Factors Affecting Information and Communication Technology (ICT) Integration in Jordanian Secondary Schools

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ABSTRACT

This study attempted to investigate the relationship between stages of concern, adopter categories, obstacles faced by the teachers and the strategies used by the teachers in integrating ICT in the teaching and learning process in Jordanian public schools, while attitude toward computers was used as a moderator variable. A concern-based adoption model and Rogers' adopter categories were used as basis for this study. The researcher distributed 360 questionnaires to teachers who taught English, Math and Science in the Amman area in Jordan only 345 were usable.

Descriptive and inferential statistics including one way ANOVA, independent sample t-test, correlation and hierarchical regression were used to analyse the data. Data showed that Jordanian teachers exhibited high attitude and moderate concern towards integration of ICT. In addition, the teachers faced many obstacles when they integrate ICT in their classroom such as time-related obstacle, training and insufficient equipment. This study indicated that there were no significant differences in teachers' stage of concern based on their demographic variables which include teaching experience and subject matter taught. But the study indicated that significant differences were found between subject matter taught with regard to obstacles and strategies in ICT integration. Similarly, significant differences were found between teaching experience with regard to obstacles and strategies in ICT integration. English teachers as well as the teachers who belong to the group with 1-5 years of experience were found to face lesser obstacles and integrate ICT more than the other groups. This study also releaved that there was a positive relationship between concern and strategies in ICT integration. On the other hand, there was a negative relationship between obstacles in ICT integration and the strategies in ICT integration. Moreover, this study showed that teachers' attitudes toward computer did moderate the relationship between obstacles in ICT integration and the strategies in ICT integration. But, attitudes towards computer did not moderate the relationship between concern and strategies in ICT integration. The results showed that out of the thirteen hypotheses only three were rejected.

Findings from the interview showed that the early and late adopters differed in terms of integrating ICT in the classroom. It also confirmed the results of the questionnaire that Jordanian teachers faced many obstacles when integrating ICT for teaching and learning purpose. On the contrary, the interview showed that most of the teachers still employed conventional teaching strategies.

Based on the findings, several recommendations are provided including the need to provide training for late adopters, to synergize between the early and late adopters and to plan properly for technology integration in order to enhance technology integration in Jordanian schools.

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CHAPTER I

INTRODUCTION

1.0 Introduction

The process of teaching and learning in the modern era has undergone radical and basic changes due to continuous developments in technological, instructional, and pedagogical domains (Bonk & King, 1998; Marina, 2001). Information and Communications Technology (ICT) is reported to change the traditional educational foundations that ought to facilitate and enhance learning. The use of ICT in Jordanian schools can be enhanced through effective continuing professional development (CPD). The Jordanian Ministry of Education feels that ICT should be integrated in teaching and learning.

ICT revolution has brought with it a variety of means, including productivity software, multimedia and network devices along with the diffusion of personal computers which opened new horizons of the development and implementation of new and innovative teaching strategies over the last decade. Integrating ICT in the learning process was motivated by the belief that this technology helps improve and prepare students to participate effectively in the 21st century workplace (Butzin, 2000; Hopson, Simms, & Knezek, 2002; Reiser, 2001).

ICT has become one of the most important components in the 21st century as it becomes educational, research and communication tool in the National Educational Technology Standards by International Society in Technology Education (2007) (www.iste.org). ICT have been introduced in many fields such as economics, business and education. Most schools and educational institutions in developed countries are well-equipped with ICT as it enhances the quality of teaching and learning process (DfEE, 1998).

One of the challenges that teachers are facing is to be proficient enough to utilize the ICT in teaching although the recent times we witness a rapid expansion of knowledge and a wide utilization of modern technologies in all walks of life. ICT advancement raises the challenge of designing and developing a continuous and efficient training. Through effective training, teachers can flexibly and effectively develop themselves as effective and efficient users of ICT (Jung, 2005).

Currently, all secondary schools in Jordan are fully equipped with computer labs, and asymmetric digital subscriber line (ADSL) connection has reached over 600 of Jordan's 3000 public schools. Leading this effort is the Ministry of Education (MOE) which has articulated a national e-learning strategy. The strategy is currently under implementation through training of teachers, development of online curriculum and courseware as well as modernization of the learning process to enable innovation and creativity. The role of teachers is being shifted to a 'guide by the side' and facilitators in a learning process rather than a knowledge giver or fact teller. To help make this happen, the MOE will be developing a learning portal for all Jordanians (Bataineh & Baniabdelrahaman, 2006).

The availability and accessibility of ICT has also provided students with an enriched experience in learning where the role of students and teachers has shifted considerably from one of teacher-centered to that of student-centered learning and student self-learning. To implement this desired goal, teachers are required to acquire appropriate attitude, knowledge and skills to integrate ICT in their daily classroom lessons.

ICT is available in most urban Jordanian schools as the MOE is spending money to provide the schools with good infrastructure as well as facilities. This study is intended to measure the relationship between teacher's stages of concern, obstacles of integrating ICT and strategies for implementing ICT in the teaching and learning process in the Jordanian public secondary schools. Teacher's attitude toward computer was used as a moderator variable.

1.1 Educational System in Jordan

The Jordanian society is distinguished by its young population. This is indicated by the fact that 42.2% of students are below 14, and 31.4% are between 15 and 29 years of age. A point to mention is that education is free for primary and secondary students as well as compulsory for students through the age of fifteen. Interestingly, one-third of this population is enrolled in educational facilities; 95% of school age children are enrolled in schools, as compared to only 47 percent in 1960. A point to mention is that there is a small variance between urban and rural areas as to the rates of attendance in primary schools.

The number of students who were enrolled in elementary and secondary education during the year 1997-98 was 1,346,178 students. Of these, 951,831 students were enrolled in schools of Ministry of Education, whereas 229,487 of these students were enrolled in private schools. Similarly, 143,893 students were enrolled in schools run by the United Nations Relief and Work Agency (UNRWA) whereas the remaining 20,967 were enrolled in other government schools. Interestingly, there was one teacher for every 21 students in Jordanian schools.

Jordanians, after finishing their basic education, are given the opportunity to pursue their higher education either at home or abroad. The statistics indicate that the number of students who were enrolled in local universities between 1997-98 is 88,267, whereas the number of those who were enrolled in community colleges in the same period was 24,657. The number of those who were enrolled in graduate school programs is 5850.

1.1.1 Jordan Education System

Duration of compulsory education:

Age of entry: 6

Age of exit: 16

Structure of school system:

Basic or General Basic Education

Length of program: 10 years

Age level : 6 to 16 years old

Secondary Education

Length of program: 2 years

Age level : 16 to 18 years old

Certificate/Diploma awarded: Tawjihi (General Secondary Education Certificate)

Vocational Education

Length of program: 2

Age level : 16 to 18 years old

Certificate/Diploma awarded: Completion certificate

The secondary education, which is free but not compulsory, is a two-year-study for students who are aged between 16 to 18 and consists of two major tracks, viz. the comprehensive education, which is either academic or vocational. Students at the end of this period sit for the general examination (Tawjihi), and students who pass are awarded the Tawjihi (General Secondary School Certificate). This stream allows students to go to university, whereas the vocational stream gives an entrance to colleges. The applied secondary education is the second track in which students are provided with intensive vocational training by the Vocational Training Corporation, which is controlled by the Ministry of Labor, and students, at the end of the educational training receive a certificate.

Jordan's educational system has undergone a dramatic development and progress. Since the 1920s, Jordan shouldered the responsibility of developing a comprehensive and a high-quality system for the development of its citizens. Citizens in poor and remote areas were provided with schools so as to have an access to education. The fact that the basic education is favored over the higher education in Jordan has enhanced the literacy levels and helped in achieving high levels of enrollment. Jordan has achieved the international standards of education and look forward to meet the challenges of the future.

1.2 Problem Statement

Most of the research concerned with ICT integration has been devoted to investigate the impact of ICT on learners. The investigation into how instructors deal and interact with the technology has not drawn enough attention and fully investigated (OTA, 1995). However, such line of inquiry has recently been the core of many investigations. These investigations were motivated by the fact that teachers have different backgrounds, perceptions, and beliefs about using ICT in instruction.

These claims were confirmed by Lancaster (2000) who suggested that teachers have different experience and backgrounds, perceptions, and beliefs regarding using ICT in their classrooms. He further reported that they encountered different barriers that restricted the use of ICT in education effectively. These problems include the lack of exposure to computers and the inability to use them, the lack of ICT equipment, and the absence of adequate techniques for integrating into the curriculum. Other teachers in the same study reported the reasons for not integrating ICT was the lack of the spirit and motivation to employ new methods of teaching using ICT, while others might not have the interest, energy, or time to change the way they teach using ICT. In addition, teachers' experience was considered to have its own influence. Teachers who were new to their subject area avoided using IC altogether until they became more confident with their subject materials. These observations suggest that teachers' background is a factor that has an influence on

their attitudes, concerns, the levels of obstacles they encounter, and the strategies that are adopted.

Part of the investigation of computer technology integration from the teachers' perspective is investigating the level to which teachers integrate ICT in the classrooms. This part of inquiry attracted researchers such as Bennett & Bennett (2003), Isman, Yaratan. and Cancer (2007), Zayim, Yildrin and Saka (2006). These researchers suggested that teachers all over the world rarely integrate ICT and its applications in the classroom. In this respect, two theories were proposed to take account of this problem. First, adopters' category theory proposed by Rogers (1995) which helps to differentiate between early and late adopters that will help encourage individuals to practice and follow the adoption of instructional technology. Also, the differentiation between two groups leads to the understanding of the potential different approaches needed to bridge the gap between early adopters and late adopters (Jacobsen, 1998; Zayim, Yildrin & Saka, 2006). And second, the stages of concern theory based on CBAM model (Hall & George, 1979). Both theories were adopted in this piece of research to take account of the variations among teachers as well as the level of ICT integration and its applications in the classrooms.

Another part of inquiry that is worth researching is when it comes to how teachers deal and interact with ICT is highlighting the barriers of ICT integration such as time, training, and insufficient funding. In particular, an attempt should be made to discover which of these barriers has the greatest impact on ICT integration strategies and to minimize the impact of these obstacles that can help teachers to integrate ICT effectively in teaching and learning process.

According to the report of the National Center for Educational Statistics (1999), only 20 percent of teachers reported that they are well-prepared to integrate ICT in education, despite of the fact that many educators believe that educational technology provides an effective means for transforming education. These claims were supported by the report of the Office of Technology Assessment (OTA, 1995). According to this report, the majority of teachers had access to computers in the United States. However, the report showed that only less than one half of this majority used computers. Similar findings were reported by Becker (1994) who

reported that a small number of teachers did use the computer regularly for particular units throughout the year. No doubt, these findings indicate that integrating computers in teaching is not an easy process.

In addition, one of the aspects related to how teachers view and perceive integrating ICT is to measure teachers' stages of concern and their attitudes. In the literature, stages of concern were used to assess and measure attitudes (Mahmod, 2005; Mukti; 2000 & Singh, 2003). In other words, concern and attitudes were in this sense used synonymously. However, a contradictory perspective differentiates between teachers' attitudes and stages of concern since both have different operational definitions, different scales, and different roles. Where concern is an issue, an attempt to define it showed that it is a composite representation of feelings, preoccupation, thought and consideration given to a particular issue or task (Hall & Hord, 1987). It was also suggested that every person has a special perception and mental interaction with a given issue, depending on the personal make-up as well as knowledge and experience. This may suggest that there are different kinds of concern, a claim that was confirmed by ibid, p. 59). Where attitudes are concerned, Kinzie et al. (1994) suggest that attitudes can be defined as learned predispositions to respond positively or negatively to certain objects, situations, concepts, or persons.

One point in order is that an investigation of the role of concern in ICT integration provides insights into why a new innovation is not being adopted by all teachers. Part of this line of investigation involves attitudes which would be employed by the researcher as a moderator variable to help better explore the influence of positive and negative attitudes that teachers hold on the relationship between independent and dependent variables.

The scale of stages of concern has seven dimensions: (1) awareness; (2) informational; (3) personal; (4) management; (5) consequence; (6) collaboration and (7) refocusing. The 'management' stage is a critical stage in this scale. Many (1994) claimed that the arousal of this stage indicates that an innovation has been adopted. Contrary to the scale of stages of concern, the attitudes scale consists of four dimensions: (1) anxiety; (2) confidence; (3) liking and (4) usefulness.

Locally, the reason behind the unemployment of advanced technologies in syllabi by Jordanian teachers, as AbdalHaqq (1995) suggests, is that the education that teachers receive in integrating ICT is inadequate as the focus was on older and simpler instructional ICT applications instead of paying more attention to multimedia and problem solving applications.

Many studies indicated that the process of ICT integration is a complex one, and because of this complexity, teachers find it difficult to integrate it in their instructional process (Mumtaz, 2000; Pelgrum & Anderson, 1999; Watson, 2001). Part of this complexity has to do with the lack of a continuous education as to the pedagogical use of technology in instruction despite the fact that teachers have received training in basic ICT skills.

These and other related issues attract the attention of the researcher in this piece of research for many reasons. As indicated by AbdalHaqq (1995), Mumtaz (2000), Mohamed (2006) and Becker (1994), teachers around the world encounter many difficulties related to integrating ICT in the teaching and learning process and they rarely integrated ICT for teaching and learning purpose. In fact, the researcher was prompted to engage this research based on the claims made. In addition, this piece of research was motivated by a desire to discover the obstacles that restrict ICT integration and to find out how such problems can be avoided and solved. Since most previous studies paid attention to the 'use' of ICT in the classroom (Cicchelli & Baecher, 1989), the main focus of this inquiry is on 'the integration' of ICT in the classrooms. According to Demiraslan and Usluel (2008) there is a difference between using and integrating computer in education. Using computer is more concerned with non instructional works such as managing and ranking students' grade as well as checking students' attendance. Demiraslan and Usluel (2008) and Isman et al. (2007) argue that most teachers use computers for non instructional purposes. Yet integrating ICT is more concerned with instructional purposes such as teaching and learning. This study will concentrate on integrating ICT for teaching and learning purposes. Moreover, this study will identify teachers' attitudes and concern toward ICT and the obstacles faced by the Jordanian teachers.

A brief account of the studies that tackled the use computers in education in Jordan reveals that such studies revolved around the efficiency of using computers in education. These studies spotlighted the impact of using computers on students' educational achievement (Al-Qadi, 2003; Mulhim, 2003; Al-Hirsh, 2006). As well as, the potential role that the computer may play in improving students' skills (Hania, 2007; Najjar, 2006). In other words, the extent to which teachers use computers and their attitudes toward the use of this technology were not the core concern of these studies. In fact, few studies have tackled the issue of using computers from teachers' perspective such as Abu-Omar (1998) and INTEL (2007). The findings of these studies revealed that such use by teachers is poor. Moreover, according to above Jordanian studies no comprehensive attempt that has been made to discover the aspects of success and failure of the enterprise of computer technology integration in schools. The project which was initiated by his Majesty King Abdulla II, in 2005 is still in its infancy. Variables such as classification of teachers as early and late adopters, teachers' stages of concern, teachers' attitudes toward ICT, the obstacles that they faced when they integrated technology in classroom, and strategies of technology integration were not explored by these studies. Thus, the present study is an attempt in this direction.

In Jordan there are three main initiatives launched by the Ministry of Education (MoE) in order to increase the ICT integration in Jordanian schools. Those initiatives are Reform for Knowledge Economy (ERfKE), Jordan Education Initiative (JEI, 2005) and INTEL (2003). The reform knolwlege Economy was initiated by the MoE in 2003 and it is still under implementation. The purpose of this initiative is to boost the quality of teaching and learning process by providing schools with new technologies such as computers labs, new software and internet lines. The Jordan Education Initiative (JEI, 2005), initiated by the Ministry of Information and Communication Technology and MoE. This initiative aims to improve Jordanian schools especially in training teachers, e-learning and online curriculum. The INTEL initiative aims to provide the teachers with the basic skills in integrating technology in the classroom. This initiative brought into light the fact that schools in Jordan face need to shift from teachers-centered to students-centered teaching because teachers used traditional methods and they are rarely using ICT for teaching and learning purposes. Moreover, some Jordanian researchers, such as Abu-Omar (1998) and Al-

Smadi (2003), confirmed that teachers are rarely using ICT in classroom. Given that, to achieve the purpose of previous initiatives teachers in Jordanian schools should integrate new ICT strategies in classroom.

MoE spent a large amount of money in order to employ previous initiatives, integrate ICT in classrooms as well as provide teachers with the necessary training on ICT integration (MoE, 2006). As a conclusion, this study comes to explore whether Jordanian teachers integrate ICT in teaching and learning process, and what kind of obstacles and barriers that prevent them from integrating ICT in classrooms. Moreover, the study will differentiate between early and late adopters of ICT by using Rogers' adopters' categories theory (1995). In addition, the researcher will identify the effect of teachers' stages of concern on ICT integration. Teachers' attitudes toward computer will be used as moderator variable that could help maximize integrating ICT and minimize the barriers of ICT integration.

1.3 Objective of the Study

This study attempts to:

1. identify the levels of stages of concern, attitudes, obstacles faced by the teachers and the strategies used by the teachers in integrating technology in teaching and learning in Jordanian schools.
2. determine the adopter's categories of Jordanian teachers.
3. determine the profile of early and late adopters.
4. ascertain the differences in stages of concern, obstacles faced by the teachers and the strategies used by the teachers based on their teaching experience, subject matter taught and training attendance.
5. ascertain the relationship between stages of concern, obstacles faced by the teachers and the strategies used by the teachers.
6. determine the moderating effect of attitude on the relationship between (stage of concern, obstacles in technology integration) and strategies of technology integration
7. explore the reasons for the differences between early and late adopters in relation to their integration strategies.

1.4 Research Questions

The research aims to answer these questions:

1. What are the levels of stages of concern, attitudes, obstacles faced by the teachers and strategies of technology integration in the teaching and learning process among teachers in Jordanian schools?
2. Based on Rogers' adopter categories, who among the Jordanian teachers are the early and late adopters?
3. What are the attributes of early and late adopters among Jordanian teachers in term of teaching experience?
4. What are the attributes of early and late adopters among Jordanian teachers in term of subject matter taught?
5. What are the attributes of early and late adopters among Jordanian teachers in term of training attendance?
6. Are there any significant differences in Jordanian teachers' stages of concern towards technology based on their teaching experience, subject matter taught and training attendance?
7. Are there any significant differences in obstacles of technology integration based on teaching experience, subject matter taught and training attendance?
8. Are there any significant differences in technology integration strategies based on teaching experience, subject matter taught and training attendance?
9. Is there relationship between teacher's stages of concern and technology integration strategies among teachers in Jordanian schools?
10. Is there relationship between obstacles faced by the teachers and technology integration strategies among teachers in Jordanian schools?
11. Does teacher's attitude toward computer moderate the relationship between (stage of concern and obstacles in technology integration) and strategies of technology integration?
12. How do early and late adopters (among Jordanian teachers) differ from each other in their technology integration strategies?

1.5 Hypotheses of the Study

1. There are significant differences in stages of concern between five levels of teaching experience
2. There are significant differences in obstacles of technology integration between five levels of teaching experience
3. There are significant differences in strategies of technology integration between five levels of teaching experience
4. There are significant differences in stages of concern between the three subject matters taught
5. There are significant differences in obstacles of technology integration between the three subject matters taught
6. There are significant differences in strategies of technology integration between the three subject matters taught
7. There are significant differences in stages of concern in training attendance
8. There are significant differences in obstacles of technology integration in training attendance
9. There are significant differences in strategies of technology integration in training attendance
10. There are significant relationship between stages of concern and strategies of technology integration
11. There are significant relationship between obstacles of technology integration and strategies of technology integration
12. Attitudes moderate the relationship between stages of concern and strategies of technology integration
13. Attitudes moderate the relationship between obstacles of technology integration and strategies of technology integration

1.6 Purpose of the Study

The study determined the nature of the use of computers in Jordanian public secondary schools and identified the factors that influence the instructional use of computers. In addition, this study explored the integration of ICT in Jordanian schools with regard to teachers' attitudes towards computer, stage of concern, obstacles faced by teachers and their strategies employed to implement ICT in teaching and learning process. Furthermore, this study evolved an understanding of how ICT will be successfully integrated in Jordanian public secondary schools. This is achieved through studying public secondary schools in Amman area which is considered the pioneer in using new technology. Also, this study classified teachers into early and late adopters and showed the differences between them. Lastly, this study plans to describe how the teachers integrate ICT in the classroom.

1.7 Significance of the Study

The importance of the study comes into sight from the variables of this study. This study will investigate the relationship between stages of concern, barriers of using ICT and strategies of integration of ICT in the teaching and learning process while attitude toward computer is used as a moderator variable. Most of previous studies such as Linnell (1992) and Gbomita, (1997) explore the relationship between stage of concern or teachers' attitude and usage of computer in the classroom. But there has not been a study looking into these variables together. Most previous studies such as Stevens (1980), Gbomita (1997), Snider and Gershner, (1999), Atkins and Vasu (2000) declared that the high stage of concern or positive attitude toward computer will increase the use of computer in the classroom. Using computer in the classroom is not regarded as integration of ICT but rather as aid equipment, for example, using the computer for non-instructional works which includes managing and ranking students' grade as well as checking students' attendance.

Nowadays ICT is considered as a new field in Jordan and many factors are still considered to be ambiguous. Therefore, the importance of this study is due to the lack of studies and information about the nature of the ICT integration in the teaching and learning process in Jordanian school. This study will provide policymakers with information and guidance about the real situation of integration of ICT in the teaching and learning process in Jordanian schools. It will also identify the obstacles that are encountered by Jordanian teachers when they integrate ICT in the teaching and learning process so administrators can attempt to overcome them. Furthermore, it hopes to suggest possible and pragmatic strategies that would be useful for teachers in order to implement ICT in the teaching and learning process. The study will explore the differences between early and late adopters. Moreover it hopes and tries to bridge or minimize the gap between early and late adopters. Lastly, the results will be beneficial for the teachers with regards to enhancing the strategies in the teaching and learning process.

The results of the study will be useful to Jordanian teachers who are interested in further developing their skills and may also provide some knowledge and skills for teachers who want to start ICT integration in the classrooms. Furthermore, the most important part of any technology integration is the teachers. So, the concern of teachers, attitudes and the barriers that are facing them will have a major impact on technology integration in the classroom.

Eventually, the relevancy of this study will bring about significant insights to the teaching and learning process, bringing with it the implementation of suitable strategies to suit the conditions of the teaching and learning environment. The study will also provide empirical data that can help teachers to integrate ICT in curriculum by minimizing the barriers of technology integration.

1.8 Limitation of the Study

The study will be analyzed within the following limitations.

1. This study is limited to the teachers in Amman only.
2. The sample that is used in this study comprises of teachers who teach English language, Mathematics, and Science only.
3. This study is limited to the secondary schools in Amman only.
4. This study is limited to the relationship between teachers' attitude toward computer and stage of concern and their strategies employed to integrate ICT in learning and teaching in Jordanian schools only

1.9 Operational Definition

1.9.1 Attitudes are learned predispositions to respond positively or negatively to certain objects, situations, concepts, or persons (Kinzie et al., 1994).

1.9.2 Computer refers to a small machine called a microcomputer, so called because it has a single integrated circuit known as a microprocessor. (OTA, 1995).

1.9.3 Computer integration is the process of adopting computers into instruction to the point where they are completely integrated into the curriculum and are a part of everyday teaching (OTA, 1995)

1.9.4 Early adopter of ICT integration refers to Jordanian teachers who are already integrating ICT and its application in the curriculum. They will be identified based on the adaptor's categories that consist of list of software and tools.

1.9.5 Late adopter of ICT integration refers to Jordanian teachers who just starting to use the ICT and its applications in curriculum. They will be identified based on the adaptor's categories that consist of list of software and tools.

1.9.6 The stages of concern is a model comprising seven stages that are experienced by persons implementing an innovation. These stages are (a) awareness, (b) informational, (c) personal, (d) management, (e) consequence, (f) collaboration, and (g) refocusing (Hall & Hord, 1987).

1.9.7 Teachers' strategies are all the activities that teachers use in the classroom involving the usage of computer in order to enhance students' learning and skills.

1.9.8 Obstacles are factors that hinder the implementation of ICT in the classroom by teachers. These factors are time, training, equipment and access, insufficient funding, administrative leadership and computer self efficacy.

1.9.9 Integration of ICT enhancing student learning by incorporating technology into a curriculum area (Dockstader, 1999).

1.10 Summary

The first part of this chapter discusses current situations of development and implementation of technology in the learning and teaching process especially in Jordan. This study attempts to investigate the relationship between stages of concern, adopter's categories, obstacles faced by the teachers and the strategies used by the teachers in integrating computers in teaching and learning process in Jordanian public schools. An attitude toward computer was used a moderator variable. Given that, Chapter Two is dedicated to address the integration of ICT in Jordan and how the above mentioned categories and obstacles are tackled in the Jordanian schools.

CHAPTER II

LITERTURE REVIEW

2.0 Introduction

The purpose of this chapter is to clarify references that were reviewed by the researcher regarding the relationship between the teachers' stages of concern and their attitudes when trying to integrate ICT in their teaching process; the obstacles facing them; and the strategies they used to utilize ICT in the teaching-learning process in Jordanian public schools. The researcher referred to some relevant and recent literature resources such as books, journals, articles, and reports.

The researcher's aim in this literature review is to review the literature written on the three main topics discussed in this paper. Section one discusses the attitudes towards ICT and its integration in teaching and learning. This section, in its turn, is further divided into subsections. Technology Diffusion is discussed in section two, which is also divided into subsections. The next section, section three, focuses on the issue of teachers' strategies and the main obstacles teachers face when attempting to utilize computers in the classroom.

2.1 ICT in Jordanian Schools

Since His Majesty, King Abdullah II, has commenced practicing His new role as the king of the Hashemite kingdom of Jordan, a new vision has emerged to implement long-term social and economic development which the country needs to overcome its problems on the national level. As a result, the nation's leaders and citizens have been called to focus their energy together in order to guarantee realizing this vision. Since then, many serious initiatives have taken place proving the government and people's commitment to participate in shaping the needed new economic future of Jordan. Such initiatives include the first National Economic Forum (Dead Sea Retreat) in November 1999, Jordan VISION 2020 and R.E.A.C.H. And, as part of this national project aiming at developing Jordan's economy, information technology sector has been looked upon as a strategic element whose development can be very effective in contributing positively to the national economic plan.

It is essential to start developing IT in Jordan. To ensure that Jordan advances to level proposed by His majesty. To achieve this vision Jordan the IT hub for the whole region; all governmental institutions and agencies, along with the private sector's companies and associations, and also individuals need to collaborate in order to work together in ensuring a better economic future for Jordan.

This step of developing an IT revolution in Jordan needs to be started from the base; to prepare the smallest unit of construction in Jordan, the individuals, representing human resources, as the essential element in such a formula. Hence, all the efforts to develop IT sector in Jordan should concentrate on education, as the starting point, to make the idea of a long-term social, economic, and technological development become applicable.

It has long been realized that the power of education cannot be ignored as the engine moving nations and economies. Education is the corner stone in any country's plans for development because it is essential in ensuring stability on the economic, social, political and environmental levels. This is obvious as the universal Declaration of Human Rights has established it as a fundamental human right more

than 50 years ago. Recently, incorporating technology into the educational process proved itself to be beneficial as it allows a growing number of people to be able to browse endless sites of information and databases. Nevertheless, technology develops everyday as there are always huge advancements creating new possibilities for people; and new challenges for governments to always be able to keep up in terms of systems and programs, especially in the field of education. This points out the necessity to begin reforming Jordan's current educational system. This means that if people targeted through education are to participate in shaping the purposed knowledge-based economic future of Jordan; then it is essential to start working on these people to meet the demands of their new role; being the "knowledge workers".

So, what is needed is more than just integrating computer into the educational system; but to totally change the current learning approach and replace it with the new "computer-based approach to learning." Key foundation documents has recommended such an immediate shift in Jordan educational system; like VISION 2020 and R.E.A.C.H. initial reports, stressing the importance of preparing human resources to become part of the national plan of making Jordan the IT hub for the region.

Approximately 1.5 million students attend public or private educational institutions that belong to the Ministry of Education. In other words, the ministry's programs and reforming plans affect over one-third of Jordan population, accordingly; if the ministry will start to prepare a new generation of knowledge workers by integrating information technology into its curricula, then the ministry will turn out to be the largest user of IT in Jordan.

2.2 Integrating ICT in Teaching and Learning

The integration of technology in education can be understood as the process of merging technology into the teaching methods, so that technology will be used in the classroom for the purpose of making teaching and learning easier on one hand, and oriented towards meeting the demands of the anticipated 21st -century knowledge economy on the other. Many researchers studied integration and defined it, such as Kinnaman (1994), Dockstader (1999) and Wetzel (2002). The word "integrate" in the literal sense means to make whole or to renew (Kinnaman, 1994). Dockstader (1999) confirmed that the integration of technology is all about helping learners to become highly skilled in using the computers meaningfully while they are being taught in the general content areas. The importance of incorporating computers in the learning process lies in improving learner's learning for both the material studied itself and the use of technology.

2.2.1 Role of Teachers in Integration of ICT

This use of ICT in the learning process doesn't omit the role of the teacher. Teachers' instructional or professional tools are needed in the classroom even when technology is incorporated into the class environment. Many researchers maintained that teacher education remains the best and favored solution for incorporating technology into the classroom (Abdal_Haqq, 1996; Grant, 2001; Mills & Tincher, 2003). So, integrating technology in learning is not mainly about the teacher, it is about the curriculum itself. Just as Wetzel (2002) stated, integration requires changes in the curricula and in the pedagogical ways and rules in order to include technology inside them.

Moreover, Dockstader (1999) stressed that in integrating technology into education, it is important to have the curriculum leading or directing the use of technology, not the opposite; making the technology lead the curriculum. That is, the teacher is still essential in delivering education with the aid of technology, as he should be highly equipped with the highest level of proficiency in both teaching and

computer skills. Hence, this new role of the teacher in the teaching-learning process requires careful selection of strategies on his part. Thus, the teacher now has the responsibility to benefit from a repertoire of knowledge of curriculum, of students' needs and abilities, and of technology and its resources in his decision on which suitable strategy to select in order to teach any given lesson with the aid of technology integrated into the curriculum (Painter, 2001). Nevertheless, although all schools have been recently equipped with computers, it seems that the majority of schools do not utilize computers completely and efficiently (Glennan & Melmed, 1996). There are several factors behind this partial utilization of ICT in schools, the most important of which are directly related to the teacher. Such factors include: teachers attitudes towards using the computer in teaching, which stem basically from their experience in using it; in addition to their own skills in teaching depending on technology.

All of these factors mentioned above do effectively constitute the view held by many about integrating and using computers in teaching (Green et al. 1993). That is, the teachers who have a positive attitude towards using ICT in the teaching – learning process are those who have got the needed experience and skills in computer knowledge and applications. This kind of teachers is the one that can play an important role in the success of implementing technology in teaching, and can enhance the quality of computer-based classroom activities.

Understanding this important role of the teachers in the implementation process, it seems essential to prepare both the teachers and the schools for the anticipated integration in order to facilitate it and to avoid any unexpected problems. At school level, incorporating technology into curricula is not a simple process; it is such a complex process that looks forward to enhance students learning and realize curricula goals through using the computer–based instruction methods (Dockstader, 1999). Among the main problems of implementing ICT in schools is the lack of financial support to install computer hardware, purchase education software, or to train teachers.

At the teachers' level, previous research concluded that this process of implementing technology in education is such a complex innovation that may be faced by many obstacles, especially when the teachers are not trained on the necessary computer and teaching skills needed. Bond (1988) suggested that the reason why this implementation seems complex is the variety found in curriculums, Jordanian population enrolled in the Ministry of Education's schools, computer platforms and programs, in addition to courseware products. This implementation process is recognized as an innovation rather than an adoption, it is an innovation in the process of learning and teaching as it should be first adopted then implemented and integrated within the process itself, it is not just adopted. This highlights the importance of implementing the ICT properly into the teaching–learning process, in order to benefit from the technology in enhancing students' motivation and achievement in learning.

Realizing the problems hindering the proper implementation of instructional technology, and understanding the role of the teacher and his skills, it sounds a little depressing how limited is the number of studies conducted to investigate the impact of technology on teachers or instructors and their technological abilities. Most of them do actually focus on the learners themselves (OTA, 1995). The majority of these studies conducted on the teacher and his technological skills examined instructors who use technology successfully, "accomplished technology users", which is considered a small category of teachers compared to those who do not use technology (Zhao & Cziko, 2001). This explains the limited use of ICT in current curricula as it is mainly benefited from in a few passive practices like drill, viewing information, making and designing presentations, and forming reports using the computer (D'Amico, 1999; Prater & MacNeil, 2001; Zhao & Cziko, 2001).

2.2.2 Factors Hindering Computer Use

Among the efforts that could be made as a first step towards implementing ICT in the educational system is starting by understanding the reasons behind using or not using computer in instruction by instructors. Making assumptions to understand this helps us to find solutions to help instructors start integrating technology in their instruction methods (Zhao & Cziko, 2001). It was found that such reason include the lack of technical and administrative support of the teacher, lack of appropriate training provided for them, lack of systemic and regular incentives, institutional infrastructure, and limitations created by the existed traditional pedagogical beliefs as it refuse change and resist it (Zhao & Cziko, 2001).

Also, studies found that there exist shortcomings in the education of pre-service teachers' students and in the training of newer teachers, as it appears that there is late adaptation to the concept of utilizing computers in instruction. In a study conducted in the U.S.A, Becker, Ravitz and Wong (1999) stated that the percentage of teachers who can be considered "reluctant" or "late adopters" of computer –based instruction methods mounts to 70%. Moreover, another reason that may affect beginning teachers' attitudes towards instructional technology is the lack of leadership by experienced teachers; they don't find in other experienced teacher an example to follow. Not to mention the limited opportunities given to those beginning teachers because of factors that are not related to their education, such as constraints created by timetable, factors related to poor or inappropriate software used, or factors related to the unavailability of computers because of their insufficient numbers (Dunn and Ridgway, 1994).

Backer (1994) conducted a survey on using the computer in grades 3-12. He classified teachers in relation to using the computer into 2 groups: exemplary computer-using teachers who constituted 5% of the whole sample, and the rest of the sample who appeared to be non-expert users of computers. He showed that exemplary computer-using teachers enjoyed some external and contextual variables in their environment that helped them to be so. These variables include conditions of collegial working as in their environment many teachers do also use the computer,

the broad scope of tasks in their schools in which they use the computer, added to their normal use of it in the courses they take, good opportunities for staff development provided to them by the school, in addition to the support they receive in the form of computer cooperation, school support represented by supporting resources and reducing class sizes. Other factors were found from the survey to be affecting the exemplary computer-using teachers and were perceived as personal factors. An interesting one of them is that those expert computer-using teachers studied majors in liberal arts, not majors in education. Such a variable can be taken into consideration in the efforts to improve recruitment standards as it is related to personal background and experience. Furthermore, Backer noted that two of the personal factors may be altered at the school level.

As a conclusion, the researcher aimed in the previous discussion to show the complexity of the process of enhancing education by integrating ICT in teaching and learning process. That is because what is meant by ICT is not the routine use of the computer in educational tasks, but it is about effectively utilizing technology as part of the curriculum. Studies showed that there are several obstacles that hinder this integration both at the level of the school and at the teacher's level. Both school and teacher need prior preparation for the integration to be accomplished; teachers need to be trained on necessary and essential skills needed, and schools need to be financially and administratively prepared for the implementation of the new instructional technology. It was also found that among the most important barriers preventing teachers from the complete and effective integration of technology into the curriculum are: insufficient funding and financial support, insufficient or ineffective training, lack of proper equipments and access to computers, unorganized timetables, lack of administrative leadership, and insufficient self-efficacy. Thus, the purpose of this study was to find out whether this integration process is implemented in Jordan and to know which of the obstacles or barriers mentioned have more impact on Jordanian teachers and hence on the ICT integration process.

2.3 Attitudes of Teachers toward Computers

One of the main factors affecting the process of implementing ICT in education is teachers' attitudes towards the technology itself. Loyd and Gressard (1984) found that attitudes of the teachers and students towards the intended change and their perception of it shape the success or failure of the new instructional computer programs. Accordingly, it sounds essential to start by measuring their attitudes. So, researchers have developed several scales to help measure attitudes towards computer, or what we can call "computer anxiety". Among these scales are computer attitudes scales (CAS, 1984) by Loyd and Gressard.

Teo (2008) conducted CAS on a sample of 139 pre-service teachers who were enrolled in two programs at the National Institute of Education in Singapore. The findings revealed that teachers showed positive attitudes towards using computer.

Kinzie and Delcourt (1991) found out that expert computer–using teachers who tend usually to utilize the technology in their teaching process make important examples or "models" for their students, generating by that positive attitudes towards the technology inside their students. That is why teachers need to be self–efficient themselves and show their willingness to utilize this technology in the classroom; they also should understand and realize the advantages of this new technology in order to convince students of these advantages. Consequently, it is vital to enhance teachers' experience with ICT by providing them with the proper training in order to form positive attitudes in them and in their students, and to raise their self-efficacy.

Supporting this idea, Baylor (1985) in his study "Assessment of Microcomputer Attitudes towards the Education of Students" found out that attending an introductory microcomputer course by the teachers affects their attitudes towards computer in a positive way. This supports the previous finding of the importance of training and introductory courses in computer for generating positive attitudes towards computer.

From another perspective of attitudes towards instructional technology, Vosburg (1993) studied the relationship between attitudes towards technology and attitudes towards computer-assisted learning. One of his most important results was that there is a strong significant relationship between attitudes towards technology itself and attitudes towards integrating this technology into education.

A positive relationship was concluded between training and access to computers on one hand and attitudes towards computers on the other. Chin and Hortin (1993) asserted this relation in their study and they suggested that providing teachers and staff with the proper training and support helps to improve their attitudes towards computers. Yildirim (2000) supported this conclusion in his study as he found that before completing a course in computer literacy, teachers showed more anxiety about using the technology; but after completing the course, all the teachers became more confident and less anxious towards technology; which asserts the assumption that training is useful to improve attitudes. Also, Hakkinen (1994) confirmed the previous finding as he found that giving the pre-service teachers a course on the basic concepts of computer had really made a difference and changed their feelings towards computers positively. Most importantly, this course raised teachers own appreciation and estimation of their computer skills, hence reducing their anxiety about it.

In a study conducted on the Mexican community, Morales (1998) indicated that there are other several factors that may affect teacher's and student's attitudes towards ICT. These factors include the availability of access to computers generally and providing them with computer applications and programs that have better quality and variety. These factors, he found, influence their attitudes towards computers positively and generate positive thoughts and feelings.

As for studying the variable of self-efficacy, Zhang and Espinoza (1998) found an association between this variable and attitudes toward technology. It is obvious from this study that self-efficacy is positively influenced by taking computer programming courses, and, in turn, self-efficacy affects decisions to take future computer courses. Also, they asserted the result that training affects attitudes towards computers positively and significantly. Cate and McNall (1993) added that their study found

that the level of training, not mainly the training itself, has a significant influence on attitudes towards computers.

As a conclusion, most of the previous studies such as Stevens (1980), Gbomita (1997), Snider and Gershner, (1999), Atkins and Vasu, (2000) confirmed the existence of a positive relationship between teachers' and students' attitudes towards technology and facilitating the process of integrating ICT into educational curricula. Other important indicators of the attitudes were experience and previous training. They were also effective factors in influencing attitudes towards computers. Self-efficacy and general access to computers constituted obstacles that may prevent the proper implementation of the technology into curriculum if they do not get improved or facilitated.

2.4 Stages of Concern

This analysis of stages of concern is considered important as it helps innovation sponsors determine if the user system personnel are ready to embrace the innovation or not. This study used a CBAM model that consists of three parts; stages of concern, level of use and innovation configuration (Hall, Wallace, & Dossett, 1973). "Stages of concern" expresses the level of adopter's concern in the intended innovations, in addition to some issues related to their experience or perception of this innovation. In other words, the target of this discussion is to analyze the user's feelings, successes, failures, observations and problems in relation to the process of adapting to the new innovation. There are seven stages of concern:

Stage 0:

Awareness level: it expresses the individual's little concern or involvement with the innovation.

Stage 1:

Level of information: it is about the level where the individual becomes more aware and interested in the innovation and he seeks to know more.

Stage 2:

Personal level: it is where the person starts questioning about his own abilities and adequacy to the new innovation, and tries to check out what are his demands and new role in it.

Stage 3:

Management level: where the individual starts concerning about the task itself, like concerning about organizing logistics and managing his resources in an efficient way.

Stage 4:

Level of Consequence: concerns about results of the implementation process and students' outcomes after its accomplishment.

Stage 5:

Collaboration level: concerns about collaborating with others and working together to accomplish this implementation of the new technology.

Stage 6:

Level of Refocusing: concerns about testing the innovation and modifying or amending the weak points in it.

This model (CBAM model) which was adopted in this study resembles Fuller's model in many aspects. Fuller's "self concern" match up stages 0, 1, and 2, while her "task concern" is matched with stage 3 (management concern), and Fuller's "impact concern" is related to stage 4, 5 and 6. The literature relates the studies of many researchers who examined the stages of concern and their importance in the innovation of integrating technology into education (Mills, 1999; Newhouse, 2001; and Rakes & Casey, 2002). Mills (1999) investigated the stages of concerns for teachers in an elementary school where an integrated learning system was implemented. The results showed that despite utilizing this learning system in their teaching, most of the teachers expressed low stages of concern or what is called "self concerns". During a minimum of two years, the period of applying the system in the

school, stage 1, 2, and 3 of concern dominated among the teachers, as 75.4% of them showed either one of the 3 stages, while only 9.2% of teachers showed "impact concern" at its highest level.

In another study conducted on a high-access secondary school, k-12 levels specifically, Newhouse (2001) reported that the scores of the 40 teachers who worked on the four-year portable computer program on the concern scales were 50% concentrated in the area of "self concern" stage. On the same direction, Rakes and Casey's (2002) study, which was conducted on a large population (n=659), wanted to achieve an interpretation of the data that is so accurate and sensitive by focusing on the peak stage of concern, the stage that follows it, and its lowest stage. According to their results, the largest percentage of teachers reached stage 2 (personal concern) on the scale of concern, while a very small percentage of them rated concerns of stage 4 (consequence) on the concerns scale. The importance of these findings appears as they are interpreted that the teachers' concerns were directed mainly towards the technology's own impact on themselves, not displaying any concrete attention or concern for the new technology's impact on the students, who are the main category meant to be affected by this new generation.

The main result deduced from the literature on concern aggregated is that change and innovation is a developmental process; meaning that it needs to have some time before it could ascend to the status aimed for it. Hope (1997) maintained that over an entire school year of applying an integrated-learning program, he noticed in his study a movement from the lower stages of concern towards the higher ones. This is explained by the assumption that teachers' concerns at the beginning of such a long-term change process will not be that well-established. Newhouse (2001) asserted the previous finding and added that it is true that this movement of the instructors towards the higher levels of concern does follow the theme established and hoped for it, but yet this movement was found to be incremental. He noticed that the portable computer program was applied and nurtured for four years in the school of study, but still the 50% percent of teachers who showed self concerns did not change or get reduced. This perception supports the foundation that this change and movement towards the better will occur at last, but it will need years before the process is accomplished.

In a similar study conducted in North Carolina, Kirby and Smith (1998) utilized a "stages of concern" model to study the teachers' and administratives' stages of concern for the school-to-work transition project. In their analysis, they used a comprehensive sample that consists of academic professors, superintendents, vocational teachers and directors, principals, assistant principals, and guidance counselors to represent all North Carolina categories that could be involved in the project. The results, which were obtained after this school-to-work program had been already run and directed for a few years, showed that the participants demonstrated a concern classified under the stages of awareness, information, and collaboration. This conclusion can be explained by the fact that those participants had already dissolved the issue of personal concerns and extended to the level of seeking information about the program and sharing these information collaborately among one another. This leads to the next conclusion that involving the educators from all categories in all the levels of executing the program helps to a great extent in its success. Moreover, the analysis of Kirby and Smith results explains also the assumption about the importance of expanding information to practitioners' level for the success of the implementation process of the intended program. It's not to be surprising or depressing that schools teachers may have different concerns at different stages for the innovation being adopted and implemented.

Merz (1996) conducted a similar study on the population of the Department of Defense. To determine the stages of concern of the civilian managers of the Defense Finance and Accounting Service towards the innovation of shifting from the traditional methods of training to the innovative satellite delivery systems, Merz used the theory of concerns and the stages of concerns questionnaire (SoCQ) method. The civilians working in the department of Defense were classified into five sub groups corresponding to their five regional centers. The research checked for the utility of SoCQ instrument by the five sub groups of workers. The highest stage of concern was noticed among the civilians in the leading positions (managers) (Hall, Wallace, and Dossett, 1973). Furthermore, the results indicated that the managers at each regional center demonstrated similar concerns; yet, most of the demographic variables studied were not related by any means with the peak stage of concern (management). The demographic variables studied include factors like; the year of federal employment and experience in a particular career field.

Supporting the premise about the incremental nature of the movement towards the highest stages of concern, Liu, Theodore, and Lavelle (2004) study results came to confirm this assumption. They conducted their study on a population of in-service teachers who were participating on an online graduate education course. The results showed that all teachers' concerns (scored on the seven stages of concern in the SoC scale) ascended significantly throughout the online course to reach higher levels at its end. Another more recent study conducted on a population of in-service teachers in the United States by Liu and Huang (2005) studied the concentration of those teachers concerns towards technology integration. The results showed that teachers' concerns' were concentrated and more intense in the areas of the informational, personal and refocusing stages as identified by the SoCQ developed by Hall, George, and Rutherford's (1977). Additionally, Evern and Ilker (2007) conducted a study on pre-service teachers at the department of Computer Education and Instructional Technology, Ankara, Turkey. The findings revealed that personal stage received high scores among all other stages. This finding is in line with the previous studies.

Another study conducted in the Netherlands supported the previous assumption. The researchers, Van den Berg et al. (2000), adopted the CBAM model to study the teacher's concern resulted from implementing the project of "adaptive teaching" in their school. At the beginning of the implementation process, the teachers demonstrated self-concerns more than any other type of concerns. Gradually, these low-stages of concern vanished and over time turned into strong task concern towards the end of the process. Showing this type to task concern, the results suggest, was of high importance and necessity to successfully achieve the intended implementation. Van den Berg et al. (2000) confirmed that these results were consistent with the results shown from many other innovation projects studied throughout Europe, asserting that self-concern of the adopters of those innovations were very high at the beginning, but after about 3 years, 40% of the teachers in the schools involved replaced their self-concerns with task ones.

In North Carolina, Chamblee and Slough (2002) conducted two studies: the first adopted the qualitative approach in examining the concern of science teachers towards implementing the project of using telecommunications; while the other

adopted the quantitative approach to investigate the concerns of teachers of first-year algebra for middle and secondary stages students towards implementing technology in teaching. They synthesized the findings of both studies to determine if the teachers of the two disciplines, science and Mathematics, show similar concerns towards implementing technology and telecommunication in the teaching and learning process. The concerns-based adoption model was used to assess level of success of the implementation and levels of teachers concern. The results of both studies asserted the basic hypothesis that teachers of both subjects demonstrated common technology implementation concerns and worries.

As stated earlier, the study of stages of concern of the technology adaptors is an important element in our attempts to understand how the innovation affects the user. First, the self concerns of the teachers express their worries about knowing more about the new innovation and to what degree its application differs from their current methods and ways of teaching (Hord et al. 1987). Next comes the stage of task concerns. Task concerns or "management level" means that teachers start to worry about when the best time to start using or applying the new innovation is and how to manage the way of doing that in balance with the existing curriculum. Finally, the stage of "impact concerns" is the highest level of concern when teachers reach to a level where they concern mainly for the impact of technology innovation on the students or the final users.

This discussion clarifies the importance of the CBAM model, as clarified earlier; it is essential to determine teachers concern for the innovation because it affects students (or users) concerns and attitudes. The model helps the technology sponsors to assist the teacher to elevate his level of concern. This is what Brzycki and Dudt (2005) maintained as they explained that the change facilitator, the person responsible for guiding and leading the intended change, can help during the implementation process, using the model of predictable areas of concern. If a teacher is aware of such model when he first introduces the new innovation, It will incrementally raise his level of concern. However, expecting too much from him too soon after introducing the new material will not help, on the contrary, it might overload him leading him to delay its application or even reject it completely (Loucks & Horsley, 2005).

To summarize, the previous related literature presents two basic findings. The first asserts a positive relationship between the stage of concern and both, experience and training. The other finding denies any significant relationship between the discipline being taught and the stages of concern which means that the subject matters teachers teach have nothing to do with the worries they express towards the new innovation.

2.5 Underpinning Theories

2.5.1 Diffusion of Innovations Theory

Diffusion means the process of adopting an innovation by members of a certain community. Rogers (1995) claims that there are four factors that affect the diffusion of any given innovation. These factors are: 1) the type of innovation itself, 2) channels of communication used to deliver information related to the intended innovation, 3) time, 4) the society to whom the innovation is being introduced and its nature. He clarified that dealing with the issue of diffusion of innovation have created 4 major theories defining it. The theories are the following: "innovation-decision process" theory, "theory of individual innovativeness", theory of "rate of adoption", and theory of "perceived attributes". Here comes a detailed discussion of these theories.

2.5.1.1 The Innovation-Decision Process Theory

This theory concentrates on the chronological order of five distinct stages. The first stage is knowledge, it means that the innovation adopter learns about the innovation at the beginning of the diffusion process and starts gathering information about it in general. Second, the adopter starts to question about the merits of the new innovation and he should be convinced of them to accept adopting it. The third stage is the time of deciding to adopt the innovation by this adopter (decision stage). Then, in the forth stage the adopter goes into implementing the innovation after he has already adopted it. The final stage, or the fifth, is the confirmation stage; meaning the adopter will now confirm that he made the appropriate decision by adopting this

innovation, because it really achieved the purposes set to it. If these five stages are achieved, this means that the diffusion have already been accomplished (Rogers, 1995).

2.5.1.2 Individual Innovativeness Theory

Rogers (1995), in his Adopters Categories Theory, argues that time is a basic factor in ICT integration. The early adopters use more innovative practices than late adopters. This indicates that the time factor is very important and teachers need to be exposed earlier to ICT integration so that they can develop their ICT skills and consequently they can be more innovative. Rogers (1995) explains that researchers usually use a bell-shaped curve to illustrate the distribution of the categories of people who adopt the innovation. They are often classified into 5 groups: 2.5% of those adopters represent the first category which is consisted of the pioneers as "innovators" who lead the way and can be labeled as "the risk-takers". The "early adopters" constitute the second category (13.5%); it represents the group of adopters who haste to utilize the innovation early and absorb it as soon as possible after the moment of launching it, moreover, they are considered an important factor contributing to spreading information about this new innovation to others who are still not informed about it. The "early majority" group, constituting 34% of the potential adopting population, is the third category which is convinced by the "innovators" group and the "early adopters" to benefit from the innovation and utilize it. The fourth group scores just as the third group, 34%, and it stands for the "late majority" who are those people who keep careful with the innovation waiting to make sure that this innovation benefits them the best and serves their goals and attitudes. Finally comes the "laggards" group which constitutes 16% of the adopters' population. These laggards are the highly skeptical individuals who resolve to resist adopting the innovation unless they discover its absolute necessity. In fact, many of those laggards do not adopt the innovation at last.

2.5.1.3 Rate of Adoption Theory

This theory is set to demonstrate the rate of the innovation adoption. It uses the S-curve to best illustrate this rate. This curve shows that at the beginning of the process of adoption, it grows gradually and slowly, representing people's hesitation and indecision in adopting the new innovation because of being worried about its potential merits and benefits and if it is really to their best interest. Later, the adoption process meets a period of rapid growth which then drops off to become stable for a while. Eventually, the curve that represents the adoption process declines exhibiting the end of the adoption process. (Rogers, 1995).

2.5.1.4 Perceived Attributes Theory

This theory follows the assumption that people adopt any new innovation if they know that it enjoys some certain attributes. These attributes include: the new innovation relatively has an advantage over the one already existing and running, it should be compatible with people's values and current relative practices and beliefs, to perceive the innovation as not being too complex, to be able to have a trial period in order to test this innovation before even adopting it; and finally people want to know that the new innovation offers observable results that can be easily noticed (Rogers, 1995).

2.5.1.5 Adopter Categories Theory

This section aims to provide a detailed description of each adopter category as classified by Rogers (1995) in order to provide a useful starting point for understanding them. Interpersonal networks help in the process of adopting any new opinion or innovation because it offers a good opportunity to exchange ideas and information about it. Members of such a network tend to argue any new innovation and so play an important role in distributing information about it along to other people in the network. After half of the individuals in such a social system have adopted the innovation, the diffusion curve (the one that represents the progress of the adoption process) begins to level off; indicating how each new adopter finds it increasingly difficult to play his role in spreading the word about the innovation by telling a "non-knower" who has not yet adopted, for such non-knower would become increasingly rare. In the diffusion curve representing adoption rates, the segment between 10-20% is known as the "critical mass" or the "heart of the diffusion" process (Rogers, 1995). This represents the "transition" between the level of innovativeness called "early adopters" and "early majority".

The first category, innovators (INs) are those people who tend to explore things and identify them without any guide. They are usually led out of their local peer networks by their interest in any new ideas, and they keep in touch with one another through the different types of connections and communication patterns set among them, which are kept even if they are geographically separated, leading them to be always informed about any new ideas in the air. There are certain qualities that distinguish "innovators" in general. First, they enjoy the ability to have a control over considerable financial resources, as this gives them the ability to absorb any possible loss from the adopted innovation if it proves unprofitable. Second, the innovators are able to comprehend complex technical knowledge and apply it in their field; ICT innovators in faculties of engineering and computer sciences are an example. Also, among the things that characterize the innovators is their successful cope with the high degree of uncertainty about the innovation being adopted. Lastly, they have the willingness to accept any occasional set back that could result from the failure of the new ideas. The innovators role in the diffusion process is very critical as a promotional one, although they are not usually supported from their own social

system, but they do help launch the new ideas (later the new innovation) in this system itself by just importing them from outside the boundaries of this social system into it.

The second category is the early adopters (EAs). What distinguishes the EAs from the innovators is that the EAs are more melted in the local social system than the innovators; this means they can be called "localities" instead of "cosmopolites". They enjoy a high degree of opinion leadership as they are always looked to by the potential adopters who ask them for advice and information regarding the new innovation. Usually, before starting to use the new ideas, potential adopters tend to check with the early adopters about their usability before urging people to join and adopt the new innovation. The change agent is the person who can direct potential adopters to adopt the new innovation in a way planned for by the change agency (Rogers,1995) because those EAs are not very surprisingly in their level of innovativeness and not too far ahead of the average people in relation to their innovativeness. As the EAs are usually respected, known for their successful use and application of new ideas, trusted in their wise innovation decisions, they serve as role models for other members of a social system. They are described in Rogers (1995) as the "heart of diffusion process" because once they adopt the innovation, and produce their subjective and/or objective evaluation of it and convey it through the interpersonal network to their peers, they help in decreasing the uncertainty about it. To compare between early adopters and late adopters, it seems that they differ in some personality variables. The early adopters surpass the late ones because they poses greater rationality and intelligence, in addition to their greater ability to deal with abstraction and to cope with potential risk and uncertainty. They have more empathy, less dogmatism, and less fatalism. Moreover, they have a more favorable attitude towards both change and science, and they enjoy a higher aspiration for formal education and occupation.

The "mainstream" in the diffusion process is represented by the "Early Majority" (EM) and the "Late Majority" (LM). The EMs represent a percentage of one-third of the members in the system and they are the people who adopt the new innovation just before 50% of the people in the system. They rarely hold positions of leadership in their social system although they keep a good level of interaction with their peers in it. This category of adopters, as it comes in a distinctive position between the early adopters and the late majority, links the different stages of the diffusion process and support the interconnectedness within the interpersonal network of the system. What latens the EMs in their adoption of new ideas is that they contemplate about them for a long period of time before completely adopting them as compared to the innovators and the early adopters. This means that they may show a deliberate willingness to adopt the innovation, but they might not lead or direct others to adopt.

The category of the "Late Majority" refers to the skeptical one-third of the social system which waits before adopting the new ideas and finally adopts after the median of the social system have adopted (median=50 percentile of the system). LMs wouldn't dare adopt unless they make sure that the innovation satisfies an economic need or achieves a necessity or if the adoption occurs as a result of the increasing pressure from the peers in the network. This implies how cautiously those LMs approach the new innovation, they wait because they do not adopt until they see that most of the system members have already adopted, and until they are convinced that the norms of the system definitely favor it. To explain the LMs situation, one must understand how their limited resources, especially the financial ones, compared to the other upper groups, requires that for them to accept adopting the innovation and feel safe about it, most of the uncertainly about if must be removed.

The last category of adopters in the social system in relation to innovativeness is the "laggard" (LG). The main point in the decision-making process of the laggards is that they depend on the past to make decisions. They always check on what has been done before in relation to the innovation. The laggards usually follow their traditional values and their basic interaction which are likely to be traditional. The LGs values forces them to be suspicious towards innovation or any kind of change, meaning that they always take a very long period for making any decision on adopting or using any new idea, often by lagging far behind the awareness-knowledge of the idea. This

resistance of the LGs to new ideas and change could be totally rational and reasonable from the LGs point of view because of their limited resources and confidence, that is, they feel the need to make sure that the new ideas will not fail before they even pay the costs of adopting it. This cautiousness from the part of the laggards, which is usually referred to their unstable economic situation, forces them to always put the blame on the system itself. (Rogers, 1995 cited in Jacobsen, 1997).

2.5.1.6 The Gap between Early and Late Adopters

Moor (1991) proved that assuming that late adopters will certainly follow the early ones is dangerous and indicates narrow-mindedness. He explained how this assumption caused many companies failure to survive because they depended on the suggestion that the technology adoption process will progress smoothly from the early enthusiasts to the late adopters represented by the highly profitable markets and customers. Huge campaign is required to bridge this gap between early adopters and late ones; paying special attention to the extremely different needs, perspectives, and demands of the late adopters.

Both Geoghegan, (1995) and Moore (1991) investigated the issue of the chasm that characterizes the innovators and the early adopters, and makes them different from all other groups. Moore (1991) showed that each group (late and early adopters) has their own needs and special requirements in order to integrate technology in the classroom. This was confirmed by Geoghegan's (1995) study on the adoption of instructional technology in higher education, where he applied the previous concept of chasm. His study, conducted on a population from a Canadian university, concluded that comprehensive adoption strategies must be based on the needs and requirements of the mainstream faculty (late adopters), and should be designed to appeal to them, not to the early adopter because we cannot depend on their support. This means that the role models essential for the diffusion process should be drawn from the mainstream faculty who are the better staff to be integrated into the administrative and social norms of the culture of the faculty. These results are consistent with Anderson et al. (1998) confirming that there is a gap between early and late adopters.

To conclude, this study explores the differences between early adopters and late adopters, taking Jordanian teachers as an example. To achieve that, the researcher had conducted interviews with English language teachers, Mathematics, and science teachers in order to investigate and find out the real reasons behind the differences between them in relation to integrating technology into their teaching process. The results of this study are expected to contribute to the attempts made to minimize the gap between early adopters and late adopters, (represented by teachers who integrate ICT in their teaching process and those who do not, respectively).

2.5.2 Teacher's Concern Theory

Concern can be defined as the sum of a person' feelings, preoccupations, considerations and thoughts towards certain issues or tasks. People express different kinds and levels of concerns towards a given issue because as they perceive it and contend with it mentally in different ways they depend on their personal knowledge, experience, and make-up (Hall & Hord, 1987, p. 59).

Many theories supported the model of this study, among which was the Fuller teachers' concern theory (1969). The "Teacher Concerns Statement" instrument was developed and used to assess the issues that concern and worry both teachers and trainees. Fuller's findings suggested a theory of a hierarchy of development involving the major areas of concern. The theory predicted that through their development to become experienced and well-doing teachers, trainees and beginning teachers follow a progress line of three stages. They first start developing concerns about themselves, then they start worrying about the task of teaching, and the final stage includes their concerns about the impact of teaching on their students' acquisition of knowledge.

This theory is relevant to this study for a number of reasons: it addresses the relationship between teachers' stages of concern and ICT integration strategies. Additionally, this theory classifies those seven stages into three main concerns namely self, task and impact concerns. This classification gives detailed explanation for teachers' stages of concern. The theory incorporates awareness, informational and personal stages under "self concern", management stage comes under "task concern" and consequence, collaboration and refocusing stages are put under "impact concern". This theory implicates that when teachers are more inclined to "self concern", it indicates that they are more concerned about themselves. However, if teachers are more inclined to task concern, it indicates that they are more concerned about technology itself. As for the effect concern, it indicates that teachers are more concerned about the impact of technology on their students.

2.5.3 Constructivism

Constructivism, or the theory of epistemology, was the foundation on which the research theoretical framework is based. It is the theory of learning or making meaning. It is the theory that explains how human beings learn or acquire knowledge. This theory states that for individuals to establish and construct their new knowledge or understanding of the learning material they need to depend on their interaction with the knowledge and beliefs they already have, and on the different activities, events, and ideas in their environment with which they come into contact (Cannella & Reiff, 1994; Richardson, 1997). Based on the work of Vygotsky (1978) the concept of proximal learning is one of the most critical components of the theories of constructivism. The concept is based on the hypothesis that for learning to take place and the learners to complete their learning tasks they require primarily some sort of support or scaffolding. This support can come in the form of teacher support or technology support; indicating that computer implementation and integration into the learning process can help in achieving the required learning. From here, the term computer-supported learning has emerged. The computer-supported learning environment means the environment which uses computers to support student learning in the Vygotskian sense, or to maintain a learning environment (DeCorte, 1990; Mevarech & Light, 1992). Accordingly, this means

that technology is needed to create the suitable learning environment, ideal to achieve knowledge acquisition, and is also required to help in offering support for the learning process.

The most important fact about the learning environment is that it should be student centered; meaning it should focus on students' acquisition of knowledge. Through exploring, evaluating and thinking, students achieve learning more efficiently than through being passively given the information by the teacher. The supreme concern of this study is the effectiveness of learning environments and sessions rather than just using computers in the learning process, even if our aim is to enhance the way of implementing current learning activities or to encourage new opportunities for learning. This implies that even the computer-based technology with its changing nature should not affect the durable nature of learning, or the base of knowledge about learning that is solid and ever rising; learning process is not superseded by new technologies.

So, students' involvement and interaction in the learning process is what matters regarding enhancing learning environment. Schiller (1999) findings stressed that in the environment of a school where the active involvement of the students in the learning process was noticed the teachers were more worried about students' acquisition of skills and concepts. Moreover, the teachers emphasized that they were able to create a non-graded learning environment in which they activated the techniques of multi-age grouping.

2.6 The ICT – Oriented Micro Models

In order to successfully integrate technology into the educational process, the Instructional Transformation Model with its five phases is proposed. The model's hierarchy applies an level of use (LoU) type of approach, and it consists of five steps: (a) familiarization (b) utilization (c) integration (d) reorientation and (e) evolution (Rieber & Welliver, 1989, p. 21); in addition to the non-use level prior to the first step.

Table 2.1

Welliver's Instructional Transformation Model

Stage	Examples of what teachers do
Familiarization	Is when teacher becomes aware of technology and its' importance.
Utilization	Is when teachers use technology, but minor problems will cause teachers discontinue use.
Integration	Is when technology becomes essential for the educational goals of the classroom with the use of technology.
Reorientation	Is when teachers begin to rethink the educational goals of the classroom with the use of technology.
Revolution	Is the evolving classroom that becomes completely integrated with technology in all subject areas. Technology becomes an invisible tool that is seamlessly woven in to the teaching learning process.

Source: Rieber & Welliver (1989)

The Instructional Transformation Model was developed by Reiber and Welliver (1989) and later Marcinkiewicz (1994), and was then used and utilized by many researchers, (e.g. Knee, 1996), who was attempting to design and create his own restructuring plans for his schools who are set to integrate technology. The model was developed depending on a previous study on the adoption behavior that was drawn from the work of Rogers (1983) and was taken from the CBAM model. Marcinkiewicz and Welliver (1993) believe that the model carries within its folds a great value for teachers and educators as it can be benefited from in many educational applications, especially for teachers development like 'recommending staff development, remediation, or differential staffing' (Marcinkiewicz & Welliver, 1993, p. 5).

The application of the above-mentioned model moves away from the traditional typical method of using technology in classrooms represented in the image of a teacher who instructs his students about the specific technology itself. According to this manner of practicing technology integration, the installation of the process of technology integration usually happens in the third phase (Hooper & Reiber, 1995). Currently, as focused upon by the work of Rieber and Welliver (as cited in Hooper & Reiber, 1995), the model is looked upon to be practical according to the constructivist teaching principles which encourage teachers to gradually proceed to the final phase, revolution. Scholars now advocate this phase to be set forth as the main goal of the educational development plans involving technology.

This process of integrating technology into education is described that it is revolutionary due to the very complex change it creates and causes within the educational system. So, emerged the educational change models in an attempt to clarify this change and assess its effectiveness, dimensions, and degrees. As an example on the revolutionary process of implementing technology into classrooms, technology-rich (ACOT) classrooms (the Apple Classroom of Tomorrow (ACOT) project) showed distinguishable instructional changes in the teachers' move from starting by developing concerns about the nature of the technology itself and its skills, progressed towards developing learning experiences powerful enough to help install the use of the technology inside their students (Dwyer, Ringstaff, & Sandholtz, 1991).

Again, the literature points to the importance of the teacher's mastery of the new technology's techniques, methods and basic skills in order to be able to pass them on to their students while integrating technology into teaching (Goddard, 2002). So, teachers first need to start by implementing these skills and techniques of the technology into "themselves"; into their teaching method, and then head on to integrate this technology into the educational system to make it effective in educating learners depending on the technology.

Five stages of instructional evolution for technology integration were identified by Dwyer, Ringstaff, and Sandholtz (1991), as part of the studies done for the Apple Classroom of Tomorrow [ACOT] project (1990). These stages are summarized in the following table.

Table 2.2

ACOT Model

Stage	Examples of what teachers do
Entry	Learn the basics of using the new technology.
Adoption	Use new technology to support traditional instruction.
Adaptation	Integrate new technology into traditional classroom practice. Here, they often focus on increased student productivity and engagement by using word processors, spreadsheets, and graphics tools.
Appropriation	Focus on cooperative, project-based, and interdisciplinary work—incorporating the technology as needed and as one of many tools.
Invention	Discover new uses for technology tools, for example, developing spreadsheet macros for teaching algebra or designing projects that combine multiple technologies.

Resource: Report on 10 Years of ACOT Research (ACOT, 1995, p. 16)

Planning of technology and training a teachers' staff who fully integrate technology use into instructions required the researchers to follow a data-driven approach. Consequently, the Level of Technology Implementation (LoTi) questionnaire was designed and distributed. According to the questionnaire results, a profile for every teacher was created along the three specified domains: LoTi,

personal computer use (PCU), and current instructional practices (CIP), for the purpose of determining the level to which the teacher implements technology into his classroom teaching (Moersch, 1995).

This framework of "levels of technology implementation" (LoTi), reported by Moersch (1997), includes seven levels of computers implementation in any given school. These levels are as follows: nonuse, awareness, exploration, infusion, integration (mechanical), integration (routine), expansion, and refinement, which are originally derived from the CBAM original levels. Based on this (LoTi) framework, Moersch created an instrument intended to calculate the total level of "computer efficiency of a school site" as referred to it by him. He defines this computer efficiency as: "degree to which computers are being used to support concept-based or process-based instruction, consequential learning, and higher-order thinking skills" (Moersch, p. 52). This instrument generates an index for every school for the purpose of comparing the computer efficiency between them. This is achieved by accumulating the results of LoTi level, ratio of using computer in the school, ratio of students' use of technology, in addition to the number of computers in the school. Some argue that the original creators of the CBAM model are not satisfied with such an instrument created out of their model; this is because they do not approve the use of the questionnaire methodology instead of the 'interview and observation', or even using the numerical calculations in order to come out with levels of comparison (Hall & Hord, 1987). The above mentioned models address ICT and technology integration in classrooms. They also focus on how teachers move from the beginning stages to the advanced stages in integrating ICT in teaching and learning. Another model similar to the ACOT model and Wellivers model is the Technology Acceptance Model (TAM). It addresses the individuals' attitudes as a mediator. This suggests that individuals should have positive attitudes in order to accept or adopt a new innovation. The next section will discuss TAM in details.

Technology Acceptance Model (TAM)

The purpose of this model was to investigate and explain the factors that may influence the process of adopting technology and influence the people who attempt to adopt it, based on the Theory of Reasoned Action (TRA). The theory draws on social psychological approach concentrating on individuals' motives or disincentives that may encourage or prevent them from adopting the new technology. This TAM theory is empirically tested and proved (Chau & Hu, 2001; Davis, 1989; Segars & Grover, 1993).

TAM developed by Davis (1989), concentrates on the differences between people in terms of their way in accepting technology and adopting it. Davis (1989) concludes that among the factors encouraging people's acceptance of technology, the most important are perceived usefulness and perceived ease-of-use. Lately, the model has been used extensively in intelligent system research (Adams, Nelson & Todd 1992; Hu, Chau, Sheng & Tam 1999; Brown, Massey, Montoya-Weiss & Burkman, 2002).

TAM proved that the user's positive attitude combined with these two factors, perceived usefulness and perceived easy-of-use, affected the user's positive use of the technology. TRA which was the basis upon which this model was based, gives an explanation of the relationship between user's attitude toward using the new technology and his intention, behaviorally, to use it, and his real use and utilization of the technology into his educational process (Davis et al., 1989). Later on, Davis et al. (1989) proposed other constructs for the theory and investigated the relations between them in order to illustrate individuals' beliefs that may influence their attitude and enthusiasm toward applying technology in their teaching or learning process, in addition to the external characteristics affecting these beliefs in the first place.

2.7 Computer in Education

As suggested by Taylor (1980), learning technologies, meaning the computer applications applied in education, can be divided into three major types: first, using the computer as a tutor in the educational process; such as the programs of instructional tutorials, second, using it as a tool; for example using word processor or spreadsheet programs in education, and third, using the computer as a tutee meaning such programs and applications like Logo or Star Logo in which the learner orders the computer to do something (teaches it), then learns something after teaching it.

2.7.1 The Computer as Tutor

Computer as tutor means that the computer follows the method of Socratic dialogues as it provides some information about any specific subject and then presents a number of questions to be answered by the student, which themselves are usually followed by a limited number of suggested responses for each question apart. The program then, according to the answer given by the student, generates further related information and asks questions regarding them (Coburn, and others, 1982, p.25).

The next step in such a tutorial program comes in accordance with each individual performance. The process that follows is that the computer proceeds to analyze the students' responses for the questions it has generated. The appropriate feedback is then supplied depending on each students' answers; be it accurate or not. So, the program provides students who didn't do well with extra examples in an attempt to present some kind of remedial instruction, while those who succeeded to give correct answers are allowed to skip any extra examples or instruction progressing to the next section or part of the instructional program (Williams, 2000, P 78-79).

Many reasons contribute to the difficulties faced when trying to produce the tutor mode by the computer. As the reasons include;

1. The flexibility of humans in comparison to the computer.

2. The less time humans need to deliver a lesson because it depends on the teachers' spontaneous performance and improvisation at the time of delivering the lesson, as his creative mind can be able to come up spontaneously with certain strategies or substances to cover the observed needs of the lessons and the learners.

3. There are still difficulties and obstacles faced when humans seek to program the computer, and the programming languages existing are still time-consuming and hard to deal with for humans.

4. As for lesson preparation and design, considering the normal classroom situation; human teachers do not necessarily try to accommodate individual differences as they are not allowed to do so, making by that the design process easier and faster. On the other hand, computer lessons give the possibility to individualize lessons according to students' differences, which causes the time allocated for lesson preparation and design to be lengthened since some more substantive and strategic details need to be included in the instructional program (Taylor, 1980).

2.7.2 The Computer as Tool

The approach followed in this case is the one preferred by constructivist pedagogy, as it gives the student the opportunity to control the learning process instead of being controlled by the computer. Constructivist pedagogy believes that constructing knowledge should be guided through experience. This is obvious from some examples on interactive simulation computer programs that give the learner the opportunity to try some alternatives that can or cannot be possible to apply in real life. For example, as a tool for learning biology, a program called biologic (specifically the early version with the name "Genscope") teaches the students the principles of genetics using the experimental method; as it presents cartoon dragons

and allows students to experiment the breeding process according to their different inherited characteristics such as the quality of breathing fire or having horns. (Hickey et al., 2000). To mention another example, students can construct knowledge about water pollution and any other environmental factor by trying out several hypotheses about the subject in a given computer program simulating ecosystem (Soloway et al., 1996).

Both types of learning strategies, using the computer as a tool or as a tutor, do, in fact, enrich and enhance the classroom learning environment, not to ignore its advantage that they both do not necessarily require the learner, or even the teacher, to learn more about computers and their programming languages. Nevertheless, the general educational benefit hoped from integrating technology into the learning system cannot be completely achieved by either one of those two types of educational-technological strategies, but only by applying the third type; using the computer in the learning process as a tutee.

2.7.3 The Computer as Tutee

Using the computer as a tutor is an instruction mode that has been basically based upon the cognitive theory of learning (Taylor, 1980). According to this mode, the computer is supposed to personate the role of the teacher in that it provides learners with information, establishes and directs learning activities according to each individual's performance and situation, guides the learner in their learning process, and provides them with the appropriate feedback. On the other hand, many qualities in the computer make it also a good tutee; meaning that the student can "teach" the computer (program it) to be able to teach other younger students certain skills and principles. These qualities include its dumbness, rigidity, patience, and capacity to be initialized. This means that the student can teach the computer how to be a tutor itself and how just to be a tool when needed to perform some rigid task. To give examples of such kinds of programs which students can make to teach their computers, one can mention some simple programs like how to teach other students arithmetic operations, or French verbs endings, playing monopoly, performing some simple

calculations like the interests on loans, or identifying other computer languages, drawing maps, inverting musical melodies and producing animated pictures.

What is different about this new mode of teaching by using the computer is that it improves both the students' and the teachers' attitudes about education and learning. As it convinces them to start perceiving education as a process not as an end product resulting from acquiring facts and knowledge, but rather as a process of getting facts and processing them in order to reach some level of understanding them. This changes learners because they get to more and more comprehend their own way of thinking by programming the computer. In addition, it improves teachers' methods of teaching while they stop to watch and benefit from their students' experience in being their computers' teachers by their turn.

Many researchers tackled the issue of how programming the computer affects students' ways of thinking and understanding. Papert (1992) proved this view stating that the process of programming the computer gives the students new insights into ways of thinking and understanding the world. This was also proved earlier by previous researchers who concluded that students' general cognitive skills should be improved by going into the process of programming the computer, nevertheless, different and mixed results were produced by empirical research (Clements, 1986; Clements & Gullo, 1984; Pea, 1984). Papert (1987) refused this result by arguing that this kind of studies should not be trusted because the human life and experience is much more complex to be abridged into some pre and post tests. Others who oppose this view say that either qualitative or quantitative evidence is needed to prove or refuse their claims due to the transformative power of technology (Pea, 1987; Walker, 1987). Nowadays, the core of the general debates held about technology is the issue of technological fluency. This issue concentrates on children's ability to use the computer as a tool effectively and efficiently in everyday life seeing how important computer use have been lately for their success and good luck in life (Resnick & Rusk, 1996).

2.8 The Barriers of Integrating ICT in the Teaching and Learning process

Different factors were mentioned by the different researchers as barriers preventing the effective implementation of technology in the educational process (Maney, 1999; Hope, 1997; and others). Many agreed on the idea that teachers' negative attitudes towards implementing such kind of technology in their teaching process are among the most important barriers of accomplishing it. Also, other barriers mentioned and agreed upon including time, the technical support received from the responsible parties, the availability of the needed computers and appropriate access to them (Maney, 1999). From another perspective, Hope (1997) classified such kind of barriers into two categories; organizational and individual barriers. He suggested that the first category includes factors that come from the organization (school) itself such as the culture prevailing in it dominating the teacher's and students' attitudes and thoughts of the technology, the limited resources of technology (hardware and software available), lack of appropriate and inspiring leadership, unavailability of the needed training and development for teacher and lack of motives encouraging them to undertake the technology, in addition to factors related to the difficulties facing the process of selecting and configuring the suitable kind of technology and software.

Moreover, he mentioned several individual factors contributing to prevent the successful implementation of technology in the teaching and learning process. These factors are like the constraints imposed by the teacher's time he can provide to start training on the new technology, his lack of confidence regarding the meant technology, and the conflicts arousing from the difference between the teacher's present style of teaching and the proposed model of ICT- integrated style of teaching, adding to that the teacher's limited ability to be well-prepared for the new different method.

Different classifications were given to the barriers preventing the effective implementation of technology in schools. Rogers (2000) as an example divided those into internal and external factors. He found that internal barriers are those caused by the persons involved in the implementation process, mainly the teachers. Those teachers' perceptions about the technology proposed and their fluency and competency in using it summarize Rogers view about the internal barriers of achieving the implementation process.

Other barriers are classified under the external sources item; these include the barriers emerging from the environment surrounding the teachers not from the teachers themselves. The availability of institutional and technical support, how accessible the necessary software and hardware are, and equipping the institution with training programs appropriate for developing the staff skills and fluency both in using the technology and in teaching are the "external barriers" mentioned by Rogers. He also suggested that there are some factors that can be regarded either internal or external barriers to integrating technology. He mentioned of those the issue of limited time available for the teacher to effectively use the technology in teaching, the lack of resources and funding, the culture existing in the institution as a uniquely different from any other. (p. 459).

From the comparative studies conducted by Rogers (2000) and Chiero (1997), it was found that the several different studies investigating the barriers hindering the effective implementation of instructional technology have come out with similar results. They all concluded a classification that summarizes those barriers to be internal and external. The studies agreed that the internal barriers are the ones imposed by the teacher himself, while those seen as imposed upon the teachers contributing to the failure of technology implementation are those classified under the category of external barriers. All the studies discovered that the lack of time specified for the teachers to learn the technology and utilize it in the teaching process is one of the many internal barriers mentioned by the several researchers. The studies also agreed on other internal barriers like teachers negative attitudes toward using the technology in teaching, in addition to the lack of inspiring leadership and role models, or even other models, in the field of using the technology. The external barriers they summarized also include the lack of support; be it on the level of

technology itself, or on the institutional level, or the financial support, the low quality if software and hardware provided, if available, the limited time, lack of staff training and development, and the general belief and attitude that this instructional technology is not sure to really affect the learning process.

The deep analysis and investigation of the different studies that tackled the issue of the barriers of integrating technology shows how the different researchers labeled the same categories of barriers by different Labels. For Rogers (2000), the barriers are under 3 categories; internal, external, or crossovers between the two. As clarified earlier, internal barriers depend on the teachers' own level of fluency in using the technology and on their positive or negative attitudes towards using it in teaching, while the external ones depend specifically on technology accessibility and support. The third type, the barriers crossover between the two types, includes the ones that can be explained under either one of the two previous categories. Time for instance can be explained as an internal or as an external barrier. Meaning that it becomes an internal factor which the teacher himself can control when he can prioritize his tasks and organize the time available to him to work on to integrate technology .

Other researchers used other different labels and classifications to describe the same fore-mentioned barriers. Ertmer et al (1999) for example used similar terms; he mentioned internal (second-order) and external (first-order) barriers. They included the unavailability of the appropriate access to hardware or software, the insufficient time available to plan for instruction methods, lack of administrative support, and lack of appropriate training in the second category, first order barriers, which they described as "extrinsic to teachers". Other barriers they described as "intrinsic to teachers" and are included into the category labeled second order barriers. This category they believe to include internal barriers like the sum of their daily practice on the new technology on the classroom, how much they do resist the idea of change and refuse new innovations, in addition, certainly, to their own beliefs and attitudes about teaching and technology. The above explanation gives a clear example on how the different researchers used similar systems of classification to describe and label the barriers hindering the efficient integration of technology into teaching.

However, researchers differed in determining what the highest and most effective obstacles are. Sheingold and Hadley (1990) for example considered that the obstacles most effective in preventing the successful implementation of ICT into the teaching process of teachers already using computers are five; the limited number of computers, the time not enough to appropriately prepare and conduct computer-based lessons, organizing and managing computer time, scheduling school time to be adequate for some computer-based instruction, lack of financial support. From another perspective, in a study interested in teachers of elementary classes, Winnans and Brown (1992) concluded that among the major issues affecting those teachers' use of computers are confidence and self-efficacy. Other researchers mentioned other factors and barriers in front of teachers like the few number of computers provided to them, they are provided with a limited space to use computer-related sources and materials, in addition to the unavailability of the needed technical help that would be supported by some computer-resource specialist working at the school to provide them with the needed assistance if they get surprised by an urgent situation.

The Office of Technology Assessment in the U.S. conducted several studies on the issue of utilizing ICT in the teaching process. They found that the perceived under-utilization of ICT in the classroom is resulted from four major factors; these factors are:

1- Teachers lack the adequate needed training on the skills and methods of using the computer in the teaching process.

2- The common belief that this educational technology is not potentially able to solve teaching problems and improve its quality.

3- The time needed to experiment the technology's efficiency in improving the educational process and to implement them. This is not always available to the teachers.

4- Lack of the appropriate technical support (OTA, 1995).

As a conclusion, it appears that barriers common to all researchers were divided into institutional and individual barriers. The common institutional ones include factors like the lack of technical support represented by the lack of technical assistants and instructional designers, the lack of vision and faith in the potential and power of technology in improving instruction and teaching, and the lack of recognition of the benefit of using technology in teaching. Other factors are the individual ones and those include; the element of experience in using technology in general and using it in instruction in particular is missing in many teachers, inadequate motivation and incentives encouraging the teachers to contribute to developing a curriculum enhanced by technology, teachers are not fully aware of the proof that technology is factually effective in the content areas. They are eventually weakly informed about the universal standards specified for considering practice as professional and for accrediting the technology as beneficial in the educational field (Beggs, 2000; Dede, 1997; Spotts & Bowman, 1995). Other kinds of organizational barriers were mentioned by other researchers concentrating on bigger obstacles in school districts.

Among the barriers and obstacles mentioned earlier as preventing teachers and schools from effectively implementing technology into the educational curriculum, six factors were focused upon by many researchers as they considered them the main obstacles that may hinder the proposed integration process (Ertmer, 1999; Rogers, 2000; Hedley & Sheingold, 1993). These primary obstacles are time, training, equipment and access, insufficient funding, administrative leadership and computer self efficacy. Therefore, the researcher will go into each of these six main obstacles in detail to highlight their significance in the technology integration process.

2.8.1 Main Obstacles Faced by Teachers

2.8.1.1 Time

Hoffman (1997) indicated that time is a very important factor helping to integrate computer into teaching. So teachers need a lot of time to assure their perception of the technology and to prepare their plans for using computers.

Cuban et al. (2001) stated evidence about teachers' lack of time to integrate computers into the educational process, and how to apply technology into their lessons and in the classroom. Cuban noticed that there is no enough time to sufficiently integrate computers in everyday lessons, in which teachers need hours to prepare daily web sites and multimedia materials for their lessons, in addition to the time needed for adequate training.

2.8.1.2 Training

Many studies revealed that teachers did not integrate ICT in the classrooms because of lack of training (Lee, 1997; Yalin, Karadeniz & Sahin, 2007). Lack of training is considered the most important barrier to ICT integration in education among the elementary school teachers in Turkey (Yalin, Karadeniz & Sahin, 2007). In this respect, Lee (1997) points out those teachers who had long teaching experience they have not been educated on how to use computers in their college. Given that, training and preparing teachers to be able to integrate computers into their teaching practices is one of the most important elements in integrating computer into learning and teaching successfully.

2.8.1.3 Equipment and Access

The most important element that affects computer implementation is the inadequate access to technology, which includes the availability, location, capacity, and maintenance of computers. Maddux (1998) mentioned that computer laboratories are available for certain applications provided in the classroom. Geisert and Futrell (1995) suggested that these laboratories provide teachers with access to use computers for specific purposes. Teachers also organize their problems when they are in the computer labs. As far as the Jordanian context is concerned. Bataineh and Baniabdelrahman (2006) point out that the main factor that prevents some universities in Jordan from using computer frequently is the shortage of the number of computers.

Hadley and Sheingold, 1993; Sheingold and Hadley, 1990; Vockell, Jancich and Sweeney (cited in Cafolla and Knee, 1995) compared two school systems: the first had 2.2 computers per class; the second, nine. The first achieved more successful integration than the second although the first had fewer computers for instruction.

2.8.1.4 Insufficient Funding

Insufficient funding was considered as one of the main barriers that prevent teachers from integrating ICT in teaching and learning process. Samuel and Zaitun (2006) indicated that lack of ICT resources and infrastructure facilities considered the most common reasons that prevent the integration of ICT tools in the teaching and learning of English in the primary and secondary schools in Malaysia. Although sufficient funding is a very important element to insure computer implementation, Stoddard and Neiderhauser (1993) noticed that schools are not interested in training even if the computers are available to them with all its materials.

2.8.1.5 Administrative leadership

Ritchie (1996) stated that in order to build a vision about the integration between technology and the lessons in the classroom, teachers should be able, confident, competent, and motivated to incorporate technology and change. Also, he stated that administrators should include the teachers, parents, students, and the community in the integration of technology. Technology provides a model to teachers to measure themselves and establish a belief on the benefits of using technology. After that, the administrators should continue offering training and support.

2.8.1.6 Computer self-efficacy

There is a relationship between computer self-efficacy and computer use. Moersch (1995) indicated that individual with low self-efficacy tend to use computers at relatively basic levels. This means increased self-efficacy beliefs may help higher levels of computer use. Thus teachers should have confidence and competency in using computers.

Turkmen (2006) conducted a study to explore the attitudes of Turkish science education faculty members towards the use of technological tools in their science lessons in Turkish colleges of education. He found out that those members demonstrated low efficiency in using technology in science classes.

If teachers develop competency of using computer, this will be positively reflected on the performance of their students. In this respect, a study about the effects of computer training on computer self-efficacy was conducted by Torkzadeh and Koufteros (1994). The study showed that students at a large Midwestern university in the United States have increased self-efficacy after receiving training on the technology and using the computer.

From the above discussion, it can be seen that teachers hardly integrate ICT in the classroom because they face obstacles that prevent them from doing so (Usluel, Mumcu & Demiraslan, 2007; Demiraslan, 2005; Askar & Usluel, 2003 as cited in Demiraslan & Usluel, 2008). Given that, identifying the obstacles that are faced by teachers will help minimize those obstacles and consequently the ICT integration can be increasingly applied in the classroom. Teachers will identify the main obstacles when they integrate ICT. This will help the administrative staff and the policymakers to find proper ways that help teachers overcome those obstacles and boost ICT integration in the classroom.

2.9 Research Framework

The framework of the study (Figure 2.1) addresses independent variables, dependant variable and moderator variable as shown below:

2.9.1 Independent Variables

The predictor variable refers to what is usually understood to be the independent variable. In this study they are:

i) Attitude of teachers toward computer (it is used as moderator variable)
ii) Stage of concern
iii) Obstacles in technology integration
iv) Teaching experience
v) Subject matter taught
vi) Adopter's categories
vii) Training attendance

2.9.2 Dependent Variables

The dependant variable is the strategies used by teachers in order to integrate ICT in teaching and learning process. This study attempted to investigate the relationship between stages of concern, obstacles faced by the teachers and the strategies used by the teachers in integrating computers in teaching and learning process in Jordanian schools.

2.9.3 Moderator Variable

Teachers' attitude toward computer was used as a moderator variable in this study.

The researcher generated the relationship between the independent and dependent variables based on the works of Ertmer et al. (1999); Hall and George (1979); Loyd and Gressard (1984) and Moersch (1995). Also, the framework is based on previous theories such as Rogers' (1995) adopters' categories theory, Fuller's (1969) teachers' concern theory and Vygotsky's (1978) constructivism theory. Rogers' theory addressed the relationship between early and late adopters and the obstacles that faced by the teachers during ICT integration or adoption. As for Concern Theory, it addressed the relationship between teachers' stages of concern and ICT integration. The constructivism theory is chosen to address the purpose of this study which is integrating ICT in the classroom in order to shift from teacher-centered to student-centered approach.

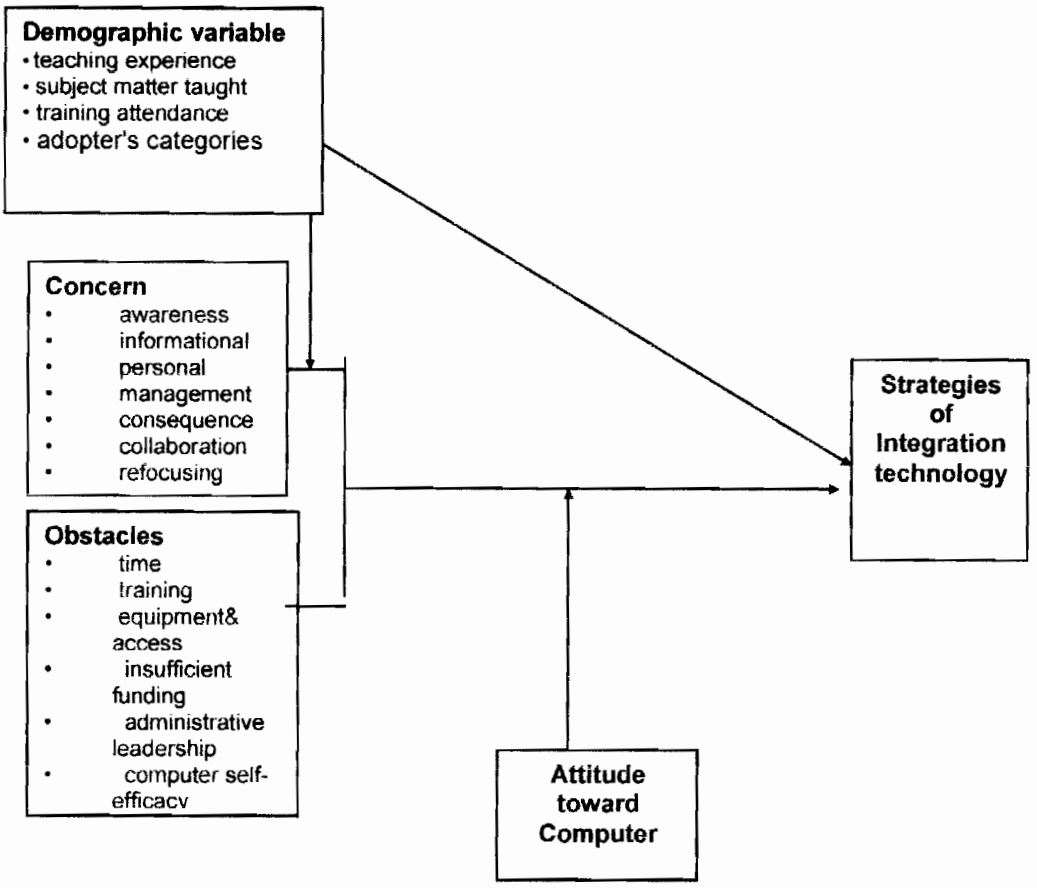

Figure 2.1 Research Framework

2.10 Hypotheses Development

2.10.1 Stages of Concern and Demographic Variables

The feeling, believes and attitudes toward certain innovation play an important role in the extent to which an innovation is being adopted by a community. And this is what was proved by Hord et al. (1987) who suggested that the stage of concern may help technology adopters to understand the effects of a certain innovation on the user. However, such concern proved to be affected by external factors such as training, experience, and the subject matter taught when it comes to adopting computer technology in learning.

Where the relationship between concern and training is concerned, Liu, Theodore, and Lavelle (2004) maintained that teachers' enrolment in an online training course does foster the rate of passing through the seven stages of concern reported in the literature. In other words, there is a positive one-to-one relationship between receiving training and the extent to which teachers exhibit concerns toward computer technology integration.

Similarly, teachers' experience proved to impact the development of the process of shaping concerns related to computer technology integration, and in experiencing certain stages of concerns. In fact, Huberman and Miles (1984) posited that the concerns of beginning teachers tend to be self and task-oriented. In addition, beginning teachers showed a more rapid development through stages of concern as their experience grow. The same group of teachers exhibited a higher degree of self concerns than their experienced counterparts.

Where the relationship between concern and the subject matter taught is concerned, Chamblee and Slough (2002) suggested that teachers, especially those who belong to different domains (in this case Science and Mathematics), have common concerns. In terms of the adoption of computer technology, which is signaled by the stages of concern teachers exhibit, Yang, and Huang,(2008) suggested that concerns of teaches in his study, especially those who teach English,

are modest, despite of motivating teachers to increase the use of computer technology.

The previous studies that discussed above lead the researcher to hypothesize the following hypotheses

1. There are significant differences in the stages of concern between five levels of teaching experience
2. There are significant differences in the stages of concern between three subject matters taught
3. There are significant differences in the stages of concern in training attendance

2.10.2 Obstacles in Technology Integration and Demographic Variables

Obstacles seem to be a real threat to the success of the process of computer technology integration. This is maintained by almost all the literature related to computer technology integration in learning. An aspect that attracted much of the attention of researchers is to study the relationship between the obstacles of computer technology integration and the demographic variables, viz. experience, training, and the subject matter taught, to see the impact of these variables on the extent to which teachers report that they encounter integration-related obstacles.

One of the most important factors to ensure the success the process of computer technology integration is training. This is supported by the fact that one of the causes of the failure of computer technology integration is misanalysing the training needs of teachers Ritchie & Wiburg (1993). Rogers (2000) indicates that among the external obstacles that teachers encounter is staff development and skill building. In other words, teachers do not receive an adequate training that enables them from utilizing computer technology properly. Similar results were observed by Ertmer et al (1999), and (OTA, 1995).

Literature also indicates that the obstacles that teachers encounter are related to their experience. Beggs (2000) indicated that the lack of experience with using the technology is a common barrier among teachers. This means that teachers who are experienced exhibit a lower extent of encountering integration-related obstacles than their experienced counterparts. Naddaf (2002) also reported that teachers whose experience ranges "between" 1-5 reported that they encounter a high level of integration- related obstacles.

As far as the subject matter taught is concerned. Yang and Huang (2008) indicated that English teachers faced barriers in technology integration; this study also identified significant relationships between first and second-order barriers. Mohammad (2003) also indicated that teachers of Math lack the basic computer skills that allow them to utilize computer technology efficiently and continually.

According to the results of the previous studies as is shown above the researcher hypothesized the following hypotheses.

4. there are significant differences in obstacles of technology integration between five levels of teaching experience
5. there are significant differences in obstacles of technology integration between three subject matters taught
6. there are significant differences in obstacles of technology integration in training attendance

2.10.3 Strategies of Technology Integration and Demographic Variables

Fisher (1996) conducted a study in which he asked experience teachers (teachers of Science and history) to rank a range of computer applications which would be useful in teaching. Fisher (1996) concluded that the responses do not differentiate between what might be useful to a teacher of history and a teacher of Math, suggesting that experience is not the crucial factor in choosing the appropriate strategy or application. Similarly, Fisher (2000) suggested that what was common among the answers of beginning teachers, when they were asked about how they use

computers, is their emphasis on obstacles to using computers more than on strategies themselves, suggesting that their use of computer is determined by the difficulties they encounter, regardless of the strategy they use.

The usefulness of computers and the way in which they are used vary extensively depending on the subject matters taught, and on the nature of ideas about the subject discipline (Waggoner, 1994). As a matter of fact, it was suggested that confidence issues were a major issue with many teachers. In other words, beliefs about the nature of their subject and its pedagogy may play an important part in the way they view computer technology (Easdown, 1997). In a study conducted by Sharp (1995), it was concluded that data logging is of a great value for Science teachers, but is of no advantage for teachers of Science. Similarly, integrated learning packages or 'drill and practis' software proved to be useful in teaching students Math, but is also of no advantage for teachers of geography and history. Teachers of geography, on the other hand, employed television and video records more frequently than teachers of Math. On the other hand, teachers of Math, according to Simkin (1989) do use computers more frequently than teachers of History.

Haydn and Barton (2007) suggest that the ways in which new technology is used in schools in the United Kingdom varies significantly from one school subject to another, both in terms of the extent of its impact on classroom processes, and in terms of which particular ICT applications are of use or potential use in particular subjects. The two groups of teachers he studied were teachers of Science and Math. Despite of the fact that both groups of teachers made regular use of the internet, history teachers were much more likely to make use of generic computer applications such as Word, PowerPoint and various digital video editing packages, in order to build up powerful 'learning packages' on particular topics, whereas Science teachers focused much more on Science specific software, including data logging equipment and Science CD-roms for making use of simulations and modeling software. Becker (2001) also indicated that English teachers used computer more than Sciences and Math teachers. Isman et al. (2007) revealed that Science teachers are hesitant in using educational technology extensively in their classrooms. However, Erdem's (2008) study revealed that 80% of Science teachers in his sample were using internet for teaching and learning purposes. On the other hand, Samuel and Zaitun (2007)

contend that in spite of the fact that teachers having ICT skills, integrating ICT resources in English language teaching is still unsatisfactory.

Continuous training would enable teachers to feel confident of their abilities to use computer applications, to choose the appropriate strategy, and to use advanced software. Studies by Mellar and Jackson (1992, 1994) and Lienard (1995) suggested that very few teachers had substantial experience of school use of ICT, but their research demonstrated that these few teachers came to know a lot about the use of ICT in teaching on initial teacher training courses. Haydn and Barton (2007) suggested that there is little evidence of newly qualified teachers moving on to higher order of computer applications use such as digital video editing, video conferencing, and web design, but the respondents felt that they had made considerable progress in being able to make more effective and extensive use of computer applications which they had become confident with in the course of training year. According to the studies that were reviewed above the following hypotheses constructed:

7. there are significant differences in strategies of technology integration between five levels of teaching experience
8. there are significant differences in strategies of technology integration between three subject matters taught
9. there are significant differences in strategies of technology integration in training attendance

2.10.4 The Relationship between Stages of Concern and Strategies of Technology Integration in the Classroom

Cicchelli and Baecher (1989) utilized the Stages of Concern model to survey 78 teachers in a large metropolitan city. The result shows that most teachers surveyed scored highest in the awareness, informational, and personal stages of their concerns related to computer use.

The findings indicated that teachers were most likely nonusers of microcomputers. However, they were concerned about how microcomputers were going to affect them personally, and the teachers were gathering information about the innovation. Therefore, teachers with less experience in computer applications may have different awareness, informational, or personal concerns from teachers who have more experience with the innovation.

The CBAM stages of concern model stated that teachers had concerns about microcomputer technology in the areas of self, task, and impact. At the beginning of the study teachers had intense concerns in the area of self. This concerns the awareness of innovation (microcomputer technology), information about microcomputer technology, and personal concerns such as perception of status, reward, and wellbeing in relation to microcomputer technology. Teachers who were concerened in the eara of task were concerned about logistic and time to implement the innovation. Finally, teachers who were concerened in the eara of impact asked questions of impact on client, how to collaborate with colleagues and they believed that there was a better way to improve their productivity.

Linnell (1992) suggests that a research incorporating teachers' concern and providing a follow-up concern is more likely to increase the level of integrating computer technology in the classroom. He further maintains that identifying and addressing teacher' concerns are the corner stone for a successful implementation and integration of computer technology in the classroom. An evidence of the different stages of concern that teachers have is provided by Yuliang Liu & Carol Huang, (2005) who posited that there are statistical differences among teachers in all the stages of concern, and that they had informational, personal concerns as well as concerns related to refocusing. The findings of above studies help the researcher to hypothesize the following hypothesis.

10. there are significant relationship between stages of concern and strategies of technology integration

2.10.5 The Relationship between Obstacles in Technology Integration and Strategies of Technology Integration

Barriers to computer technology integration have a crucial role in determining the strategies that teachers use. Maddux (1998) maintained that the lack of equipments is one of these barriers. According to Maddux (1998) teachers could only use computers through computer labs at schools, which mean that the range of applications and strategies they use are limited. Training proved to limit the range of strategies that teachers use. In this respect, Geisert and Futrell (1995) suggested that one of the reasons of the failure of computer technology integration is a failure to use adequate and appropriate strategies, due to the fact that training courses do not include relevant activities that enable teachers to know the best strategies to integrate computer technology. Another point to mention is that teachers are trained to acquire the basic computer skills rather than receiving an advanced training. Consistenant with the result that is shown above, the following hypothesis was formed.

11. there is significant relationship between obstacles of technology integration and strategies of technology integration

2.10.6 Attitudes toward ICT

Woodrow (1992) maintains that positive attitudes toward computer technology integration are recognized as precondition for an effective integration of computer technology. This view is supported by the results of some of researchers (Stevens, 1980; Gbomita, 1997; Snider & Gershner, 1999; Atkins & Vasu, 2000) who suggested that teachers' attitudes have an influence on the behaviors of computer adoption and integration. Similarly, Gerschner (1982) maintains that the extent to which the process of computer technology integration in the classroom is successful is highly determined by the attitudes that teachers hold toward this technology. Marcinkiewicz, (1993/1994) also suggests that changing teachers' attitudes is the engine of a successful implementation and integration of computer technology, since the majority of teachers resist using technology.

Teachers' attitudes toward computers are one of the most important factors for the proper implementation of computers to facilitate the learning and teaching process. Loyd and Gressard (1984) found that the success or failure of the new computer programs depend on students' and teachers' attitudes toward the change.

According to Atkins and Vasu (2000); Gbomita (1997); Snider and Gershner (1999), teacher's attitude has a significant influence on one's computer adoption or implementation behavior in the classroom. Teacher's attitudes toward computer were chosen as a moderator variable in this study because the attitude would influence, effect, and increase the relationship between independent variables (teacher's stage of concern and obstacles in integration of technology variables) and dependant variable (technology integration strategies). Attitudes had been used as mediator variable in previous studies. Mahmod, et al (2005) used attitude as mediator variable between independent variables (attitudinal belief - perceived usefulness, trialability, result demonstrability, image, and enjoyment) and independent variable (behavior intention towards e-MBA adoption) in his study. In addition, the TAM model used attitude as a mediator variable between perceived of ease and perceived of usefulness from one side and actual use of an innovation from other side. Ajzen and Fishbein (1980) stated that technology adoption behavior is an outcome of individual's attitude toward an innovation. The researcher indicated that attitude as mediator variable was significant and supported.

Filzah Mohd Isa (2007) used attitudes toward change as a moderator variable in her study (change management initiatives and change success in direct selling industry: the moderating effect of attitudes towards change). She stated that attitudes toward change influenced the relationship between compensation and training (independent variables) and job satisfaction (dependant variable). The findings revealed that compensation and training among salespersons can increase job satisfaction if their attitude towards change is high. As discussed earlier, attitudes toward technology could be also used as independent, intervening, mediator or moderator variable, however, in this study attitude toward technology was used as a moderator variable and the following hypotheses were constructed:

12. attitudes toward computer moderate the relationship between stages of concern and strategies of technology integration
13. attitudes toward computer moderate the relationship between obstacles of technology integration and strategies of technology integration

The reason for using this moderator is based on the argument that if it is used as a mediator, there will not be a direct relationship between the independent variables and the dependant variable in this study (Sekaran, 2003). However, in this study, there is a relationship between the independent variables and the dependant variable. Given that, using attitudes as a mediator is not useful and meaningful for this study. However, using attitudes as a moderator can help assess whether attitudes boost the relationship between concern, obstacles (independent variables) on one hand and ICT integration strategies (dependant variable) on the another hand. Thus, it is considered one of the main contributions of this study.

2.11. Summary

The purpose of this study was to identify the process of integrating ICT in the educational process, and to find out whether this integration process is implemented in Jordan. The researcher discussions showed that the process of enhancing education by integrating ICT in it is a complex and not an easy one. The researcher explained that what is meant by technology integration is not the routine use of the computer in educational tasks, but it is about effectively utilizing technology as part of the curriculum.

This study revealed that there are many factors controlling the process of implementing ICT. These factors can be utilized and exploited to effectively integrate the technology into teaching. Teachers' and students' attitudes towards technology play an important role in facilitating the process of integrating ICT into educational curricula. Examples on some important indicators determining the attitudes are experience and previous training are also effective factors influencing attitudes towards computers, and hence affecting the process of implementing

technology itself. Self-efficacy and general access to computers constituted obstacles that may prevent the proper implementation of the technology into curriculum if they do not get improved or facilitated.

Moreover, investigating the related literature revealed that the teacher's stage of concern is an important element studied in the premise of implementing technology into their teaching methods. It is asserted that there is a positive relationship between the stage of concern and both experience and age. Also, the findings deny any significant relationship between the discipline being taught and the stage of concern which means that the subject matters teachers teach have nothing to do with the worries they express towards the new innovation.

Individual's attitudes regarding any innovation affect its success. Teachers' and student's attitudes towards ICT determines whether this technology implementation in the classrooms will succeed or not. The literature proved that the success of any new educational technological program relies heavily on the attitudes of the teachers participating in it and their support. In other words, teachers positive attitudes towards computing and new technology are regarded as one of the main factors guaranteeing its effective integration into the curricula of elementary and secondary stages.

This chapter also discusses the categories of adopters of any new innovation and the differences existing among them. The literature viewed these differences among them as a gap that may hinder the total integration of technology in schools as teachers who integrate ICT in their teaching process are considered early adopters, and those who do not are the late ones. The results of this study are expected to contribute to the attempts made to minimize the gap between early adopters and late adopter.

Previous research also tackled the issue of constructivism, constructivist learning, and its relation to integrating ICT in the learning process. Constructivism means that for individuals to establish and construct their new knowledge or understanding of the learning material they need to depend on their interaction with the knowledge and beliefs they already have, and on the different activities, events, and ideas in their

environment with which they come into contact. Also, the literature shows how the proximal learning concept was introduced into the constructivist learning theory as it is based on the hypothesis that for learning to take place and the learner to complete their learning tasks he requires primarily some sort of support. Researchers agreed that technology support and environment is a perfect kind of support that can be made available for learners to achieve their learning process in the constructivist sense. This explains how the decision to resort to computer support in the student-centered learning process comes as a result of the teachers' need to create the ideal learning environment that helps students be active learners rather than passive recipients of knowledge.

From here, the role of the learning environment appears to become more and more influential. It is now proved that the success or failure of the integration of ICT in the teaching and learning process is positively connected with creating a learning environment applying the pedagogy of constructivism. This constructivist classroom employs a number of education technologies which are used to make students' access to information easier and immediate; these technologies were studied and explained throughout the literature reviewed in this study. For example, the interactive style provided by the on-line technologies and education makes it an excellent example on constructivist student-centered pedagogy. Also, the supportive and guiding role of the teacher in students' self-acquisition of knowledge was affirmed and discussed.

On the other hand, beside the constructivist learning is the notion of collaborative learning which encourages the self-directed and interactive learning by the existence of an appropriate environment, and the aid of technology and other available tools; opening by that the gates for meaningful effective learning.

The Instructional Transformation Model, with its five phases, was introduced in the literature as a model followed to successfully integrating technology into the educational process.

Moreover, previous research summarized three types of educational technologies and applications that are used in the technological education process. These technologies include; using the computer as a tutor; using it as a tool; and using it as a tutee itself, which was proved to be the most effective way of learning.

Studies showed that there are several obstacles that hinder this integration both at the level of the school and at the teacher's level. Both school and teacher need prior preparation for the integration to be accomplished; teachers need to be trained on necessary and essential skills needed, and schools need to be financially and administratively prepared for the implementation of the new instructional technology. It was also found that among the most important barriers preventing teachers from the complete and effective integration of technology into the curriculum are: insufficient funding and financial support, insufficient or ineffective training, lack of proper equipments and access to computers, unorganized timetables, lack of administrative leadership, and insufficient self-efficacy.

It appears that barriers common to all researchers were divided into institutional and individual barriers. The common institutional ones include the lack of technical support represented by the lack of technical assistants and instructional designers, the lack of vision and faith in the potential and power of technology in improving instruction and teaching, and lack of recognition of the benefit of using technology in teaching. Other factors are the individual ones which include; the element of experience in using technology in general and using it in instruction in particular is missing in many teachers, inadequate motivation and incentives encouraging the teachers to contribute to developing a curriculum enhanced by technology, teachers are not fully aware of the proof that technology is factually effective in the content areas, and eventually that they are weakly informed about the universal standards specified for considering practice as professional and for accrediting the technology as beneficial in the educational. Studying and investigating these barriers and obstacles help scholars to work on solving these problems hindering the proper

implementation of technology, in order to be able to create a successful ICT-integrated learning environment that applies the principles of constructivist learning. After reviewing literature pertinent to the above issues, Chapter Three is devoted to address the design, procedures, sampling, and instruments of this study. Additionally, it discusses how the researcher addressed the proper procedures that can enhance the validity and the reliability of the research.

CHAPTER III

RESEARCH METHODOLOGY

3.0 Introduction

The chapter gives an account of the background of the research design, population and sampling and the instruments that were used for data collection. As well as, the researcher identified the procedures of the data collection, data analysis and pilot study. This study seeks to investigate whether the attitude of teachers toward computer, the stage of concern and the obstacles in technology integration can be used to predict good integration of ICT in the teaching and learning process. The overview of the methodology is illustrated below in Figure 3.1.

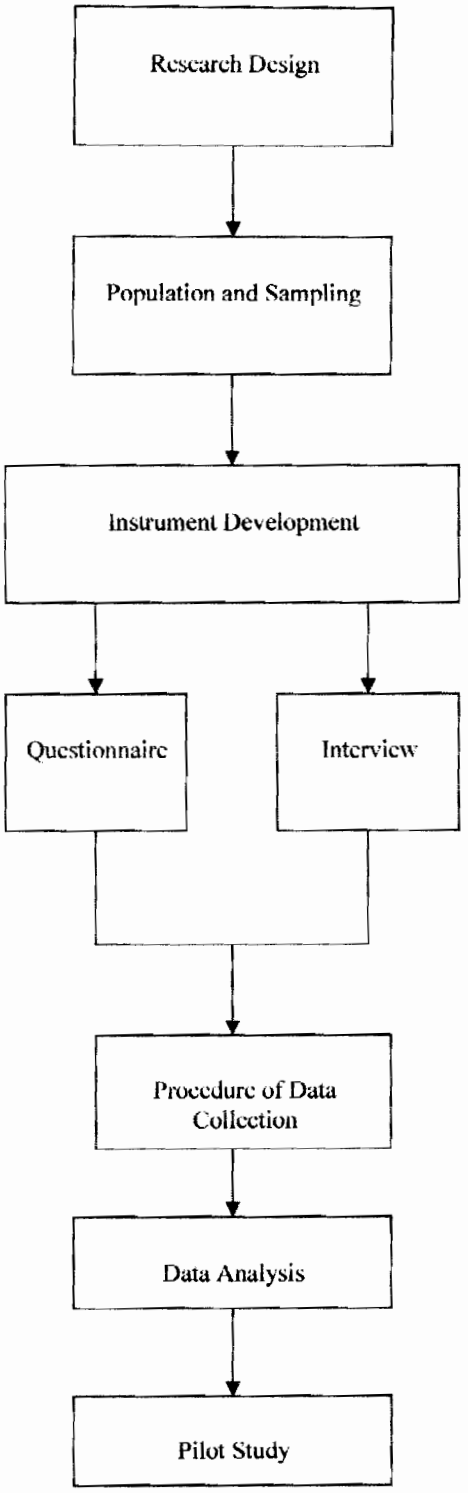

Figure 3.1 Overview of Methodology

3.1 Research Design

This study is descriptive in nature and employs a correlational design. The goal of correlation research is to measure the strength of the relationship between variables in order to predict one variable from another. This study is expected to clarify and show the relationship between the stage of concern and obstacles in ICT integration in the aspect of strategies employed by teachers. The attitude of teachers towards computer was used as a moderator variable. This study also used the qualitative procedure (face-to-face qualitative interviews) to differentiate between early and late adopters of ICT as well as to find practical ways to bridge or minimize the gap between early and late adopters of ICT integration.

3.2 Population and Sampling

The population of the study comprised of the teachers of public secondary schools who taught English language, Mathematics and Science in Aman in the schools year of 2007/2008. The population consisted of 712 teachers. These teachers were distributed in 44 schools. There were approximately 16 teachers in each school who taught English, Math and Science. Out of this population, the researcher used the stratified random sampling procedures and selected 360 teachers. This sampling included 120 teachers of Science, 120 teachers of Math and 120 teachers of English as illustrated below in Figure 3.2.

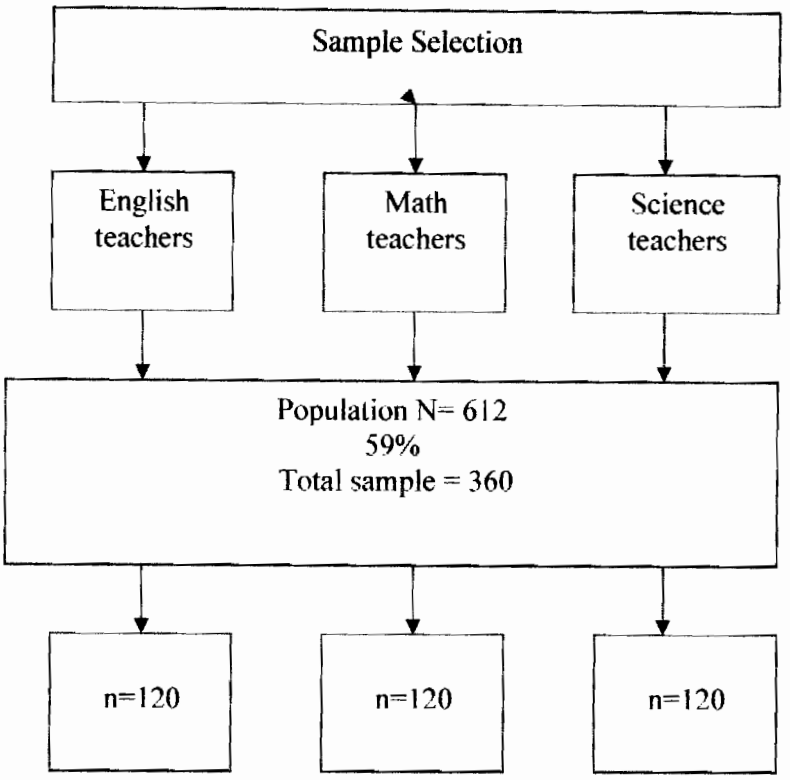

Figure 3.2 Sampling Selection

Stratified random sample means that "it involves a process of stratification or segregation, followed by random selection of subjects from each stratum. The population is first divided into mutually exclusive groups that are relevant, appropriate, and meaningful in the context of the study" (Sekaran, 2003).

The sample size was determined based on Yamanes' (1967) equation $n = \frac{N}{1 + N(e)^2}$ (n for sample size, N for population = 612, e for precision=, 05). The result is 242. However the sample size chosen was 360 teachers because the larger the sample is, the better are results, and the results that are derived from large sample can be generalized (Hair et al., 2006). Moreover, Tabachnick and Fidell (1996) suggested that "it is comforting to have at least 300 cases for factor analysis" (p. 640). Three hundred and sixty cases were chosen by the researcher to ensure that at least 300 cases were entered to factor analysis after deleting outliers.

3.3 Instruments (Questionnaire)

Five instruments were deemed suitable for this research. They are:

1. Adopters' categories Rogers' theory (1995)
2. Stage of Concern Questionnaire (SoCQ) by Hall and George (1979)
3. Attitude Toward Computer (ATC) by Loyd and Gressard (1984)
4. Obstacles *scale*
5. Strategies of technology integration (LoTi) adapted from Moersch (1995)

Based on these instruments, a questionnaire consisting of 151 items was developed for this study. The questionnaire consisted of five sections namely, adopter's categories (24 items), attitudes toward computer (40 items), stage of concern (35 items), obstacles scale (33 items), ICT integration strategies (19 items).

Although the instruments adopted by the researcher were developed some years ago, they are still relevant today. The literature is abundant with evidence that these instruments are still used in recent studies. For example the ATC questionnaire that was used in Yushau' (2006) study and Gallagher's (2008) study. Adopters' categories theory was used in Nyirongo's (2009) and Kwan's (2003) study. SoCQ was used by Liu, Theodore and Lavelle (2004) and Yakin and Sumuer (2007). LoTi was used by Bashara (2008) and Keeler and Langhorst (2008).

3.3.1 Questionnaires Validity (Content Validity)

The content validity of the questionnaire was evaluated by two referees at Universiti Utara Malaysia, and was judged appropriate to meet the needs of the present investigation. The questionnaire was then translated into Arabic, and was evaluated by two referees of Arabic origins at the time when they were teaching English at the Universiti Utara Malaysia. The suggestions of the referees were then incorporated into the final Arabic version and were then translated into English. The translated version was also compared and contrasted with the original English version, and the two versions were found to match each other. The questionnaire then was evaluated by my two supervisors and by six referees who specialized in ICT in Faculty of Educational Sciences at Aal Al-Bait, and was judged appropriate.

3.3.2 Adopter's Categories

Rogers (2003) defined innovation as "any idea, practice or object that is perceived as new by an individual or other unit of adoption" (p.12). As a result, using ICT in schools for the purpose of teaching and learning is a kind of diffusion process in which ICT is an innovation

The primary purpose of the study is to understand why some of Jordanian teachers integrate technology in their teaching and learning and other did not do that. So, Rogers' theory (1995) was used in order to classify teachers into innovator, early adopter, early majority, late majority and laggard according to their experience in using ICT application. To simplify data analysis procedure, the five groups were combined into two: early and late adopters. Innovators and early adopters were incorporated under early adopter while the early majority, late majority and laggard were incorporated under late adopters. This kind of incorporation is common in previous studies (Anderson et al., 1998; Author & Writer, 2003).

For this study the researcher used adopter's categories to simplify the complexity of adoption pattern and process. Adopter's categories will also help to show the differences between early and late adopters in terms of stages of concern, attitudes

toward computer, obstacles in integration of technology and strategies of technology integration in teaching and learning process. Understanding the differences between early and late adopters will help to plan more widespread adoption of ICT in Jordanian public schools. It will also help to predict how to support further adoption of ICT in Jordanian public schools. Consequently, respondents were assigned to either early adopter (EA) or late adopter (LA) subgroups using the scoring procedure developed by Anderson, Varnhagen, and Campbell (1997).

The scoring procedure was developed on the basis of the assumption that EAs have come to use these technologies earlier and have gained more expertise relatively to the majority of the faculty (Anderson, Varnhagen, and Campbell, 1999). A composite score was calculated for innovativeness of faculty by adding the self-rated expertise level of each individual faculty member (i.e., 5 for None, 4 for A little, 3 for fair, 2 for good, and 1 for extensive) indicated for each of the 24 types of computer software and tools. The total possible cumulative score for innovativeness is 96. Consistent with Rogers' assertion that adoption of an innovation will be normally distributed, cumulative frequency of the scores on this scale approach an S-shaped curve which lends confidence to assumption of normalcy. The sample of the study was divided into two groups namely early adopter (EA) and late adopter (LA) for statistical comparison. According to Rogers (1995), adopter's categories and individual innovativeness scores were used to predict how many of the sample was (EA) and how many were (LA).

3.3.3 Stage of Concern

The Concerns - based Adoption Model (CBAM), designed by Hall and Hord (1987), is a unique way of looking at the change process. In this case the researcher is interested in the concerns that teachers have about the integration of ICT in the teaching and learning process. There are two components to the CBAM, the stages of concern and the levels of use. This study utilized the stages of concern. This study did not utilize the levels of use questionnaire, primarily because the information that would emerge from such a study is not relevant to the themes and organization of the present study.

The stages of concern relate to the feelings, perception, motivations and attitudinal dynamics of individuals as they first become aware of an innovation, approach it, and gradually become increasingly confident in their use of the innovation.

CBAM described the adoption of an innovation as a growth process. Each teacher experiences a characteristic sequence of concerns as an innovation is implemented (Hall et al., 1987; 1998). The scale of stages of concern has seven dimensions: (1) awareness; (2) informational; (3) personal; (4) management; (5) consequence; (6) collaboration and (7) refocusing. The 'management' stage is a critical stage in this scale which means that innovation has been adopted. This scale consists 35 items these items were distributed equally five items for each dimension, as well as Likert scale with five point was used.

3.3.3.1 Reliability of stages of concern questionnaire (SoCQ)

Table 3.1 and 3.2 shows the reliability of (SoCQ) by Hall, George and Rutherford (1986).

Table 3.1

Coefficients of Internal Reliability for the SoCQ

Dimensions	0	1	2	3	4	5	6
Alphas	.64	.78	.83	.75	.76	.82	.71

As shown in Table 3.1 the coefficients of internal reliability (alpha coefficients) ranged from .64 to .83 on the seven constructs measured (Hall, George, & Rutherford, 1986)

Table 3.2

Test-Retest Correlations on the SoCQ

Dimensions	0	1	2	3	4	5	6
Pearson-r	.65	.86	.82	.81	.76	.84	.71

As shown in Table 3.2 a test-retest of 171 of the original 830 participants was performed to determine the consistency of the responses. Results indicated that the Pearson-r coefficients of the 132 participants who responded during the test-retest procedure range between .65 and .86.

3.3.3.2 Validity of Stages of Concern Questionnaire

The evidence for the validity of the stages of concern comes from Intercorrelation analyses of the 195-item questionnaire and the 35- item questionnaire (Hall & George, 1979).

Table 3.3

The validity of stages of concern questionnaire

Dimensions	1	2	3	4	5	6
0	.48	.39	.13	.27	.30	.16
1		.81	.32	.19	.18	.17
2			.47	.23	.18	.25
3				.24	.12	.37
4					.58	.57
5						.49

3.3.4 Computer Attitude Scale

The Computer Attitude Scale (CAS) is an instrument used to assess teachers', students' and administrations' attitudes toward computer. The validity and reliability of CAS has been tested numerous times (Loyd & Gressard, 1984). The first, original version of the Computer Attitude Scale consists of three subscales: anxiety of computers, liking of computers, and confidence in computers (Loyd & Gressard, 1984). Later, a computer usefulness subscale was added to the Computer Attitude Scale as a fourth dimension (Loyd & Loyd, 1985). The total number of questions became 40 instead of 30. There are 10 questions per subscale and the questions for each subscale are distributed evenly throughout the instrument. CAS consists of 40 items, as well as Likert scale with five points was used. In this study the researcher adopted the 40 -item CAS because it is considered the latest version. Additionally, it

has been proved to be valid and reliable by many researchers (Yushau, 2006; Gulbahar, 2008)

Loyd and Loyd (1985) investigated reliability and factorial validity, and differential validity of the new CAS together with all its four subscales (computer anxiety, computer confidence, computer liking, and computer usefulness). The result of their study which was conducted on 141 teachers who enrolled in computer staff development indicated that CAS is "reliable in measuring teachers' attitude toward computers and effective in differentiating among teachers with different amount of computer experience" (Loyd & Loyd, 1985: 903). The reliability coefficients were found to be .90, .89, .89, and .82 for computer anxiety, computer confidence, and computer liking subscales, while the total scores was estimated as .95.

3.3.4.1 Reliability of Computer attitude scale

Table 3.4 shows the reliability of attitudes subscales ranged from .82 and .90.

Table 3.4

Coefficients of Internal Reliability for the CAS

Subscales	Anxiety	Confidence	Liking	Usefulness
Alphas	.90	.89	.89	.82

3.3.4.2 Validity of Computer Attitude Scale

The evidence for the validity of the computer attitude scale comes from the study of Mnsh and Moroz (1997). The sample data were gathered from 208 educators (mostly certified teachers) enrolled in graduate education course at a large Southwestern University in the USA.

Table 3.5

The validity of Computer Attitudes Scale

Subscales	Mean	SD	1	2	3	4
Anxiety	40.4	6.4				
Confidence	38.9	7.3	.81			
Liking	40.6	7.1	.91	.82		
Usefulness	43.0	4.6	.67	.68	.65	

Table 3.5 shows the means and standard deviation for each of the four subscales. the intercorrelation between the subscales range from .65 to .91.

3.3.5 Obstacles scale

Obstacles that were encountered by teachers when they attempted to integrate computer was considered one of the most vital variables that affect the integration of ICT in the curriculum. There are a number of obstacles that affect computer integration. These obstacles are lack of time, lack of training, access to sufficient numbers of computers, and lack of support. This study also deals with main obstacles faced by teachers.

The obstacles scale consisted of 33 items. These items cover the main obstacles faced by teachers. Past researchers (Lancaster, 2000; Hadley & Sheingold, 1993; Jacobsen, 1998) guided the creation of the list of obstacles to assess which of these obstacles most affected technology integration.

Likert scale was used in this study, so the individuals indicate the degree to which they agree with the statement on a five-point scale, with "agree strongly" on one end and "disagree strongly" on the other. Each response is given a value of 1 to 5, with 5 indicating that this item is considered as a serious obstacle for teachers when they integrate computer in curriculum.

3.3.6 Strategies of technology integration

The items for this section were adopted from Moersch's (1995) Level of Technology Implementation (LoTi) questionnaire. The original LoTi questionnaire had 50 items in five sections; technology integration, technology limitation, technology resistance, computer proficiency and learner-centered instruction. Moersch (1999) believed that measuring teachers' level of technology use can quantify how they are using technology in their classroom and describe the academic achievement of students that results from teachers' instructional technology practices. Moersch has developed the LoTi framework to measure the degree to which teachers implement instructional technology. Moersch (1997) includes seven levels of computers implementation in any given school. These levels are as follows: nonuse, awareness, exploration, infusion, integration (mechanical), integration (routine), expansion, and refinement, which are originally derived from the CBAM original levels.

Each level reflects different stages of classroom technology implementation. As a teacher progresses from one level to the next, a series of changes to the instructional curriculum is observed. The instructional focus shifts from being teacher-centered to being learner-centered, so that the technology is no longer the focus of the instruction, but a tool to extend the students' understanding of the concepts being explored (Moersch, 1995). Altogether 19 items from technology integration section were selected for this study.

3.3.6.1 Reliability of Level of Technology Implementation (LOTI)

Table 3.6 shows the reliability of LoTi by Keller et al. (2008). The reliability values range from .79 and .93.

Table 3.6

Reliability of the Level of Implementation Technology

Factors	Reliability
Technology Integration	**.93**
Technology Limitations	.78
Technology Resistance	.66
Computer Proficiency	.80
Learner-centered Instruction	.79

3.3.6.2 Validity of Level of Technology Implementation (LOTI)

The results of the validation study revealed the following:

i) Each of the domains embedded in the LoTi survey (LoTi Levels, CIP, and PCU) achieved content validity.

ii) The domains, PCU (Personal Computer Use) and CIP (Current Instructional Practices) emerged as statistically reliable and therefore, are empirically valid.

iii) The domain, LoTi Level 0 (Non-use) emerged as statistically reliable and therefore, is empirically valid.

3.4 Interview

The primary objective of interview was to gather more in-depth and specific information about how the Jordanian teachers integrate the ICT and its application in the teaching and learning process. A set of questions was prepared for the interviews (see appendix C). The interviews involved the teachers who taught English language, Science and Mathematics. The questions were designed to get information on the possible reasons of the obstacles of technology integration and suggestions for improving teachers' knowledge of these obstacles.

In summary, using the method of triangulation allowed "opportunities for deeper insight into the relationship between inquiry approach and the phenomenon under study" by analyzing consistencies and inconsistencies across these data (Patton, 2002, p. 248). This combination of methods of data collection strengthens a qualitative study and augments the possibility of "internally valid or trustworthy conclusions and inferences" (Tashakkori & Teddle, 1998, p. 91).

3.4.1 Interview procedure

The researcher held five pilot interview sessions with five teachers from the selected sample. The pilot sessions aimed to test the relevance of the questions and the flow of the discussion as well as to ensure confidence in the interview process (Tan, Dawson & ven ville, 2008).

The researcher transcribed the data and then gave it back to the respondents in order to verify their response and avoid misrepresentation. Also the researcher gave the data to respondents and non respondents to get more validity. The researcher translated the interview from English language to Arabic language. After that the transcription of interview was shown and checked by a translation specialist to confirm that the meaning in Arabic and English version is the same. Audit trail was based on the translation specialist to give the translation more verification and validity. The interviews were recorded on tape in consideration that the researcher

already had permission from the interviewees. The interview focus was to obtain data about the differences between early and late adopters in the integration of technology and how to improve the teachers to overcome the obstacles in the integration of technology.

The researcher interviewed 24 teachers who taught English language, Math and Science. They had different level of experience in teaching and were from two different training categories (attended training course or did not attend training course). So the information given by them had provided a source of information which validated the finding as they were highly qualified.

To ensure that the teachers will be prepared for the interview, the researcher informed them of the purpose of the interview. The interview took place in the teachers' room. The researcher asked the questions and the answers were recorded in the question set.

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3.4.2 Trustworthiness of interview

The interview abided by the following steps according to Merriam (1998) in order to ensure more validity:

1. Triangulation involves multiple sources of evidence to confirm the emerging findings.
2. Member checks by allowing participants to examine and evaluate the findings and interpretation.
3. Clarification of research bias involves "clarifying the researcher's assumptions, worldview, and theoretical orientation at the outset of the study"
4. Pattern matching: how findings match reality.

3.4.3 Analysis of the interview

The qualitative data analysis procedure for this study was based on the procedures suggested by Denscombe (2003) .These procedures are:

1. **Descriptive accounts of situation**

   The researcher obtains rich information through the interviews with selected interviewees. In order to obtain thick descriptive data, the researcher was keen on observing the body language and the reaction of the participants during interviewing them. The researcher also used a tape recorder in order to record all the details of the interview. This provided rich information that enabled the researcher to make a comparison with the results from other research about the differences between early and lat adopters.

2. **Coding and categorizing the data**

   After interviewing the participants, the researcher transcribed the speech and classified the data into categories. The researcher focused on the most significant words, sentences or patterns that could clearly implicate a specific category. In this respect, Strauss and Corbin (1990) argue that "the aim of open coding is to discover, name and categorize a phenomena and to develop categories in terms of their properties and dimensions" (p. 181).

3. **Reflections on the early coding and categories**

   In this stage, the researcher kept the memos and notices that were meticulously written down in the margins of the raw data. In this respect, Denscombe (2003) points out that these memos and notices serve two purposes "first, they act as a reminder about new thinking by the researcher on facets of the investigation. Second, they act as a log of the developing line of thinking, and this helps enormously with the audit trail" (p.272). Given that, keeping those kinds of memos and notices facilitated the process of categorizing the data and saved the researcher any kind of redundancy.

4. **Identification of themes and relationships**

After breaking the data into categories, the researcher meticulously gathered the most common categories and put them under an appropriate theme.

5. **Return to the field to check out emerging explanations**

In order to check the trustworthiness of the emerged themes, the researcher asked the participants again to check these emerged themes in order to avoid any misleading results.

3.5 Procedures

This study was conducted on the teachers of public secondary schools who taught English language, Mathematics, and Science in Amman in Jordan (2007/2008). The researcher managed to obtain the permission from the Ministry of Education before collecting data and applying the research tools on the sample of the study. The researcher applied the research tools on the data collected through the use of questionnaires which were distributed personally by the researcher to the teachers in Amman area in Jordan. The researcher identified the sample of this study which included 360 teachers. Then the researcher administered the questionnaire himself on these teachers who were distributed in 44 schools. A week later, the researcher conducted interviews with 24 teachers who were randomly selected. They included eight teachers of English, eight teachers of Math and eight teachers of Science.

3.6 Data analysis

The questionnaires were designed for optic reading. Data were scanned and verified into SPSS format, descriptive analysis, Independent-sample t-test, one way ANOVA correlation analyses and hierarchical regression analyses were used.

Table 3.7

Summary of Statistical Analysis

Research Questions	Statistical Analysis
One	Mean, Standard deviation and proportions
Two, three, four and five	Chi-square
Six, seven and eight	Independent-sampl t-test, one way ANOVA
Nine and ten	Correlation
Eleven	Hierarchical regression
Twelve	Interview analysis

3.7 Pilot Study

The Arabic version of the questionnaire adopted in this study was administrated to 36 teachers representing 10% of the sample. Teachers were then asked to fill the questionnaire and asked for clarification of any point they did not get. The researchers shouldered the responsibility of clarifying and answering their questions. Hereunder are some of the items that the teachers did not understand and which where clarified orally to them.

In section 1. The item "Using simulation programs to provide situation similar to reality" was clarified by rephrasing it in another way. The researcher suggested that "simulation programs are programs similar to any other programs, save that these programs helps in creating situations similar to what happens in real life so that students can get and understand more easily".

In section 2, some teachers asked "how would I feel aggressive and hostile toward computers". The researcher suggested that "you don't feel comfortable with using computers, and you don't feel you can get along with it". In Section 3, some teachers did not get the point when they read the item "I would like to know what resources are available if we decide to adopt this integrating technology". The researcher suggested that what is meant be resources is the computer devices and the other tools related to it such as printers and data show, as well as the material-based software.

Section 4: Some of teachers to whom the questionnaire was administrated indicated that they did not understand the item "Limited materials provided by the district". Thus, the researcher clarified this item to them by suggesting that "limited materials include insufficient funding, insufficient computer devices and software."

Section 5: the item "I integrate the most current research on teaching and learning when using the classroom computer(s)" was vague to some teachers. The researcher suggested that this means "keeping in contact with the latest in the field of using computer in the teaching process, including remarks on how to use the computer as a teaching tool"

After rewriting the questionnaire, the researcher administrated it from 17th of November 2007 to the 18th of February 2008. Teachers needed 35 minutes to give their responses. Finally, the reliability coefficients in this study were computed by the implementation of Cornbach alpha. Additionally, interviews were then conducted with 24 teachers from the sample study. Teachers' responses were then analyzed using SPSS version 12.

3.8 Summary

This chapter discusses the sampling of research, the variables, the research design, the populations, the procedures, and the implementation of the instruments. The data were gathered from 360 teachers of public secondary schools who taught English, Math, and Science in Amman, Jordan (2007/2008). The data were scanned and verified into SPSS format. Descriptive analysis, Independent-sample t-test, one way ANOVA, correlation analyses and hierarchical regression analyses were used. In addition, the pilot was conducted to establish the reliability of the instruments. In Chapter Four, the researcher demonstrated how descriptive and inferential analyses as well as hierarchical regression were used in order to obtain valid and reliable data.

CHAPTER IV

FINDINGS

4.0 Introduction

This study highlights a number of issues revolving around the integration of ICT in schools in Jordan. To achieve the purposes of this study, a questionnaire was devised and distributed to a sample of teachers in Amman schools, and interviews were conducted with a selected sample of these teachers. This chapter deals with the results of the study on the basis of the questionnaire and the interviews. What follows are the answers to the following research questions.

1. What are the levels of stages of concern, attitudes, obstacles faced by the teachers and strategies of technology integration in the teaching and learning process among teachers in Jordanian schools?

2. Based on Rogers' adopter categories, who among the Jordanian teachers are the early and late adopters?

3. What is the distribution of early and late adopters among Jordanian teachers in term of teaching experience?

4. What is the distribution of early and late adopters among Jordanian teachers in term of subject matter taught?

5. What is the distribution of early and late adopters among Jordanian teachers in term of training attendance?

6. Are there any significant differences in Jordanian teachers' stages of concern towards technology based on their teaching experience, subject matter taught and training attendance?

7. Are there any significant differences in obstacles of technology integration based on teaching experience, subject matter taught and training attendance?

8. Are there any significant differences in technology integration strategies based on teaching experience, subject matter taught and training attendance?

9. Is there relationship between teacher's stages of concern and technology integration strategies among teachers in Jordanian schools?

10. Is there relationship between obstacles faced by the teachers and technology integration strategies among teachers in Jordanian schools?

11. Does teacher's attitude toward computer moderate the relationship between (stage of concern and obstacles in technology integration) and strategies of technology integration?

12. How do early and late adopters (among Jordanian teachers) differ from each other in their technology integration strategies?

4.1. Factor Analysis for Independent Variables

The 91 items of the independent variables (adopters' categories, stages of concern and obstacles) were subjected to the principle component analysis (PCA) using SPSS version 12 (Sekaran, 2003). Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Okllin value was .70 exceeding the recommended value of .5 (Hair, 2006). And the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

Inspection of the screeplot revealed a clear break after the third component. Using scree test, it was decided to retain three components for further investigation. To aid in the interpretation of these components, Varimax rotation were performed as it is more common and easy to interpret (Hair, 2006). These three components were showing a number of strong loading, and all variables loading substantially on only one component. These three components explained a total 65 percent of the variance (see appendix, B).

4.1.1 Factor Analysis for Dependent Variable

The nineteen items of the dependent variable (strategies of technology integration) were subjected to the principle component analysis (PCA) using SPSS version 12. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Okllin value was.87, exceeding the recommended value of .5 (Hair, 2006) and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

A clear break after the first component was revealed after the inspection of the screeplot. A point to mention is that all items strong loading on one component (see appendix, B).

4.1.2 Factor Analysis for Moderator Variable

The forty items of the moderator variable (teachers' attitudes toward ICT) were subjected to the principle component analysis (PCA) using SPSS version 12. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Okllin value was.85, exceeding the recommended value of .5 (Hair, 2006) and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

A clear break after the first component was revealed after the inspection of the screeplot. A point to mention is that all items strong loading on one component (see appendix, B).

4.2 Instruments Reliability

Reliability analysis allows studying the properties of measurement scales and the items that make them up. The reliability analysis procedure calculates a number of commonly used measures of scale reliability and also provides information about the relationships between individual items in the scale. Cronbach's alpha is a measure of internal consistency, based on the average inter-item correlation.

Table 4.1

Cronbach's Alpha of Variable

Variable	Cronbach's Alpha	No of item
Attitudes	0.86	35
Concern	0.90	20
Obstacles	0.93	33
Strategies	0.91	18
Adopters categories	0.91	23

Table 4.1 shows the reliability of the instruments for teachers' attitudes toward ICT, teachers' stages of concern, obstacles in technology integration, technology integration strategies and adopters' categories. The measurement of these variables is considered good, because the Cronbach's Alpha values for all variables were above value .8 (Sekaran 2003). According to Hair et al. (2006), items which have factor loadings below .3 or have double loading are to be deleted. Based on the above reason some items were deletes as follows: five items from attitudes scale, 15 items from concern scale, one item from adopters categories scale and one item from strategies scale. So the overall omission of items a mounted to 22 items.

4.3 Respondent Rate

A total of 360 questionnaires were distributed equally to English, Math and Science teachers (120 questionnaires for each group) in the Amman area for data collection purpose. The questionnaires were distributed and collected personally by the researcher. Of the 360 for statistical purpose only 345 questionnaires representing 91% were usable. The remaining 15 questionnaires were incomplete and were excluded from this study.

4.4 Profile of Respondents

The sample consisted of 345 teachers, 155 received training and 190 did not receive training. They taught English, Math and Science and are from different groups of experience. Their profile as follows.

Table 4.2

Teachers' profile

Profile	N	%
Range of teaching experience		
1-5	85	25
6-10	67	19
11-15	68	20
16-20	26	8
21 & above	99	29
Total	345	100
Subject matter taught		
English	117	34
Math	113	33
Science	115	33
Total	345	100
Training attendance		
Yes	155	45
No	190	55
Total	345	100

Table 4.2 shows that the number of teachers who belonged to the group with 1-5 years of experience was 85 teachers. This is representing 25% of the overall number of teachers. Those who belonged to the group with 6-10 years of experience were 67, representing 19% of the overall number of teachers. Sixty eight teachers representing 20% of the overall number of teachers belonged to the group with 11-15 years of experience, whereas 26 teachers representing 8% of the overall number of teachers belonged to the group with 16-20 years of experience. Another 99 teachers representing 29% of the overall number of teachers belong to those who have been teaching for more than 21 years.

Subject matter taught was another variable used to profile the teachers. Table 4.2 shows that 117 teachers representing 34% of the overall number of teachers were teachers of English, whereas 113 teachers representing 33% of the overall number of teachers were teachers of Math. Of the total respondents, 115 teachers representing 34% of the overall number of teachers were teachers of Science.

With regard to their training attendance Table 4.2 shows that 155 teachers representing 45% of the overall number of teachers received training courses with regard to integrating computers in schools, whereas 190 teachers representing 55% of the overall number of teachers did not receive training courses.

4.5 QUANTATATIVE DATA ANALYSIS

In this section, the researcher presents and discusses the data in light of the research question.

Question one: What are the levels of stages of concern, attitudes, obstacles faced by the teachers and strategies of technology integration in the teaching and learning process among teachers in Jordanian schools?

To find out the teachers' levels of stage of concern, teachers' attitudes toward integrating ICT in schools, and the obstacles they encountered, and the integration-related strategies they used, an analysis was carried out, where means and standard deviations were calculated. What follows are the results of each of these aspects.

Question one first branch: What are the levels of stages of concern among teachers in Jordanian schools?

As far as the Jordanian teachers' level of stage of concern is concerned, the mean and the standard deviations were calculated. Table (4) provides teachers' answers in details.

Table 4.3

The Levels of Stages of Concern among Jordanian Teachers

The Concern Dimensions	M	SD
Awareness	2.7	.67
Informational	3.6	.87
Personal	3.7	.83
Management	3.2	.86
Consequence	3.7	.68
Collaboration	3.5	.77
Refocusing	3.3	.61
Stages of concern	3.3	.48

It is worth mentioning that some research indicated that the middle point (M = 3.0) is referred to as average (Al-Senaidi et al., 2009; Sam, Othman & Nordin, 2005; Sekaran, 2003; Teo, 2008). Therefore in this study a score between 3.0-3.4 labeled as neutral (N) is considered as moderate. Based on the previous argument, the researcher determined a standardized interval using Kuzus' (2007) formula of 5-1/5=0.8. Based on the formula, the intervals are interpreted as below:

$1 \leq M < 1.8$ very low

$1.8 \leq M < 2.6$ low

$2.6 \leq M < 3.4$ moderate

$3.4 \leq M < 4.2$ high

$4.2 \leq M < 5.00$ very high

Table 4.3 indicates that the teachers' level of concern for integrating computers in schools is moderate.The overall mean and the standard deviation of teachers' responses to all dimensions were 3.3 and .48, respectively. As far as individual categories are concerned, Table 4.3 shows and teachers' personal and consequence concerns received the highest score. The mean and the standard deviation of teachers' responses to the two dimensions were (M =3.7; SD = .83) and (M =3.7; SD = .68) respectively; followed by the informational dimension, with the mean and the standard deviation of teachers' responses were (M=3.6; SD=.82) respectively. Teachers' level of concern is also moderate with regard to the Collaboration, Refocusing, and Management dimensions, where the means and the standard deviations of teachers' responses to these dimensions of the questionnaire were (M=3.5; SD=.77 and M=3.3; SD=.61 and M=3.2; SD=.86) respectively. However, the teachers' level of concern with regard to the awareness dimension is very low, since the mean and the standard deviation of teachers' responses were (M=2.7; SD= .67) respectively.

Table 4.4

The Items of the Levels of Stages of Concern among Jordanian Teachers

The Concern Dimension and Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		M	SD
	N	%	N	%	N	%	N	%	N	%		
Awareness											2.7	.67
1. I don't even know what the technology integration is	59	*17.1*	98	*28.4*	88	*25.5*	86	*24.9*	14	*4.1*	2.7	1.1
2. I am not concerned about this technology integration	70	*20.3*	111	*32.2*	138	*40*	18	*5.2*	8	*2.3*	2.4	.94
3. I am completely occupied with other things	14	*4.1*	35	*10.1*	118	*34.2*	152	*44.1*	26	*7.5*	3.4	.92
4. Although I don't know about this technology integration, I am concerned about things in the area	46	*13.3*	122	*35.4*	81	*23.5*	94	*27.2*	2	*.6*	2.7	1.0
5. At this time, I am not interested in learning about this technology integration	68	*19.7*	129	*37.4*	84	*24.4*	55	*15.9*	9	*2.6*	2.4	1.1
Informational											3.6	.87
6. I have a very limited knowledge about the technology integration	38	*11*	84	*24.3*	94	*27.2*	109	*31.6*	20	*5.8*	3.0	1.1
7. I would like to discuss the possibility of using the technology integration	14	*4.1*	60	*17.4*	76	*22*	153	*44.3*	41	*12.2*	3.4	1.1
8. I would like to know what resources are available if we decide to adopt this technology integration	11	*3.2*	45	*13*	63	*18.3*	182	*52.8*	44	*12.8*	3.6	1.4
9. I would like to know what the use of the technology integration will require in the immediate future	5	*1.4*	36	*10.4*	67	*19.4*	196	*56.8*	41	*11.9*	3.7	.87
10. I would like to know how this technology integration is better that what we have now	6	*2.3*	27	*7.8*	103	*29.9*	161	*46.7*	46	*13.3*	3.7	1.9
Personal											3.7	.83
11. I would like to know the effect of reorganization on my professional status	7	*2*	51	*14.8*	88	*25.5*	162	*47*	37	*10.7*	3.5	.94

The Concern Dimension and Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		M	SD
	N	%	N	%	N	%	N	%	N	%		
12. I would like to know who will make the decisions in the new system	12	3.5	34	9.9	90	26.1	156	45.2	53	15.4	3.6	.98
13. I would like to know how my teaching or administration is supposed to change	14	4.1	25	7.2	63	18.3	180	52.2	63	18.3	3.7	.98
14. I would like to have more information on time and energy commitments required by this technology integration	13	3.8	36	10.4	75	21.7	156	45.2	65	18.8	3.7	1.0
15. I would like to know how my role will change when I am using the technology integration	5	1.4	39	11.3	44	12.8	180	52.2	77	22.3	3.8	.95
Management											3.2	.86
16. I am concerned about not having enough time to organize myself each day	36	10.4	65	18.8	45	13	152	44.1	47	13.6	3.3	1.2
17. I am concerned about conflict between my interests and my responsibilities	24	7	59	17.1	98	28.4	125	36.2	39	11.3	3.3	1.1
18. I am concerned about conflict between my interests and my responsibilities	20	5.8	66	19.1	135	39.1	98	28.4	26	7.5	3.1	1.0
19. I am concerned about the time spent working with nonacademic problems related to this technology integration	32	9.3	75	21.7	95	27.5	123	35.7	20	5.8	3.1	1.1
20. Coordination of tasks and people is taking too much of my time	18	5.2	64	18.6	110	31.9	122	35.4	31	9	3.2	1.0
Consequence											3.7	.68
21. I am concerned about students' attitudes toward this technology integration	24	7	71	20.6	106	30.7	122	35.4	22	6.4	3.1	1.0
22. I am concerned about the technology integration affects students	16	4.6	94	27.2	107	31	105	30.4	23	6.7	3.1	1.0
23. I am concerned about evaluating my impact on students	0	0	47	13.6	53	15.4	182	52.8	63	18.3	3.8	.91
24. I would like to excite my students about their part in this approach	4	1.2	34	9.9	89	25.8	157	45.5	61	17.7	3.7	.92

The Concern Dimension and Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		M	SD
	N	%	N	%	N	%	N	%	N	%		
25. I would like to use feedback from students to change the program	5	1.4	23	6.7	98	28.4	169	49	50	14.5	3.7	.85
Collaboration											3.5	.77
26. I would like to help other faculty in their use of this technology integration	3	.9	46	13.3	104	30.1	150	43.5	42	12.2	3.5	.90
27. I would like to develop working relationships with our faculty and outside faculty using this technology integration	6	1.7	50	14.5	117	33.9	126	36.5	46	13.3	3.5	.95
28. I would like to familiarize other departments or persons with the progress of this new approach	2	.6	41	11.9	106	30.7	153	44.3	43	12.5	3.6	.88
29. I would like to coordinate my efforts with others to maximize the technology integration effects	1	.3	43	12.5	111	32.2	140	40.6	50	14.5	3.6	.90
30. I would like to know what other faculty are doing in this area	6	1.7	37	10.7	100	29	147	42.6	55	15.9	3.6	.94
Refocusing											3.3	.61
31. I now know of some other approaches that might work better	9	2.6	69	20	141	40.9	77	22.3	49	14.2	3.3	1.0
32. I am concerned about revising my use of the technology integration	13	3.8	54	15.7	173	50.1	78	22.6	27	7.8	3.2	.91
33.I would like to revise the technology integration instructional approach	26	7.5	33	9.6	148	42.9	117	33.9	21	6.1	3.2	.97
34. I would like to modify our use of the technology integration based on the experience of our students	8	2.3	33	9.6	127	36.8	152	44.1	25	7.2	3.4	.85
35. I would like to determine how to supplement, enhance, or replace the technology integration	12	3.5	22	6.4	145	42	139	40.3	27	7.8	3.4	.86

Table 4.4 shows that the two items that had highest responses in the positive categories (either Agree or Strongly Agree) were items number 13 and 15 (N= 243, 71% ; N= 257, 75%) respectively. Both of them belonged to personal dimension which means that teachers were concerned on their abilities to use new innovation in teaching and learning process. On the other hand the two items that had highest response in the negative categories (either Disagree or Strongly Disagree) were items number two and five (N=181, 53%; N=197, 57%) respectively. Both of them belonged to awareness dimension which means that teachers show little concern toward innovation. Also, Table 4.4 shows that the mean for the overall personal dimension received the highest score among all dimensions with mean and standard

deviation (M =3.7; SD = .83) respectively. Whereas, the mean for overall awareness dimension received the lowest score among all dimensions with mean and standard deviation (M = 2.7; SD = .67) respectively.

Question one second branch: What are the attitudes toward ICT integration among teachers in Jordanian schools?

Table 4.5 provides the teachers' attitudes toward ICT integration in details.

Table 4.5

The Levels of Attitudes toward Computer Integration among Teachers in Jordanian Schools

The Attitudes Dimensions	M	SD
Usefulness	3.9	.54
Confidence	3.9	.62
Liking	3.5	.56
Anxiety	2.5	.41
Attitudes toward computer	3.5	.31

Table 4.5 indicates that Jordanian teachers' attitudes toward integrating technology in schools are positive. The overall mean and the standard deviation of the teachers' responses of this scale were (M=3.5; SD= .31) respectively. Table 4.5 shows that the teachers hold the highest positive attitudes toward the usefulness dimension. In particular, the mean and the standard deviation of the teachers' attitudes in this dimension were (M=3.9; SD= .54) respectively.

The teachers also hold positive attitudes related to their confidence of their abilities to use computers in the process of teaching and learning. In particular, the mean and the standard deviation of the teachers' attitudes in this dimension were (M=3.9; SD=.62) respectively. The teachers also indicated partial attitude in liking to integrate ICT in schools. This dimension scored a mean and standard deviation of (M=3.5; SD= .56) respectively. Table 4.5 however, indicates that they are not anxious with regard to ICT integration in schools. This is indicated by the low mean of (M=2.5; SD=.41) for the anxiety dimension. Details of teacher's attitudes toward

computer technologies are shown in tables 4.6 and 4.7. Table 4.6 shows teacher's attitudes on negatively- stated statements and Table 4.7 shows teacher's attitudes on positively- stated statement.

Table 4.6

Teacher's Attitudes toward Computer Technologies (Negatively-stated Statement)

Negative items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		M	SD
	N	%	N	%	N	%	N	%	N	%		
1. Working with a computer would make me very nervous	96	27.8	187	54.2	45	13.0	15	4.3	2	.6	4.0	.80
2. I feel aggressive and hostile toward computers	4	1.2	32	9.3	22	6.4	103	29.9	184	53.3	1.8	1.0
3. Computers make me feel uncomfortable	69	20.0	137	39.7	104	30.1	32	9.3	3	.9	3.7	.92
4. I get a sinking feeling when I think of trying to use a computer	9	2.6	19	5.5	68	19.7	120	34.8	129	37.4	2.0	1.0
5. Computers make me feel uneasy and confused	26	7.5	92	26.7	135	39.1	83	24.1	9	2.6	3.1	.95
6. I'm no good with computers	156	45.2	128	37.1	40	11.6	21	6.1	0	0	4.2	.88
7. I don't think I would do advanced computer work	80	23.2	80	23.2	107	31.0	60	17.4	18	5.2	3.4	1.2
8. I'm not the type to do well with computers	94	27.2	152	44.1	73	21.2	26	7.5	0	0	3.9	.88
9. I think using a computer would be very hard for me	106	30.7	148	42.9	68	19.7	20	5.8	3	.9	4.0	.90
10. I do not think I could handle a computer course	100	29.0	127	36.8	87	25.2	31	9.0	0	0	3.9	.94
11. I do not enjoy talking with others about computers	75	21.7	102	29.6	110	31.9	46	13.3	12	3.5	3.5	1.1
12. I don't understand how some people can spend so much time working with computers and seem to enjoy it	70	20.3	95	27.5	77	22.3	75	21.7	28	8.1	3.3	1.2
13. Figuring out computer problems does not appeal to me	48	13.9	86	24.9	119	34.5	69	20.0	23	6.7	3.2	1.1
14. The challenge of solving problems with computers does not appeal to me.	70	20.3	100	29.0	111	32.2	48	13.9	16	4.6	3.5	1.1
15. I will do as little work with computers as possible	32	9.3	89	25.8	91	26.4	112	32.5	21	6.1	3.0	1.1
16. Learning about computers is a waste of time	196	56.8	96	27.8	31	9.0	18	5.2	4	1.2	4.3	.93
17. I expect to have little use for computers in my daily life	80	23.2	142	41.2	90	26.1	33	9.6	0	0	3.8	.91
18. I can't think of any way that I will use computers in my career	133	38.6	138	40.0	45	13.0	19	5.5	10	2.9	4.0	1.0
19. Anything that a computer can be used for, I can do just as well some other way	24	7.0	67	19.4	126	36.5	104	30.1	24	7.0	2.9	1.0
20. Working with computers will not be important to me in my life's work	112	32.5	148	42.9	55	15.9	25	7.2	5	1.4	4.0	.95

Table 4.6 shows teacher's attitudes towards computer technologies on negatively-stated statements. In general teachers revealed a moderate positive attitude towards computer technologies. The two items that had the highest response in the negative categories were items six and 16 (N=284, 82%; N=292, 85%) respectively. Both of them belonged to the confidence and usefulness dimensions respectively. This could be due to the fact that MoE in Jordan provide teachers with sufficient training that helps Jordanian teachers to get self confidence in dealing with computers. Table 4.6 also shows that 16 out of 20 items obtain means between 3.0 and 4.3 which confirmed the above argument that Jordanian teachers have moderate positive attitudes toward computers.

Table 4.7

Teacher's Attitudes towards Computer Technologies (Positive-stated Statements)

Positive Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		M	SD
	N	%	N	%	N	%	N	%	N	%		
1. Computers do not scare me at all	130	37.5	138	40	45	13	24	7	8	2.3	2.0	1.0
2. I do not feel threatened when others talk about computers	103	29.9	147	42.6	43	12.5	36	10.4	16	4.6	2.2	1.1
3. It wouldn't bother me at all to take computer courses	155	44.9	123	35.7	44	12.8	20	5.8	3	.9	1.8	.93
4. I would feel at ease in a computer class	59	17.1	148	42.9	104	30.1	23	6.7	11	3.2	2.4	.95
5. I would feel comfortable working with a computer	74	21.4	143	41.4	90	26.1	26	7.5	12	3.5	2.3	1.0
6. Generally, I would feel OK about trying a new problem on the computer	4	1.2	17	4.9	54	15.7	169	49.0	101	29.3	4.0	.87
7. I could get good grades in computer courses	13	3.8	12	3.5	81	23.5	152	44.1	87	25.2	3.8	.97
8. I am sure I could do work with computers	11	3.2	24	7.0	30	8.7	172	49.9	108	31.3	4.0	.98
9. I have a lot of self-confidence when it comes to working with computers	14	4.1	35	10.1	107	31.0	146	42.3	43	12.5	3.5	.97
10. I am sure I could learn a computer language	6	1.7	14	4.1	33	9.6	184	53.3	108	31.3	4.1	.85
11. I would like working with computers	2	.6	25	7.2	51	14.8	151	43.8	116	33.6	4.0	.91
12. think working with computers would be enjoyable and stimulating	6	1.7	22	6.4	36	10.4	157	45.5	124	35.9	4.1	.93
13. If a problem is left unsolved in a computer class, I would continue to think about it afterward	13	3.8	16	4.6	45	13.0	163	47.2	108	31.3	4.0	.99
14. When there is a problem with a computer run that I can't immediately solve, I would stick with it until I have the answer	19	5.5	59	17.1	66	19.1	164	47.5	37	10.7	3.4	1.1
15. Once I start to work with the computer, I would find it hard to stop	15	4.3	94	27.2	97	28.1	112	32.5	27	7.8	3.1	1.0
16. I will use computers many ways in my life	5	1.4	15	4.3	46	13.3	187	54.2	92	26.7	4.0	.84
17. Learning about computers is worthwhile	5	1.4	5	1.4	33	9.6	131	38.0	171	49.6	4.3	.82
18. I'll need a firm mastery of computers for my future work	7	2.0	37	10.7	31	9.0	135	39.1	135	39.1	4.0	1.0
19. Knowing how to work with computers will increase my job possibilities	14	4.1	20	5.8	48	13.9	164	47.5	99	28.7	3.9	1.0
20. It is important to me to do well in computer classes	6	1.7	23	6.7	39	11.3	184	53.3	93	27.0	4.0	.90

Table 4.7 shows teacher's attitudes towards computer technologies on positively-stated statements. In general teachers revealed a positive attitude towards computer technologies except the first five items that belonged to anxiety dimension. this means the Jordanian teachers had high anxiety toward computer. The mean for these items is only 2.1. Most other items had more than 75% of the responses in the two positive categories; Agree and Strongly Agree for positively-stated statements. The two items that had the highest response in the positive categories were items 17 and 18 (N= 302, 88%; N= 270, 78%) respectively. Both of them belonged to the

usefulness dimension. Also, Table 4.7 shows that 15 out of 20 items obtain means between 3.1 and 4.1 which confirmed the above argument that Jordanian teachers have moderate positive attitudes toward computers.

Question one third branch: What are the levels of obstacles in technology integration among teachers in Jordanian schools?

Where the obstacles that teachers encounter when they integrate ICT in schools are concerned, the findings indicated that teachers encountered high levels of obstacles. Table 4.8 provides the means and the standard deviations of the dimensions related to the obstacles in details.

Table 4.8

The levels of Obstacles in Technology Integration among Teachers in Jordanian Schools

The obstacles Category	**M**	**SD**
Time-related obstacles	3.4	.76
Training-related obstacles	3.1	.70
insufficient Funding	3.1	.85
Equipment and access-related obstacles	3.0	.78
Obstacles related to administration leadership	3.0	.80
Computer self efficiency	2.9	.79
Obstacles faced by teachers	3.1	. 64

It is clear from Table 4.8 that teachers encountered obstacles when they integrated ICT in the classroom. This is indicated by the moderate overall mean of all dimensions related to the obstacles of integrating ICT in schools. The overall mean and the standard deviation were (M=3.1; SD=.64) respectively. A detailed analysis of teachers' answers indicates that the teachers encountered moderate level of time-related obstacles, with a mean and a standard deviation of (M=3.4; SD=.76) Similar

level of obstacles is reported for obstacles related to insufficient funding. This dimension scored a mean and a standard deviation of (M=3.1; SD=.85) respectively. The teachers also indicated that they encountered moderate level of obstacles related to training, the mean and the standard deviation of which were (M=3.1; SD=.70) respectively. Teachers also indicated that they encountered moderate level of access and equipment-related obstacles and administration and leadership obstacles, of which the mean and the standard deviation were (M=3.0; SD=.78; and M=3.0, SD=.80) respectively. Table 4.8 also shows that teachers encountered low level of computer self efficacy; the mean and the standard deviation of which were (M=2.9; SD=.79) respectively.

Table 4.9

The Items of the levels of Obstacles in Technology Integration among Teachers in Jordanian Schools

The Obstacle Dimension	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		M	SD
	N	%	N	%	N	%	N	%	N	%		
Time											3.4	.76
1. While designing my course(s), I feel that the inclusion of technology requires too much of my time	45	13	38	11	61	17.7	164	47.5	37	10.7	3.3	1.2
2. Technology integration into teaching and learning requires too much of my class preparation time.	26	7.5	48	13.9	58	16.8	164	47.5	49	14.2	3.5	1.1
3. Technology integration requires too much time within my course delivery	20	5.8	41	11.9	86	24.9	155	44.9	43	12.5	3.5	1.0
4. Using technological means (e.g. email, Blackboard email, etc.) to communicate with my students requires too much of my time.	16	4.6	57	16.5	103	29.9	145	42	24	7	3.3	98.
5. Lack of enough time to develop instruction that uses computers	29	8.4	57	16.5	77	23.3	129	37.4	53	15.4	3.4	1.2
Training											3.1	.70
6. There are limited institutional training opportunities at my school.	31	9	79	22.9	95	27.5	105	30.4	35	10.1	3.1	1.1
7. My school does not provide enough training opportunities that target the use of technology in instruction	47	13.6	97	28.1	85	24.6	85	24.6	31	9	2.9	1.2
8. Lack of training in pre-service period	38	11	70	20.3	82	23.8	117	33.9	38	11	3.1	1.2
9. Lack of training during in-service period	28	8.1	91	26.4	98	28.4	104	30.1	24	7	3.0	1.1
10. Technology training is offered at inconvenient times	30	8.7	54	15.7	61	17.7	132	38.3	68	19.7	3.5	1.2
11. Generic technology training is irrelevant to teacher needs	32	9.3	98	28.4	127	36.8	53	15.4	35	10.1	2.9	1.1
12. There is a lack of sufficient technology training.	21	6.1	83	24.1	69	20	131	38	41	11.9	3.3	1.1
Insufficient funding											3.1	.85

The Obstacle Dimension	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		M	SD
	N	%	N	%	N	%	N	%	N	%		
13. There are too few computers for the numbers of students	55	15.9	83	24.1	54	15.7	87	25.2	66	19.1	3.1	1.4
14. Limited materials provided by the ministry of education	17	4.9	65	18.8	82	23.8	146	42.3	35	10.1	3.2	1.3
15. There are too few computers for individual school	51	14.8	105	30.4	58	16.8	75	21.7	56	16.2	2.9	1.2
There is lack inadequate financial support for the development of instructional use of computer	49	14.2	53	15.4	79	22.9	115	33.3	49	14.2	3.3	1.2
17. Financial support for computer integration from administration is inadequate.	50	14.5	71	20.6	112	32.5	75	21.7	37	10.7	3.3	1.1
18. There is insufficient fund to purchase equipment or software	33	9.6	46	13.3	89	25.8	133	38.6	44	12.8	2.9	1.3
Administration leadership											3.0	.78
19. There is little or no administrative support for the integration of technology into teaching and learning.	56	16.2	116	33.6	71	20.6	73	21.2	29	8.4	2.7	1.2
20. There is little administrable sharing, discussion, in my school	49	14.2	130	37.7	76	22	56	16.2	34	9.9	2.7	1.2
21. Lack of rewards or incentives	38	11	39	11.3	73	21.2	113	32.8	82	23.8	3.5	1.3
22. Lack of inspiration from leadership	43	12.5	82	23.8	101	29.3	87	25.2	32	9.3	3.0	1.2
23. Commitment from supervisors	31	9	69	20	124	35.9	98	28.4	23	6.7	3.0	1.1
Equipment and access											3.0	.80
24. I cannot depend on access to essential software and hardware	27	7.8	80	23.2	101	29.3	105	30.4	32	9.3	3.1	1.1
25. Hardware is unstable and always breaking down	32	9.3	56	16.2	105	30.4	99	28.7	53	15.4	3.3	1.2
26. Computer manual and materials are inadequate and unhelpful	49	14.2	107	31	64	18.6	91	26.4	34	9.9	2.9	1.2
27. Poorly designed software applications	33	9.6	82	23.8	125	36.2	83	24.1	22	6.4	2.9	1.1
28. Software is not adaptable for meeting students' needs	39	11.3	112	32.5	114	33	61	17.7	19	5.5	2.7	1.1
Computer self efficiency											2.9	.79
29. I lack essential knowledge of how to effectively integrate technology into instruction to benefit student learning.	22	6.4	81	23.5	70	20.3	138	40	34	9.9	3.2	1.1
30. Insufficient knowledge, skills and experience about how integrating technology	33	9.6	82	23.8	60	17.4	130	37.7	40	11.6	3.2	1.2
31. I face difficult when I am working on a personal computer	82	23.8	155	44.9	51	14.8	42	12.2	15	4.3	2.3	1.1
32. I can not use a variety of program (software)	57	16.5	103	29.9	80	23.2	75	21.7	30	8.7	2.8	1.2
33. Lack of advanced skills within a specific program	35	10.1	64	18.6	85	24.6	140	40.6	21	6.1	3.1	1.1

Table 4.9 present the details of the distribution of the responses on obstacles, also Table 4.9 shows that the two items that had the highest responses in positive categories (either Agree or Strongly Agree) were items number two and three (N=; 213, 62%; N= 201,58%) respectively. Both of them were related to time- related obstacle which means that teachers considered time as the main obstacle that prevented them from integrating technology in the classrooms. On the other hand, the two items that had the highest response in negative categories (either Disagree or Strongly Disagree) were items number 20 and 31 (N= 179, 52%; N= 237, 69%) respectively. Both of them belonged to administration leadership- related obstacle and computer self efficacy-related obstacle which means that teachers did not consider administration and their computer skills as real obstacles once they have integrated technology in the classrooms. This is because the Ministry of Education provided the schools with new equipment and encouraged the teachers to use it. Also Table 4.4 shows that the mean for overall time-related obstacle dimension received the highest score among all dimension with mean and standard deviation (M =3.4; SD = .76) respectively. Whereas, the mean for overall of administrative leadership-related obstacle and self efficacy-related obstacle dimensions received the lowest score among all dimensions with mean and standard deviation (M = 3.0; SD = .78 and M = 2.9; SD = .79) respectively.

Question one fourth branch: What are the levels of integration strategies among teachers in Jordanian schools?

As far as the extent to which the teachers employed strategies in the process of integrating ICT in schools is concerned, the findings of the study indicated that teachers employed such strategies to a moderate extent. Table 4.10 includes the mean and the standard deviation of the level of using integration strategies.

Table 4.10

The Levels of Technology Integration Strategies among Teachers in Jordanian Schools

The Strategies of technology Integration	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		M	SD
	N	%	N	%	N	%	N	%	N	%		
1. I assign daily or weekly computer-related tasks that support my curriculum (analyzing data from a survey, creating multimedia presentations that showcase students' understanding of important content researching information via CD's or the internet)	37	*10.7*	61	*17.7*	135	*39.1*	94	*27.2*	18	*5.2*	3.0	1.0
2. I provide short-term (daily or weekly) assignments using the classroom computer(s) that emphasize the use of different software applications (spreadsheets, databases, Internet use, multimedia	27	*7.8*	84	*24.3*	138	*40*	90	*26.1*	6	*1.7*	2.9	.94
3. I alter my instructional use of the classroom computer(s) based upon the newest software applications and research on teaching, learning, and standards-based curriculum.	27	*7.8*	60	*17.4*	132	*38.3*	107	*31*	19	*5.5*	3.1	1.0
4. I seek professional development, software applications, and peripherals that maximize the use of the endless array of computers and technology available to my students	13	*3.8*	50	*14.5*	138	*40*	116	*33.6*	28	*8.1*	3.3	.94
5. I allocate time for students to practice their computer skills on the classroom computer(s)	5	*1.4*	48	*13.9*	129	*37.4*	142	*41.2*	21	*6.1*	3.4	.85
6. Using the classroom computer(s) is not a priority for me this school year	18	*5.8*	101	*29.3*	111	*32.2*	103	*29.9*	12	*3.5*	3.0	.97
7. I integrate the most current research on teaching and learning when using the classroom computer(s)	9	*2.6*	62	*18*	148	*42.9*	107	*31*	19	*5.5*	3.2	.89
8. Students in my classroom participate in on- line interactive projects with other schools to solve relevant problems (not including exchanging email)	42	*12.2*	108	*31.3*	114	*33*	66	*19.1*	15	*4.3*	2.7	1.0
9. My students' authentic problem-solving is supported by continuous access to a vast array of current computer-based tools and technology	35	*10.1*	103	*29.9*	115	*33.3*	79	*22.9*	13	*3.8*	2.8	1.0

The Strategies of technology Integration	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		M	SD
	N	%	N	%	N	%	N	%	N	%		
10. It is easy for me to evaluate software applications to determine whether the use of the computer(s) is seamlessly linked to students' critical thinking skills and authentic problem solving	8	2.3	69	20	157	45.5	97	28.1	14	4.1	3.1	.86
11. My students use the Internet for collaboration with others, publishing, communication, and research to solve authentic problem	22	6.4	87	25.2	133	38.6	85	24.6	18	5.2	3.0	1.0
12. I have the background to show others how to merge technology with integrated thematic curricula	16	4.6	119	34.5	115	33.3	73	21.2	22	6.4	2.9	1.0
13. I seek out activities that promote increased problem-solving and critical thinking using the classroom computer(s)	16	4.6	52	15.1	113	32.8	139	40.3	25	7.2	3.3	1.0
14. I plan computer-related activities in my classroom that will improve my students' basic skills (e.g. reading, writing, Math computation)	14	4.1	54	15.7	110	31.9	148	42.9	19	5.5	3.3	.94
15. In my classroom, students use technology-based computer and Internet resources beyond the school (government agencies, private sector) to solve authentic problems	21	6.1	104	30.1	114	323	79	22.9	27	7.8	3.0	1.0
16. It is easy for me to design student-centered, integrated curriculum units that use the classroom computer(s) in a seamless fashion	22	6.4	95	27.5	135	39.1	79	22.9	14	4.1	2.9	.96
17. Using cutting edge technology and computers, I have stretched the limited instructional computing in my classroom	14	4.1	43	12.5	157	45.5	102	29.6	29	8.8	3.0	.56
18. Students taking action at school or in the community relating to the content learned in class is a vital part of my approach to using the classroom computer(s)	12	3.5	80	23.2	129	37.4	107	31	17	4.9	3.1	.93
19. My students discover innovative ways to use the endless array of classroom computers to make a difference in their lives and in their community	31	9	116	33.6	119	34.5	64	18.6	15	4.3	3.0	1.0
Overall											3.0	.56

Table 4.10 shows that the two items that had the highest responses in the positive categories (either Agree or Strongly Agree) were items number 14 and 15 (N= 164,48% ; N= 167, 49%) respectively. On the other hand, the two items that had the highest response in negative categories (either Disagree or Strongly Disagree) were items number eight and ten (N=150, 44%; N=147, 43%) respectively. Also Table

4.10 shows that 12 out 19 items obtain means of between 3.0 and 3.4 and the overall mean of ICT integration strategies is 3.0 which mean that Jordanian teachers integrated ICT moderately.

Question two: Based on Rogers' adopter categories, who among the Jordanian teachers are the early and late adopters?

Teachers were asked indirectly to identify themselves as early or late adopters. This integration -related aspect is discussed in light of Rogers' adopter categories, which divide teachers into either early or late adopters. Chart 4.1 shows the distribution of the teachers as belonging to either early or late adopters.

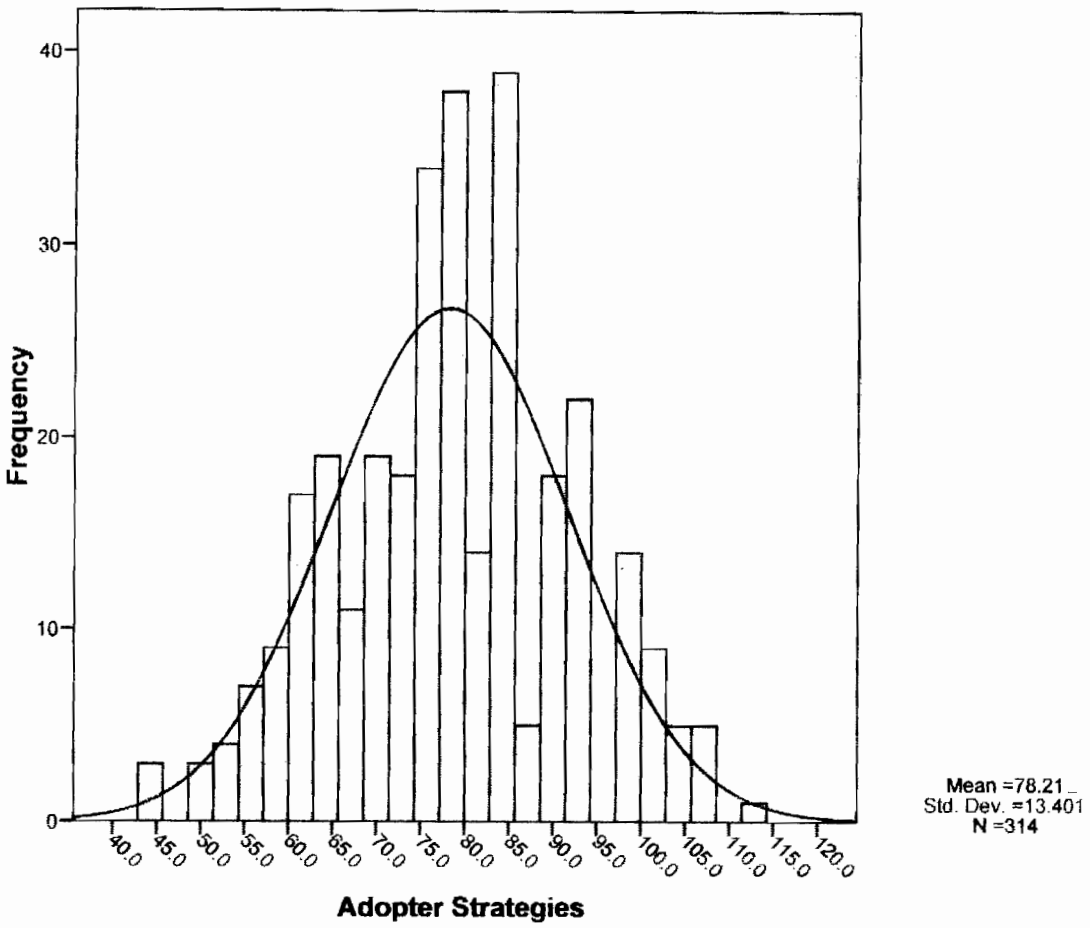

Chart 4.1 The Distribution of Teachers as Early or Late Adopters

Chart 4.1 shows that late adopters constitute the overwhelming majority of the subjects. The number of teachers who belonged to this category was 262 teachers representing 83% of the overall number of teachers. The number of teachers who belonged to the early adopter category, on the other hand, was 52 teachers representing 17% of the overall number of teachers. Moreover, respondent were assigned to either earlier adopter (EA) or late adopter (LA) subgroups using scoring procedure developed by Anderson, Varnhagen, and Campbell (1997) in similar study on adoption pattern. The scoring procedure was developed on the basis of the assumption that EAs have come to use these technologies earlier and have gained more expertise relatively to majority faculty (Anderson, Varnhagen, and Campbell,

1999). A composite score was calculated for innovativeness of faculty by adding the self-rated expertise level of each individual faculty member (i.e., 5 for None, 4 for little, 3 for fair, 2 for substantial, and 1 for extensive). The self-rated expertise level was given for each of the 24 types of computer software and tools and the lowest possible score is 24. The scores giving a range of between 24-120. A user with a score of 120 is considered as nonuser while a score of 24 refers to an extensive user. For this study, the scores obtained ranged from 44-114. Rogers categorized the top 17% as early adopters and the remaining 83% as late adopters. Those teachers (52) who scored below the cut point of 64 are considered as early adopters. The remaining 162 are considered as late adopters.

Question three: What are the distributions of early and late adopters among Jordanian teachers in term of teaching experience?

A more profound analysis of the data was done to determine the number and the percentage of teachers who belong to the early and late adopter in terms of their teaching experience, which was divided into five groups, viz.1-5, 6-10, 11-15, 16-20, 21 & above. Chart 4.2 represents the percentage of teachers who belong to either of the adopter categories within each group of experience.

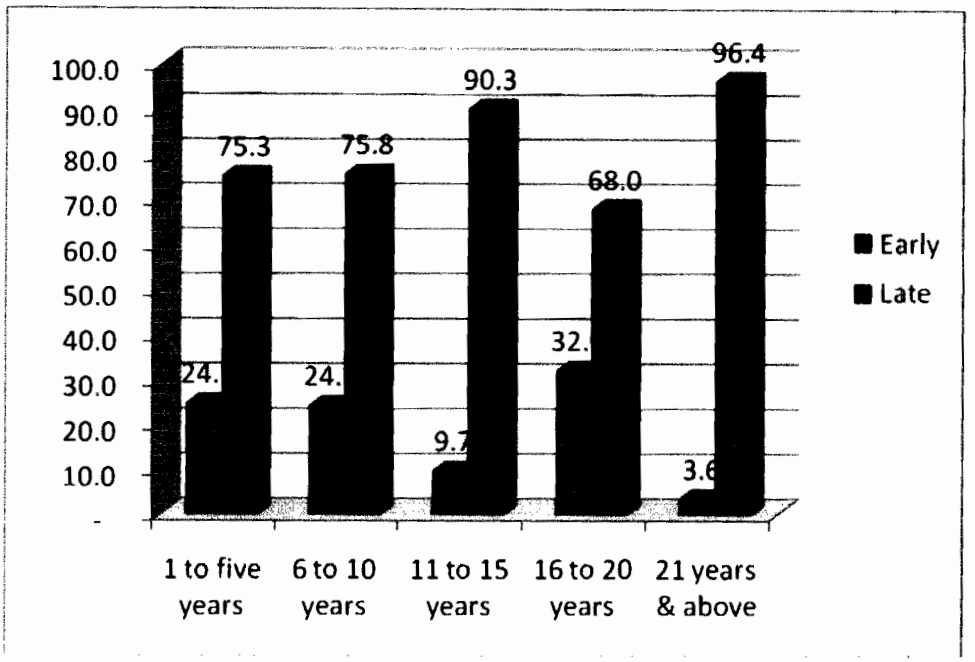

Chart 4.2 The Distribution of Early and Late Adopters Among Jordanian Teachers in Term of Teaching experience

Chart 4.2 shows that teachers who belonged to the late adopter category constituted the majority of teachers in all experience groups which means that regardless of their teaching experience, most of Jordanian teachers are late adopters. This could be especially true with senior teachers (21 years of teaching experience & above) where 96% are late adopters. Of the five groups, the highest number of early adopter is the 16-20 years of experience group: This could be due to the fact that computers were newly introduced and was not common in the Jordanian schools 20 years ago.

Of the teachers who belonged to the group with 6-10 years of experience, 15 teachers representing 24% of the overall number of teachers were early adopters, whereas 47 teachers, representing 76% were late adopters.

Of the respondents who belonged to the group with 11-15 years of experience, 6 teachers representing 10 % of the overall number of teachers were early adopters, whereas 56 teachers, representing 90% were late adopters.

Of the respondents who belonged to the group with 16-20 years of experience, 8 teachers representing 32% of the overall number of teachers were early adopters, whereas 17 teachers, representing 68% were late adopters.

Of the respondents who belonged to the group with 21 year of experience, 3 teachers representing 4% of the overall number of teachers were early adopters, whereas 81 teachers, representing 96% were late adopters.

Question four: What are the distributions of early and late adopters among Jordanian teachers in term of subject matter taught?

Another analysis aimed at figuring out the distribution of teachers as either early or late adopters in relation to the subject matter they taught was conducted. Chart 4.3 describes the results of this investigation.

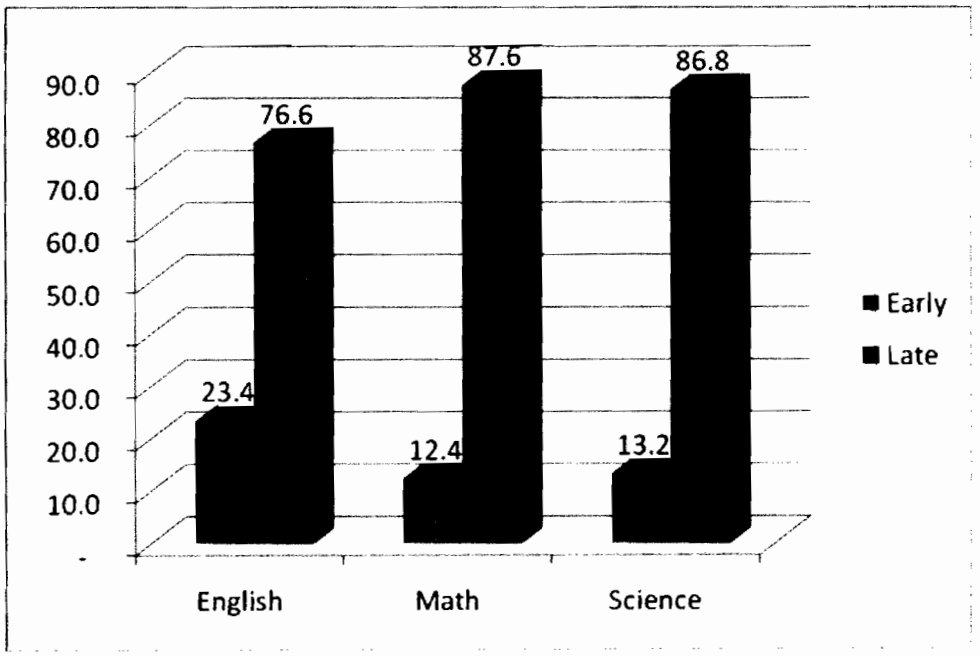

Chart 4.3 The Distribution of Early and Late Adopters Among Jordanian Teachers in Term of Subject Matter Taught

As shown in Chart 4.3 the majority of teachers, regardless of the subject matter they taught, were late adopters. More specifically, 26 teachers representing 23% of

the overall number of teachers who taught English were early adopters, whereas 85 teachers representing 77% of the overall number of teachers who taught English were late adopters.

Chart 4.3 shows that 12 teachers representing 12% of the overall number of teachers who taught Math were early adopters, whereas 85 teachers representing 88% of the overall number of teachers who taught Math were late adopters.
Of the respondents, 14 teachers representing 13% of the overall number of teachers who taught Science were early adopters, whereas 92 teachers representing 87% of the overall number of teachers who taught Science were late adopters.

Question five: What are the distributions of early and late adopters among Jordanian teachers in term of training attendance?

In order to find out the distribution of early and late adopters among Jordanian teachers in terms of training attendance, frequencies as well as percentages were used to indicate the distribution of teachers. Table 4.4 represents the results related of this line of investigation.

Table 4.11

The Distribution of Early and Late Adopters among Jordanian Teachers in Term of Training Course Attendance

	Yes	No
Early Adopters	43	9
Late Adopters	100	162

As shown in Table 4.11 the majority of teachers belonged to the category of late adopters, notwithstanding whether they attended training courses related to ICT integrating in schools or not. Specifically, 43 teachers representing 30% of the overall number of teachers who attended computer integration-related courses were early adopters, whereas 100 teachers representing 70% of the overall number of teachers who attended training courses were late adopters.

Where teachers who did not attend training courses were concerned, the findings indicated that only 9 teachers representing 5 % of the overall number of teachers were early adopters, whereas 162 teachers representing 95% of the overall respondents were late adopters.

Question six: Are there any significant differences in Jordanian teachers' stages of concern towards technology based on their teaching experience, subject matter taught and training attendance?

One line of investigation is concerned with finding out whether there were differences in the teachers' stages of concern with regard to their experience, the subject matter they taught, and training attendance. What follows is a description of the results related to this line of investigation.

Question six branch A: Are there any significant differences in Jordanian teachers' stages of concern towards technology based on their teaching experience?

To determine whether there were significant differences in the teachers' stage of concern toward technology, the one way ANOVA was performed. Table 4.12 provides results of one way ANOVA performed to address the above research question.

Table 4.12

Group Differences for Teachers' Stages of Concern towards Technology Based on Their Teaching Experience (One-way ANOVA)

Variable	M	SD	F	Df
Group of Experience			2.24	4,309
1-5	3.7	.51		
6-10	3.8	.58		
11-15	3.6	.56		
16-20	3.5	.52		
21 and above	3.6	.47		
Overall	3.6	.53		

The analysis of variance revealed that there is no significant differences in Jordanian teachers stage of concern, (F (4.309) = 2.24.

Question six branch B: Are there any significant differences in Jordanian teachers' stages of concern towards technology based on the subject matter taught?

In order to find out whether there were statistically significant differences in teachers' stages of concern on the basis of the subject matter they taught, the One-WAY ANOVA was utilized. Table 4.13 indicates the results of the One-WAY ANOVA.

Table 4.13

Group Differences for Teachers' Stages of Concern towards Technology Based on Their Subjects Matter Taught (One-way ANOVA)

Variables	M	SD	F	Df
Subjects			.55	2,311
English	3.7	.57		
Math	3.7	.55		
Science	3.6	.47		
Overall	3.6	.53		

With regard to teacher's stages of concern in term of their subject matter taught, the analysis of variance revealed that there is no significant differences among the three subject matter taught, F(2,311) = .55.

Question six branch C: Are there any significant differences in Jordanian teachers' stages of concern towards technology based on the training course received?

The Independent-sample t-test was used as a statistical test to find out whether there were statistically significant differences in teachers' stages of concern in terms of receiving a training course. Table 4.14 provides the results of this test.

Table 4.14

Group Differences for Teachers' Stages of Concern towards Technology Based on Their Training Attendance (Independent-sample t-test)

	Training Attendance	N	M	SD	T	Df
Stages of Concern	Yes	143	3.7	.59	2.77*	312
	No	171	3.6	.46		

*p<.05

Teachers who attended training courses (M = 3.7, SD = .59) reported higher level of teachers' stages of concern than teachers who did not attend training courses (M = 3.6, SD .46). The t statistics, t (312) = 2.77 was significant at the .05 level, two tailed

Question seven: Are there any significant differences in obstacles of technology integration based on teaching experience, subject matter taught and training attendance?

One line of investigation is concerned with finding out whether there were differences in teachers' obstacles toward technology with regard to their experience, the subject matter they taught, and training attendance. What follows is a description of the results related to this line of investigation.

Question seven branch A: Are there any significant differences in obstacles of technology integration based on teaching experience?

The one-way ANOVA was utilized to find out whether there were statistically significant differences in the extent to which teachers encountered obstacles in technology integration in terms of their teaching experience. Table 4.15 describes the results of this test.

Table 4.15

Group Differences for Teachers' Obstacles in Technology Integration Based on Their Teaching Experience (One-way ANOVA)

Variable	M	SD	F	Df
Group of Experience			8.61*	4,309
1-5	2.9	.50		
6-10	3.0	.69		
11-15	3.2	.59		
16-20	3.4	.74		
21 & above	3.4	.59		
Overall	3.1	.63		

*p<.05

as shown in Table 4.15 there were significant differences between group teacher in obstacles toward technology in term of teaching experience F(4,309) = 8.61.

Further more, post- hoc analysis was performed using the Scheffe post-hoc analysis procedure to identify exactly where significant differences exist. The Scheffe post-hoc analysis procedure showed that there were statistically significant differences in the obstacles that faced by teachers in terms of the teaching experience between the groups with 1-5 and 6-10 year of experience , and the groups with 16-20 and 21& above year of experience. The groups with 16-20 and 21& above year of experience (M = 3.4; SD = .74 and M = 3.4; SD = .59) respectively have higher level of obstacles when they employed technology than the groups with 1-5 and 6-10 year of experience (M= 2.9; SD= .50 and M = 3.0; SD = .69) respectively.

Question seven branch B: Are there any significant differences in obstacles of technology integration based on the subject matter taught?

The one-way ANOVA test was utilized to find out the extent to which teachers who taught different subject encountered obstacles in general. Table 4.16 provides the results of this analysis in details.

Table 4.16

Group Differences for Teachers' Obstacles in Technology Integration Based on Their Subjects Matter Taught (One-way ANOVA)

Variables	M	SD	F	Df
Subjects			20.72*	2,311
English	2.8	.69		
Math	3.2	.51		
Science	3.3	.55		
Total	3.1	.63		

*p<.05

The finding in Table 4.16 shows that there are significant differences between group of teacher's obstacles toward technology in term of subject matter taught F(2,311) = 20.72.

Further more, post- hoc analysis was performed using the Scheffe post-hoc analysis procedure to identify exactly where significant differences exist. The Scheffe post-hoc analysis procedure showed that there were statistically significant differences in the obstacles that faced by teachers in terms of the subject matter taught. There were statistically significant differences in the obstacles that faced by teachers when they employed technology between teachers of English, on one hand, and teachers of Math and Science, on the other hand. These statistically significant differences were in favor of teachers of Math and Science. Math and Science teachers (M= 3.2, SD= .51; M = 3.3, SD = .55) had significantly higher level of obstacles when they employed technology than English teachers (M= 2.8, SD= .69).

Question seven branch C: Are there any significant differences in obstacles of technology integration based on training attendance?

Independent-sample t-test was used as a statistical test to find out whether there were statistically significant differences in obstacles that faced teacher when they integrated technology based on training attendance. Table 4.17 provides the results of this test.

Table 4.17

Group Differences for Teachers' obstacles in Technology Integration (Independent-sample t-test)

	Training Attendance	N	M	S.D	T	Df
Obstacles	Yes	143	3.0	.60	-2.72*	312
	No	171	3.2	.64		

*p<.05

Teachers who attended training courses (M = 3.0, SD = .60) reported lower level of obstacles when they employed technology than teachers who did not attend training courses (M = 3.2, SD .64). The t statistics, t (312) = -2.72 was significant at the .05 level.

Question eight: Are there any significant differences in technology integration strategies based on teaching experience, subject matter taught and training attendance?

One part of this investigation is concerned with finding out whether there were differences in teachers' technology integration strategies with regard to their experience, the subject matter they taught, and training attendance. What follows is a description of the results related to this line of investigation.

Question eight branch A: Are there any significant differences in technology integration strategies based on teaching experience?

The one-way ANOVA was utilized to find out whether there were statistically significant differences in the extent to which teachers integrated strategies in term of their teaching experience. Table 4.18 describes the results of this test.

Table 4.18

Group Differences for Teachers' Technology Integration Strategies Based on Their Teaching Experience (One-way ANOVA)

Variable	M	SD	F	Df
Group of Experience			4.59*	4,309
1-5	3.2	.56		
6-10	3.2	.53		
11-15	3.0	.50		
16-20	2.9	.61		
21 & above	2.9	.49		
Total	3.1	.54		

*p<.05

The finding in Table 4.18 shows that there were significant differences between groups of teacher's technology technology integration strategies in term of teaching experience (F (4,309) = 4.59.

In addition, Scheffe post-hoc analysis procedure showed that there were statistically significant differences in the teachers' technology integration strategies in terms of the teaching experience between the group with 1-5 year of experience, and the group with 21& above year of experience. The group with 1-5 years of experience (M = 3.2, SD = .56) had significantly higher level of technology integration than the group with 21& year of experience (M= 2.9, SD= .49).

Question eight branch B: Are there any significant differences in technology integration strategies based on the subject matter taught?

The one-way ANOVA test was utilized to find out the extent to which teachers who taught different subject integrated technology strategies for teaching and learning purpose. Table 4.19 provides the results of this analysis in details.

Table 4.19

Group Differences for Teachers' Technology Integration Strategies Based on Their Subjects Matter Taught (One-way ANOVA)

Variables	M	SD	F	Df
Subjects			4.79*	2,311
English	3.2	.60		
Math	3.0	.51		
Science	2.9	.48		
Total	3.1	.54		

*p<.05

The findings in Table 4.19 show that there are significant differences between groups in teacher's technology integration strategies in term of subject matter taught (F (2,311) = 4.79.

In addition, Scheffe post-hoc analysis procedure showed that there were statistically significant differences between groups in the teachers' technology integration strategies in terms of the subject matter taught. There were statistically significant differences in teachers' strategies between teachers of English, on one hand, and teachers of Science, on the other hand. These statistically significant differences were in favor of teachers of English. English teachers (M= 3.2, SD= .60) had significantly higher level of strategies when they employed technology than Science teachers (M= 2.9, SD= .48).

Question eight branch C: Are there any significant differences in technology integration strategies based on training attendance?

Independent-sample t-test was used as a statistical test to find out whether there are statistically significant differences in technology integration strategies based on training attendance. Table 4.20 provides the results of this test.

Table 4.20

The results of the Independent-sample t-test with Regard to the Differences in Technology Integration Strategies Based on Training Attendance

	Training Attendance	N	M	SD	T	Df
Strategies	Yes	143	3.2	.58	3.65*	312
	No	171	3.0	.48		

* p<.05

Teachers who attended training courses (M = 3.2, SD = .58) had higher level of technology integration strategies than teachers who did not attend training courses (M = 3.0, SD .48). The t statistics, t (312) = 3.65 was significant at the .05 level.

Question nine: Is there relationship between teacher's stages of concern and technology integration strategies among teachers in Jordanian schools?

To answer this question, Pearson correlation test was utilized. Table 4.21 provides the results of this test.

Table 4.21

The Relationship between Teacher's Stages of Concern and Technology Integration Strategies

	Concern
Strategies	.43*

* Correlation is significant at the .05 level.

Table 4.21 shows that the value of Pearson Correlation between teachers' stages of concern and technology integration strategies was .43 which was significant at the .05 level. This indicated that there was a significant positive relationship between Teachers' stages of concern and technology integrating strategies.

Question ten: Is there relationship between obstacles faced by the teachers and technology integration strategies among teachers in Jordanian schools?

This study also attempted to find out whether there is a relationship between the obstacles that teachers encountered during the process if ICT integration in schools and the extent to which they employed integration-related strategies. To achieve this end, Pearson Correlation was utilized. Table 4.22 provides the results of this test.

Table 4.22

The Relationship between Obstacles Faced by Teachers and Technology Integration Strategies

	Obstacles
Strategies	-.24*

* Correlation is significant at the .05 level.

Table 4.22 shows that there was a significant negative relationship between the obstacles that teacher encountered when they integrated technology in schools and the extent to which they employed integration-related strategies. In other words, the more teachers encountered obstacles in technology integration, the less they employed integration-related strategies. This is indicated by the fact that the value of Pearson Correlation was -.24 which is significant at the .05 level.

Question eleven: Does teacher's attitudes toward computer moderate the relationship between (stage of concern, and obstacles in technology integration) and strategies of technology integration?

Since the regression is sensitive to abnormal data, histogram is used for checking for normal distribution. If the bars of the histogram follow a similar pattern to bell curve, then this indicates the scores are drawn from a normally distributed population. The normal curves show that dependant variable data are considerably normal distribution with small standard deviation value <0.7, therefore the data are acceptable to be analyzed using parametric test (Hinton, et. al 2004; Green and Slakind; 2006).

To control type 1 and type 2 errors in accepting or rejecting hypothesis, the data normality were tested and normalized by deleting the outlier (violated data). Pallant (2001) stated that inferential statistic such as regression, ONE WAY ANOVA are sensitive with abnormal distribution of sample and outliers data. To minimize the risk of invalid analysis result, outlier distribution strongly suggested to be deleted. In this study, there were 31 outliers deleted.

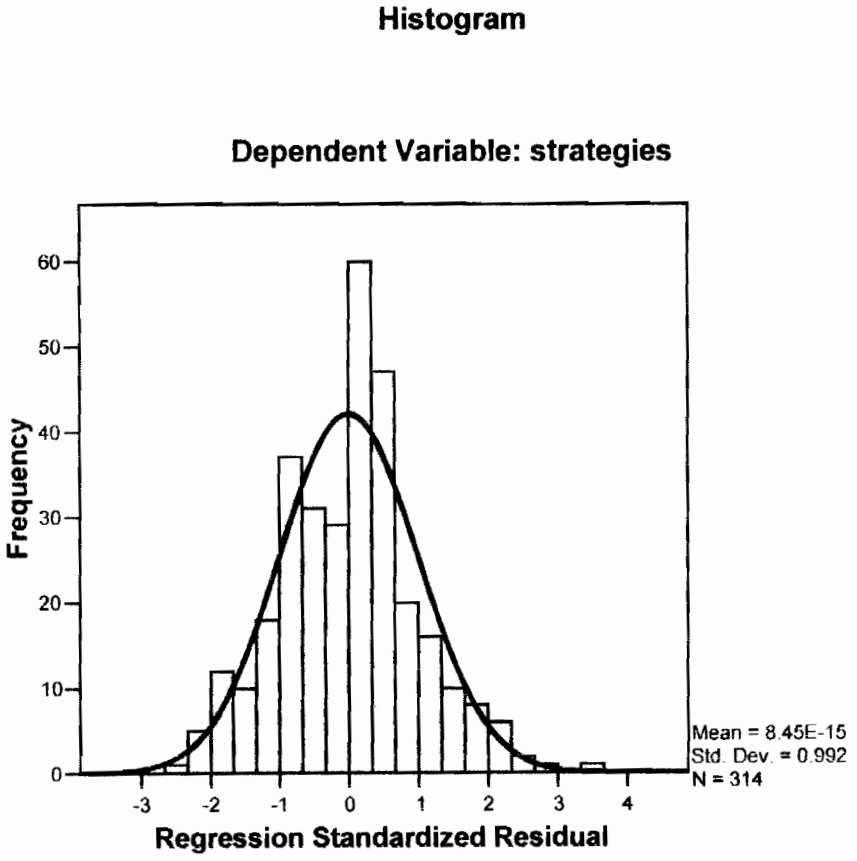

Chart 4.4 Normality distribution represented by histogram

Skewness

Skewness is a measure of the asymmetry of a distribution. The normal distribution is symmetric, and has a skew-ness value of zero. A distribution with a significant positive skew-ness has a long right tail. A distribution with a significant negative skew-ness has a long left tail (Hair, et. al 2006). As a rough guide, a skew-ness value more than twice it's standard error is taken to indicate a departure from symmetry. In this study SPSS was used to evaluate statistically the distribution shape of concern, attitudes, obstacles faced by the teachers and strategies of technology integration. As depicted in Table 4.23 the value of skewness come within -1 and 1. This indicate that these data of concern, attitudes, obstacles faced by the teachers and strategies of technology integration is normally distributed and not skewed or deviated from the standard normal distribution curve Hair, et al. (2006) .

Table 4.23

Skewness Results

Variables	Skewness
Obstacles	-.075
Strategies	.018
Attitudes	.210
Stages of concern	-.120

Since regression is very sensitive with abnormal distribution, Pallant (2001) suggested that it is important to examine normal curve, probability plot and scatter plot before. Scatter plot and probability plot were used to check whether normality assumption is violated or not. If the results of the P-P plot shows that residuals follow the 45-degree line which means that the P-P plot indicates that the normality assumption is obtained. The normal plot (scatterplot) of regression standardized residual for dependent variables also indicates a normal distribution (good scattered).

Then all of the assumptions of regression in this study were obtained. The result of the analysis yielded an accurate statistic results (Pallant, 2006; Green & Salkind, 2006)

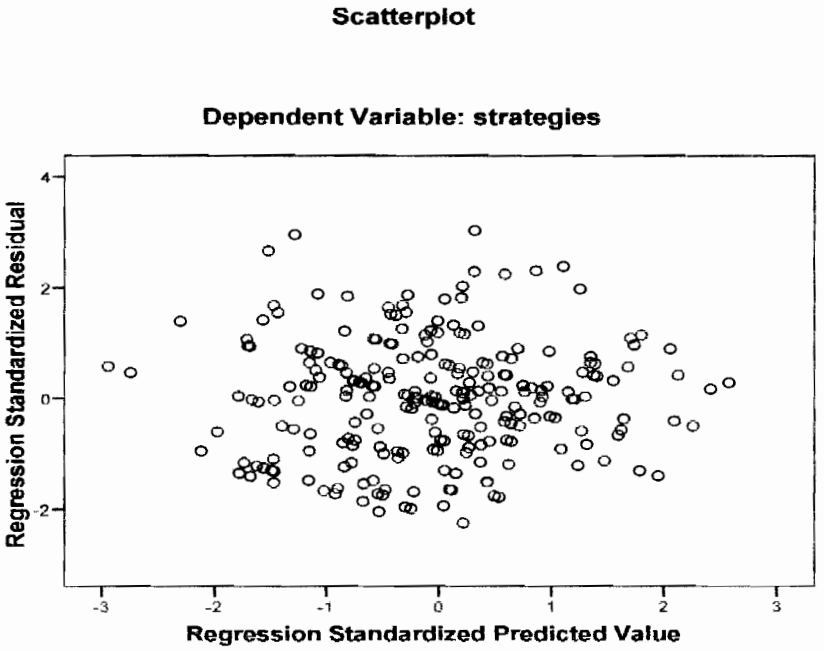

Chart 4.5 The Normal plot (scatterplot) of Regression Standardized Residual

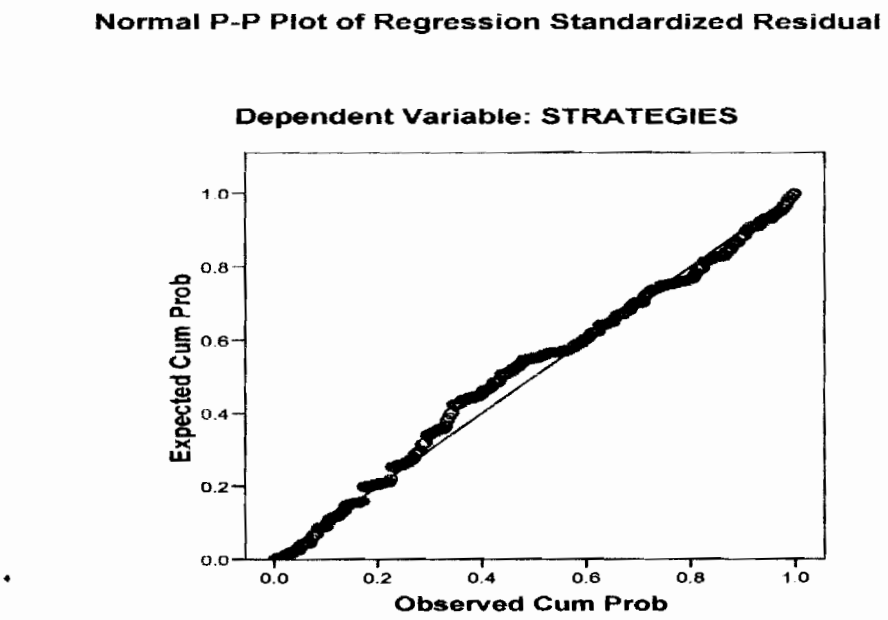

Chart 4.6 P-P plot of Regression Standardized Residual

Multicollinearity

When there is a perfect linear relationship among the predictors, the estimates for a regression model cannot be uniquely computed. The term collinearity implies that two variables are near perfect linear combinations of one another. When more than two variables are involved it is often called multicollinearity, although the two terms are often used interchangeably.

The primary concern is that as the degree of multicollinearity increases, the regression model estimates of the coefficients become unstable and the standard errors for the coefficients can get wildly inflated. In this section, the researcher explored some SPSS commands that help to detect multicollinearity.

Tolerance is a statistic used to determine how much the independent variables are linearly related to one another (multicollinear). VIF or the variance inflation factor is the reciprocal of the tolerance.

As depicted in Table 4.24 it could be concluded that the value of tolerance for all independent variables are more than the cutoff point (0.1) and less that the value of 10 for VIF. This implies that, there is no collinearity problem in this data according to Hair, et al. (2006).

Table 4.24

Collinearity Statistics

Variables	Collinearity Statistics	
	Tolerance	VIF
Obstacles	.995	1.005
Concern	0.569	1.756
Attitudes	0.573	1.744

Question Eleven (Analysis)

Hierarchical regression was used to determine if the attitudes moderate the relationship between obstacles and stages of concerns independent variables upon strategies.

A hierarchical regression analysis is said to go through three main steps, (Sharma et al., 1981). In the first step, model variables were entered; in the second step, moderator variables were entered; and in the third step the results of the interaction between the moderator and independent variables were entered. In what follows is a discussion of the results of the hierarchical regression.

Table 4.25

Hierarchical Regression Analysis

Dependant variable	Independent variable	Std Beta step 1	Std Beta step 2	Std Beta step 3
Strategies of technology integration	Concern	.42*	.32*	-.49
	Obstacles	-.19*	-.19*	1.40*
	Moderating attitudes		.15*	.31
	Interaction term			
	Concern× attitudes			1.14
	Obstacles× attitudes			-1.65*
	R^2	.227	.240	.262
	R^2 change	.227	.013	.022
	F change	45.62	5.48	4.50
	Sig. F change	.000	.020	.012

P*< .05

The Hierarchical regression equation is Y= X1+X2+X1M+X2M+e

Y= Constant
M= Attitudes
X1 = Obstacles
X2= Stages of concern
e = Std. Error

Table 4.25 shows the results of moderated regression analysis the moderating effect of the attitudes on the relationship between stages of concern, obstacles of technology integration and strategies of technology integration. The R^2 change and the F- change are significant from step 1 to 2 and from step 2 to 3 at .05 levels.

As far as the interaction between independent variables and moderator variables is concerned, the analysis indicated that there is no a significant interaction (B=1.14) between stages of concern and attitudes. In contrary the analysis indicated a significant interaction (B=-1.65*) between obstacles of computer technology and attitudes. Consequently, it is safe to say that attitudes are moderator of the relationship between obstacles of computer technology integration and strategies of technology integration. On the other hand, attitudes are not a moderator of the relationship between stages of concern and strategies of technology integration.

4.6 Qualitative Data Analysis

To investigate the integration of ICT in schools, interviews were conducted with 24 teachers; eight of them were teachers of English; eight were teachers of Math and eight were teachers of Science. Each teacher was asked six questions each of which revolves around one aspect of ICT integration[1]. Of course, each teacher was asked to introduce his self, to report the subject matter each teaches and how long each has been teaching. In what follows is the analysis of the qualitative data. The names of the respondents that used in the discussion below are not the real names of the respondents as the researcher promised confidentially and anonymity.

First question: How do you think that the administration could help you to overcome the obstacles that you might face while integrating ICT in teaching process?

The analysis of the interview data indicated that three themes have emerged, viz. the administration plays a major role, the administration plays a minor role and the administration plays no role.

The First theme: The Administration Has a Major Role

The first theme that emerged was the positive role of the administration in overcoming obstacles in integrating ICT. They believed that the administration had a role in overcoming obstacles in technology integration indicating that there were two sub-themes that were extracted, viz. motivating teachers, and overcoming obstacles related to ICT integration.

The analysis of the interview data indicated that 17 teachers reported that they thought that the administration had a role in overcoming obstacles in technology integration. A closer examination of the data indicated that seven teachers of English

[1] In analyzing the qualitative data, what was taken in consideration is the number of the responses for each question rather than the number of teachers, since teachers, in some cases, provided more than one response for every single question.

had such a perception. Among these teachers, three teachers reported that they received training, and four other teachers reported that they did not receive training. Where teachers who received training were concerned, two teachers reported that they belonged to the group with 1-5 years of experience, and one teacher reported that he belonged to the group with 6-10 years of experience. Where those who did not receive training were concerned, one reported that he belonged to the group with 1-5 years of experience; one reported that he belonged to the group with 6-10 years of experience; one reported that he belonged to the group with 11-15 years of experience; one reported that he belonged to the group with 16and above year of experience.

Where teachers of Math were concerned, five teachers reported that the role of the administration was a crucial one. Among these teachers, three teachers reported that they received training; while other two teachers reported that they did not receive training. Among those who received training, one reported that he belonged to the group with 1-5 years of experience; one reported that he belonged to the group with 6-10 year of experience; one reported that he belonged to the group with 11-15 years of experience. While those who did not receive training were concerned, both reported that they belonged to the group with 11-15 years of experience.

As for teachers of Science, the interview data indicated that six teachers reported that they believed that the administration role is the engine of the process of ICT integration. Among these teachers, four reported that they received training. Where their teaching experience was concerned, one teacher reported that he belonged to the group with 1-5 years of experience; two reported that he belonged to the group with 6-10 years of experience; one reported that he belonged to the group with 11-15 years of experience. Among those who did not receive training, one reported that he belonged to the group with 1-5 years of experience; one reported that he belonged to the group with 11-15 years of experience; one reported that he belonged to the group with 16 and above year of experience.

A number of teachers stressed the role of the administration in the success of the process of ICT integration. Rania an English teacher said that "*I think that the administration may foster the process of ICT integration*". Another teacher added

that "*I think that the administration can increase the rate of technology use through supporting technology staff development, through having a vision for technology use and a long-term technology plan*" (Adel: TS). However, the administration, according to some teachers did not perform the tasks required. Ali another English teacher stated that "*Actually the administration in my school does not pay attention or care about the problems we encounter. All it does is to tell us you should do this you should do that, but there is no practical aid*".

The first sub-theme: Motivating teachers

A group of teachers suggested that that the administration can play a role in motivating and encouraging teachers through incentives and rewards. Rana a Science teacher said that *"the administration had a role in supporting teachers and encouraging them"*. Another Science teacher added that *"incentive and rewards have magical impact on me"* (Sara: TS). Zaynab an English teacher she was very enthusiastic when she answered "I *was against using this type of technology in the classroom since I need a lot of training ..... But I think that the administration had a great impact on me, since it keeps encouraging and motivating us by incentives and rewords*".

The administration may motivate teachers by setting itself as a model of a successful leadership who has a vision for integrating ICT. Ameen, a Science teacher cited that "*... the administrators need to motivate and convince teachers to embrace technology and change. It plays an important role in the building of the vision of ICT integration, and in helping teachers accept this vision*".

The Second Sub-theme: Overcoming Barriers to Integrating ICT.

In the effort to overcome barriers in the integrating of ICT the Teachers suggested that the administration could help them to integrate ICT into teaching and learning by solving the problems that teachers are encountering. Some teachers suggested that the administration could help by providing teachers with the equipment. Mohmood, an English teacher stated that administration had a major role in overcoming the obstacles *"such as providing classrooms with enough computers, and holding training courses"*. Fatima a Math teachers also confirmed that the administration had a big role in overcoming obstacles, *"through giving a listening ear to teachers complains and needs"*. Amani, a Science teacher, very confident in her answer, stated, *"I think that the main contribution of the administration is embodied in providing us with computers and maintenance, since it is required by teachers to do everything on the computer"*.

Hani, an English teacher one of those teachers who talked in details about the role of administration in overcoming the obstacles in integration ICT indicated that the role of administration consider an essential one. He also stated that

> *Such a problem can be solved only if the administration shoulders the responsibility of providing the classroom with such devices, and we also suffer from maintenance-related obstacles in the sense that computer devices, because they are old, break down most of the time and the administration is responsible for handling such problems*

Most of the respondents feel that the provision of the Internet and the most up-to-date software programs to teachers is among the potential role that the administration may help, as one respondent commented that

> *I'm personally unable to access a wide range of resources using the Internet, but I would be able to demonstrate certain specialized techniques of analysis to a large classroom if technology were available to me. So I think that the administration could help by providing us by the necessary technology* (Ruqaya: TE).

It is the opinion of many that teachers would be able to incorporate ICT into their lessons in a better way if they were enrolled in training programs. This is the responsibility of the administration as asserted by the teachers. Samar, a Math teacher cited, *"The administration could help by training teachers on how to use technology to enhance student learning, and on how to acquire the strategic skills needed to promote and achieve the vision of how schools can integrate ICT"*.

Apart from these obstacles, the teachers suggested that the whole process of integrating ICT in the classroom is the responsibility of the administration.

A group of teachers posited that the administration could help by giving teachers the opportunity to report the problems they had encountered and by giving them room to express their opinions. Fatima a Math teacher stated that, *"I think that the administration has a great role in overcoming such obstacles. They can do this by giving a listening ear to the teachers' complaints and needs, since it is the teachers who are the ones who are experiencing ICT integration"*. Ahmad, an English teacher had a similar answer. He said, "*I think that the administration could help by opening channels of communication with teachers so as to be aware of the problems the teachers are encountering and to provide them with appropriate solutions"*. Another colleague stressed that, "*I think that the administration has a role in listening to the teachers' demands, complaints and suggestions. This would enhance the process of ICT integration"* (Dania: TM)

In addition, the education of the administration itself is integral in order to guarantee the success of the process of ICT integration.

> *The Principals can help their teachers if they were to understand the uses of computers, the pedagogical implications, the effects of using computers, I mean that leaders need education to effectively manage technology in their schools and make computer integration a reality* (Sameer: TM).

The Second Theme: The Administration Has a Minor Role

The second theme extracted from the interview data is the minor role that the administration plays in overcoming obstacles in technology integration.

A small group of teachers suggested that the role of the administration is a minor one. In fact, the number of these teachers was small. Four teachers had this opinion. Science teacher reported that he did not receive training and that he belonged to the group with 16 and above year of experience. Similar to teachers of Science, two teachers of Math had this perception. Of these two teachers, one reported that he received training and that she belonged to the group with 11-15 years of experience, and the other one reported that he did not receive training and that he belonged to the group with 6-10 years of experience. In addition, the only teacher of English who had this perception indicated that he did not receive training and that he belonged to the group with 6-10 years of experience

The fact that teachers are the ones who are involved in the actual process of ICT integration in the classroom has its implications when it comes to teachers' perceptions of the potential role of the administration in this process. Amal, a Math teacher said that

> *Well, I find that the administration plays a minor role since the real individuals who are integrated in the process of using computers are the teacher and the student so I think that the success of compute technology integration and overcoming the problems in using it have to do with teachers' ability to use the technology effectively and the students proper use of this particular technology.*

Another Math teacher asserted, the previous idea, of the administration having a minor role in overcoming the obstacles that face teachers by citing that,

> *Well, I think that the administration has a role but not a major one, since the teacher is the one who has the major role. From my experience in using computers in classrooms, I can say that the major challenge when you use a computer is to know how to use it effectively and appropriately and I think that the success of ICT integration has to do with teacher's ability to use the computer in the teaching process* (Saeed: TM).

Teachers' acceptance, according to some participants, of using the technology in the classroom is the basic in the success of ICT integration. Eiman, a Science teacher confirmed that

> *Well, I think what is important in ICT integration in the classroom is the teacher's willingness to utilize this technology ... and I believe that the reason behind the failure of ICT integration in the classroom is that teachers do not have the spirit to do that because most of them are old and I think that something has to be done to get rid of these problems.*

The Third Theme: The administration Has No Role

The third theme extracted from the interview data was the belief that the administration had no role in overcoming obstacles in technology integration. The analysis of the interview data revealed that four teachers reported that they did not believe that the administration had a role in overcoming obstacles in technology integration. The only one teacher of English who had such a perception indicated that he did not receive training and that he belonged to the group with 1-5 years of experience. Similarly, the only teacher of Math who had this perspective reported that she did not receive training and that she belonged to the group with 1-5 years of experience. In addition, the only teacher of Science who had such a perception reported that he did not receive training and that he belonged to the group with 1-5 years of experience.

Since teachers and students are the ones involved in the process of ICT integration, they are the key of overcoming obstacles in technology integration. Amira, an English teacher she believed that administration had no role in overcoming obstacles in integration ICT and the most effective role is due to the teacher and the students, she also said that *"Their collaboration in designing and utilizing ICT might facilitate the learning process. In this respect, the administration has no role in the process of integration"*. Hind, a Math teacher concentrated on the teacher's and student's roles as they had the main role in overcoming the obstacles in integration ICT. In this respect the administration has no role. She also added, "*if we take in*

consideration the fact that student' attitudes and use of computer technology is highly determined by the attitudes that teachers hold toward such technology".

According to some participants, overcoming obstacles in technology integration and the success of the process of ICT integration has to do with the way teachers use the computer and its applications.

> *Actually any method or any innovation has its good as well as bad aspects and it is the way that we manipulate the innovation that does make difference, so I think that it depends on teachers' creativity and ability to use the technology to achieve the ultimate educational advantage* (Suzan: TE).

Second question: What are the factors that would enable teachers to contribute to utilizing ICT in the classrooms?

The second question in the interviews attempted to highlight the factors that teachers perceived as the most important for the success of ICT integration. The analysis of the interview data indicates that there are five themes to emerge, viz. training teachers, motivating teachers, providing schools with equipments and access, the collaboration between teachers themselves and planning for the process of ICT Integration.

The First Theme: Training Teachers

The first theme to emerge when it comes of teachers' perceptions of the factors that contribute to ICT integration is training.

The analysis of the interview data indicated that **14** teachers reported that training is the most important factor for an effective integration of ICT in the classroom. A close examination of the data indicates that five teachers of English, five teachers of Math, and four teachers of Science reported that training is the corner stone in the integration of ICT in schools. Among teachers of English, three teachers reported that they received training while two teachers reported that they did not receive training. As far as the teaching experience for those who received training was

concerned, two teachers reported that they belonged to the group with 1-5 years of experience, and one teacher reported that he belonged to the group with 6-10 years of experience. Where those who did not receive training were concerned, one teacher reported that he belonged to the group with 1-5 years of experience, and the other one reported that he belonged to the group with 6-10 years of experience.

Where **teachers of Math** were concerned, the data analysis indicated that five teachers believed that training is the engine of an effective integration of ICT. Among these teachers, four reported that they received training, and one reported that he did not receive training. Those who received training indicated that they belonged to the group with 1-5 and 11-15 year of experience, while those who did not receive training reported that they belonged to the group with 6-10 and 11-15 year of experience

As for **teachers of Science**, three teachers reported that they received training and that they belonged to the group with 1-5 and 6-10 year of experience; two reported that they did not receive training and that they belonged to the group with 11-15 and 16 and above year of experience

Training was stressed by teachers since it according to some of the participants, *"give teachers comprehensive understanding of how to integrate ICT, and teachers would be able to use ideal ways and strategies when they decide to integrate ICT inside classroom"* (Ahmad: TM). Training also has a main role in improving teaching and learning process, that is what stated by Salem a Science teacher who added that training also *"increases teachers' spirit to innovate and teachers become more independent and shoulder the responsibility of creating lesson's software"*.

Training, according to some of the participants guarantees that teachers enjoy using ICT. *"... And I noticed that teachers who received training enjoy using the computer"* (Sara: TS). According to some participants, *"trained teachers are more skillful in saving time when they use ICT than their untrained counterparts"* (Ameen: TS). Training also *"... helps teachers to use different kinds of ICT' devices that will make teachers able to catch students' attention all the time"* (Samar: TM).

The fact that training helps teachers enjoy self-efficacy when integrating ICT, and gain positive attitudes toward this technology is stressed by some of the participants.

> *I think that some teachers need the spirit to integrate ICT in the classroom, and they need to hold positive attitudes toward this technology so that utilizing ICT would be efficient. And I believe that we can do this through training because training would enable teachers to feel confident of their ability to use the technology in hand* (Amira: TE).

Some of the participants valued their personal abilities to develop software programs if they were provided with advanced training.

> *When I interact with computers, I feel that I can do something if I were provided with an advanced training because.... So I think that we need to receive continuous training on how, for instance, to develop software that helps us in our educational task, and I think that the extent to which teachers are qualified in terms of using computer affect the extent to which students interact with this technology* (Mahmood: TE).

The type of training that teachers receive and its potential role in improving the level of ICT integration attracted the attention of some teachers. According to some of the participants, the type of training that teachers receive must match their experience in using computers.

> *Actually we have not received training on how to integrate ICT in the classroom, and I think that the type of training varies according to the teachers' experience as well as the time that they have been exposed to it. All we have trained to use is some of the computers' applications* (Zaynab: TE).

Other participants stressed the importance of focusing on the practical part of training rather than the theoretical aspect.

> *I think we need more focus on instructional methods of integrating technology. Teachers want more technology but need step-by-step instruction and collaboration. Teachers may have the ability to use word-processing applications, spreadsheets, presentation software, and Internet browsers, but they still need help in applying these skills to teaching and learning* (Hind: TM).

Some participants stressed the fact that training encompasses, in addition to how to use computers, how to manage the time of the class in such a way that guarantees an effective investment of it.

> *"... by training I don't mean using computers only but what I have in mind is teaching teachers how to manage their time in the classroom, how to control the class when students use computers, and selecting the strategies that fit within their domain of teaching"* (Ahmad: TM)

The amount of training that teachers should receive was highlighted by some participants.

> *I think that some aspects of training must be taken in consideration because they play an important role in the success of the process of ICT integration. Sometimes the amount of training is insufficient, and in some cases teachers are trained to use some of the software packages only* (Sameer: TM).

The Second Theme: Motivating Teachers

The second theme that emerged from the data analysis and which represents one of the teachers' perceptions of the factors that contribute to an effective integration of ICT is motivating teachers. In fact, the number of teachers who had this perception is four. According to the interview data, one of these teachers is a teacher of Science; she reported that she received training and she belonged to the group with 6-10 years of experience. In addition, one of these teachers is a teacher of Math. This teacher reported that she did not receive training and that she belonged to the group with 16and above year of experience. Among the teachers of English (n=2), one teacher reported that he did not receive training and that he belonged to the group with 1-5 years of experience, while the other one reported that he did not receive training and that he belonged to the group with 16 and above year of experience.

Motivating teachers is an integral part for the success of ICT integration. Motivating teachers could be achieved through providing them with appropriate conditions. In this respect Fatima said that *"they must take care of their teachers through providing them with friendly atmosphere and keep teachers far from stress and pressure. In this way, teachers would be released from stability and inactivity,*

and they would be more self confident". Incentives are another form of motivating and encouraging teachers. *"I think that incentive programs have a great impact. This would show teachers how they are appreciated and valued by their administration"*. Rana, a Math teacher she expressed the same idea that incentive and rewards have a big impact on teacher as well as to push them *"to do their best in integrating technology in the teaching process"*.

The Third Theme: Providing Schools with Equipments and Access

The third theme that was extracted from the interview data is the teachers' claim that the most important factor is providing classrooms with equipments and access means. In fact, a small group of teachers had this perception. In particular, **two** teachers, one of English and one of Science, reported that the most important factor is related to equipment and access. The teacher of English reported that he received training and that he belonged to the group with 1-5 years of experience, while the teacher of Science reported that he did not receive training and that he belonged to the group with 1-5 years of experience.

A vital integration of ICT in schools would not be achieved unless schools were provided with sufficient number of computers and equipments. *"I think that the most crucial factor is to supply classrooms with computers"* (Rasha: TS). The same part of this argument applies to providing schools with advanced software programs. *" I think that providing schools with an advanced software and curriculum-based applications would be very influential and basic for a vital, effective, and meaningful integration of ICT in the classroom"* (Hani: TE) .

The internet, as a source of information, was reported to be of the most important factors. Rasha mentioned that,

> *... and internet line in order to help us in providing students with new information rather the information included in the curriculum. This helps students in enriching their knowledge very quickly and easily. All what you need to do is to type the subject in the research box on Google and you will be astonished to the large body of information you get.*

The Fourth Theme: Collaboration between Teachers

The fourth theme extracted from the interview data is encouraging collaboration between teachers for an effective integration of ICT. Two teachers had this suggestion. One of these teachers reported that he is a teacher of Math; that he received training and that he belonged to the group with 16and above year of experience. In addition, another teacher reported that he is a teacher of English; that he did not receive training and that he belonged to the group with 11-15 years of experience.

The teachers' exchange of the experience of ICT integration seems to have a positive role . Ruqaya, a teacher of English added that

> *Well the fact that teachers have different experiences with computers, I think that it is impotent to enhance and encourage the collaboration between teachers. In this way teachers would be able to utilize ICT more effectively and can deal with any problem they encounter.*

Amal, a Math teacher said that she was interested in the collaboration of teachers, idea. She cited that *"...and through this way they can get benefit of the methods they use in teaching, the way they plan for integrating ICT and the way they manage their time"* .

The Fifth Theme: Planning for the process of ICT Integration

The fifth theme extracted from the interview data spotlights the fact that a careful planning of the process of ICT integration is the basic and most important factor for a successful integration of ICT.

Two teachers reported that they believed that the planning for the process of ICT integration is essential. The first one reported that he is a teacher of English; that he received training and that he belonged to the group with 1-5 years of experience. The second one he reported that he is teacher of Science; that he received training and that she belonged to the group with 11-15 years of experience.
Hani the English teacher explained that there is no clear plan in order to integrate ICT in teaching and learning process. He also mentioned that

> *... I use it within a very limited and restricted range because there are no curriculum-based applications, or a clear vision of how to use the computer effectively, so I think that we need to plan carefully for the process of ICT integration in the classroom* (Hani: TE).

Amani a Science teacher stressed that teachers must enjoy enough freedom. Also she explained that the policymaker must, in their plans, provide teachers with enough freedom to boost their ICT integration,

> *We are not allowed for instance to use the audio and the visual properties of computers ...but I think that these properties make the process of teaching more appropriate, enjoyable and interesting. So I think that teachers need a space of freedom in this respect.*

Third question: What are the obstacles that you might face integrating ICT in the classrooms?

A close examination of the interview data indicated that teachers encountered four main obstacles: training, equipment and access related obstacles, time, as well as self efficacy.

The First Theme: Training

Training was the most often to recur in the teachers answers. The analysis of the interview data indicates that ten teachers reported that they encountered problems related to training. Among these teachers, three reported that they are teachers of English. Two of them reported that they belonged to the group with 6-10 years of experience.

However, one reported that he did not receive training while the other one reported that they received training. Another teacher reported that she belonged to the group with 16and above year of experience. This teacher reported that she did not receive training.

In addition, three teachers indicated that they are teachers of Math. Two of them reported that they belonged to the group with 1-5 years of experience and that they received training, while the third one reported that she belonged to the group with 16and above year of experience and that she did not receive training. Moreover, three reported that they are teachers of Science. One teacher reported that she belonged to the group with 1-5 years of experience and that she received training, while the other two reported that they belonged to the group with 11-15 years of experience. However, one reported that she received training while the other one reported that he did not receive training.

Some teachers indicated that there are some problems in the place in which teachers receive training. Ali who was teaching Math indicated that "*We find problems in training. The halls in which training courses are held have inadequate lighting control for computerized presentations. Most of the rooms are not equipped with the hardware capabilities*". Zaynab, another English teacher confirmed that training is the main obstacles because

> *The training courses that the Ministry of Education offers do not meet teacher training needs, since the climate in which these courses are provided are inappropriate. The halls in which these courses are held are big, and teachers can't hear what the trainer is saying, and they are also crowded with a great number of teachers who receive training* (Zaynab: TE).

Lack of enough training opportunities was reported by some participants. Most of the time, teachers did not attend training courses because of bad planning. *"I think training is the main obstacle. I did not attend any training course so I don't have computer skills that qualify me to integrate computer for teaching purpose"* (Dania: TM). Ahamad, who is also teaching Math, mentioned that *"One of the major problems here is the fact that very little training is provided on how to integrate computers into the curriculum or how to choose appropriate software"*.

With regards the quality of training some of the factors behind the failure of training teachers is a failure to identify the knowledge needed. The responses of the participants indicate that the quality of training they received did not allow them to integrate ICT efficiently. Some of the participants reported that there is a concentration on the theoretical part of the technology and a little focus on the practical part. Dania, a Math teacher said that,

> *... But even teachers who attend training course told me that training course concentrate on theoretical issues more than practical issues. I note that their information about integration process is very good but they face difficulties to employ it in reality* (Dania: TM).

Some teachers suggested that training courses did not cover all the skills required for an efficient integration of ICT. Salem a Science teacher said that *"I think that training is the main obstacle. Actually the training I'm attending at the present time is not comprehensive and it does not cover all computer skills. Moreover the period of course is short"*.

On the other hand, the focus of training, according to some respondents, is on the basic skills while little attention is given to the advanced skills. Amani, a Science teacher stated that

> *Although I attended training course I cannot use a variety of program because what I really need is to know how to run some of the programs because actually what we have been trained for is the basic computer skills.*

Amani, also added that *"we have not received training that enables us to run certain programs and to use these programs effectively"*. Others reported that they use computers in a very narrow range of tasks because they lack the adequate skills. Rasha, another Science teacher mentioned that *"What we (teachers) do with computer is only preparing the exam questions and students' grades, and actually we can't use any other applications because we are not familiar with training related to ICT integration"*.

After thinking Rasha, also added another issue that "*most teachers lack the basic computer skills because they escape and ignore to attend training course, since it is elective not compulsory"*. In addition, teachers indicated that the ministry does not hold continuous training courses that keep them aware of the latest in the world of ICT and its pedagogical applications. Hind stated that *"One of the major problems here may be the lack of a suitable training that is required to keep teachers abreast of new and innovative technology"*.

As for the time at which training courses are held, some teachers reported that the time at which training courses are held is inappropriate. Fatima mentioned that

> *... they hold training courses after the school time and actually I can't attend these courses because I have to take care of my children and I have to prepare the lunch for them. In addition, I think that this time is also inappropriate because we get exhausted after a day full of teaching and we are unable to receive and acquire new things.*

Second theme: Equipment and access

The interview data revealed that eight teachers noted that they encountered equipment and access –related obstacles. A close examination of these data shows that nine teachers reported that they encountered equipment and access-related obstacles. Among these teachers, three reported that they are teachers of English. Two of them reported that they belonged to the group with 1-5 years of experience and that they received training while one teacher reported that she belonged to the group with 11-15 years of experience and that she did not receive training.

Four teachers reported that they are teachers of Math. Of these teachers, one teacher reported that she belonged to the group with 1-5 years of experience and that they received training; one teacher reported that he belonged to the group with 6-10 years of experience and that he did not receive training; two teachers reported that they belonged to the group with 11-15 years of experience and that they did not receive training. Two teachers reported that they are teachers of Science. One of these teachers indicated that she belonged to the group with 16and above year of experience, and the other teacher reported that she belonged to the group with 6-10 years of experience and that she received training.

The respondents indicated that the lack of equipment restricts the level of ICT integration. One of the interviewed teachers reported that "... *we don't have an enough number of computers at each classroom and because of that student are unable to use these devices effectively* (Hani: TE). Amira, another English teacher pointed out that "... *not all of students have the opportunity to do some exercises in the classroom when I ask them to do that, since the number of devices is very few*" .

Other teacher reported that because there are no computers in the classroom, they

> ... *have to go to computer labs to be able to use the computer in teaching, and the other students would not be able to use computers in their free time to improve their computer skills. Even using the labs' computers is not an easy process, since you have to reserve the lab one week in advancement* (Sameer: TM).

The same problem is reported by another teacher who said that

> *The main obstacle relies in the limited materials provided by the district, and this results in a restricted utilization of ICT. For instance, we don't have an adequate number of computer devices, and we can't even use the available devices all the time because they are dominated by teachers who teach computer Science* (Sara: TS).

Eiman, a Science teacher reported that the insufficient number of computers does not allow teachers to pay attention to individual differences.

> *...students cannot perform the tasks I ask them to do using the computer because the number of computers is limited, so I have to divide them into groups and this does not give me the opportunity to pay attention to the individual differences among students and I cant, in this case, evaluate them properly (Eiman: TS).*

Another equipment-related obstacle that emerged from the theme analysis of the data is the availability of software program. Hani, a teacher of English, asserted *"... we don't know how to use computer applications in an effective way in the classroom; since we are not provided with advanced or curriculum-based software, so I think that the lack of computer software is the main obstacle"*.

Ruqaya, a teacher of English, reported that she finds a problem in using software programs. *"I think that it is not easy to deal with new software, so I think that we need to be trained how to use such software. Unfortunately, my computer skills are poor and I depend on the assistance of my colleagues if they were willing to help me"*.

Scheduling problems when computers are located in computer labs was considered a big challenge for teachers. The responses of the participants confirmed such claims. Saeed, a Math teacher stated that

> *I think that the main obstacle has to do with the fact that computers are located in computer laboratories. Having computers located in a computer laboratory makes it difficult for teachers to have access to them for use as an everyday tool, and prevents the integration from taking place.*

Other teachers reported that maintenance-related obstacles. Samar, a Math teacher she was angry when she reported that *"Actually, my computer keeps breaking down*

so I haven't been able to use it". Ameera, another Math teacher she was frustrated when she mentioned that *".... Even when students have the opportunity to interact with the computer, many problems occur and prevent them from being engaged in such an interaction such as the countless break downs".*

Some teachers reported that they have problems with the access to the internet. Amira an English teacher also she was disappointed when she reported that

> *... I think that teaching English as a second language involves navigating through the internet and visiting websites designed for such purposes. But unfortunately we don't have the chance to do that because we are not provided with an access to the internet.*

Others complained from continuous breakdown in the connection. Amal, a Math teacher she cant cover her disappointed when she mention that

> *Sometimes the internet signals disconnect for several days; moreover, the router becomes hot, and because of these problems we waste the time of the class solving these problems instead of investing in it to teach students. Also we all miss wireless service and we have no laptops.*

Third theme: Time

The interview data revealed that five teachers reported that they encountered time-related obstacle. A close examination of the data indicates that six teachers reported that they encountered time related obstacles. Three teachers reported that they are teachers of English. All of them reported that they belonged to the group with 1-5 years of experience and that they received training. On the other hand, one teacher reported that he is a teacher of Math, that she belonged to the group with 1-5 years of experience and that she received training. Of these teachers, two reported that they are teachers of Science, that they belonged to the group with 1-5 years of experience and that they received training.

Participants reported that they needed time to prepare what is going to be explained using the computer." *I spent a lot of time in preparing the material to be*

explained using the computer, and this leads to wasting a lot of time which must be spent in explaining the lessons" (Hani: TE).

Interview participants indicated that integration of technology in the classroom consumes their time. Ameen, a Science teacher said that

> *While preparing for the lesson, I feel that the inclusion of technology requires too much of my time. 45 minutes per a class is not fair enough to make full technological integration, and the situation gets worse because the number of student in classroom is too big, and students do not have the chance to practice their skills and teachers can't pay attention to students' individual differences.*

Fatima teacher of Math confirmed that time is not enough for perfect ICT integration. She also stressed that "*it is time consuming finding web sites and lessons that fit my students and are not too hard or too easy*". Fatima also added that *" I think that finding time to decide which programs are good and going to best help me instruct my class is a challenge).*

Managing how to invest the time available to integrate ICT and to teach students is a dilemma for some teachers. Adel a Science teacher said that *"How to manage the time given to a class to encompass both teaching students and integrating technology causes the failure of the process of ICT integration"*. Suzan an English teacher confirmed the previous obstacle (how to mange the time of the class). She was wondering how she can balance between preparing for computer use and explaining lessons to students. She gave a lot of information about this obstacle,

> *I have a lot of things to do besides using computer which really takes a lot of time. I have to take attendance, I have to explain the lesson and I have to prepare for using the computer in teaching, and I have to preview some of the websites that and these tasks need a lot of time and I cant do them at the class nor at the school itself since I have classes all the time, and I don't have an access to the internet at home. So I think that we really need to do something.*

One more confirmation on this problem come out from Amal, a Math teacher. She added that *"I said before that we encounter problems related to how to manage the time of the class since the time of the class is limited"*.

The Fourth Theme: Computer Self Efficacy

One teacher reported that she was not confident of her computer skills. This teacher is a teacher of Science and reported that she belonged to the group with 6-10 years of experience and that she received training. This teacher complained that she did not *"have enough computer skills that help me to integrate technology in teaching and learning"*, since she found *"that insufficient knowledge, skills and experience about how integrate technology are the main obstacles against integrating ICT in the classroom"* (Rana: TS).

Fourth Question: What are the strategies you usually use to integrate ICT in the classroom?

The strategies that teachers employed for integrating ICT in the classroom were highlighted. The analysis of the interview data indicates that five themes were extracted, viz. the absence of employing any strategy, using software programs, using the internet, manipulation the visual and audio properties of computers and allocating time for students to practice their computer skills.

The First Theme: The Absence of Employing any Strategy

A group of teachers reported that they did not employ any integration strategy. The number of teachers who reported that they did not have any particular strategy is 11 teachers. A close examination of the data indicates that three were English teachers. These teachers reported that they did not receive training; however, one of them reported that he belonged to the group with 1-5 years of experience; another one reported that he belonged to the group with 6-10 years of experience; and the third one reported that they belonged to the group with 11-15 years of experience.

Where teachers of Math are concerned, the analysis of data indicates that the number of teachers who did not have a particular strategy among the teachers of Math is four teachers. One of them reported that he received training and that he

belonged to the group with 6-10 years of experience. On the other hand, the rest of them reported that they did not receive training. One of these teachers reported that he belonged to the group with 6-10 years of experience; the other one reported that he belonged to the group with 11-15 years of experience; the third one reported that he belonged to the group with 16and above year of experience.

Lacking the basic computer skills seems to be a barrier to employing any integration-related strategy. *"I don't think that I will apply technology as a teaching method, because I lack the necessary skills to handle this integration, so I don't have any particular strategy in mind to integrate ICT"* (Mahmood: TE). Ali, a teacher of English, asserted that *"the surrounding conditions and circumstances affect the extent to which I integrate ICT such as training"*. Teachers seem to be affected also by the negative attitudes they hold toward this technology, and consequently, the extent to which they employed integration-related strategies.

Respondents reported that they were not provided with appropriate conditions for integrating ICT. Ali also added that *"... and actually (they are) being affected by the negative attitudes that ... colleagues hold toward ICT"* . The lack of appropriate applications that cover a wide range of subject matters taught seem to be another reason that prevent ICT strategies. Rania, a teacher of English suggested that

> *since there are no curriculum-based software that would facilitate teaching any given subject...So I think that teachers should be proficient in using computers if they were to employ a wide range of computer applications. Misusing computers by students is the reason behind the fact that they do not employ integration-related strategies.*

Fatima, a teacher of Math, suggested that she *"resorts to the traditional method of teaching"*, since she *"was shocked when I saw my students using computer to play, to chat, and to download music"*.

According to some participants, using ICT in teaching does not give teachers the opportunity to take account of the different abilities of students, since *"each student has his own way of approaching the idea, and dealing with the subject"*. This is why some of the respondents believe in "individual leaning" (Rana: TS). The participant

indicated that she is *"satisfied with my teaching method"* (Rasha: TS), also she added that *" I prefer my own way of presenting the material"*. Others participant prefer their teaching method which consists of *"face to face lecture"* (Dania: TM), and use the traditional means *"such as chalk"* (Samar: TM), because using ICT is "worthy all this effort", since it is a *"time-consuming process, and teacher need to be on touch with every thing new so as to use it in teaching"* (EimanTS).

The Second Theme: Using Software Programs

The second theme extracted concerning the strategies is using a wide range of computer applications and software programs. The data suggest that the number of teachers who used these applications and programs is **six** teachers. A detailed analysis of the data indicates that the number of teachers who used computer applications is two. These teachers reported that they received training. However, one of them reported that he belonged to the group with 1-5 years of experience, and the other one reported that he belonged to the group with 6-10 years of experience.

Where the teachers of Math are concerned, the data indicates that the number of teachers who deal with computer programs is two. These two teachers indicated that they received training and that they belonged to the group with 1-5 years of experience. Where the teachers of Science are concerned, a close examination of the data indicates that the number of teachers who got advantage of computer applications is two. These two teachers reported that they received training. However, one of them reported that he belonged to the group with 1-5 years of experience, while the other one reported that he belonged to the group with 11-15 years of experience.

The second theme extracted from the interview data is manipulating computer applications to achieve educational purposes. Participants reported that they made use of *"valuable software such as spelling software, comprehension tasks, listening, and reading exercises"* (Amira: TE). Some participants indicated that some applications enable them to catch the problems that students suffer from.

> *Some computer applications have the ability to diagnose students' skills before presentation information, and I think that this is good in order to test their understanding, and actually, I use these programs. I do also provide students with new materials and information that they have not been introduced to before* (Zaynab: TE).

Computer applications, according to some of the participants, provide a new means for presenting information. *" Most of the time I use PowerPoint presentations because I notice that students get interested when I present the material using this strategy"* (Amal: TM).

What is interesting about certain applications, as some participants assert, is their ability to take account of students' individual differences. Ahmad, a teacher of Math, reported that he uses *"drill and practice software as a teaching strategy, because I think that this software help students to remember things that they have studied, and it also enables me to teach children according to their educational level".*

Simulation programs are popular among teachers. Ameen, a teacher of Science, suggests that *"simulation programs are appropriate for the subject matter [he] teaches ... some software that show how earthquakes and volcanoes take place, and [he] uses three-dimensional means to explain many of the physical phenomena in our life"*

The Third Theme: Using the Internet

The third theme that emerged from the data analysis concerning the integration-related strategies that teachers employ is using the internet for achieving learning purposes. In fact, the number of teachers who reported that they used the internet is **five**. Among the teachers of English, two teachers made use of such strategy. The analysis of the data indicates that one of these two teachers reported that he received training and that he belonged to the group with 1-5 years of experience, while the other teacher reported that he did not receive training and that he belonged to the group with 11-15 years of experience. As for the teachers of Math, the analysis of data reveals that the number of teachers who used the internet is one. This teacher reported that she received training and that she belonged to the group with 1-5 years of experience. Where the teachers of Science are concerned, a close examination of the data reveals that the number of teachers of Science who used the internet is two. These two teachers reported that they received training and that they belonged to the group with 1-5 years of experience.

The intensive amount of information that the internet provides students with is what motivates teacher to use it as a learning strategy. *"Make use of some of the websites which are designed to teach English"* (Hani: TE). *"... I think that the internet is a good source of information, so sometimes I ask students to get some information about the lesson, and very quickly they get an endless amount of information"* (Amal: TM). Adel a Science teachers added that *"I navigate the internet to find out how others teach Math, and I try to find relevant exercises that would help students understand"*.

The Fourth Theme: Visual and Audio Properties.

The fourth theme extracted from the interview data is manipulating the audio and the visual properties of the computer. The number of teachers who did use of these properties is **three**. Two of them are teachers of English. These two teachers reported that they received training and that they belonged to the group with 1-5 years of

experience. The third teacher is a teacher of Math. She reported that she received training and that she belonged to the group with 1-5 years of experience.

Participants indicated that making use of the visual and audio properties of the computers make students more interested in learning. *"... I ... use the audio and visual features that the computer provides to make teaching more enjoyable and interesting"* (Ameera: TE). These properties also give an opportunity to live real life situations. Suzan reported that

> *I use the audio as well as the visual properties of the computer to help students learn as if they live a real situations, and these properties have a great impact on teaching English as a second language since students use these properties and learning games to train themselves how to speak, converse and interact in English.*

These properties also give an opportunity to learn better. Hind said that

> *... I use the audio properties of computers. I think that there were lots of elements in the course that students really liked. They really liked the audio they really liked the exercises particularly the fact that you could do the exercises over and over again until you get it".*

The Fifth Theme: Allocating Time for Students to Practice their Computer Skills.

The fifth theme extracted from the interview data is allocating time for students to practice their computer skills. In fact, the number of teachers who reported that they gave students the opportunity to practice their computer skills is **three**. Two of these teachers were a teacher of English, both of them reported that they received training and that they belonged to the group with 1-5 years of experience. The third teacher is a teacher of Math. This teacher reported that he received training and that he belonged to the group with 11-15 years of experience.

Participants realized that computer skills are basic for a job career. This is why some of them reported that they gave students the opportunity to practice their computer skills. Amira an English teacher said that *"...I try to allocate time for students to practice their computer skills using the computers available in the classroom ..."* Teachers also instruct their students how to use the computer. Sameer stated that *"I give students instructions on how to use the computer and at the end of the lesson I ask them to answer some of the questions, and I evaluate their answers"*. Interestingly, some of the participants reported that they planned computer-executed activities to help them in teaching students.

> *Actually I look for activities and tasks that could be explained using the computer and especially those which I feel that if they were performed using computer applications, students would be get the ultimate benefit and understanding of the activities being performed using the computer* (Hani: TE).

Fifth question: What are your suggestions for improving the teaching process by integrating ICT?

Seven themes concerning teachers' suggestions for improving the integration of ICT in schools emerged form the qualitative data, viz. providing schools with equipments and access, training, solving problems related to time, motivating teachers, planning for the process of ICT integration, and collaborating between teachers.

The First Theme: equipments and access

The first theme extracted regarding teachers' suggestions for a better integration of ICT has to do with equipments and access. In fact, the umber of teachers who suggested that equipment and access related concerns is an integral part of a successful integration of ICT is **six**. Among the teachers of English, three teachers had this perception. In fact, these three teachers reported that they received training and that they belonged to the group with 1-5 and 6-10 year of experience. As far as the teachers of Math are concerned, the analysis of the interview data indicated that

two teachers came up with this suggestion. Both of them reported that they received training and that they belonged to the group with 1-5 years of experience. Only one teacher of Science had this suggestion. This teacher reported that he received training and that he belonged to the group with 1-5 years of experience.

Participants suggested that enough equipment and devices are basic. Zaynab, a teacher of English, and Amal, a teacher of Math, suggested that increasing the number of computers in each classroom is a crucial factor, so that students would have equal chances to get benefit from utilizing technology in the classroom. Hani, a teacher of English asserted that *"providing teachers with laptops would be a good idea, since the income that teachers receive is not enough to buy PCs which they can use at homes"*.

Paying attention to the software programs that teachers use in teaching is essential to guarantee good educational outcomes. In fact, Hani suggested that *"it is important to design advanced software so that computer would be used in a systematic way, and would be as beneficial as possible"*. Another related observation is that a level of match between the software program and students' level must exist. *"I think that we need to be provided with advanced software programs in such a way that these software programs would be appropriate to students' level"* (Hind: ET). Such software programs, as some participants suggest must be always updated. *"And I also suggest updating and upgrading the entire educational program"* (Ameera: TE).

Network connection occupied teachers' attention and care. It is *"important to update internet network because the current network breaks down frequently"* (Zaynab: TE). Providing schools with wireless networks was among teachers' suggestions. *'... I suggest providing wireless network that covers the whole school"* (Adel: TS).

The Second Theme: Training

The second theme extracted from the interview data is training. The number of teachers who suggested that teachers must be trained enough is **six**. The number of teachers of English who had this suggestion is two. Both of them reported that they did not receive training. However, one of them reported that he belonged to the group with 1-5 years of experience, and the other one reported that he belonged to the group with 11-15 years of experience. Only one teacher of Math had this suggestion. This teacher reported that he did not receive training and that he belonged to the group with 16and above year of experience. As for teachers of Science, three teachers suggested that the wheel of a successful integration of ICT is training. In fact, two of these teachers reported that they did not receive training. They have also reported that they belonged to the group with 1-5 and 16and above year of experience. The teacher who reported that he received training indicated that he belonged to the group with 6-10 years of experience.

Training, according to some participants must be among the priorities of teachers and the administration, *"since teachers can not use the computer unless they are acquainted with the basic technological skills"* (Ruqaya: TE). In fact, the time at which training courses are held received a considerable attention from teachers. Mahmood, a teacher of English, and Dania, a teacher of Math claimed that*"it is important to offer training courses at times when every teacher is able to take such courses, so the largest number of teacher might benefit from the courses held"*.

The quality of training was also highlighted by teachers. It was suggested that there must be a concentration *"on practical issues rather than theoretical issues when they train teachers. In other words, they must allocate more time to practicing computer skills rather than concentrating on theoretical considerations"* (Ruqaya: TE). She also added that the training courses *"must be comprehensive and match teachers' needs, and must be related to their subject matter taught"*.

Continuous presentation of new themes and topics related to ICT is what really teachers need according to some participants. " ... *it is important to change the themes and topic of training courses from time to time and trainers must also be changed so that teachers would not be bored"* (Rasha: TS).

The Third Theme: Time

The third theme extracted from the interview data is time. In particular, **five** teachers reported that the time problems that teachers encountered must be solved. Among the teachers of English, two teachers reported such a suggestion. One of these teachers reported that he received training and that he belonged to the group with 1-5 years of experience, while the other teacher reported that he did not receive training and that he belonged to the group with 6-10 years of experience.

As for the teachers of Math, two teachers recommended time-related concerns. The first teacher reported that he received training and that he belonged to the group with 1-5 years of experience, while the second teacher reported that he did not receive training and that he belonged to the group with 6-10 years of experience. One teacher of Science had the same perception. This teacher reported that she received training and that she belonged to the group with 1-5 years of experience.

Since time was one of the obstacles that teachers encountered, suggestions revolved around the importance of adding more time to the class, and around helping teachers in managing their time. Where the duration of the class is concerned, some participants suggested that *"should be given more time to execute our tasks in the classroom ... and I think that more time should be added to the class to get benefit of the educational innovations* (Suzan: TE). A solution to this problem as some teachers suggest is *"to give the teacher the authority to integrate two classes into one so as to get the chance to prepare well for his class and to give students the opportunity to interact with computers*" (Ameen: TS). Another solution is to keep teachers *"far from administrable task because this takes a lot of their time"* (Ahmad: TM)

Ali an English teacher suggested that

> *it is important to help teachers manage their time, since the preparation for computer use in the classroom requires too much time, and ... every class and personal contact time has to be spent giving teachers basic technology skills such as how to send and receive electronic e-mails* (Ali: TE).

The Fourth Theme: Motivating Teachers

The fourth theme extracted from the interview data is motivating and encouraging teachers. According to the interview, **three** teachers had this suggestion. One of them is a teacher of English; she reported that she did not receive training and that she belonged to the group with 16and above year of experience. The other teacher is a teacher of Math and reported that she received training and that she belonged to the group with 6-10 years of experience; the third teacher is a teacher of Science and reported that he did not receive training and that he belonged to the group with 11-15 years of experience.

Among the suggestions that the participants came up with is to raise the spirit of teachers through encouraging and motivating them. This could be achieved according to some of the participants, through *"providing them with incentives or even by promoting them if they receive training*" (Rania: TE). Or "*by providing them with appreciation letters if they show their willingness to integrate ICT"* (Salem: TS). This could also be done through *"drawing the teachers' attention to the fact that it is important to improve their personal skills and their knowledge in computer, since we have heard that some countries celebrated last computer illiterate"* (Rania:TE)

The Fifth Theme: Planning for the process of ICT integration

Planning is what really counts for a successful implementation of ICT, according to some teachers. **Three** teachers reported that planning is the most important thing.

Three of them are teaches of Science, The first teacher reported that she did not receive training and that she belonged to the group with 16and above year of experience, and the other two teachers reported that they received training and that they belonged to the group with 6-10 years of experience.

Eiman, a teacher of Science, asserted that *"we need a clear vision of how to integrate ICT, since I feel that there is no plan for integrating ICT in schools"*. Rana, another Science teacher, claimed that *"it is important to take some steps in advance when we plan to integrate ICT"*.

Part of the planning for the process of ICT integration is the fact that

> *teachers should be involved in planning for the process of ICT integration because they are after all the individual who integrate ICT and their vision and opinion as to how to integrate this technology would be very valued* (Sara: TS).

The Sixth Theme: collaboration between teachers

Another theme extracted from the interview data is encouraging teachers to exchange their experiences. In fact, the number of teachers who had this suggestion is three. Two of these teachers reported that they are teachers of Math. One of them reported that she did not receive training and that she belonged to the experience group 6-10. The other teacher reported that she did not receive training and that she belonged to the group with 11-15 years of experience. The third teacher reported that she is a teacher of Science, that she did not receive training, and that she belonged to the group with 16and above year of experience. Samar, a teacher of Math stressed that *"exchange experiences with each other as to how to produce new technological devices ... this should take place under administrations supervision"*.

Fatima, a teacher of Math suggested that collaboration must be between *"teachers who are experts in the same school. In this way, teachers would not be embarrassed when they ask about ambiguous and unclear things"*. Collaboration must also be among schools especially those *"in which ICT has been integrated from a long time*

are proficient and can handle this technology better than us ... holding and arranging regular visits to theses schools" (Eiman: TS).

4.7 Summary of the Interviews

The results of the qualitative data indicate that there are three themes related to the role of administration in overcoming integration related obstacles is concerned, the analysis indicated that the major themes are the presence of a role of the administration, the absence of such a role, or the minority of the role of the administration.

Where the factors that facilitate the process of ICT integration are concerned, the data shows that these factors are training teachers, motivating them, providing schools with equipments and access, collaboration between teachers, and planning for the process of ICT integration, respectively. As far as the obstacles to ICT integration in the classroom are concerned, the results of the analysis indicate that training, equipment and access, time, and computer self-efficacy are the major obstacles.

Where the strategies that teachers employ are concerned, the data indicates that majority of the teachers did not employ integration-related strategies. On the other hand, those who reported that they employed such strategies indicated that the strategies they employed were using software programs, using the internet, using the visual and the audio properties, and allocating time for students to practice their computer skills, respectively. Among the suggestions that students came up with are supplying schools with equipment and access, training teachers, time, motivating teachers, planning for the process of integration, collaboration between teachers, and supporting schools financially.

The coming Chapter is meant to discuss the findings of the study and their implications to the Jordanian context .Additionally, the researcher also reflected on the literature review and stroke a comparison between the present finings of this research and the previous ones. Furthermore, the contribution and recommendations were also addressed.

Chapter v

Discussion and Recommendations

5.0 Introduction

In light of the two major enterprises, the Jordan Education Initiative (JEI) and Reform for the Knowledge Economy Initiative (ERFKE), which aim at "overcoming the shortcomings of the educational process especially in preparing students as entrepreneurs and job creators "through the integration of ICT in schools, this study is an attempt to discover the extent to which teachers integrate ICT in the process of teaching and learning.

Such an end could be met through answering some of the questions that revolved around central topics in ICT integration in schools, among of which are teachers' attitudes toward the process of integrating ICT in schools, the extent to which teachers are concerned with integrating ICT in schools, the potential obstacles that may block the way of an efficient utilization of ICT in schools, the classification of teachers' in accordance with Rogers' categorization, the strategies that teachers employ in using computer in the classroom, and the potential role of experience, the subject matter taught, and training on the main aspects this study revolves around.

This chapter consists of two related parts. The first part discusses the results of this investigation with regard to the research questions. The second part is a set of recommendations suggested in light of the results of the present investigation.

On the basis of the literature reviewed in this investigation, the instrument was designed and constructed by the researcher. The instrument constitutes a questionnaire that majors attitudes toward computer, stage of concern, obstacles and strategies used to integrate ICT in curriculum. In addition, interviews were conducted with a selected sample of teachers for the purposes of identifying them as early or late adopters and bridges the gap between them. This chapter brings together the

results of the questionnaire and interviews as to answer the questions of this investigation.

5.1 Research Summary

This study was intended to measure the relationship between teacher's stages of concern, adopters categories, obstacles of integration of ICT and strategies of implementation of ICT in the teaching and learning process in the Jordanian public secondary schools while teacher's attitudes was used as a moderator variable The main objective in this research were to diagnose if Jordanian teachers in public schools integrated ICT for teaching and learning purpose. Also it intended to identify the differences between early and late adopters of ICT and attempted to bridge the gap between them. The research questions and hypotheses addressed in this research are as follows:

1. What are the levels of stages of concern, attitudes, obstacles faced by the teachers and strategies of technology integration in the teaching and learning process among teachers in Jordanian schools?
2. Based on Rogers' adopter categories, who among the Jordanian teachers are the early and late adopters?
3. What are the distributions of early and late adopters among Jordanian teachers in term of teaching experience?

4. What are the distributions of early and late adopters among Jordanian teachers in term of subject matter taught?
5. What are the distributions of early and late adopters among Jordanian teachers in term of training attendance?
6. Are there any significant differences in Jordanian teachers' stages of concern towards technology based on their teaching experience, subject matter taught and training attendance?

- H1 : There are significant differences in stages of concern between five levels of teaching experience
- H2 : There are significant differences in stages of concern between three subject matters taught
- H3 : There are significant differences in stages of concern in training attendance

7. Are there any significant differences in obstacles of technology integration based on teaching experience, subject matter taught and training attendance?
    - H4 : There are significant differences in obstacles of technology integration between five levels of teaching experience
    - H5 : There are significant differences in obstacles of technology integration between the three subject matters taught
    - H6 : There are significant differences in obstacles of technology integration in training attendance
8. Are there any significant differences in technology integration strategies based on teaching experience, subject matter taught and training attendance?

- H7 : There are significant differences in strategies of technology integration between five levels of teaching experience
- H8 : There are significant differences in strategies of technology integration between the three subject matters taught
- H9 : There are significant differences in strategies of technology integration in training attendance

9. Is there relationship between teacher's stages of concern and technology integration strategies among teachers in Jordanian schools?

- H10 : There are significant relationship between stages of concern and strategies of technology integration

10. Is there relationship between obstacles faced by the teachers and technology integration strategies among teachers in Jordanian schools?

- H11 : There are significant relationship between obstacles of technology integration and strategies of technology integration

11. Does teachers' attitude toward computer moderate the relationship between (stage of concern and obstacles in technology integration) and strategies of technology integration?

- H12 : Attitudes does moderate the relationship between stages of concern and strategies of technology integration
- H13 : Attitudes does moderate the relationship between obstacles in technology integration and strategies of technology integration

12. How do early and late adopters (among Jordanian teachers) differ from each other in their technology integration strategies?

The research employed both quantitative and qualitative research methods in collecting and analyzing data. In summary, using the method of triangulation allowed "opportunities for deeper insight into the relationship between inquiry approach and the phenomenon under study" by analyzing consistencies and inconsistencies across these data (Patton, 2002, p. 248). This combining of methods of data collection strengthens a qualitative study and augments the possibility of "internally valid or trustworthy conclusions and inferences" (Tashakkori & Teddle, 1998, p. 91). To achieve this goal researcher distributed the questionnaires to the teachers. After the teachers completed and finished the questionnaires, the researcher conducted the interviews with selected sample of teachers.

The researcher interviewed 24 teachers who taught English language, Science and Mathematic. They had different levels of experience in teaching and were from two different training categories (attended training course or did not attend training course). So the information given by them provided a source of information which validated the finding as they were highly qualified. In addition, qualitative data was used to reveal the differences between early and late adopters of ICT in order to bridge the gap between them. On the other hand, 345 teachers out of 360 successfully finished the questionnaire. Quantitative data was used to explore and

evaluate if Jordanian teachers integrated ICT in teaching and learning process and what were the obstacles they faced while they were integrating ICT.

5.2 Summary of Research Findings

The findings of the study indicated the following:

- The level of teaches' stages of concern were moderate.
- They hold positive attitudes toward integrating computers in the process of teaching and learning.
- They encountered obstacles in technology integration.
- They employed integration strategies moderately.
- The majority of teachers were classified as late adopters, notwithstanding the experience group to which they belong; the subject matter they taught, and whether or not they received training courses.
- There were no statistically significant differences at 0.05 level in teachers stages of concern in terms of their teaching experience.
- There were no statistically significant differences in teachers' stages of concern in terms of the subject matter they taught.
- There were statistically significant differences in teachers' stages of concern in terms of the training course they received in favor of teachers who received training courses.
- There were statistically significant differences in the extent to which teachers encountered obstacles in technology integration in terms of teaching experience in favor the group with 15-20 year of experience and the group with 21 above year of experience.
- There were statistically significant differences at 0.05 level in the extent to which teachers encountered obstacles in technology integration in terms of the subject matter they taught in favor of teachers of Science.
- There were statistically significant differences at 0.05 in the extent to which teacher's encountered obstacles in technology integration in terms of training attendance in favor of teachers who did not receive training courses.

- There were statistically significant differences at 0.05 level in the extent to which teachers employed integration-related strategies in terms of their teaching experience. Those significant differences were in favor of the group with 1-5 years of experience and the group with 6-10 years of experience.

- There were statistically significant differences at 0.05 level in the extent to which teachers employed integration-related strategies in terms of the subject matter they taught in favor of teachers of English.
- There were statistically significant differences in the extent to which teachers employed integration-related strategies in terms of training attendance in favor of teachers who received training courses.
- There was a significant positive relationship between teachers' stages of concern and technology integration strategies.
- There was a significant negative relationship between the obstacles that teacher encountered when they integrated technology in schools and the extent to which they employed integration-related strategies.
- Attitude moderated the relationship between obstacles and strategies technology integration. On the other hand, attitude was not moderate the relationship between teachers' stages of concern and strategies technology integration.

5.3 Discussion of the Research Results

Question one: What are the levels of stages of concern, attitudes, obstacles faced by the teachers and strategies of technology integration in the teaching and learning process among teachers in Jordanian schools?

The first question in this investigation branches into sub-questions that aim at giving insights into teachers' levels of stages of concern, the attitudes teachers hold toward integrating ICT in schools, the potential obstacles they may encounter prior to or during using computers in the classroom, and the strategies they employed when they used computers in the process of teaching and learning.

Teachers' responses to the first question indicated that their level of concern was above the average, since the mean of all concern categories is (3.3). Where teachers' attitudes were concerned, the analysis indicates that teachers' attitudes toward ICT integration in schools were positive, since the mean of all attitude categories was (3.5). Where the extent to which teachers encounter obstacles in technology integration was concerned, the analysis indicated that teachers encountered a moderate level of obstacles in technology integration, since the mean of all obstacles categories was (3.1). Teachers employed a wide range of integration related strategies, since the mean of their answers was (3.0). What follows is a detailed description and analysis of the responses of each branch of the first question.

Question one first branch: What are the levels of stages of concern among teachers in Jordanian schools?

As mentioned earlier, teachers' answers to the first branch of the question indicated that they exhibited high levels of concern. These findings confirmed the ones reported by previous studies in the sense that the teachers exhibited similar stages of concern (Mills's, 1999; Rakes and Casey, 2002; Kirby and Smith, 1998). In addition, an observation between the results of this study and the ones reported previously is a shared focus on personal concerns as the most important (Mill 1999, Newhouse 2001, Rakes and Casey 2002, and Van den Berg et al. 2000).

However, the differences between the results of this study and the ones reported by the previous studies lie in the order of these stages of concern. In the present investigation, personal concerns occupied the top of the hierarchy followed by consequence-related concerns, informational concerns, collaboration-related concerns, refocusing-related concerns, management-related concerns, and awareness-related concerns, which occupied the bottom of the hierarchy, respectively.

Mills (1999), on the other hand, reported that the lower order or self concerns is dominant, despite of the application of the integrated learning system for a minimum of two years. In addition, the respondents were reported to pass through the following stages: Awareness, Informational, and Personal as the most intense concerns. On the other hand, Rakes and Casey (2002) who were motivated by an interest to find out the

peak stage of concern, second highest and the lowest concern reported that personal concerns were at the top of the hierarchy, while consequence concerns were reported to occupy the lowest position.

One point in order is that, in discussing teacher's level of concern, this study adopted Fullers' (1969) teacher concern theory, and Hall, et al (1973) CBAM model. According to Fullers' theory, teachers pass through stages of concerns each of which has its own concern characterizations. According to Hall, Wallace, and Dossett's (1973) model, there are seven stages of concern, viz. awareness related concerns, informational concerns; personal concerns; management concerns; consequence concern; collaboration concerns; and refocusing concerns. This kind of analysis was conducted so that a profound understanding of the impact of innovation on users can be detected (Hall & Hord, 1987), and an evaluation of the readiness of users to adopt the innovation could be conducted.

In taking account of these differences in the order of the stages of concern, Hope (1997) concluded that change is a developmental process, since a movement toward higher order concerns was reported. In addition, Kirby and Smith (1998) also stated that educators were more concerned with the awareness, informational, and collaboration stages. In the study conducted by Van den Berg et al. (2000), teachers were found to concentrate on self-concerns at the beginning of the implementation process, but they were replaced by strong task concerns at the end of the process.

In light of CBAM model and Fuller's concern theory, the analysis of teachers' stages of concern indicated that teachers in Jordanian schools build their own hierarchy of concerns, and order the stages they pass through in accordance with their experience and preoccupation with computers. "Personal" concerns occupied the top of the hierarchy, followed by "consequence" concerns, "informational" concerns, "collaboration" concerns, "refocusing" concerns, "management" concerns, and "awareness" concerns, respectively.

In taking account of those findings, one may suggest that the teachers regarded their personal ability, demands, adequacy, and role in the process of integrating ICT as the most crucial. It seems that the teachers considered this issue from the vantage point that

an efficient implementation of ICT in the classroom is extensively determined by teacher's abilities, demands, adequacy, and role. One would not expect that the implementation of ICT in class would be successful if teachers lack the ability to use the ICT and its applications, since they are the ones who actually perform the process of ICT integration.

In addition, the teachers believed that integrating ICT requires collaborating (representing stage number five) with others. This kind of collaboration may involve consulting experts so as to know how to best implement ICT. Another level of collaboration may involve working with the Ministry of Education for the purposes of producing curriculum-assisted softwares. Teachers may also cooperate with other teachers to get benefits of their experiences on how to deal with ICT.

The teachers have also experienced their concerns with the expected outcomes and the potential advantage of ICT for students. In this respect, it is the teachers who evaluate the levels to which using ICT is efficient in the process of teaching on the basis of students' performance before and after implementing the technology under consideration.

Teachers also are the only ones who are able to identify the points and strength of the process of implementing ICT in the process of teaching and learning, and the potential modifications that the innovation under consideration is required to undergo in order to achieve the expected outcomes.

Question one second branch: What are the levels of teachers' attitudes toward computer technologies among teachers in Jordanian schools?

As indicated above, teachers' attitudes toward ICT integration in schools are positive. Teachers responded most positively to the usefulness of ICT integration, their confidence of their ability to use the technology, the extent to which they like to integrate ICT, and the extent to which they are anxious about the technology, respectively.

The second branch of the first question highlights the attitudes that teachers hold toward integrating ICT in schools. The results of this study corroborated with Baylor's (1985) and Alajami's (2004), who indicated that teachers hold positive attitudes toward using ICT in schools. More specifically, the teachers believed that computer has a positive (useful) role in teaching, they were confident of their abilities to cope with the new technology; they liked to use it, and were not anxious or worried of using it.

One may suggest that the positive attitudes that the teachers hold toward ICT integration in schools is reflected positively on the extent to which teachers adopt ICT in schools. In other words, such positive attitudes are a clue of the success of the implementation of ICT in schools. In fact researchers Rice and Aydin, (1991); Woodrow (1991), Stevens, (1980); Gbomita (1997); Snider and Gershner, (1999); Atkins & Vasu, (2000); Gressard (1984) suggested that the success of the integration process is largely determined by the attitudes that teachers hold toward integrating ICT.

In taking account of such positive attitudes, different reasonable grounds were suggested by researchers. For instance, Pop-Davis and Twing (1991) suggested that age and experience are critical factors, in the sense that the older teachers are and the greater the experience with computers is, the greater is the extent to which teachers like to integrate ICT.

This may suggest that there is a positive correlation between attitudes toward ICT integration and training. Good infrastructure has been proven to correlate positively with the attitudes that teachers hold toward ICT. In particular, Morales (1998) concluded that "general access and better quality and variety of computer applications resulted in more positive attitudes towards computers among both students and teachers". Internal factors, such as self-efficacy, were also found to correlate with attitudes, in the sense that teachers who are self-efficient respond positively to integrating ICT in schools (Zhang & Espinoza (1998); Kinzie and Delcourt (1991). However, the relationship between these factors and attitudes goes beyond the scope of this investigation.

To these factors one may add, according to the present study, a prior experience of how to use ICT, because of which teachers are aware of the immense advantages that ICT may provide, such that the process of teaching and learning would be enhanced and facilitated. In addition, such attitudes may be motivated by a desire to improve the outcomes of the educational process by engaging students early in the world of ICT. This is enhanced by the fact that one requirement to get a good job in the market is a good deal of skills of how to use computer applications.

Question one third branch: What are the levels of obstacles faced by the teachers while they integrated technology in teaching and learning process in Jordanian schools?

The analysis of the data indicated that the teachers encountered a high level of obstacles in technology integration. The teachers reported that they encountered mostly time-related obstacles, followed by training-related obstacles, insufficient funding, equipment and access-related obstacles, obstacles related to administration leadership, and obstacles related to computer self-efficacy.

A point to mention is that the part of this study is discussed in light of Rogers' (2000) classification of the obstacles as internal and external. According to Roger (2000), the obstacles that constitute internal obstacles are teachers' attitudes and perceptions of technology as well as the actual level of competency that an individual has to deal with any kind of technology. External attitudes include availability and accessibility of necessary hardware and software, the presence of technical personnel and institutional support, and a program for staff development and skill building. A third category that crosses internal and external barriers includes time-related obstacles, and the unique culture of the institution.

The findings of this study confirmed those of previously conducted studies, especially those of Alajami (2004); Naddaf (2002), Mohammad (2003); Hope (1997); Maney (1999); Rogers (2000) and Chiero (1997) who reported that teachers encountered a high level of obstacles in technology integration.

The teachers in this study rated time-related obstacles as the major obstacle they encountered during the process of integrating ICT in the curriculum. Similar findings were reported by Sheingold and Hadley (1990), and (1997). The fact that the teachers rated time-related obstacles as the most frequent obstacle they encountered may suggest that planning for integrating ICT in the process of teaching and learning misinterpreted time needs as reported by teachers. Time-related obstacles may refer to the limited space of time allocated for teachers to integrate ICT in classrooms during the class. It may also be related to insufficient time with which teachers are provided to prepare for the stuff to be presented either by manipulating computer application or through navigating the Internet searching for relevant material. Time-related obstacles may also be related to the time at which teachers are provided with training. In fact, the literature review indicated that training is provided at inconvenient times because of which teachers could not get the opportunity to attend training courses.

The findings of this study also confirmed previous literature such as Lee, (1997) in that teachers reported that they encountered training-related obstacles. Such an obstacle can not be ignored, since preparing teachers is a crucial factor in determining the success or failure of the process of integrating ICT in schools. The fact that teachers reported training among the obstacles they encountered may suggest that there are serious flaws in the process of planning how to train teachers to use ICT. Such flaws may be related to the quality of training provided to the teachers. Such obstacles may be ascribed to the absence of a clear vision of the requirements of implementing a computer integration enterprise. It may also be attributed to the negative attitudes that teachers hold toward integrating ICT in the classroom.

Teachers of this study had also reported that they encountered equipment and access related obstacles because of which a successful integration of ICT in schools could not see the light. In fact, similar obstacles were reported by Vockell, Jancich & Sweeney (cited in Cafolla & Knee, 1995) and Geisert & Futrell (1995). This kind of obstacles may be related to insufficient number of computers provided to classrooms because of which not all students may have the opportunity to use the computer. On the other hand, teachers may not be provided with up-to-date software that would

facilitate the process of teaching and learning. The lack of equipment and access may be attributed to insufficient funding, or the random and unplanned distribution of devices among schools.

Teachers of this study had also reported that they encountered problems which results from insufficient funding. These obstacles may result from misevaluation of the commercial needs related to ICT integration in schools. Sufficient funding, for instance, is needed to get variable and up-to-date computer applications that may contribute to an efficient integration of ICT in the process of teaching and learning. Schools also need a budget to provide classrooms with devices, and to be connected to the internet so as to give students and teachers better benefits from the World Wide Web. Holding training courses also needs to be sufficiently funded so that teachers would be able to use ICT as efficiently as possible. In other words, it seems that sufficient funding is the engine for the success of any enterprise whose aim is to improve the quality of learning by integrating ICT.

Despite of these obstacles, the teachers rated obstacles related to computer self-efficacy and obstacles related to leadership and administration as the least frequent obstacles. In the literature, researchers tend to measure the impact of self efficiency on the extent to which teachers use computers. Moersch (1995), for instance, reported that teachers with low self efficiency used to use computers rarely, while the subjects of Torkzadeh and Kouftero's (1994) experienced an increased level of self efficiency after receiving a training course. Yet, such connection would not apply to the findings of the present study, since teachers reported that they encountered a high level of training related obstacles. As such, one would expect that there are other factors that may contribute to the teachers having a high level of computer self-efficacy. In this respect, one would suggest that teachers are skillful in using computers, since most universities offer courses on acquiring computer skills.

These findings may suggest that teachers feel competent about their abilities to integrate ICT in to the process of teaching and learning. In addition, this may suggest that the administration provides teachers with what they need to use computers in schools.

Question one fourth branch: What are the levels of strategies of technology integration in the teaching and learning process among teachers in Jordanian schools?

The findings of this study suggested that teachers employed integration strategies to a moderate extent. The fact that the teachers in this study exhibited a moderate extent of employing computer integration-related strategies may suggest that teachers were aware of the immense advantages that ICT provides teachers and students with. Taylor (1980) suggested that firstly, the computer can be used as a tutor by asking students questions, analyzing them, and evaluating students' answers. Secondly, computer can be used as a tool, where, for instance, simulation programs allow learners to try different possibilities that would be difficult in real life (Hickey et al., 2000). Thirdly, the computer can be used as a tutee, where the computer imitates the teacher in providing information, structuring learning activities, and in providing guidance and feedback (Taylor, 1980).

The fact that the teachers of this study moderately employed integration strategies may reflect positive attitudes toward ICT integration; this is confirmed in this study. Teachers seem aware of the potential role that computers may play in providing students with new concepts of what knowledge is, and provide them with new ways of thinking about and understanding the world they live in (Papert, 1992). In addition, teachers are probably aware of the new horizons that ICT provides in terms of presenting the material they are teaching. Such differences would be clear when these new methods are compared and contrasted with the traditional methods of teaching.

Question two: Based on Rogers' adopter categories, who among the Jordanian teachers are the early and late adopters?

The findings of the part of this investigation indicate that the overwhelming majority of teachers were late adopters.

This study attempted to explore the portion of early and late adopters among Jordanian teachers, on the basis of Rogers' classification. This line of investigation is discussed in light of Rogers' Theory of Rate of Adoption. Rogers' bell curve holds true for the results obtained in this study. The overwhelming majority of respondents were late adopters.

The results of this study support those reported by Becker, Ravitz & Wong (1999) who reported that the majority of their respondents were late adopters. According to Rogers, these late adopters are characterized by less ability to absorb the innovation, less favorable attitudes toward the adoption of the innovation under consideration, and lack the ability to cope with uncertainty and risk, to mention a few.

The fact that the majority of teachers belongs to the late adopter category may suggest that the process of the diffusion of ICT integration in schools is slow, since early adopters, who are described as the agents of innovation, and who should spread the innovation under consideration to their peers, constitute a minority. The factors that may contribute to classifying the majority of teachers as late adopters, in light of Rogers' (1995) proposal, are the innovation itself, communication channels used to spread the innovation, time, and the nature of society to whom it is introduced. This investigation makes it clear that these factors play an important role in classifying the majority of teachers as late adopters. In this respect, one may suggest that the innovation itself (ICT integration in the process of teaching and learning) is not a source of appeal for teachers, due to internal as well as external factors. For instance, equipment and access related obstacles constitute external barriers to adopting ICT as a potential mean of teaching in schools (Roger, 2000).

Question three: What are the distributions of early and late adopters among Jordanian teachers in term of teaching experience?

Although the majority of the respondents, regardless of their experience group, are late adopters, a profound analysis of the data shows that the percentage of late adopters was the lowest among teachers who belong to the group with 1-5 years of experience, and the percentage of early adopters was also the highest among this experience group, followed by teachers who belong to the group with 6-10 years of experience, teachers who belong to the group with 11-15 years of experience; teachers who belong to the group with 15-20 year of experience, and those who have been teaching for more than 21 years, among which the percentage of late adopters was the highest, respectively.

In taking account of these differences, Rogers (1995) suggested that experienced users are more enthusiastic than their beginner counterparts to adopt the new innovation and use. In addition, it is claimed that the quality of pre-service education that teachers receive at universities and colleges is a determining factor. Most teachers in this study who had long teaching experience are college graduates, to whom no adequate and qualified computer education is provided, whereas the majority of teachers who are at the beginning of their teaching experience are university graduates to whom a sufficient amount of computer knowledge is provided. As we can see, the result of the study matched with Rogers' result (1995). In addition, one may suggest that teachers' first-hand experience with computers plays a role, since beginning teachers are more familiar with ICT due to their university education.

In light of these findings, one may suggest that the extent to which teachers are familiar with using computers and the extent to which they are self efficient has an important role in classifying them as early and late adopters. It goes without saying that sufficient knowledge of ICT and computer usage contributes positively to acquiring the characteristics of early adopters.

Question four: What are the distributions of early and late adopters among Jordanian teachers in term of subject matter taught?

The objective of question four in the present investigation was to find out the attributes of early and late adopters among Jordanian teachers in term of subject matter taught. Despite of the fact that the majority of teachers, regardless of the subject matter taught, are late adopters, subtle differences were found between teachers who teach English, Math, and Science. The highest portion of early adopters is found among teachers of English, followed by teachers of Science, whereas the lowest portion of early adopters was found among teachers of Math.

The fact that the highest portion of early adopters is among teachers of English may suggest that teachers of English are more integral part of the society, intelligent, willing to adopt the new technology, have the ability to deal with abstraction, knowledge seekers, ... etc (Rogers, 1995). In addition, such superiority in favor of teachers of English over their counterparts who teach Math and Science may have to do with the advantage of the English language, giving the fact that the language of programming is English. In addition, unlike the other subjects, teaching a language involves a wide range of applications. Thus, the relative advantage of computer applications among teachers of English is highly estimated.

Question five: What are the distributions of early and late adopters among Jordanian teachers in term of training attendance?

In question five of the present investigation, an attempt was made to find out the distribution of early and late adopters among Jordanian teachers in term of training attendance. The findings of this study indicated that there were significant differences between teachers who received training and those who did not receive training in terms of classifying them into early and late adopters. In other words, the highest portion of early adopters is found among teachers who received training, whereas the portion of early adopters among teachers who did not receive training is low.

Hakkinen (1994-95) posited that training results in reducing computer anxiety, in thinking highly of their computer skills. Without doubt training would guarantee that teachers would acquire the characteristics of early adopters among of which are positive attitudes toward the innovation, grater rationality, greater ability to deal with abstraction, better ability to deal with uncertainty and risk, more favorable attitudes toward Science (Rogers, 1995). In this respect, Yildirim (2000) has suggested that competence which results from training enhances teachers' attitudes, concerns and interest in the technology under consideration. Such factors would reflect on teachers' willingness to adopt the new technology, thus, characterizing them as early and late adopters on the basis of the characterizations of each group of adopters.

Question six branch A: Are there any significant differences in the Jordanian teachers' stages of concern towards technology based teaching experience?

H1: There are significant differences in the stages of concern between the five levels of teaching experience

This investigation was driven by an interest in finding out if teachers' teaching experience has an impact on the stages of concern that teachers' express. A primary attempt in this investigation was carried out to find out the level of concern among teachers in terms of their teaching experience. The findings related to this question indicated that teachers, regardless of their teaching experience, have high levels of concern.

The fact that the teachers in this study from all experience groups have high levels of concern may imply that teachers are concerned about the success of the process of integrating ICT in schools, and in utilizing such technology to get better educational outcomes. It goes without saying that teachers wish to know more about the innovation (Hord et al. 1987), their attempts to allocate enough time in the utilization of it, their interest to find out the impact of it on students, their interest to cooperate with others; their interest to have a role in a better utilization of the technology are all indications of the positive concerns teachers have towards the innovations, and a primary success of the enterprise.

The profound analysis of the data indicated that teachers from different teaching experiences have the same concern. **Thus, the hypothesis that there are significant differences in the stages of concern between the five levels of teaching experience is accepted.** The findings of this study contradict those reported by Bradshaw (1997) and Linnell (1992), who indicated that teaching experience is a critical factor in determining the stages of concerns. More specifically, Bradshaw (1997) and Linnell (1992) indicated that teachers in the short experience group have higher stages of concern than those who have long experience in teaching.

In analyzing the patterns of concern of teachers with experience, Huberman and Miles' (1984) maintained that the concerns of beginning teachers are self and task-oriented. On the other hand, Fuller suggested those beginning teachers' stages of concern increase as their experience grows, and that experienced teachers are more concerned about students rather than themselves.

The fact that the teachers in this study exhibited high stages of concern and they shared the same concern may have profound implications with regard to how rapid and successful the process of integrating compute technology in the process of teaching and learning is (Mills, 1999). The teachers in this study may have a better background with regard to the potential advantages that ICT may provide to the educational outcomes (which has its own reflections on teachers' interest in "consequence" concerns), and have an experience with regard to how to use the technology ("personal" concerns).

Question six branch B: Are there any significant differences in the Jordanian teachers' stages of concern towards technology, based on the subjects taught?

H2: There are significant differences in the stages of concern between the three subject matters taught

Another branch of this question is concerned with finding out whether there are statistically significant differences in the stages of concern in terms of the subject matters taught. The findings confirmed those indicated by Chamblee and Slough (2002) who reported that teachers of Science and Mathematics shared the same concerns and worries. On the contrary, Shu and Yen (2008) suggest that the concerns

of teaches in his study, especially those who teach English, are modest, despite motivating teachers to increase the use of computer technology.

More specifically, the present study indicated that there are no statistically significant differences between English, Math and Science teachers. **Thus, the hypothesis that there are significant differences in the stages of concern according to the subject matters taught is accepted.**

In taking account of these findings, one may suggest that teachers of Science believed that computer applications provide them with a great help in teaching the material. In other words, the nature of the subject matter taught may determine the range of tasks that can be performed using computer-assisted teaching methods such as simulation and the use of Internet in teaching students how to get information that help them to increase their abilities in solving problems. Teachers of English may also use computer applications as well as the Internet in teaching students how to interact in English, given the fact that the language of the Internet is English. Computer applications may be used to teach students how to pronounce words in English, how to spell using spelling check softwares and interact in English with others to promote their communication skills. Teachers of Maths, on the other hand, are expected to use computer applications in the same level as that expressed by English and Science teachers.

Question six branch C: Are there any significant differences in Jordanian teachers' stages of concern towards technology based on the training attendance?

H3: There are significant differences in stages of concern in terms of training attendance

Another related investigation aimed at exploring the influence of training on the levels of stages of concerns that teachers express. The results of this investigation confirmed those reported by and Germann and Sasse (1 997) Liu, Theodore, and Lavelle (2004), who concluded that teachers exhibited an increased level of stages of concern when they were enrolled in an on-line training course.

In particular, the findings of this study show that teachers who had training expressed a high degree of integration-related concerns. **Thus, the hypothesis that there are significant differences in stages of concern in terms of training attendance was accepted.**

The findings of this study is supported by Van den Berg et al. (2000), who suggested that stages of concern is a developmental process in the sense that the more teachers are integrated in ICT, the more they express integration-related concerns. In this respect, such a proposal can be extended to take account of the impact of training on the level of stages of concern that teacher's exhibit. Teacher's stages of concern depend on the extent to which they are integrated in the new innovation. Ultimately, teachers are expected to pass through all stages of concern as they become more familiar with the innovation under consideration. Their progress along the line of adopting the technology is signaled by different stages of expressing different levels of concerns.

Question seven branch A: Are there any significant differences in obstacles of technology integration based on teaching experience?

H4: There are significant differences in obstacles of technology integration between five levels of teaching experience

Since barriers to integration ICT in schools may have a profound impact on the success of the process of integration, one integral part of this investigation spotlighted those obstacles and the potential influence of demographic variables on the extent to which teachers encounter such obstacles.

The teachers in this study from all experience groups exhibit a high level of obstacles in technology integration. These findings confirm the results of previous studies in which teachers were found to encounter such barriers (Hope (1997); Maney (1999); Rogers (2000); Chiero (1997); Alajami (2004); Naddaf (2002); Mohammad (2003); Al-Sartawi (2001). However, this study reported that teachers who belong to the group with (1-5; 6-10) year of experience encountered less level of obstacles than did their counterparts who belong to the groups with (11-15;15-20; 21 above) year of experience. Such findings contradict those reported by Naddaf (2002),

who indicated that teachers whose experience ranges from 1-5 encounter a high level of obstacles. Beggs (2000), also stated that the lack of experience with using the technology is a common barrier among teachers. This means that teachers who are experienced exhibited a lower extent of encountering integration-related obstacles than their experienced counterparts.

Where the influence of teaching experience on the extent to which teachers encounter obstacles is concerned, the results of this study indicates that there were statistically significant differences in the extent to which teachers encountered obstacles in terms of their teaching experience between teachers who belong to the group with 1-5 years of experience and teachers who belonged to the group with 15-20 and 21 above year of experience. Similar differences were found between teachers who belonged to the group with 6-10 years of experience and teachers who belong to the group with 15-20 and 21 above year of experience. **Thus, the hypothesis that there are significant differences in obstacles of technology integration between five levels of teaching experience was accepted.**

The fact that the teachers who have long experience encountered obstacles more often than their counterparts with short experience may suggest that teachers with a short period of experience are more successful in adopting, using, and dealing with the innovation. One point in order is that teachers with long experience are most probably college graduates, and graduated at a time when courses that taught them how to use computers were not offered. Another point in order is that teachers with a short teaching experience, are young, and have the motivations and the sprit to adopt new technologies, whereas those with a long teaching experience lacked such motivations and spirits. Such factors have the consequences of being unwilling to adopt any kind of change. In addition, such differences may be attributed to differences in terms of knowledge, experience with regard to how to use computers, and in terms of personal attitudes toward such innovations.

Question seven branch B: Are there any significant differences in obstacles of technology integration based on subject matter taught?

H5: There are significant differences in obstacles of technology integration between the three subject matters taught

Despite of the fact that teachers from all groups under consideration encountered a high extent of obstacles in technology integration, teachers of Science were found to encounter the highest extent of obstacles in technology integration, followed by teachers of Math. On the other hand, teachers of English exhibit the lowest extent of obstacles in technology integration. These findings confirm the results of previous studies Yang and Huang (2008) in which English teachers faced barriers in technology integration, this study also identified significant relationships between first and second-order barriers. Mohammad (2003) also indicated that teachers of Math lack the basic computer skills that allow them to utilize computer technology efficiently and continually.**Thus, the hypothesis that there are significant differences in obstacles of technology integration according to the subject matters taught was accepted.**

The fact that teachers of English exhibited the lowest level of obstacles in integration may suggest that language may constitute an important factor in the extent to which the process of ICT integration is successful. Such factor is important because the language in which the software is written is English, suggesting that teachers of English found it easier to deal with this kind of technology than their counterparts who taught other subject matters did. In addition, such differences may be attributed to individual differences, and teachers' confidence of their abilities to deal effectively with the new technology, as well as differences in knowledge background of the innovation under consideration

Question seven branch C: Are there any significant differences in obstacles of technology integration based on training attendance?

H6: There are significant differences in obstacles of technology integration in training attendance

The results of another part of this study show that teachers who received training are less likely to encounter obstacles in technology integration when contrasted with their counterparts who did not receive training. Such results **do confirm the hypothesis that there are significant differences in obstacles of technology integration in training attendance.**

The results of this study were supported by Lee (1997) who suggested that teachers, especially those "of advanced age" were most likely to encounter barriers because they lacked training. Another source of support was provided by Torkzadeh and Koufteros (1994) who suggested that teachers' self efficiency was found to correlate positively with the training teachers were provided with. Hedney (1998) also found that training gives teachers the ability to put what they learned theoretically into practice.

In light of these findings, one may suggest that the success of integration process depends greatly on the training teachers receive. In fact, Lee (1997) suggested that training teachers on how to utilize ICT in classrooms is fundamental so as the process to integrating ICT in schools would be successful. In addition, one can not ignore the fact that training would be reflected positively on teachers' attitudes toward the integration of ICT, and their confidence in their abilities to use such technology.

Question eight branch A: Are there any significant differences in technology integration strategies based on teaching experience?

H7: There are significant differences in strategies of technology integration between five levels of teaching experience

This investigation highlighted the strategies that teachers employed in the process of integration, and the potential influence of such variables as teaching experience on the extent to which teachers employed integration-related strategies.

The findings of this study revealed that teachers who have been teaching for 1 to 5 years showed more readiness to integrate ICT in education than the teachers who have been teaching for 20 years and above. This result may indicate that the recent graduate teachers are considered the pioneers of ICT integration, they show high extent of expressing stages of concern. In this respect, it is suggested that the high level of concerns expressed by these teachers is reflected positively on the extent to which they employed integration strategies. This is maintained by Hord et al. (1987) who suggest that at each stage of concern teachers employed a wide range of computer integration-strategies. In light of literature, one may suggest that the range of strategies may include such strategies as employing the most current research with regard to how to use ICT in the process of teaching and learning, using simulation exercises, designing computer related activities, giving students the chance to be engaged in on-line activities, and giving them the opportunity to practice their computer skills, to mention a few. However, discovering the strategies that teachers employ goes beyond the scope of this piece of research.

This study also reported statistically significant differences in the extent to which teachers employed integration related strategies in terms of teaching experience between the group with1-5 year of experience and the group with 21 year & above of experience, and between the group with 6-10 years of experience and the group with 21 year & above of experience. These findings contradicted those reported by Fishers (1996) who indicated that experience is not the crucial factor in choosing the appropriate strategy or application. **Thus, the hypothesis that there are significant differences in strategies of technology integration between five levels of teaching experience was accepted.**

It seems that teachers who have a short teaching experience excel in all aspects of ICT integration, which proves that teaching experience is not a critical factor in determining the success of this process. Again, this may have to do with the willingness of these teachers to adopt new changes. Teachers who have been teaching for a long time, on the other hand, may find it unworthy to learn new things and to employ new methods of computer-assisted teaching, since they are familiar with the traditional methods which they excel. In addition, one may suggest that teachers believe in face-to-face learning which has its own merits, one of which is that each student is given the opportunity to approach new ideas in his own way.

Question eight branch B: Are there any significant differences in technology integration strategies based on subject matter taught?

H8: There are significant differences in strategies of technology integration between three subjects matter taught

The study also indicated that there are statistically significant differences between teachers of English and teachers of Science in the extent to which they employed integration-related strategies. **Thus, the hypothesis that there are significant differences in strategies of technology integration according to the subject matter taught was accepted.**

The results of this study consistent with that of Becker (2001) who indicated that English teachers used computer more than Sciences and Math teachers. Simkin's (1989) and Sharp (1995) indicated that there were significant differences between teachers (Math, Science and History) when they used computer or when they employed strategies. The fact that teachers of English outperformed their counterparts who taught Math may suggest that they were more concerned with using computers in teaching. Such a high extent of employing computer integration strategies on the part of teachers of English may be ascribed to the wide variety of tasks and applications that teachers of English may use in teaching students. Teaching English as a foreign language involves attempting to teach students how to acquire basic skills in English, for which a wide range of applications are designed, such as pronunciation, conversation, spelling, as well as listening and reading

comprehension. Apparently, this wide range of applications is not available for teachers of Math, since teaching Math is probably restricted to teaching students Mathematical operation. Thus, strategy to be employed is largely determined by the nature of the subject matter taught.

Question eight branch C: Are there any significant differences in technology integration strategies based on training attendance?

H9: There are significant differences in strategies of technology integration in training attendance

The findings indicated that there were statistically significant differences in the extent to which teachers employed strategies of technology integration in terms of training. Teachers who received training reported a higher extent of employing integration-related strategies than those who did not receive training. The results of this study were supported by BartonCommon (2006) and Lienard (1995) who suggested that training enables teachers to utilize computer. **Thus, the hypothesis that there are significant differences in strategies of technology integration in training attendance is confirmed**

The fact that teachers who received training outperformed their counterparts who did not receive training in the range of strategies they employed may suggest that teachers with training were aware of the three roles that computers play in education, viz. computers as tutee, tutor, and as a tool (Taylror, 1986), and have been trained to chose the appropriate strategies in accordance with the best way they see that the computer could help. In fact, Lee (1997) suggested that training enables teachers to be professional in utilizing computers. He added that a meaningful type of training is the most important issue that teachers should have. Training enables teachers to analyze and identify the knowledge required, enables them to think profoundly of appropriate strategies, and to include relevant activities

Question nine: Is there a relationship between teachers' stages of concern and technology integration strategies among teachers in Jordanian schools?

H10: There is significant relationship between stages of concern and strategies of technology integration

This investigation attempts to discover the relationship between teachers' stages of concern and technology integration strategies among teachers in Jordanian schools.

This part of the investigation was motivated by the fact that, according to Mills (1999), stages of concern are the most important factors that affect technology integration in the classroom, and by the fact that each stage of concern is characterized by a set of strategies that teachers use in order to facilitate the process of ICT integration (Hord et al. 1987). However, these considerations go beyond the scope of the present study.

A positive correlation was found between the level of stages of concern that teachers expressed and the extent to which they integrated ICT in schools. In other words the higher the level of concern is, the higher is the extent to which teachers employed integration-related strategies. **Thus, the hypothesis that there is significant relationship between stages of concern and strategies of technology integration was accepted.**

In addition, Mills (1999) provides similar observation by suggesting that teachers' concerns and perceptions of an integrated learning system (ILS) affect the way they implement ILS.

The findings related to this part of the inquiry confirmed the ones reported by Mills (1999), who suggested that one's concern about technology has a substantial influence over the success of the process of integrating technology in the process of teaching and learning, as reported by Bradshaw (1997) and Linnell (1992), who suggested that there is a positive relationship between the stages of concern and the extent to which teachers integrate ICT in the classroom. In particular, this

investigation suggested that there was a statistically positive relationship between stages of concern and ICT integration.

Question ten: Is there a relationship between obstacles faced by the teachers and technology integration strategies among teachers in Jordanian schools?

H11: There is significant relationship between obstacles of technology integration and strategies of technology integration

Question ten is motivated by an interest to discover the relationship between obstacles faced by the teachers and technology integration strategies among teachers in Jordanian schools. This part of the inquiry indicated that there was a significant negative relationship between the obstacles teachers encountered and the extent to which they employed integration related strategies, in the sense that the more teachers encountered obstacles in technology integration; the less they employed such strategies. **Thus, the hypothesis that there are significant relationship between obstacles of technology integration and strategies of technology integration was accepted**

Those findings confirmed the ones reported by Sheingold and Hadley (1990) for example considered that the obstacles most effective in preventing the successful implementation of ICT into the teaching process. In this respect, one may suggest that, as Maddux (1998) , Geisert & Futrell (1995) conforms, that problem of the insufficient number of devices per class and other equipments in addition to the problems of maintenance and other related problems concerning equipments and access limits the range of the strategies that teachers could employ in integrating ICT. if it was not the case that such obstacles restrict the process of integration as a whole.

The leading role of the administration in the process of integration is important, since a confident and competent administration is aware of the needs of teachers to be knowledgeable of the applications of computers and the appropriate strategies for manipulating them (Ritchie, 1996). In addition, teachers' self-efficacy to manipulate relevant strategies would be increased if they were provided with training (Torkzadeh and Koufteros, 1994).

Question eleven of the present investigation attempted to find out whether teacher's attitudes toward computer moderate the relationship between (stage of concern and obstacles in technology integration) and strategies of technology integration.

H: 12 Attitudes does moderate the relationship between stages of concern and strategies of technology integration

H: 13 Attitudes does moderate the relationship between obstacles in technology integration and strategies of technology integration

The analysis of data indicated that attitudes increase the relationship between (stages of concern and obstacles in integration of technology) and employing integration strategies. This suggests that **the hypothesis that attitude does moderate the relationship between stages of concern and strategies of technology integration, was rejected**. On the other hand the hypotheses that Attitude moderate the relationship between obstacles in technology integration and strategies of technology integration was accepted.

The results of this part of investigation partially confirm the results reported by Filzah Mohd isa (2007) who suggested that attitudes toward change increased the relationship between compensation and training (independent variables) from one side and job satisfaction (dependant variable) from another side. In this respect, Ajzen & Fishbein, (1980) suggest that technology adoption behavior could be viewed as the gist of individuals' affective response to, or attitude toward, the innovation. This view is supported by the results of some of researchers (Stevens, 1980; Gbomita, 1997; Snider & Gershner, 1999; Atkins & Vasu, 2000) who suggested that teachers' attitudes have an influence on the behaviors of computer adoption and integration. Similarly, Gerschner (1982) maintains that the extent to which the process of computer technology integration in the classroom is successful is highly determined by the attitudes that teachers hold toward this technology.

5.4 Qualitative data

Interview considered as qualitative tools was used to answer the last research question (How do early and late adopters (among Jordanian teachers) differ from each other in their technology integration strategies). The interview consisted of six questions. In the following the details of teachers' answer on each question.

First question: How do you think that the administration could help you to overcome the obstacles that you might face while integrating technology in teaching process?

The analysis of the interview data indicates that there are four themes with regard to the role of the administration in overcoming obstacles in technology integration. According to these themes, the administration may play a role, may not play a role, may play a minor role, or its role depends on the nature of the problem that teachers encounter. In addition, a number of some themes emerged as to the potential role of the administration in overcoming such obstacles. These themes include motivating teachers, and helping them overcoming the obstacles they encounter.

Interestingly, many teachers reported that the administration has a role helping teachers overcoming the obstacles they encounter. In fact, teachers suggested that *"... the administration can increase the rate of technology use through supporting technology staff development, through having a vision for technology use and a long-term technology plan"* (Adel: TS), through *"motivating and convincing teachers to embrace technology and change"* (Ameen: TS), and through *"Providing us with computers and maintenance, since it is required from teachers to do everything on the computer"* (Fatima: TM).

On the other hand, a small number of teachers reported that "the role that the administration may play in overcoming the obstacles is largely determined by the nature of such problems

> *... We suffer from an insufficient number of computer devices in the classroom, and I think that such a problem can be solved only if the administration shoulders the responsibility of providing the classroom with such devices .... On the other hand, problems related to the extent to which teachers use computer applications in the classroom, and the range of tasks the compute is used to perform depend only on the teacher and his skills as well as his creativity (Hani: TE).*

In taking account of the role of the administration in the process of ICT integration, Ritchie (1996) suggested that the administration is to be prepared and motivated so as to adopt the new technology. In addition, he suggested that incorporating technology in the leaders' daily practice provides a model for teachers to measure themselves. Becker, Ravitz & Wong (1999), on the other hand, suggested that lack of leadership and example by experienced classroom teachers have a negative effect on adopting the technology. However, the role of the administration in overcoming obstacles in technology integration has not attracted considerable attention yet.

Second question: What are the factors that would enable teachers to contribute to utilizing technology in the classrooms?

Six themes were extracted from the interview data with regard to the teachers' perceptions of the potential factors that may facilitate the process of ICT integration, viz. training teachers, motivating them, providing classrooms with equipments, planning for the process of ICT integration, collaboration between teachers, as well as providing teachers with a space of freedom.

Expectedly, the majority of teachers suggested that the most important factor is training. It seems that training has its special attraction to teachers, since training *"give teachers comprehensive understanding of how to integrate ICT, and teachers would be able to use idle ways and strategies when they decide to integrate ICT inside classroom"* (Ahmad: TM), and since it "increases *teachers' spirit to innovate*

and teachers become more independent and shoulder the responsibility of creating lesson's software" (Salem: TS).

On the other hand, a small number of teachers realized that planning for the process of ICT integration is the roots of a successful integration. In fact, this is what Hani, a teacher of English, observed by stating that "we need to plan carefully for the process of ICT integration in the classroom".

Few teacher have also realized that "Teachers need a space of freedom in this respect.

> *... we are not allowed for instance to use the audio and the visual properties of computers, because the administration thinks that these instruments are a waste of time, but I think that these properties make the process of teaching more appropriate, enjoyable and interesting* (Amani: TS).

The researcher has indicated that there is a positive relationship between the training that teachers receive and the attitudes they hold toward ICT. In other words, training results in positive attitudes toward ICT, and this is this effects the extent to which teachers integrate ICT (Chin and Hortin, 1993-94; Yildirim, 2000). In addition, Liu, Theodore, and Lavelle (2004) have also reported that training increases the level of stages of concern for teachers. Similarly positive influence of training was observed by Hedney (1998) who suggested that training on how to incorporate technology in the classroom is the most advantageous type of training that teachers should receive.

The fact that the largest number of teacher regards training as the most influential factor may suggest that teachers are unfamiliar with using ICT. Thus, it is natural for these teachers to report training as the most crucial factor, since such training would guarantee a successful as well as a rapid integration of ICT.

Third question: What are the obstacles that you might face while integrating technology in the classrooms?

Four themes were extracted from the interview data with regard to the obstacles that teachers encountered. These themes included time –related obstacles, equipment and access-related obstacles, training-related obstacles, as well as obstacles related to computer self-efficacy.

Many teachers reported that they encountered equipment and access-related obstacles, while very few reported that they encountered obstacles related to computer self-efficacy. They suggested that *"There are too few computers for the numbers of students"* (Samar: TM). On the other hand, very few teachers reported that they suffer from *"Insufficient knowledge, skills and experience about how integrating technology"* (Eiman: TM). Some of them reported the *"lack of advanced skills within a specific program"* (Hani: TE). A glance at the literature conducted in this area indicates that these obstacles were reported by other researchers. Similar to the obstacles reported in this investigation, Vockell, Jancich & Sweeney (cited in Cafolla & Knee, 1995) and Geisert & Futrell (1995) reported that subjects in their studies encounter equipment and access-related obstacles.

Similar to the results derived from the paper-based questionnaire in which computer self-efficacy was reported to be among the least frequent obstacle that teachers encounter. Literature concentrated on finding out the impact of self-efficacy on the extent to which teachers integrate ICT (Moersch 1995; Torkzadeh and Koufteros's, 1994). These studies concluded that low self efficiency reflects negatively on the extent of ICT integration.

It seems natural for teachers who did not receive training to regard training related obstacles as the major obstacle they encounter. A point to mention is the fact that computer self efficiency is largely determined by training. This is evident in the fact the self efficiency of Torkzadeh and Koufteros's (1994) subjects increased when they received training course

Fourth question: What are the strategies you usually use to integrate technology in the classroom?

Clues about the level of ICT integration are provided by asking teachers to report the strategies they employ to integrate ICT. In fact, the analysis of the qualitative data indicates that there are six themes that emerged regarding the strategies that teachers employ, viz. using the internet, using computer software programs, allocating time for students to practice their computer skills, planning computer-related activities, using the visual and the audio properties of computers, and the absence of integration-related strategies.

Many teachers indicated that they did not have a particular strategy for integrating ICT in the classroom. These teachers suggested that they *"... don't think that [they] will apply technology as a teaching method, because they lack the necessary skills to handle this integration"* (Mahmood), and because *"the surrounding conditions and circumstances affect the extent to which [they] integrate ICT such as training"* (Ali), and because they are *"being affected by the negative attitudes that ... colleagues hold toward ICT"* (Ali).

That smallest group of those who reported that they employ integration related strategies indicated that they plan computer related activities. Hni, a teacher of English asserted that he looks for *"... activities and tasks that could be explained using the computer and especially those which feel that if they were performed using computer applications, students would be get the ultimate benefit and understanding of the activities being performed using the computer"*. This is why he *"plans computer related activities"*.

Fisher (2000) suggested that what was common among the answers of beginning teachers, when they were asked bout how they use computers, is their emphasis on obstacles to using computers more than on strategies themselves, suggesting that their use of computer is determined by the difficulties they encounter. Those findings confirmed the results of this question that the teachers of this study also concentrated much more on the obstacles that faced them rater than pay attention on the strategies that they have employed in the teaching and learning process.

In taking account of the responses of teachers who do not employ integration-related strategies, one may suggest that training plays an important role in providing teachers with sufficient knowledge with regard to how to integrate ICT and how to choose the best strategy. In fact, Lee (1997) suggested that training is important so as to ensure the success of the process of ICT integration, of which an integral pat is to choose an appropriate strategy. On the other hand, teachers who employ integration-related strategies seem to be acquainted with the knowledge necessary to integration ICT.

Fifth question: What are your suggestions for improving the teaching process by integrating technology?

The analysis of the interview data indicates that there are seven themes extracted among of which are training, equipment and access supplying, time, motivating teaches, planning, collaboration between teachers, and the financial support.
Many teachers suggested that what is necessary for an effective use of technology is training as well as supplying schools with equipments and access.

Based on the responses of interviewee concentration was on the quality of training since *"practicing computer skills rather than concentrating on theoretical considerations"* (Ruqaya); on time in which training is provided so that *"every teacher is able to take such courses, so the largest number of teacher might benefit from the courses held"* (Mahmood). Equal attention was paid to the importance of supplying classrooms with equipments *"so that students would have equal chances to get benefit from utilizing technology in the classroom"* (Amal).

Few teachers realized that financial support is the basic thing. According to Amani, a teacher of Math, *"we really need for the time being is enough financial support. You know that such a financial support is the engine of the process of ICT integration in schools"*.
Such results confirm those of previously conducted studies. Maddux (1998), and Geisert & Futrell (1995) suggested that it is important to have enough number of

computers so as to teach specific computer applications, and to support teachers when necessary.

In addition, it seems that teachers perceive it positive for classrooms to be provided with computer devices. In fact, students would be better able to have their first-hand experience with computers and their applications if every student had the opportunity to work with his own device. One point in order is that an adequate number of devices per class could increase the level of students as well as teachers familiarity with the most recent up-t-date knowledge of ICT and would increase the range of applications in which computer would be used. On the other hand, it seems natural to perceive training as one of the most important factors, since most of teachers reported that they did not receive training.

5.5 A Comparison between the Results of the Quantitative and the Qualitative Data

Although teachers, according to the results of the paper-based questionnaire, hold positive attitudes toward utilizing ICT in schools, the results of the qualitative data indicates that many teachers rarely use this technology. This suggests that these teachers, in terms of Rogers' (1995) classification of teachers, are late adopters. Such a fact does confirm the results of the paper-based questionnaire, since the majority of them, regardless of their experience, the subject matter they teach, and their teaching experience, are late adopters.

The results of the paper-based questionnaire indicate that obstacles related to administration leadership are among the least obstacles that teachers encounter. In fact, this result is conformed by the results of the qualitative data in which teacher reported that not only the administration does not constitute a barrier, but also helps teachers overcoming the obstacles they encounter.

The fact is that qualitative data indicated that training is the most important factor in facilitating the process of ICT integration. However, the same data indicated that teachers perceive it as the most serious barrier to integrating ICT. This also indicated

in the results of the paper-based questionnaire (Training-related obstacles rank second in the order of the obstacles perceived by teachers).

Where strategies are concerned, the results of the qualitative data contradicted those reported by the paper-based questionnaire. The analysis of the interviews data indicated that a large number of teaches did not employ integration-related strategies, whereas the results of the paper-based questionnaire indicated that teachers exhibited a moderate extent of integration-related strategies.

A comparison between the obstacles that teacher encountered as extracted from the qualitative data and the ones indicated in the results of the analysis of the paper-based questionnaire shows some similarities and differences. In particular, the qualitative data indicates that training, equipment and access, time, and self efficiency are the obstacles that teachers encounter. On the other hand, the results of paper-based questionnaire indicates that Time-related obstacles, Training-related obstacles, insufficient Funding, Equipment and access-related obstacles, Obstacles related to administration leadership, and Computer self efficiency are the obstacles that teachers encounter. However the results of both type of data indicates that training related obstacles, time related obstacles, and access and equipment related obstacles as being very important ones.

Where strategies of ICT integration are concerned, a difference exists between the results of the paper-based questionnaire and the results of the qualitative data. In particular, the questionnaire indicated that teachers employed different strategies, where as the results of the analysis of the qualitative data indicated that most teachers did not employ any strategy.

5.6 Contributions of the study

This study addressed new knowledge that is necessary to improve and enhance the technology integration strategies in the classroom by Jordanian teachers. Also the researcher reviewed relevant literature to explore the differences between this study and previous studies that help to reveal how this study is distinctive. By the way, Alfieri (1998); Jacobsen, (1998); Kwan, (2003); Singh, (2003) & Yazid (2000) had used either Rogers (1995) model or CBAM theoretical framework in order to explain and understand new innovations. So the contribution of this study is that it used Rogers' model (adopters categories) and CBAM theoretical framework (stage of concern) to get more understanding about a new innovation (integrating ICT in Jordanian public school). Moreover, it will explain why some teachers integrate ICT in teaching and learning process and others did not do.

There are two reasons for combining CBAM theoretical framework and Rogers theory. Firstly, Jacobsen (1998) indicated that one of the possible limitations is when integration of technology relies on Rogers' adopter's categories only. This is because the categories are based on global characteristic and time of adoption. On the other hand, the stages of concern put teachers in different level of concern toward an innovation, and it does not explain why they are in that level.

Secondly, the importance of using Rogers' theory (adopter's categories) and CBAM theoretical framework (stages of concern) in one model is to get more understanding about adoption pattern and to understand why innovation has been adopted by some while the rest did not adopt. Moreover, Rogers' model not only explains how and why individual adopts innovation but also addresses the issue of what happens to an innovation before and after it has been adopted. On the other hand, CBAM theoretical framework helps to capture the role of individual in adoption process Hall and Hord (1987) indicated that CBAM theoretical framework tend that "management" concern is intense during the first use of an innovation. Many (1994) also stated that arousal of stage three "management concern" indicates that an innovation has been adopted.

Second contribution is that most previous studies like (Geoghegan (1995), Jacobsen (1998), Moore (1991) and Rogers (1995) indicated that there is gap between early and late adopters. So this study explored the differences between them and provided practical ways to bridge the gap between early and late adopters among Jordanian teachers.

The third contribution is that attitude was used as a mediator or intervening variable in many studies such as TAM model and Mahmod et al. (2005). In TAM model attitude was found to be as intervening variable between independent variable (perceived of ease and perceived usefulness) and dependent variable (actual use of an innovation). Ajzen and Fishbein (1980) assumes that technology adoption behavior is an outcome of an individual's affective response to, or attitude toward, the innovation. Mahmod et al. (2005) also used attitude as a mediator variable between independent variables (attitudinal belief - perceived usefulness, trialability, result demonstrability, image, and enjoyment) and independent variable (behavior intention towards e-MBA adoption). The researcher indicated that attitude as a mediator variable was significant and supported. As shown above attitudes was used as mediator or intervening variable, so that the contribution of this study is that teachers' attitudes toward computer was used as moderator variable. The contribution of this study is that the researcher used attitude as moderator variable between independent variable (stage of concern and obstacles in integrating technology) and dependent variable (technology integration strategies). These independent and dependent variables that were used in this study are totally different on independent and dependent variables that were used in previous studies. So, this study is considered as the first study that employed these independent and dependent variables and attitude was used as a moderator variable.

The fourth contribution is that the study participated in building a new model because this study was used Rogers' theory (adopter's categories) and CBAM theoretical framework (stage of concern). In addition, obstacles of technology integration and demographic variables were addressed in this model while an attitude toward computer was used as a moderator variable. So, the exit model (model of this study) has never been applied before.

5.7 Implications

This study has the following implications:

The study reported that the majority of teachers are late adopters; hence, the diffusion of ICT would be restricted. To increase the level of the diffusion of ICT in schools, the late adopters need to be giving special attentions which include:

1. The policy makers should consider the needs of the late adopters when integrating ICT programs in schools.
2. The policy makers should expose late adopter to extensive training courses more supervision and observation in order to boost their ICT adoption
3. Increasing how-to knowledge needed for proper adoption. This includes principles knowledge of information dealing with the functioning principles underlying how the innovation works.
4. Utilizing the early adopters' experience in guiding late adopters in order to develop innovative teaching methods.
5. Directing late adopters to start with flexible technologies that can be integrated in any number of ways.
6. Encouraging cooperation between early and late adopter by exchanging experiences and skills in favor of late adopters.
7. Finding ways to include both early and late adopters in making mutual decisions about the integration of technology.
8. Providing late adopters with incentives in order to increase the relative advantage of adopting the innovation.
9. Paying a considerable attention to integration plans.
10. Building a technology infrastructure to encourage adoption and integration.

Since teachers in this inquiry encounter integration related obstacles, the administration is expected to do the following:

1. Meeting training-related needs through holding training courses, and developing training workshops, and planning such training courses in order to encourage broader diffusion of technology in schools

2. Investment in instructional development (providing assistance to teachers to use technology in classroom).

3. Designing web sites that serve as meeting rooms for teachers through which they can exchange knowledge and experiences.

4. Designing curriculum-based software that enables students to be involved in the process of teaching rather than being passive recipients of knowledge.

5.8 Recommendations for Further Research

The following recommendations are made in an attempt to bridge the gap between early and late adopters:

1. Studies that provide insights into the needs of late adopters, the proffered methods of learning about the innovation are recommended.

2. Since every stage of concern is distinguished by a set of strategies that teachers use to integrate ICT, further insights into these strategies are required.

3. The underlying assumption that computers can improve educational outcomes has not been proven. Therefore, some experimental work on educational outcomes, with and without computer, and with different levels of computer use, would be valuable.

4. The potential impact of gender on the extent to which teachers integrate ICT in schools needs further investigation.

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Appendix A

The questionnaire

To: Selected Teachers
From: Yousef A. Jaraideh
Date: October 25, 2007
Subject: Technology Integration Survey

Dear teachers

The survey consists of six sections namely, adopter's categories, attitudes toward computer, stage of concern, obstacles, strategies used to integrate ICT in curriculum and demographic information. These sections consist of 150 questions and should take approximately 40 minutes to complete. This survey is designed to collect information regarding teachers' attitude toward computers, stage of concern, obstacles and strategies used to integrate ICT in Jordanian public schools.

Your responses are strictly confidential and they will not be disclosed individually to anyone in your school or in any publication. Your responses will be used strictly for research goals. All information disclosed will take the form of statistical data. Please answer all questions honestly and accurately. Your responses are extremely valuable contribution to this thesis and thus your effort and time spent are sincerely appreciated.

Thank you for your time and assistance.

Section 1 adopter's categories

Below are a series of statements. Pleas respond to the statements by circling the number that most closely represents your opinion, there are no correct answer. Please provide a response to every statement

		None	little	Fair	Good	Extensive
1.	**Using internet to improve research skills, creating instructional materials, gathering information for planning lessons**					
2.	Using hyper media to encourage creative thinking					
3.	**Using simulation programs to provide situation similar to reality**					
4.	Using educational courseware to present lessons					
5.	**Using problem solving programs to develop students' problem solving skills**					
6.	Using instructional game to make curriculum more vivid, and more enjoyable					
7.	**Using communication tools to keep in touch with students off classes**					
8.	Using groups learning strategies to achieve curriculum objectives					
9.	**Using Desktop publishing software to create news letters or other specially formatted documents in order to facilitate the learning and teaching process**					
10.	Using Word processing to create news letters, templates, mail merge .....etc					
11.	**Using Graphic tools and software to edit acquire and include images into documents**					

		None	little	Fair	Good	Extensive
12.	**Using Presentations software to create and present lessons and to help student to design their reports**					
13.	Using Drill and practice software to develop students' skills					
14.	**Using Database software to arrange and analyze data**					
15.	Using Spreadsheet software to analyze, organize, and state school-related numeric data					
16.	**Using online instructional tools and simulations is to provide curriculum-related learning experiences**					
17.	Using search strategies to pinpoint beneficial curricular/instructional resources on the internet					
18.	**Using email to allow students to communicate with students outside the school**					
19.	Creating animations to enhance students' comprehension					
20.	**Using web publishing and edit web pages to improve creative learning**					
21.	Using training software to achieve higher degree of accuracy of skills					
22.	**Using tutorial software to provide every student to meet his needs according to his\her ability and time**					
23.	Using evaluation software to train students assess their achievement and get instant feedback					
24.	**Using diagnostic and treatment software to plant students at the right stage of learning process and to decide next steps of curriculum to be made**					

SECTION 2 Attitudes toward computer

Below are a series of statements about attitudes toward computer. Please respond to each statement by checking (v) appropriate box. There is no correct answer. Please provide a response to every statement.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
1.	**Computers do not scare me at all**	□	□	□	□	□
2.	I'm no good with computers	□	□	□	□	□
3.	**I would like working with computers**	□	□	□	□	□
4.	I will use computers many ways in my life	□	□	□	□	□
5.	**Working with a computer would make me very nervous**	□	□	□	□	□
6.	Generally, I would feel OK about trying a new problem on the computer	□	□	□	□	□
7.	**The challenge of solving problems with computers does not appeal to me.**	□	□	□	□	□
8.	Learning about computers is a waste of time	□	□	□	□	□
9.	**I do not feel threatened when others talk about computers**	□	□	□	□	□
10.	I don't think I would do advanced computer work	□	□	□	□	□
11.	**I think working with computers would be enjoyable and stimulating**	□	□	□	□	□
12.	Learning about computers is worthwhile	□	□	□	□	□
13.	**I feel aggressive and hostile toward computers**	□	□	□	□	□
14.	I am sure I could do work with computers	□	□	□	□	□

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
15.	**Figuring out computer problems does not appeal to me**	□	□	□	□	□
16.	I'll need a firm mastery of computers for my future work	□	□	□	□	□
17.	**It wouldn't bother me at all to take computer courses**	□	□	□	□	□
18.	I'm not the type to do well with computers.	□	□	□	□	□
19.	**When there is a problem with a computer that I can't immediately solve, I would stick with it until I have the answer**	□	□	□	□	□
20.	I expect to have little use for computers in my daily life	□	□	□	□	□
21.	**Computers make me feel uncomfortable**	□	□	□	□	□
22.	I am sure I could learn a computer language	□	□	□	□	□
23.	**I don't understand how some people can spend so much time working with computers and seem to enjoy it**	□	□	□	□	□
24.	I can't think of any way that I will use computers in my career	□	□	□	□	□
25.	**I would feel at ease in a computer class**	□	□	□	□	□
26.	I think using a computer would be very hard for me	□	□	□	□	□
27.	**Once I start to work with the computer, I would find it hard to stop**	□	□	□	□	□
28.	Knowing how to work with computers will increase my job possibilities	□	□	□	□	□

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
16.	**I plan computer-related activities in my classroom that will improve my students' basic skills (e.g. reading, writing, Math computation)**	□	□	□	□	□
17.	In my classroom, students use technology-based computer and Internet resources beyond the school to solve authentic problems	□	□	□	□	□
18.	**It is easy for me to design student-centered, integrated curriculum units that use the classroom computer(s) in a seamless fashion**	□	□	□	□	□
19.	Using cutting edge technology and computers, I have stretched the limited instructional computing in my classroom	□	□	□	□	□

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
29.	**I get a sinking feeling when I think of trying to use a computer**	□	□	□	□	□
30.	I could get good grades in computer courses	□	□	□	□	□
31.	**I will do as little work with computers as possible**	□	□	□	□	□
32.	Anything that a computer can be used for, I can do just as well some other way	□	□	□	□	□
33.	**I would feel comfortable working with a computer**	□	□	□	□	□
34.	I do not think I could handle a computer course	□	□	□	□	□
35.	**If a problem is left unsolved in a computer class, I would continue to think about it afterward**	□	□	□	□	□
36.	It is important for me to do well in computer classes	□	□	□	□	□
37.	**Computers make me feel uneasy and confused**	□	□	□	□	□
38.	I have a lot of self-confidence when it comes to working with computers	□	□	□	□	□
39.	**I do not enjoy talking with others about computers**	□	□	□	□	□
40.	Working with computers will not be important to me in my life's work	□	□	□	□	□

SECTION 3 Stages of Concern

Below are a series of statements about teacher's concern toward technology. Please respond to each statement by checking (v) appropriate box. There is no correct answer. Please provide a response to every statement.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
1.	**I don't even know what technology integration is.**	□	□	□	□	□
2.	I am not concerned about technology integration	□	□	□	□	□
3.	**I am completely occupied with other things**	□	□	□	□	□
4.	Although I don't know about technology integration, I am concerned about things in the area	□	□	□	□	□
5.	**At this time, I am not interested in learning about technology integration.**	□	□	□	□	□
6.	I have a very limited knowledge about technology integration	□	□	□	□	□
7.	**I would like to discuss the possibility of integrating technology in my teaching**	□	□	□	□	□
8.	I would like to know what resources are available if I decide to integrate technology in my teaching	□	□	□	□	□
9.	**I would like to know what technology integration will require in the immediate future**	□	□	□	□	□
10.	I would like to know how technology integration is better that what we do now	□	□	□	□	□

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
11.	**I would like to know the effect of reorganization on my professional status**	□	□	□	□	□
12.	I would like to know who will make the decisions in the new system	□	□	□	□	□
13.	**I would like to know how my teaching or administration is supposed to change**	□	□	□	□	□
14.	I would like to have more information on time and energy commitments required by technology integration	□	□	□	□	□
15.	**I would like to know how my role will change when I am integrating technology in my teaching**	□	□	□	□	□
16.	I am concerned about not having enough time to organize myself each day	□	□	□	□	□
17.	**I am concerned about conflict between my interests and my responsibilities**	□	□	□	□	□
18.	I am concerned about my inability to manage all technology integration requires	□	□	□	□	□
19.	**I am concerned about the time spent working with nonacademic problems related to technology integration**	□	□	□	□	□
20.	Coordination of tasks and people is taking too much of my time	□	□	□	□	□
21.	**I am concerned about students' attitudes toward technology integration**	□	□	□	□	□
22.	I am concerned about the effects of technology integration on students	□	□	□	□	□

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
23.	**I am concerned about evaluating my impact on students**	□	□	□	□	□
24.	I would like to excite my students about their part in this approach	□	□	□	□	□
25.	**I would like to use feedback from students to change the program**	□	□	□	□	□
26.	I would like to help other faculty in their technology integration	□	□	□	□	□
27.	**I would like to develop working relationships with our faculty and outside faculty in integrating technology**	□	□	□	□	□
28.	I would like to familiarize other departments or persons with the progress of this new approach	□	□	□	□	□
29.	**I would like to coordinate my efforts with others to maximize the effects of technology integration**	□	□	□	□	□
30.	I would like to know what other faculty are doing in this area	□	□	□	□	□
31.	**I now know of some other approaches that might work better**	□	□	□	□	□
32.	I am concerned about revising my technology integration	□	□	□	□	□
33.	**I would like to revise the instructional approach of technology integration**	□	□	□	□	□
34.	I would like to modify our technology integration based on the experience of our students	□	□	□	□	□
35.	**I would like to determine how to supplement, enhance, or replace technology integration**	□	□	□	□	□

SECTION 4 Obstacles

Below are a series of statements about obstacles that faced teachers when they integrate technology. Please respond to each statement by checking (v) appropriate box. There is no correct answer. Please provide a response to every statement.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
1.	**While designing my course(s), I feel that the inclusion of technology requires too much of my time**	□	□	□	□	□
2.	I cannot depend on access to essential software and hardware	□	□	□	□	□
3.	**There are limited institutional training opportunities at my school.**	□	□	□	□	□
4.	There is little or no administrative support for the integration of technology into teaching and learning.	□	□	□	□	□
5.	**There are too few computers for the number of students**	□	□	□	□	□
6.	I lack essential knowledge of how to effectively integrate technology into instruction.	□	□	□	□	□
7.	**Technology integration into teaching and learning requires too much of my class preparation time.**	□	□	□	□	□
8.	There are limited materials provided by the Ministry of Education	□	□	□	□	□
9.	**My school does not provide enough training opportunities that target the use of technology in instruction**	□	□	□	□	□

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
10.	**There is little administrative use of technology for sharing and discussion in my school**	□	□	□	□	□
11.	There are too few computers for individual school	□	□	□	□	□
12.	**Insufficient knowledge, skills and experience about how to integrate technology**	□	□	□	□	□
13.	Technology integration requires too much time within my subject	□	□	□	□	□
14.	**Hardware is unstable and always breaking down**	□	□	□	□	□
15.	There is lack of training in pre-service period	□	□	□	□	□
16	**There is lack of rewards or incentives for integrating technology in my classes**	□	□	□	□	□
17.	Computer manual and materials are inadequate and unhelpful	□	□	□	□	□
18.	**I face difficulty when I am working on a personal computer**	□	□	□	□	□
19.	Using technological means (e.g. email, e learning system, etc.) to communicate with my students requires too much of my time.	□	□	□	□	□
20.	**Available software applications are poorly designed**	□	□	□	□	□
21.	There is limited training during in-service period	□	□	□	□	□
22.	**There is lack of inspiration from leadership for instructional use of computers**	□	□	□	□	□
23.	There is inadequate financial support for the development of instructional use of computer	□	□	□	□	□
24.	**I can not use a variety of program (software)**	□	□	□	□	□

25.	I lack advanced skills in using a specific program	☐	☐	☐	☐	☐
26.	**Financial support for computer integration from administration is inadequate.**	☐	☐	☐	☐	☐
27.	There is little commitment from supervisors for instructional use of computers	☐	☐	☐	☐	☐
28.	**Technology training is offered at inconvenient times**	☐	☐	☐	☐	☐
29.	Generic technology training is irrelevant to teacher needs	☐	☐	☐	☐	☐
30.	Software is not adaptable in meeting students' needs	☐	☐	☐	☐	☐
31.	**I do not have enough time to develop instruction that uses computers**	☐	☐	☐	☐	☐
32.	There is a lack of sufficient technology training.	☐	☐	☐	☐	☐
33.	**There is insufficient funds to purchase equipment or software**	☐	☐	☐	☐	☐

SECTION 5 Strategies used by teachers to integrate ICT

Below are a series of statements about strategies that are used by teachers when they integrate ICT in teaching and learning process. Please respond to each statement by checking (v) appropriate box. There is no correct answer. Please provide a response to every statement.

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	**I assign daily or weekly computer-related tasks that support my curriculum (analyzing data from a survey, creating multimedia presentations that showcase students' understanding of important content researching information via CD's or the internet)**	□	□	□	□	□
2.	I provide short-term (daily or weekly) assignments using the classroom computer(s) that emphasize the use of different software applications (spreadsheets, databases, Internet use, multimedia)	□	□	□	□	□
3.	**I alter my instructional use of the classroom computer(s) based upon the newest software applications and research on teaching, learning, and standards-based curriculum.**	□	□	□	□	□
4.	I seek professional development, software applications, and peripherals that maximize the use of the endless array of computers and technology available to my students	□	□	□	□	□
5.	**I allocate time for students to practice their computer skills on the classroom computer(s)**	□	□	□	□	□
6.	Using the classroom computer(s) is not a priority for me this school year	□	□	□	□	□

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
7.	**I integrate the most current research on teaching and learning when using the classroom computer(s)**	□	□	□	□	□
8.	Students in my classroom participate in on- line interactive projects with other schools to solve relevant problems (not including exchanging email)	□	□	□	□	□
9.	**My students' authentic problem-solving is supported by continuous access to a vast array of current computer-based tools and technology**	□	□	□	□	□
10.	My students discover innovative ways to use the endless array of classroom computers to make a difference in their lives and in their community	□	□	□	□	□
11.	**Students taking action at school or in the community relating to the content learned in class is a vital part of my approach to using the classroom computer(s)**	□	□	□	□	□
12.	It is easy for me to evaluate software applications to determine whether the use of the computer(s) is seamlessly linked to students' critical thinking skills and authentic problem solving	□	□	□	□	□
13.	**My students use the Internet for collaboration with others, publishing, communication, and research to solve authentic problem**	□	□	□	□	□
14.	I have the background to show others how to merge technology with integrated thematic curricula	□	□	□	□	□
15.	**I seek out activities that promote increased problem-solving and critical thinking using the classroom computer(s)**	□	□	□	□	□

Section 6 demographic information

Please provide the following information about your :

Working experiences:

- □ 1-5 years
- □ 6-10 years
- □ 11-15 years
- □ 16-20 years
- □ 21 years & above

Subject matter taught:

- □ English language
- □ Mathematics
- □ Science

Have you attended any technology related courses\ workshop?

- □ **Yes**
- □ **No**

Thank you for your cooperation.

Appendix B The output of factor analysis

Appendix B

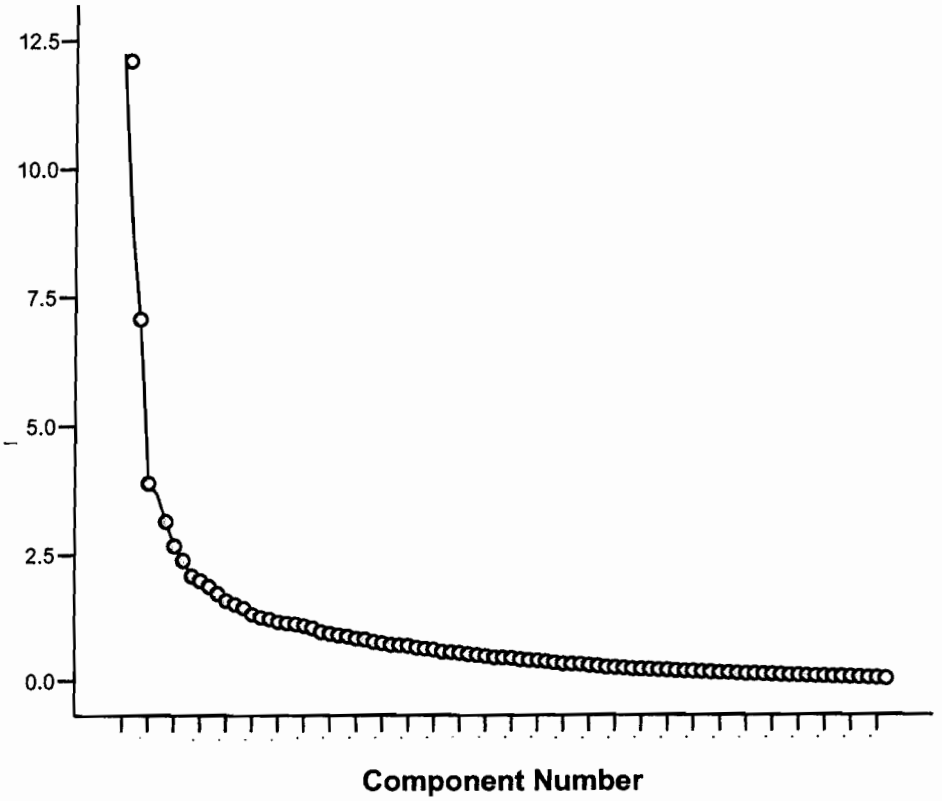
SPSS Results

Independent variables

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.702
Bartlett's Test of Sphericity	Approx. Chi-Square	20739.660
	Df	3916
	Sig.	.000

Scree Plot



Rotated Component Matrix(a)

	Component		
	1	2	3
C24	.747		
C15	.698		
C27	.683		
C29	.672		
C26	.659		
C14	.645		
C13	.640		
C12	.632		
C28	.625		
C33	.589		
C11	589		
C9	.588		
C34	.573		
C30	.534		
C7	.534		
C35	.529		
C10	.515		
C23	.489		
C25	.454		
C8	.332		
D23		.625	
D16		.624	
D17		.624	
D22		.621	
D9		.620	
D20		.594	
D7		.589	
D21		.577	
D15		.576	
D5		.576	
D12		.574	
D25		.574	
D33		.574	
D24		.563	
D6		.558	
D11		.557	
D10		.555	
D13		.535	
D3		.518	
D19		.515	
D28		.501	
D29		.494	
D32		.486	

D1		.483	
D4		.480	
D31		.466	
D30		.404	
D18		.396	
D27		.389	
D14		.364	
D8		.346	
D26		.334	
A12			.644
A16			.636
A20			.630
A15			.586
A22			.572
A13			.564
A18			.561
A10			.540
A14			.517
A9			.516
A1			.509
A4			.498
A19			.493
A1			.490
A23			.484
A2			.445
A3			.441
A5			.432
A7			.418
A8			.413
A6			.400
A17			.378
A21			.356

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 5 iterations.

Total Variance Explained

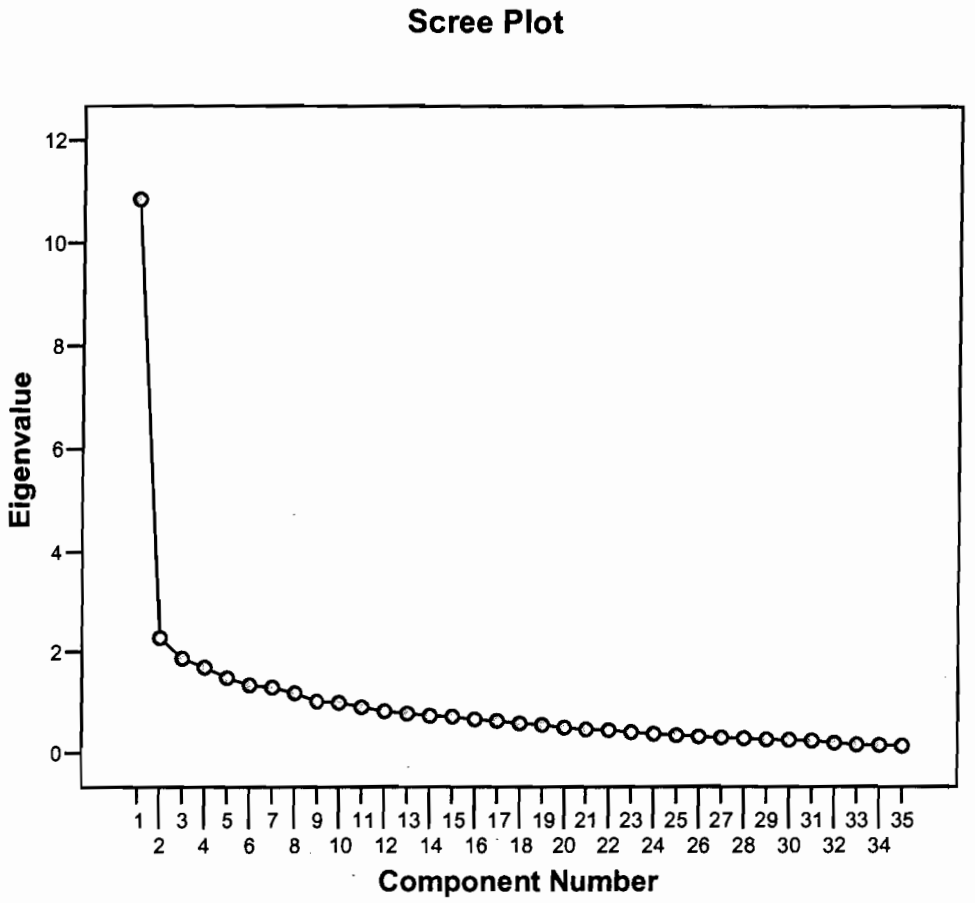
	Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %
1	10.407	11.693	11.693
2	8.959	10.066	21.759
3	8.857	9.951	31.710

Extraction Method: Principal Component Analysis.

Moderator variable

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.851
Bartlett's Test of Sphericity	Approx. Chi-Square	5605.715
	Df	595
	Sig.	.000



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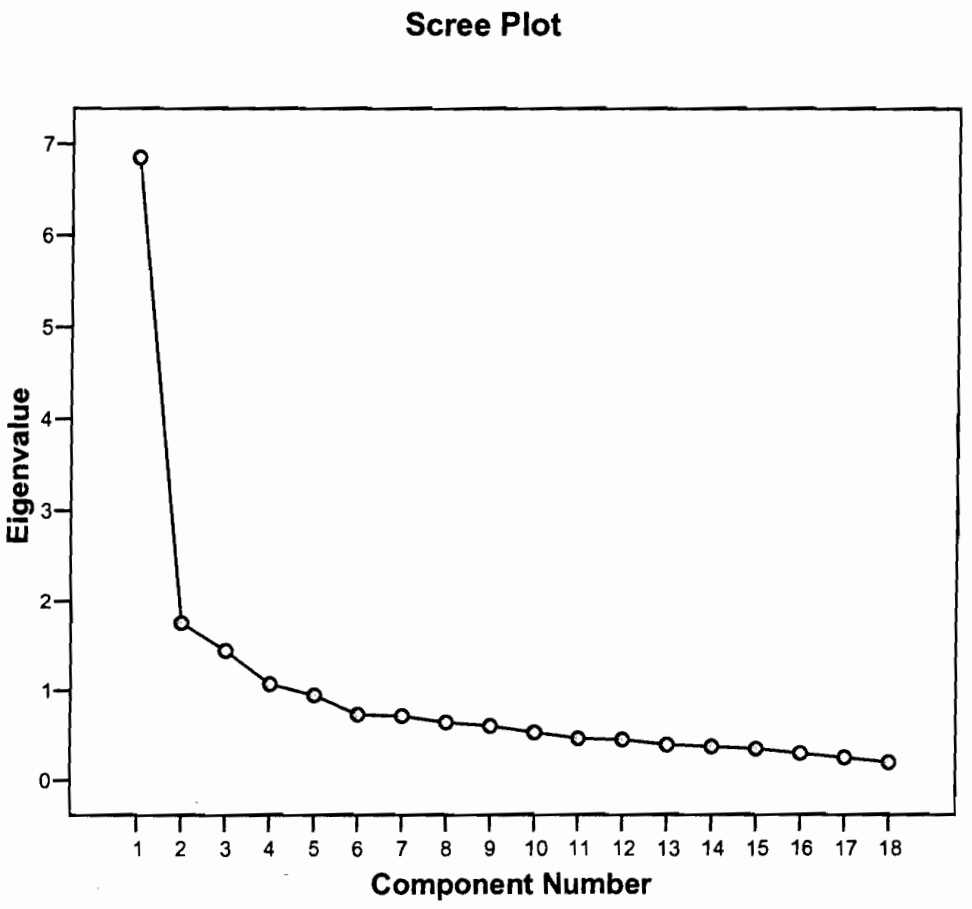
Rotated Component Matrix(a)

Item	Component
B13	.744
B30	.680
B33	.679
B34	.671
B22	.665
B20	.648
B4	.644
B29	.638
B1	.637
B11	.618
B16	.613
B40	.610
B6	.609
B36	.609
B38	.600
B18	.595
B26	.594
B12	.587
B25	.581
B3	.575
B2	.567
B17	.548
B24	.546
B14	.537
B35	.508
B28	.482
B23	.474
B8	.465
B39	.454
B15	.417
B10	.387
B7	.375
B19	.319
B27	.306
B9	.303

Dependant variable

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.868
Bartlett's Test of Sphericity	Approx. Chi-Square	2920.146
	Df	171
	Sig.	.000



Item	
E13	.704
E15	.680
E18	.666
E9	.551
E10	.630
E17	.623
E3	.609
E11	.598
E1	.576
E16	.545
E5	.532
E8	.510
E2	.499
E7	.472
E4	.450
E12	.413
E19	.391
E14	.382

Oneway ANOVA(obstacles in integration technology in term teaching experience)

Descriptives

Obstacles

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1-5	81	2.8702	.50453	.05606	2.7586	2.9817	1.79	3.76
6-10	62	2.9751	.68876	.08747	2.8002	3.1500	1.55	4.18
11-15	62	3.1540	.58776	.07465	3.0047	3.3032	1.88	4.33
15-20	25	3.3503	.74042	.14808	3.0447	3.6559	1.91	4.64
21 & above	84	3.3575	.58561	.06390	3.2304	3.4846	1.91	4.64
Total	314	3.1155	.63064	.03559	3.0455	3.1855	1.55	4.64

Test of Homogeneity of Variances

Obstacles

Levene Statistic	df1	df2	Sig.
2.668	4	309	.032

ANOVA

Obstacles

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.487	4	3.122	8.613	.000
Within Groups	111.996	309	.362		
Total	124.483	313			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: obstacles
Scheffe

(I) exper	(J) exper	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1-5	6-10	-.10489	.10159	.899	-.4197	.2099
	11-15	-.28378	.10159	.102	-.5986	.0310
	15-20	-.48012(*)	.13774	.018	-.9070	-.0533
	21 & above	-.48732(*)	.09375	.000	-.7779	-.1968
6-10	1-5	.10489	.10159	.899	-.2099	.4197
	11-15	-.17889	.10813	.603	-.5140	.1562
	15-20	-.37523	.14263	.143	-.8172	.0668
	21 & above	-.38243(*)	.10080	.007	-.6948	-.0701
11-15	1-5	.28378	.10159	.102	-.0310	.5986
	6-10	.17889	.10813	.603	-.1562	.5140
	15-20	-.19634	.14263	.755	-.6384	.2457
	21 & above	-.20354	.10080	.397	-.5159	.1088
15-20	1-5	.48012(*)	.13774	.018	.0533	.9070
	6-10	.37523	.14263	.143	-.0668	.8172
	11-15	.19634	.14263	.755	-.2457	.6384
	21 & above	-.00720	.13716	1.000	-.4323	.4178
21 & above	1-5	.48732(*)	.09375	.000	.1968	.7779
	6-10	.38243(*)	.10080	.007	.0701	.6948
	11-15	.20354	.10080	.397	-.1088	.5159
	15-20	.00720	.13716	1.000	-.4178	.4323

* The mean difference is significant at the .05 level.

Oneway ANOVA (obstacles in integration technology in term subject matter taught)

Descriptives

Obstacles

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
English	111	2.8329	.69326	.06580	2.7025	2.9633	1.55	4.64
Math	97	3.1993	.51005	.05179	3.0965	3.3021	2.33	4.39
Science	106	3.3348	.55206	.05362	3.2284	3.4411	1.94	4.52
Total	314	3.1155	.63064	.03559	3.0455	3.1855	1.55	4.64

Test of Homogeneity of Variances

Obstacles

Levene Statistic	df1	df2	Sig.
5.017	2	311	.07

ANOVA

Obstacles

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14.641	2	7.320	20.726	.000
Within Groups	109.842	311	.353		
Total	124.483	313			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: obstacles
Scheffe

(I) subject	(J) subject	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
English	Math	-.36639(*)	.08260	.000	-.5696	-.1632
	Science	-.50184(*)	.08071	.000	-.7003	-.3033
Math	English	.36639(*)	.08260	.000	.1632	.5696
	Science	-.13545	.08351	.270	-.3408	.0699
Science	English	.50184(*)	.08071	.000	.3033	.7003
	Math	.13545	.08351	.270	-.0699	.3408

* The mean difference is significant at the .05 level.

Independent sample test T-Test

Group Statistics

	courses	N	Mean	Std. Deviation	Std. Error Mean
obstacles	Yes	143	3.0108	.60474	.05057
	No	171	3.2031	.64019	.04896

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval o the Difference	
									Lower	Upper
obstacles	Equal variances assumed	.186	.667	-2.718	312	.007	-.19228	.07074	-.33147	-.053(
	Equal variances not assumed			-2.732	307.374	.007	-.19228	.07039	-.33077	-.053'

Oneway ANOVA (strategies of technology integration in term of teaching experience)

Descriptives

Strategies

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1-5	81	3.2034	.56464	.06274	3.0785	3.3282	2.00	4.63
6-10	62	3.1808	.52912	.06720	3.0464	3.3152	2.00	4.11
11-15	62	2.9890	.50086	.06361	2.8618	3.1162	2.00	4.00
15-20	25	2.9389	.61316	.12263	2.6858	3.1920	2.00	3.74
21 & above	84	2.9091	.49043	.05351	2.8027	3.0156	1.89	3.74
Total	314	3.0568	.54224	.03060	2.9966	3.1170	1.89	4.63

Test of Homogeneity of Variances

Strategies

Levene Statistic	df1	df2	Sig.
1.008	4	309	.403

ANOVA

Strategies

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.158	4	1.289	4.586	.001
Within Groups	86.873	309	.281		
Total	92.030	313			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: strategies
Scheffe

(I) exper	(J) exper	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1-5	6-10	.02256	.08947	1.000	-.2547	.2998
	11-15	.21441	.08947	.222	-.0629	.4917
	15-20	.26443	.12131	.316	-.1115	.6404
	21 & above	.29423(*)	.08257	.014	.0384	.5501
6-10	1-5	-.02256	.08947	1.000	-.2998	.2547
	11-15	.19185	.09523	.400	-.1033	.4870
	15-20	.24187	.12562	.449	-.1474	.6312
	21 & above	.27167	.08878	.055	-.0035	.5468
11-15	1-5	-.21441	.08947	.222	-.4917	.0629
	6-10	-.19185	.09523	.400	-.4870	.1033
	15-20	.05002	.12562	.997	-.3393	.4393
	21 & above	.07982	.08878	.937	-.1953	.3549
15-20	1-5	-.26443	.12131	.316	-.6404	.1115
	6-10	-.24187	.12562	.449	-.6312	.1474
	11-15	-.05002	.12562	.997	-.4393	.3393
	21 & above	.02980	.12080	1.000	-.3446	.4042
21 & above	1-5	-.29423(*)	.08257	.014	-.5501	-.0384
	6-10	-.27167	.08878	.055	-.5468	.0035
	11-15	-.07982	.08878	.937	-.3549	.1953
	15-20	-.02980	.12080	1.000	-.4042	.3446

* The mean difference is significant at the .05 level.

Oneway ANOVA(strategies of technology integration in term of subject matter taught)

Descriptives

strategies

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
English	111	3.1731	.60162	.05710	3.0599	3.2862	2.00	4.63
Math	97	3.0412	.51035	.05182	2.9384	3.1441	1.95	4.11
Science	106	2.9494	.48270	.04688	2.8564	3.0423	1.89	3.89
Total	314	3.0568	.54224	.03060	2.9966	3.1170	1.89	4.63

Test of Homogeneity of Variances

strategies

Levene Statistic	df1	df2	Sig.
4.467	2	311	.012

ANOVA

strategies

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.748	2	1.374	4.786	.009
Within Groups	89.283	311	.287		
Total	92.030	313			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: strategies
Scheffe

(I) subject	(J) subject	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
English	Math	.13183	.07447	.210	-.0513	.3150
	Science	.22371(*)	.07276	.010	.0447	.4027
Math	English	-.13183	.07447	.210	-.3150	.0513
	Science	.09188	.07529	.476	-.0933	.2771
Science	English	-.22371(*)	.07276	.010	-.4027	-.0447
	Math	-.09188	.07529	.476	-.2771	.0933

* The mean difference is significant at the .05 level.

Independent sample T-Test

Group Statistics

	courses	N	Mean	Std. Deviation	Std. Error Mean
strategies	Yes	143	3.1785	.58475	.04890
	No	171	2.9551	.48257	.03690

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interv of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
strategies	Equal variances assumed	5.524	.019	3.710	312	.000	.22344	.06023	.10493	.341
	Equal variances not assumed			3.647	275.235	.000	.22344	.06126	.10284	.344

Oneway

Descriptives

Concern

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1-5	81	3.6833	.50701	.05633	3.5712	3.7954	2.75	4.90
6-10	62	3.7758	.58153	.07385	3.6281	3.9235	2.70	5.00
11-15	62	3.5718	.56005	.07113	3.4295	3.7140	2.40	5.00
15-20	25	3.4820	.52219	.10444	3.2665	3.6975	2.55	4.40
21 & above	84	3.5821	.47603	.05194	3.4788	3.6854	2.35	4.40
Total	314	3.6365	.53073	.02995	3.5775	3.6954	2.35	5.00

Test of Homogeneity of Variances

Concern

Levene Statistic	df1	df2	Sig.
.808	4	309	.521

ANOVA

Concern

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.486	4	.621	2.241	.065
Within Groups	85.679	309	.277		
Total	88.165	313			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: concern
Scheffe

(I) exper	(J) exper	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1-5	6-10	-.09247	.08886	.897	-.3678	.1829
	11-15	.11156	.08886	.813	-.1638	.3869
	15-20	.20133	.12048	.594	-.1720	.5747
	21 & above	.10119	.08200	.822	-.1529	.3553
6-10	1-5	.09247	.08886	.897	-.1829	.3678
	11-15	.20403	.09458	.327	-.0891	.4971
	15-20	.29381	.12475	.238	-.0928	.6804
	21 & above	.19366	.08817	.308	-.0796	.4669
11-15	1-5	-.11156	.08886	.813	-.3869	.1638
	6-10	-.20403	.09458	.327	-.4971	.0891
	15-20	.08977	.12475	.972	-.2968	.4764
	21 & above	-.01037	.08817	1.000	-.2836	.2629
15-20	1-5	-.20133	.12048	.594	-.5747	.1720
	6-10	-.29381	.12475	.238	-.6804	.0928
	11-15	-.08977	.12475	.972	-.4764	.2968
	21 & above	-.10014	.11997	.952	-.4719	.2716
21 & above	1-5	-.10119	.08200	.822	-.3553	.1529
	6-10	-.19366	.08817	.308	-.4669	.0796
	11-15	.01037	.08817	1.000	-.2629	.2836
	15-20	.10014	.11997	.952	-.2716	.4719

Oneway

Descriptives

Concern

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
English	111	3.6505	.56739	.05385	3.5437	3.7572	2.35	5.00
Math	97	3.6675	.55335	.05618	3.5560	3.7791	2.70	4.90
Science	106	3.5934	.46849	.04550	3.5032	3.6836	2.55	4.90
Total	314	3.6365	.53073	.02995	3.5775	3.6954	2.35	5.00

Test of Homogeneity of Variances

connew

Levene Statistic	df1	df2	Sig.
1.182	2	311	.308

ANOVA

connew

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.312	2	.156	.552	.576
Within Groups	87.853	311	.282		
Total	88.165	313			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: connew

Scheffe

(I) subject	(J) subject	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
English	Math	-.01708	.07387	.974	-.1988	.1646
	Science	.05705	.07218	.732	-.1205	.2346
Math	English	.01708	.07387	.974	-.1646	.1988
	Science	.07413	.07468	.611	-.1096	.2578
Science	English	-.05705	.07218	.732	-.2346	.1205
	Math	-.07413	.07468	.611	-.2578	.1096

T-Test

Group Statistics

	courses	N	Mean	Std. Deviation	Std. Error Mean
connew	Yes	143	3.7283	.59246	.04954
	No	171	3.5596	.46086	.03524

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidenc Interval of the Difference	
									Lower	Upp
Concern	Equal variances assumed	8.422	.004	2.836	312	.005	.16867	.05948	.05165	.28
	Equal variances not assumed			2.774	265.321	.006	.16867	.06080	.04896	.28

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
strategies	3.0568	.54224	314
obstacles	3.1155	.63064	314
Concern	3.6365	.53073	314
Attitudes	3.4735	.28062	314
iv2m	10.8091	2.29077	314
Interkk	12.7282	2.66960	314

Correlations

		strategies	obstacles	connew	Attitudes	iv2m	interkk
Pearson Correlation	strategies	1.000	-.233	.438	.374	-.097	.460
	obstacles	-.233	1.000	-.109	-.072	.929	-.114
	Connew	.438	-.109	1.000	.653	.129	.951
	Attitudes	.374	-.072	.653	1.000	.296	.849
	iv2m	-.097	.929	.129	.296	1.000	.196
	Interkk	.460	-.114	.951	.849	.196	1.000
Sig. (1-tailed)	strategies	.	.000	.000	.000	.043	.000
	obstacles	.000	.	.027	.103	.000	.022
	Connew	.000	.027	.	.000	.011	.000
	Attitudes	.000	.103	.000	.	.000	.000
	iv2m	.043	.000	.011	.000	.	.000
	Interkk	.000	.022	.000	.000	.000	.
N	strategies	314	314	314	314	314	314
	obstacles	314	314	314	314	314	314
	Connew	314	314	314	314	314	314
	Attitudes	314	314	314	314	314	314
	iv2m	314	314	314	314	314	314
	Interkk	314	314	314	314	314	314

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	connew, obstacles(a)	.	Enter
2	Attitudes(a)	.	Enter
3	iv2m, interkk(a)	.	Enter

a All requested variables entered.
b Dependent Variable: strategies

Model Summary(d)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Chang
1	.476(a)	.227	.222	.47832	.227	45.621	2	311	.0
2	.490(b)	.240	.233	.47492	.013	5.476	1	310	.0
3	.512(c)	.262	.250	.46964	.022	4.503	2	308	.0

a Predictors: (Constant), connew, obstacles
b Predictors: (Constant), connew, obstacles , Attitudes
c Predictors: (Constant), connew, obstacles , Attitudes, iv2m, interkk
d Dependent Variable: strategies

ANOVA(d)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.875	2	10.438	45.621	.000(a)
	Residual	71.155	311	.229		
	Total	92.030	313			
2	Regression	22.111	3	7.370	32.677	.000(b)
	Residual	69.920	310	.226		
	Total	92.030	313			
3	Regression	24.097	5	4.819	21.850	.000(c)
	Residual	67.934	308	.221		
	Total	92.030	313			

a Predictors: (Constant), connew, obstacles
b Predictors: (Constant), connew, obstacles , Attitudes
c Predictors: (Constant), connew, obstacles , Attitudes, iv2m, interkk
d Dependent Variable: strategies

Coefficients(a)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statist	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	2.009	.243		8.272	.000					
obstacles	-.162	.043	-.188	-3.747	.000	-.233	-.208	-.187	.988	1.01
connew	.427	.051	.418	8.327	.000	.438	.427	.415	.988	1.01
(Constant)	1.353	.370		3.659	.000					
obstacles	-.162	.043	-.188	-3.772	.000	-.233	-.209	-.187	.988	1.01
connew	.325	.067	.318	4.843	.000	.438	.265	.240	.569	1.75
Attitudes	.296	.126	.153	2.340	.020	.374	.132	.116	.573	1.74
(Constant)	.303	2.644		.115	.909					
obstacles	1.203	.567	1.399	2.121	.035	-.233	.120	.104	.006	181.
connew	-.498	.508	-.488	-.981	.327	.438	-.056	-.048	.010	103.
Attitudes	.599	.776	.310	.773	.440	.374	.044	.038	.015	67.2
iv2m	-.391	.163	-1.650	-2.392	.017	-.097	-.135	-.117	.005	198.
interkk	.232	.145	1.144	1.605	.110	.460	.091	.079	.005	212.

a Dependent Variable: strategies

Excluded Variables(c)

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	Attitudes	.153(a)	2.340	.020	.132	.573	1.744	.569
	iv2m	.283(a)	1.642	.102	.093	.083	11.983	.083
	interkk	.432(a)	2.690	.008	.151	.095	10.567	.095
2	iv2m	-1.743(b)	-2.529	.012	-.142	.005	197.151	.005
	interkk	1.288(b)	1.799	.073	.102	.005	210.566	.005

a Predictors in the Model: (Constant), connew, obstacles
b Predictors in the Model: (Constant), connew, obstacles , Attitudes
c Dependent Variable: strategies

Collinearity Diagnostics(a)

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions					
				(Constant)	obstacles	Concern	Attitudes	iv2m	interkk
1	1	2.958	1.000	.00	.00	.00			
	2	.034	9.284	.01	.68	.22			
	3	.008	19.297	.99	.31	.78			
2	1	3.952	1.000	.00	.00	.00	.00		
	2	.037	10.284	.00	.72	.07	.01		
	3	.009	21.365	.25	.25	.63	.03		
	4	.002	41.121	.75	.03	.29	.96		
3	1	5.905	1.000	.00	.00	.00	.00	.00	.0
	2	.071	9.126	.00	.00	.00	.00	.00	.0
	3	.019	17.580	.00	.00	.00	.00	.00	.0
	4	.004	36.877	.00	.01	.02	.01	.01	.0
	5	.000	228.927	.00	.52	.41	.00	.51	.4
	6	.000	423.997	1.00	.47	.57	.99	.48	.5

a Dependent Variable: strategies

Appendix C

Interviews Questions

1. **How do you think that the administration could help you to overcome the obstacles that you might face while integrating ICT in teaching process?**

2. **What are the factors that would enable teachers to contribute to utilizing ICT in the classroom?**

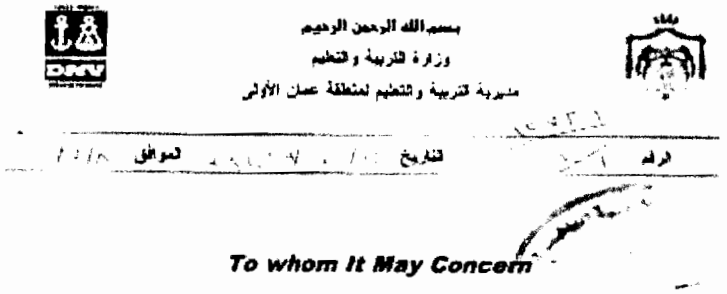
3. **What are the obstacles that you might face integrating ICT in the classroom?**

4. **What are the strategies you usually use to integrate ICT in the classroom?**

5. **What are your suggestions for improving the teaching process by integrating ICT?**

Appendix D

Approval letter certify that the researcher conducted the study on the sample



بسم الله الرحمن الرحيم
وزارة التربية والتعليم
مديرية تربية وتعليم لمنطقة عمان الأولى

الموافق ... التاريخ ... الرقم ...

To whom It May Concern

The Directorate of Education for the Amman First District certifies that Mr.Yousef Ahmad Marzouq Al-Jaraydeh has conducted a study on a sample of school teachers within the District and distributed a questionnaire conducted interviews with them, and recorded these interviews for the purposes of his academic thesis entitled, "Integrating ICT in Jordanian Public Schools".

This certificate has been given to him upon his request.

Ahmad Ghassab Al-Hawamedeh
Director of Education
Amman First District

تلفون : (٦ ٥٩٢٩١٨١) فاكس : (٥٩٦٩٥٨٠) ص.ب : (٩٥٧٩ الرمز البريدي)