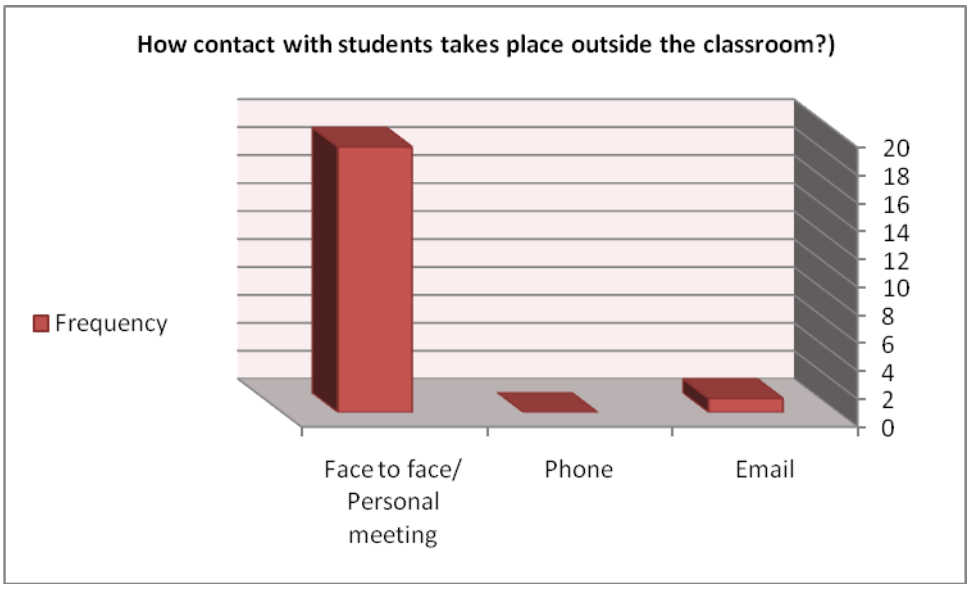

Figure 25. How contact with students takes place outside the classroom?

CHAPTER 5 Discussions, Recommendations and Conclusions

5.1. Introduction

The in depth study of the prevailing educational system in Saudi Arabia particularly at secondary school level reflects that there has not been much done to incorporate IT in the delivery of training to the students and the teachers and also the curriculum of the higher education studies has no significant course or hours of training of IT for the students. Of course a lot of potential projects could be launched to improve the current situation but there are immediate remedies available which will not only strengthen the current system but will open new avenues for a broad based IT infrastructure in Saudi school education and training system.

Why have we used Moodle?

Saudi Arabia is full of resources, and has the infrastructure and necessary resources in Primary and Secondary Schools. We found from our research that there is no proper utilization of resources to be used properly because of no proper guidance, and no necessary tools and systems implemented in the schools. Therefore, we suggest that Learning Management Systems (LMS) should be implemented in all schools. The reasons why we are suggesting LMS are given below.

1) Present resources will be utilized
2) It will reduce the use of paper in Schools
3) It will provide an efficient way of teaching online.
4) It will be interactive source of communication between teachers and students.
5) Teachers can provide their resources online
6) Students can access resources from any location i-e from lab or from their own home
7) Students can submit their assignments online and Teachers can give feedback to student's assignment online
8) Teachers can provide grades to students online and students can access their grade books online from any location
9) Students will have an access of 24/7 to use resources, any kind of announcement about the courses and grades.

10) Students can also send messages to other students, or to their teacher, teacher can interact with students and can do correspondence online.

The LMS we suggest should be used is Moodle, (a sample of an implemented system is attached in Appendix A). There are various benefits of using Moodle as the LMS in Schools of Saudi Arabia, some of them are mentioned below:

1) Moodle is an open source LMS so schools do not need to pay any extra fees.
2) Moodle could be used the same as it is being used worldwide (there are millions of users already using and benefiting from Moodle)
3) It is very easy to install and configure so present human resources can easily install and configure Moodle in the current infrastructure.
4) Most of the features of any efficient LMS are present in Moodle so schools can get maximum benefit of using a LMS.
5) There is a demonstration website present on the Moodle website which can be used as demo to show Schools Administration (this is in addition to our implemented system attached in Appendix A).
6) It is a well-tested LMS that many universities, vocational colleges and schools are already using.
7) There is online support provided by the community available for Moodle users so if there is any technical difficulty in usage, schools of Saudi Arabia can get the required support from the present community.
8) Moodle is very easy to use, for both students and teachers.
9) There is no extra cost involved in training required to be given to teachers and students because many resources are already being presented online.
10) Moodle is open source so if schools want to customize it they can easily update Moodle or modify it as per their requirements
11) Students will be able to view assignment on weekly basis.
12) The user logins provides discrete access to every user including students, teacher and guests.
13) Students will be able to upload and download assignments.
14) Students will be able to view lectures online.
15) Online results will be available to view.
16) Students will be able to chat through live chat with other colleagues and teachers.

17) Access to notes and resources will be available though respective logins and privileges.
18) Online blogs and discussion forums will be accessed by teachers and students.
19) Students will be able to access past papers.
20) Previous project thesis and other resources will be available in the online data base for referencing and guidelines
21) Students will be able to attend lectures online through live streaming.

5.2. Recommendations

After comprehensive study of the data acquired from the surveys and interviews the data calls for the need of immediate actions on the part of all the stakeholders in general and the Saudi government and education ministries in particular. Following are some of the key recommendations for the improvement of the educational system at higher/secondary school levels which will bring immediate changes and will have long term potential to improve the system.

5.2.1. Educate the stakeholders

Stake holders which include the teachers, administrators, planners, policy makers, students and ministry of education should be taught the current global trends for imparting IT education and delivery methods using IT in daily life.

5.2.2. Upgrade of existing Hardware in computer labs

The days are gone when floppy drives were used to store and transfer data. Computing speeds have increased many times and operating systems (OS) are much more capable of handling complex situations and as are other customised applications. So the existing hardware, OS and application software should be replaced by the new and currents ones.

5.2.3. Encourage use of multimedia in delivery of lectures

Overhead projectors and multimedia equipment is widely used in most of the private schools, so why shouldn't public schools be equipped with these technologies? Many are now daily life gadgets for education and training. The investment is not that huge when compared to the benefits and efficiency achieved.

5.2.4. Development of dynamic web based application

A dynamic web based application should be designed and developed with logins for teachers, students and administrators. This system should provide functionality for uploading and downloading assignment and projects. This will not only save time but such a system could allow students can get hold of their teachers remotely without having to physically meet them for their needs.

5.2.5. Free Tablet Pcs/laptops for students and teachers

Although Saudi Arabia is one of the under developing third world nations, we are far better off in terms of economy and GDP. We are a rich country and kingdom which can afford to provide tablet pcs to students. This will be a quick fix and could address the current IT "backwardness" in our educational system.

5.2.6. Wi-Fi hot spots in library and syndicate rooms

If students are given tablet pcs and several Wi-Fi spots are provided, then students can use the internet and be connected for completing their group tasks, assignments and projects. The burden on computer labs will be significantly reduced.

5.2.7. Train the trainers

The teachers are from the old school of thought and they pose more opposition and resistance to change; this may be driven from a fear of losing their jobs. They could be taken in

confidence while ensuring that they will not lose jobs and will be provided with the minimum required training for delivering education using IT in a multimedia environment.

5.2.8. Overcome barriers by educating those who stereotype

Again the school administrators and other senior citizens still think that technology will ruin the cultural norms, but they need to be educated and informed about both advantages and disadvantages of the technology. They should also be told about the ways to restrict access to adult web content and other offensive and inappropriate material.

5.2.9. Data and record keeping by maintaining activity logs for users

The users including students and teachers will be given their respective logins and passwords to access internet and web resources and all their data and activities can be tracked and recorded in the activity log files at the server. This monitoring may reduce the chances of misappropriate usages.

5.2.10. Inclusion of stakeholders in IT development and implementation

The teachers, administrators and students should be included while conducting system/project analysis because they are the best individuals to reflect upon the needs and current deprivations. They will be the end users and so their input could lead the development in the right direction from the start.

5.2.11. Encourage feedback

Feedback from the teacher, students and other stakeholders will help resolve the problems and an insight of future potential problems could be achieved too. Users should be given this confidence that their apprehensions and problems will be addressed not dismissed.

5.2.12. Be prepared for major upgrade of hardware and operating system

History tells us that any reluctance in taking a step at the most appropriate time may eventually lead reduced functionality of the system. Issues fixed as they arise can prevent further damage and leads to much lesser cost. If hardware and software needs upgrading then administrators should be prepared to do it.

5.2.13. Promote paperless environment

Paperless environment is not only environmentally friendly and reduces our carbon footprint but it also reduces cost, time and saves energy. It is highly recommended that if assignments and project thesis are required to be submitted in the form of softcopy it will help save costs and other resources.

5.2.14. Restrict access to unwanted sites and contents though user's access privileges and setting

The users should be given limited access to sites which may contain inappropriate content not suitable for young ones. However teachers should be given limited access however they should be made answerable and accountable for such access which is not relevant to the educational and training needs of the institute.

5.3. Moodle system main pages

As highlighted in the recommendations one of the initial strategies that can be deployed is to encourage topic participation through a LMS like Moodle. The following sections demonstrate a sample topic that was set up by the researcher to illustrate the capabilities of Moodle. It is expected that this example site could be used by policy and administration officials to appreciate the potential of such services.

5.3.1. Home page

It is the first page that user will see when they open the system and before they log in. The top right corner has an indication that user is not logged in, and there is an introduction in Arabic about what the system provides.

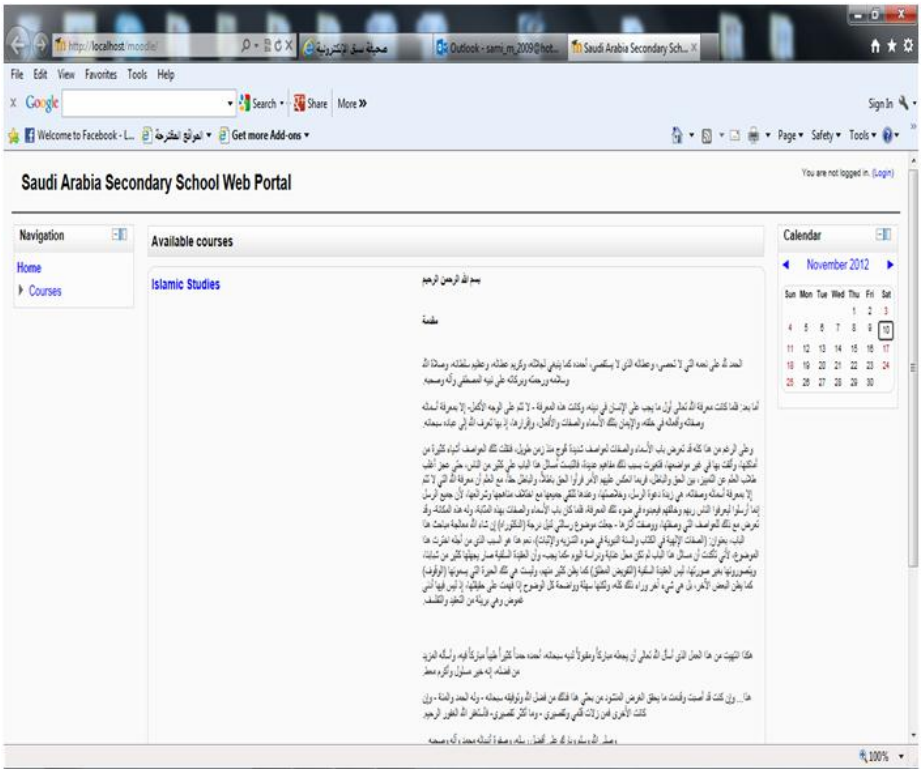

Figure 26. Moodle Sample Topic Home Page

5.3.2. Login page

It is a basic login screen that the user has to enter their user name and password to use the system features based on his role, there is an option to remember the user name and password so browser will cache the user name and password so that in future user will not need to enter their password. There is an option to log in as guest; guest users have limited access to the system but could be used by teachers to demonstrate main functional areas.

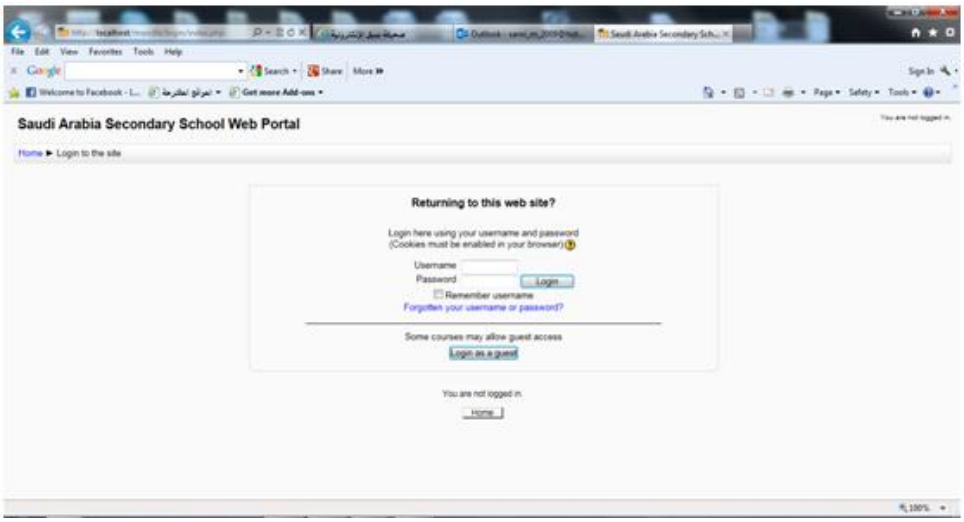

Figure 27. Moodle Sample Topic Log In Screen

5.3.3. Course details

This page lists course contents with time lines; it lists all course weeks and weekly lessons. The user will select a course from left navigation menu and then specific course details will be displayed.

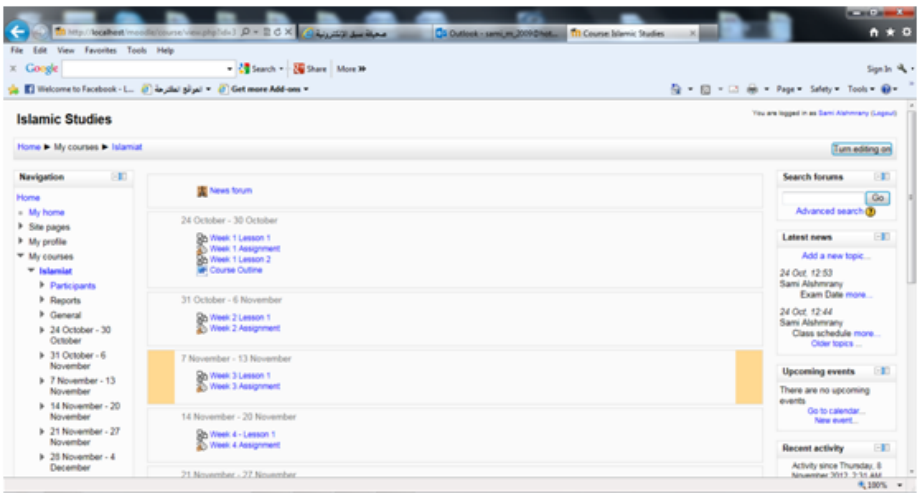

Figure 28. Moodle Sample Topic Course Detail

5.3.4. Assignment details

The user can select a specific assignment to view its details, like assignment description which is displayed on the top of the page, and the assignment grading summary which includes number of participants, due date, and how many submissions.

Figure 29. Moodle Sample Topic Assignment Details

5.3.5. Course participants' details

In this screen user may select any course from courses list, then a table of course participants' details will be displayed showing participant name, picture if available, email address, and

address, also last time participant used the system is displayed, user may select one or more participant and perform any action.

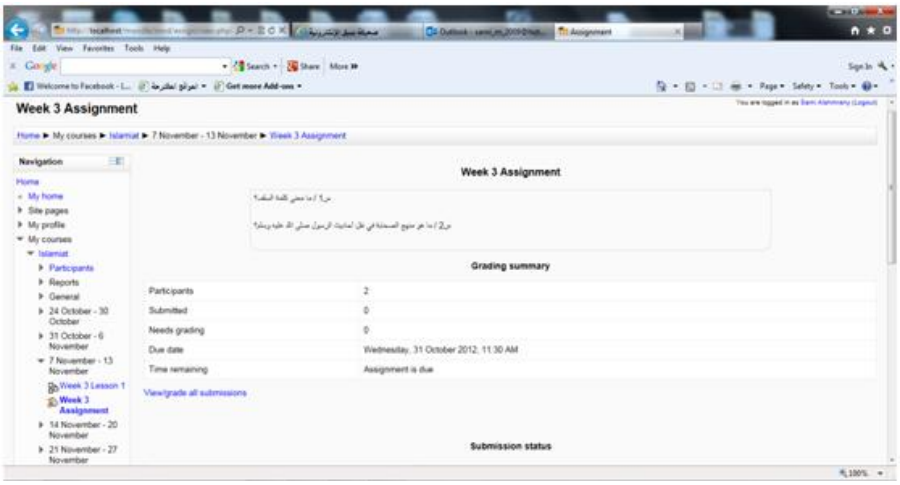

Figure 30. Moodle Sample Topic Participant Details

5.3.6. View user profile

User can view profile details like display name, profile picture, email address, street address, and details about first access time and last time user used the system.

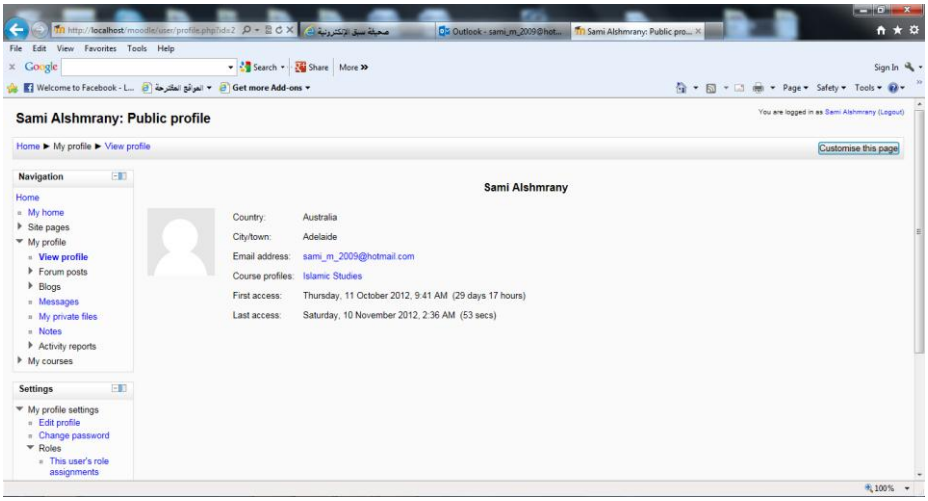

Figure 31. Moodle Sample Topic User Profile

5.4. Conclusion

The little steps if properly taken now ensure that they will have greater and positive outcomes for the future. While this thing has become global truth that without IT there will be no country in the world that would be able to survive, compete and even protect it stakes, it is high time that the Saudi government should invest in the IT sector and incorporate IT in its current departments.

They say the next war would a cyber war. Are we prepared to attack or if we are attacked could we win? Unfortunately we are not equipped even to defend or retaliate against an attack.

Previous decades gave us no IT infrastructure, but with a positive attitude we can lay a new IT foundation keeping in mind our future needs and with potential to absorb changes and grow. Being far behind in the race doesn't mean we should never make a move or start a fresh. We can see some great examples of countries like China and Korea that started from nowhere and now are prominent players not only in terms of achievements but with a greater IT presence.

Success is never achieved over night, but those who strived, had a vision and were determined, have set examples that everything is achievable. The existing IT setup is not equal with the current global IT trends and practices but it does give us a base to measure where we stand and what could be our best course for success.

In a nutshell a few key steps will bring a bit of change and would address the current situation. The flow of following steps may not be sequential but their significance is mutually exclusive. What is required is a plan and realistic target, allocation of resources, funds and human hours, consultation with industry experts, upgrade of hardware , operating systems and other application software, training of trainers, networking of computer labs and other terminals within schools with centralised data and web server, limited but realistic access to users, promotion of paperless environment, continuous evaluation of system and its outcomes, user feedback, pre emptive approach for future technologies and openness to change.

At high schools in Saudi Arabia the future leaders are being taught without much IT infrastructure and curriculum in their syllabi. The aggressive approach is vital and a further delay of few years in incorporating IT in all educational institutions along with government agencies and institutions would require decades to recoup. The above discussed recommendations provide basis for the new generation to work in line with other pupils in different parts of the world. The investment of time, energy and resources are worth doing these projects and the future generations will reap the benefits of today's infrastructure and foundations laid by existing stakeholders.

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Appendix A

Questionnaire for students:

Section 1: Personal Information

1. Please state the city where you attend school:

……..

---

2. Please state the name of your school:*****

……..

---

3. Please state what level (year) that you do:

……..

---

4. Please state your gender:

[ ] Male

[ ] Female

Section 2: Information About Your Electronic Devices

5. Do you have a personal computer? Please tick as many as apply

[ ] NO

[ ] Desktop

[ ] Laptop

[ ] Smartphone

[ ] Tablet computers

---

6. Please indicate whether you use a computer? Please tick as many as apply

[ ] I use a computer at home

[ ] I use a computer at school

[ ] I have access to a computer that I use away from School/Home

[ ] I do not use a computer

---

7. How many hours that you use the computers a week at school?

[ ] 0 hour

[ ] 4 hours

[ ] 6 hours

[ ] more than 6 hours

---

8. How many hours that you use the computers a week at home?

[ ] 0 hour

[ ] 4 hours

[ ] 6 hours

[ ] more than 6 hours

---

9. If you use the computer at **School**, please indicate the frequency for doing Homework and other school assignments/projects etc.

[ ] Extensive Use

[ ] Moderate

[ ] Limited Use

[ ] Hardly used at all

[ ] Never Use

Section 3: Information About Your Internet Connection

10. Please indicate the type of Internet connection used at home?

[ ] High-speed (ADSL)

[ ] Dial-up

[ ] 3G/Mobile internet

[ ] Others…….

[ ] Do not have Internet connection

11. If you use the Internet, please indicate the frequency for doing Homework and other school assignments/projects etc.

[ ] Extensive Use

[ ] Moderate

[ ] Limited Use

[ ] Hardly used at all

[ ] Never Use

12. If you use the Internet, please indicate the frequency for using internet for fun (Game, Movies).

[ ] Extensive Use

[ ] Moderate

[ ] Limited Use

[ ] Hardly used at all

[ ] Never Use

13. How significant are the following barriers to your present and future use of the Internet? (teacher)

	Very Significant	Somewhat Significant	Not Significant
a. Security or privacy concerns (Viruses & loss of personal info.)			
b. Technology not user friendly/difficult to use			
c. Too Busy			
d. Do not have a computer at home			
e. Internet connection cost too much			

f. Internet connection unreliable			
g. Not interested in technology			
h. I do not have the technical support I need			
i. Family or culture reasons			
j. Other……..			

Appendix B

Questionnaire for teachers:

Section 1: Personal Information

7. Please state the city where you attend school:

……

---

8. Please state the name of your school:*****

……

---

9. Please state topic that you are teaching:

……

---

10. Please state your gender:

[ ] Male

[ ] Female

Section 2: Information About Your Electronic Devices

11. Do you have a personal computer? Please tick as many as apply

[ ] NO

[ ] Desktop

[ ] Laptop

[ ] Smartphone

[ ] Tablet computers

---

12. Please indicate whether you use a computer? Please tick as many as apply

[ ] I use a computer at home

[ ] I use a computer at school

[ ] I have access to a computer that I use away from School/Home

[ ] I do not use a computer

---

14. How many hours that you use the computers a week at school?

[ ] 0 hour

[ ] 4 hours

[ ] 6 hours

[ ] more than 6 hours

---

15. How many hours that you use the computers a week at home?

[ ] 0 hour

[ ] 4 hours

[ ] 6 hours

[ ] more than 6 hours

---

16. If you use the computer at **School**, please indicate the frequency for using computer in the class to assist your teaching?

[ ] Extensive Use

[ ] Moderate

[ ] Limited Use

[ ] Hardly used at all

[ ] Never Use

Section 3: Information About Your Internet Connection

17. Please indicate the type of Internet connection used at home?

[ ] High-speed (ADSL)

[ ] Dial-up

[ ] 3G/Mobile internet

[ ] Others…….

[ ] Do not have Internet connection

---

18. If you use the Internet, please indicate the frequency for using computer in the class to assist your teaching?

    [ ] Extensive Use

    [ ] Moderate

    [ ] Limited Use

    [ ] Hardly used at all

    [ ] Never Use

---

19. If you use the Internet, please indicate the frequency for using internet for fun (Game, Movies) and reading newspapers .

    [ ] Extensive Use

    [ ] Moderate

    [ ] Limited Use

    [ ] Hardly used at all

    [ ] Never Use

---

20. How significant are the following barriers to your present and future use of the Internet? (teacher)

	Very Significant	Somewhat Significant	Not Significant
a. Security or privacy concerns (Viruses & loss of personal info.)			
b. Technology not user friendly/difficult to use			
c. Too Busy			
d. Do not have a computer at home			
e. Internet connection cost too much			

f. Internet connection unreliable			
g. Not interested in technology			
h. I do not have the technical support I need			
i. Family or culture reasons			
j. Other……..			

21. What operating system do u use? Windows or Mac or Linux or other?

    .....

22. Do you do email communication with other staff members?

    [ ] Yes

    [ ] No

23. How you do communication with your students outside the class?

    [ ] Email

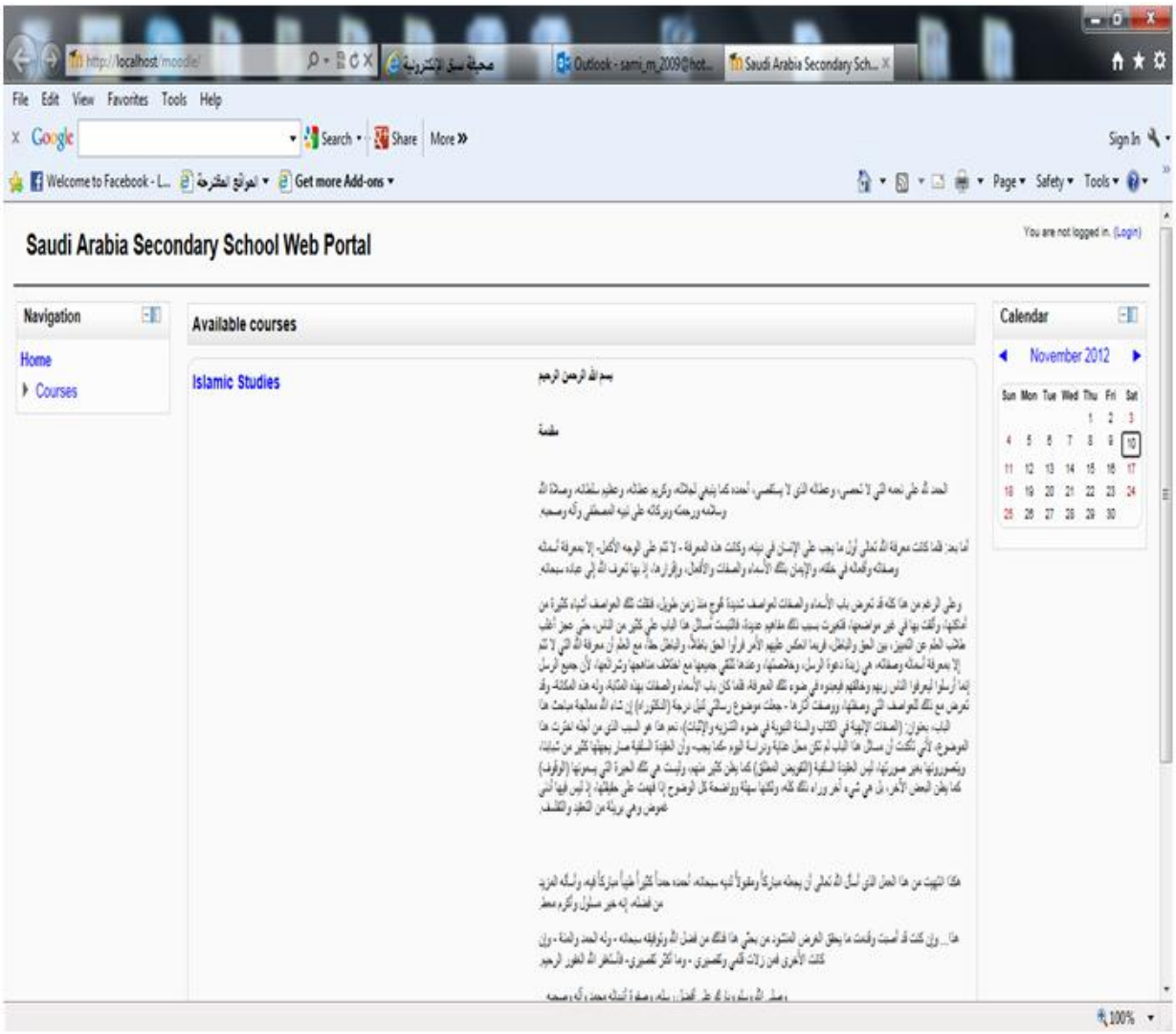
    [ ] Phone

    [ ] Face to face / Personal meeting

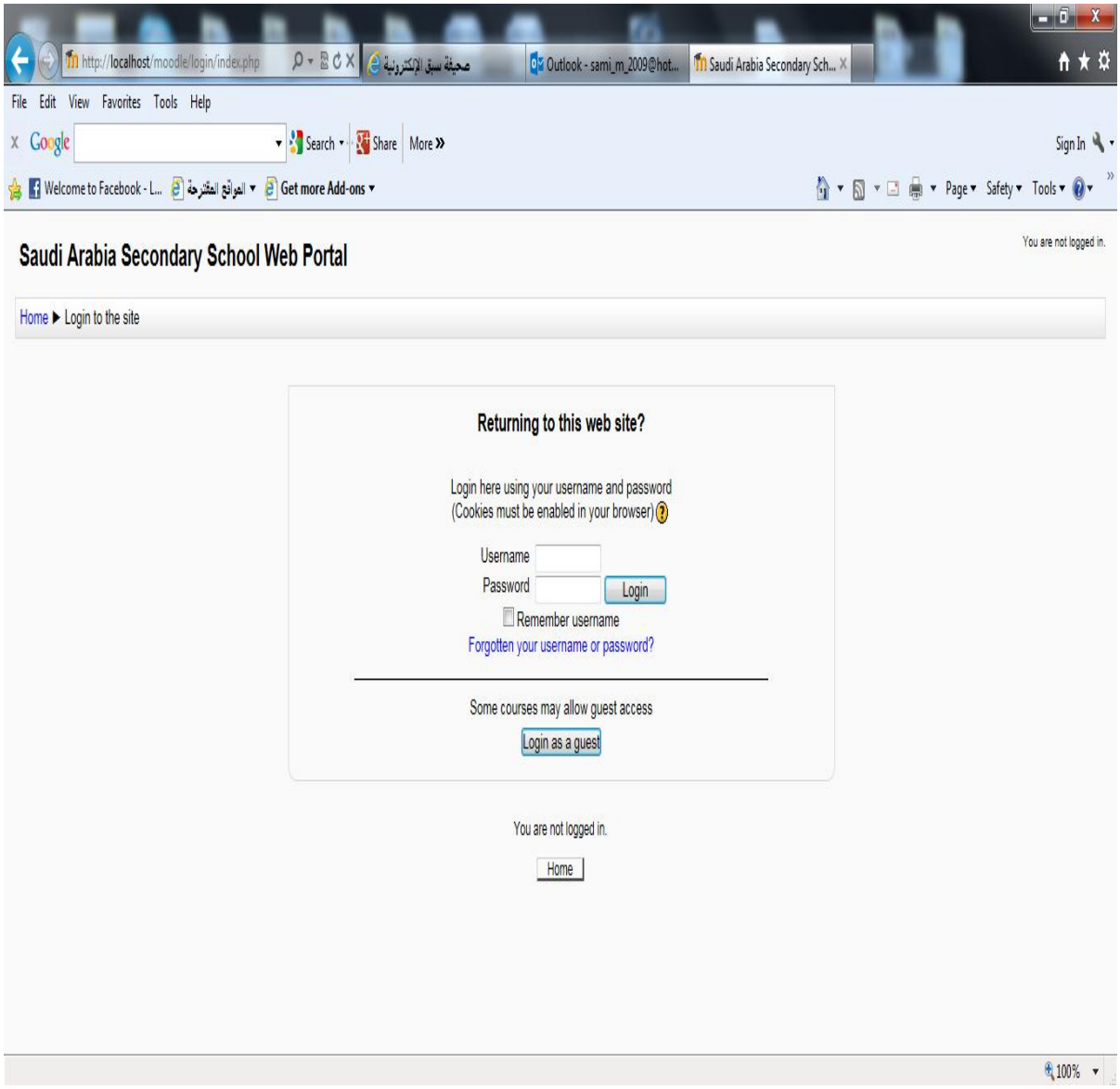
Appendix C

Moodle system screen shots

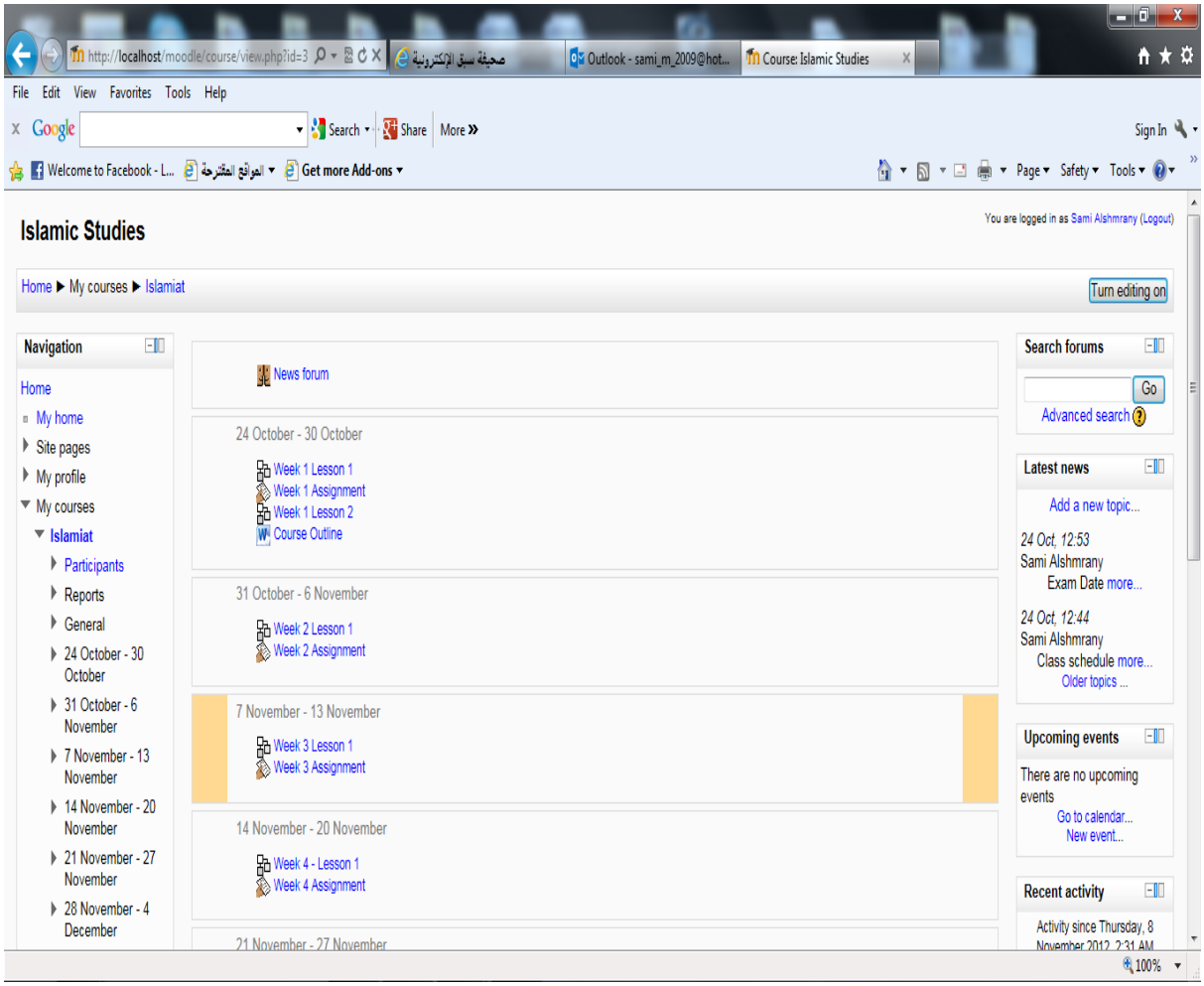
1- Home page



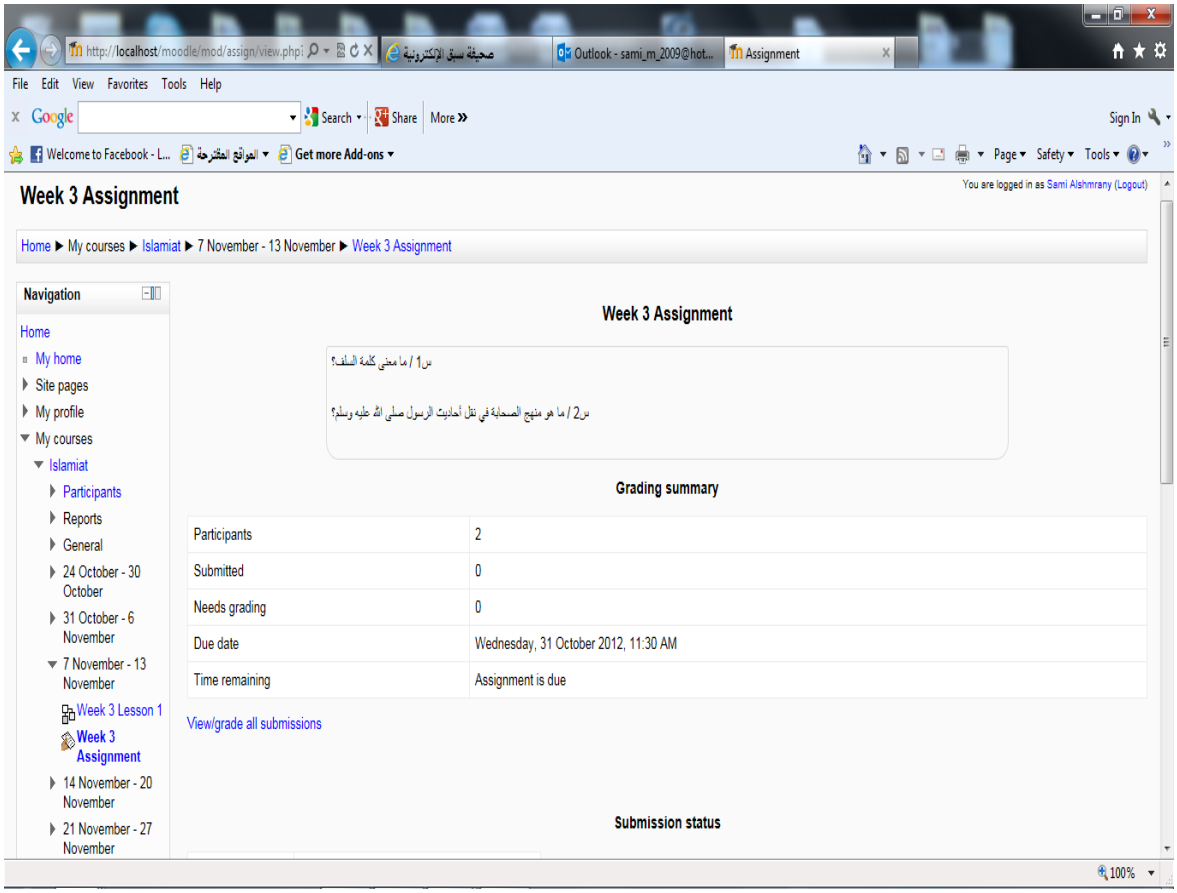
2- Login page


http://localhost/moodle/login/index.php
Outlook - sami_m_2009@hot...
Saudi Arabia Secondary Sch...
File Edit View Favorites Tools Help
Search
Share
More
Sign In
Welcome to Facebook - L...
Get more Add-ons
Page
Safety
Tools
Saudi Arabia Secondary School Web Portal
You are not logged in.
Home ▶ Login to the site
Returning to this web site?
Login here using your username and password
(Cookies must be enabled in your browser)
Username
Password
Login
Remember username
Forgotten your username or password?
Some courses may allow guest access
Login as a guest
You are not logged in.
Home
100%

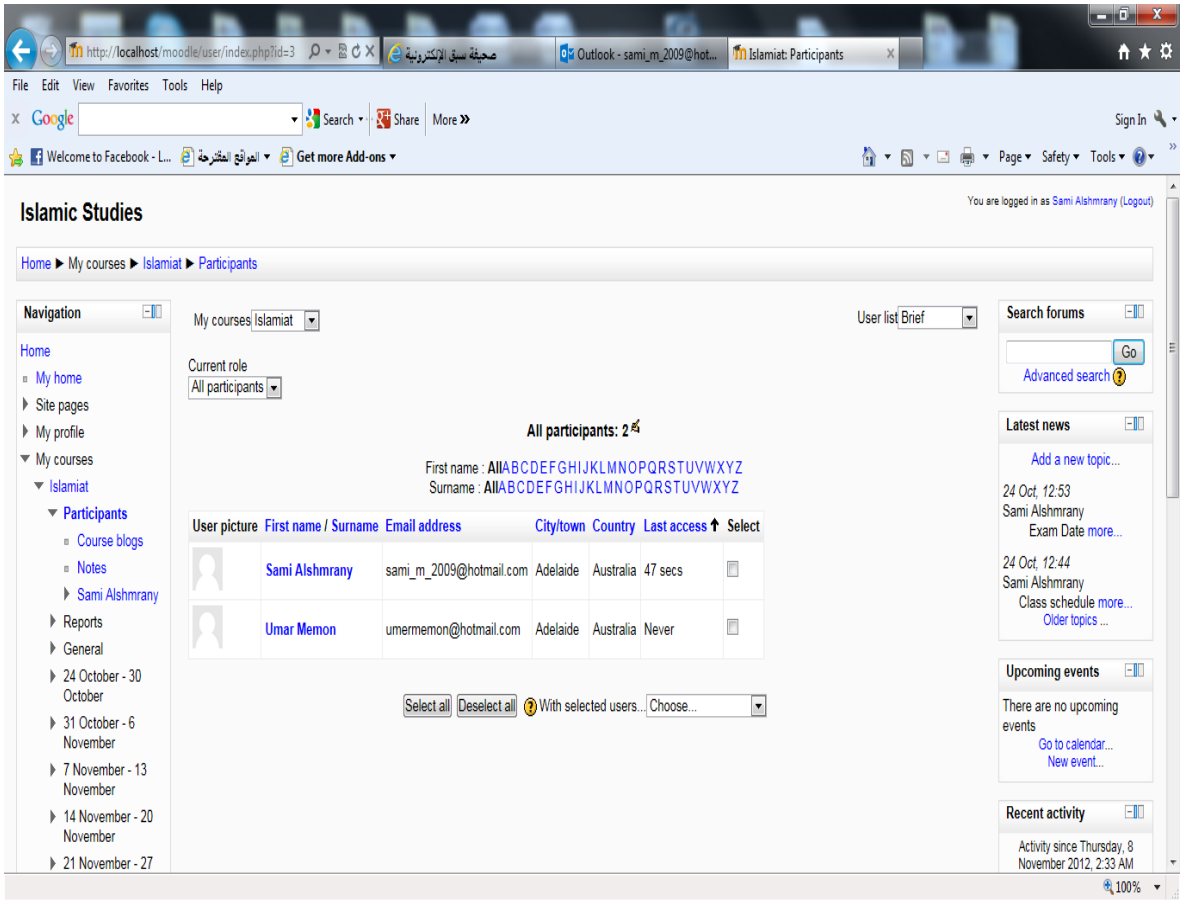
3- Course details



4- Assignment details



5- Course participants' details



6- View user profile