CHAPTER TWO

Review of the Literature

Introduction

Education provides society with a great opportunity for people to learn. People are encouraged to construct their knowledge and have their skills through the exploration and development of solutions for the problems they face. The National School Board Association (NSBA, 2000) points to education as the key sector of our society that can prepare us and ensure our success. The North Regional Educational Laboratory (NREL, 2000) states that a comprehensive school reform is a means to improve student achievement through reorganizing and revitalizing entire schools, rather than implementing isolated programs. Additionally, the primary purpose of education reform is students learning and developing their experiences in order to assist them to obtain the fullness of their potential (U.S. Department of Education, 1995). Education influences students' thinking by making them knowledgeable, wise, and creative. Indeed, education constructs and develops healthy intellectuals.

Teachers need knowledge and skills that will enable them to improve their teaching, such as integrating information technology (IT) with the curriculum in order to enhance learning and allow students to learn from different resources. When teachers use IT in teaching their classroom role will be reduced while the students' role increases by their becoming more independent and responsible for acquiring skills and knowledge.

Saudi Arabia reforms its educational policies from time to time in order to develop new educational environments depending upon the demands of the society. Presently, the decision makers need to infuse comprehensive technology and staff

development programs into the school system to enable the students to meet their needs and empower them to deal with a new technological environment.

Education in Saudi Arabia

Background of Saudi Arabian Education

K-12 education in Saudi Arabia is managed by two government organizations. The first is the Ministry of Education, which was established in 1953 for the purpose of developing a plan for boys' education. The second is the Presidency of Girls Education founded in 1960. The Ministry of Education develops educational policy for the entire country. Saudi Arabian decision-makers recognized the importance of integrating educational technology into the curriculum during the Second Educational Development Plan (1975-1980), the Third Development Plan (1980-1985) and in the Fourth Development Plan (1985-1990). However, the major changes took place during the Fourth Development Plan when the Ministry of Education established a new department called the General Administration for Educational Technology in order to develop and improve the quality of education through the use of technology (Moshaikeh, 1991).

The integration of computer literacy in the boys' high schools was implemented in three main stages. The first stage began in 1985 with the establishment of new high schools that were called "Developed High Schools." In this new experiment, every student in these schools was to complete 168 credit hours (Ahamed, 1990). The study plan included two types of computer curricula. The initial course of study required all of the students to complete five credit hours. The program was divided into two courses which included Computer Introduction for two credit hours and Basic Programming Language for three credit hours. The second type was taught by the Management of Science Program. Each student who decided to be in this program had

to study Computer and Information Systems, which was three credit hours (Ministry of Education, 1995). After implementing the computer literacy curriculum in the schools, there were some barriers that were encountered in the teaching of these curricula. The primary problem was that there were no computer labs in the schools.

In 1985 the Ministry of Education stopped working on "Developed High Schools" and introduced a general computer curriculum for each of the high school grades. The third stage started in 1994 when the Ministry of Education developed another computer curriculum. This stage oversaw the implementation of computers in schools in order to motivate students and reduce the anxiety of students toward using computer technology (Ministry of Education, 1995).

The Ministry of Education began in 1994 to encourage teachers who taught science and math to enroll in a training program at the Public Management Institute. One hundred and twenty six teachers enrolled between 1994 and 1995. Those who were enrolled in these programs would help to teach computer literacy in high schools. The training programs included DOS, Windows, word processing, spreadsheet, database, and BASIC Language. The program did not include training on how to use computer technology as a tool for teaching and learning. They did not train the teachers and administrators in the use of computer technology, which was important for all the staff in the school (Ministry of Education, 1995).

The Presidency of Girls' Education, in charge of girls' education, developed its plan for improving the quality of the learners. The first college for girls was founded in 1970 in Riyadh, the second in Jeedah in 1974, and the third in Makkah in 1975. In 1979 there were many Junior Colleges for women founded to prepare teachers for intermediate and high schools (Ministry of Education, 1985 &1986). Ibin Dhaish et al., (1992) indicated that the girls' schools did not teach computer literacy.

They used their curricula to enhance teaching and learning. The Presidency of Girls Education (1999) reported that they started to teach computer literacy in some high schools in the academic year of 1999. They established a committee to discuss and issue a curriculum of computer literacy (p. 141).

In 1978 the King Fahad University established the Department of Computer Science and Computer Engineering. The students in this program were awarded a bachelor's degree. In 1983 a masters program in Computer Science was implemented (King Fahad University, 1995). King Abdul-Aziz University was one of the first universities to use computer technology in its library and admission department.

In addition, it was the first university that developed and used computer technology in office work, such as admission, registration, course schedules and grade reports in the Arabic language. The university computer center was established in 1976 to provide many services, including computer hardware, software, and maintenance of colleges and the other branches (King Abdul-Aziz University, 1995).

Mandurah (1997) indicated that King Saud University started to teach computer literacy in 1982. There were two programs: Computer Science, which was taught in the College of Science, and Computer Engineering, which was taught in the College of Engineering. King Saud University established the College of Computer Science and Information System in 1984. The college consisted of four departments, which were Computer Engineering, Information Systems, Computer Science, and Computer Technology.

Leaders of these universities are working to improve computer literacy to construct and improve the knowledge and skills of the learners. This impacts the environments of many sectors that use computer technology in their workplace, such as the public sector, business sector, and the education sector.

Information Technology in Educational Institutions in Saudi Arabia

Information technology is fundamental for improved productivity of an organization. Saudi Arabia's economy has been influenced by the adoption of information technology in the workplace in order to save time and improve productivity. The Ministry of Education became aware of the development of information technology, especially among developed countries such as the USA. These countries placed a high importance on the integration of information technology in classroom teaching. Many scholarships have been granted by the Ministry of Education to Saudi Arabian students to enable them to study abroad in these developed countries. The goals are to improve the education system, reduce the shortage of skilled information technology personnel, and to improve the Saudi Arabian schools. These changes could improve the school system and develop the society as a whole. The school teachers and administrators need to acquire the skills and knowledge of information technology and its uses so as to function well in a school setting. This study seeks to determine the perceptions of administrators and teachers in both girls' and boys' high schools towards utilizing information technology in Riyadh, Saudi Arabia.

Education is the cornerstone of any society. It is an important tool to improve the society and to allow the citizens of that society to acquire new information, which is critical for creating and developing their knowledge and skills. Education is a means of classifying countries as being either developed or undeveloped. When King Abdul Aziz began to unite the biggest part of the Arab Peninsula, which is now called the Kingdom of Saudi Arabia, he realized the importance of education. The Ministry of Education in Saudi Arabia has been in the forefront of trying to improve

the quality of learning through changes in the quality of the curriculum (Ministry of Education, 1998).

There are two important periods in the history of education in the Kingdom of Saudi Arabia. These are:

1. Before the unification of the country (Saudi Arabia).

2. After the creation of the Kingdom of Saudi Arabia (Ministry of Education, 1998; Al-Hogail, 1998)

Before the Kingdom

There were many schools during this period that were not organized into a school system as we have in Saudi Arabia today.

AlHashemaih Schools

Hassain Bin Ali started a war against Empirical Othmany in 1916 (1335 H) and closed all their schools. He opened many schools in the western region, but the quality of these schools decreased because there were not enough resources, money, and quality of curriculum (Al-Hogail, 1998; Ministry of Education, 1998).

Private Schools

There were numbers of private schools that were established before King Abdul- Azize controled the most of Arab Peninsula, which are Alsoulataih in 1872A.D (1292 H); AlMaddrash Alfakhraih in 1878 A.D. (1298H); Alfalah in 1903 (1323H) and Alngah in 1930 (1350H). The main reasons for establishing these schools were, failure to control the system in that time, and that most of the people were illiterate. There were, however, many people who worked voluntarily to develop these schools and provide curricula. The people who graduated from these

schools developed the education system in the modern country after it was established (Al-Hogail, 1998; Ministry of Education, 1998).

After the Creation of the Saudi Kingdom

Directorate of Education.

The modern education system began when King Abdul-Aziz established the first educational department in 1925 (1344 H), which was called the Directorate of Education. This department was established in order to supervise and to spread education.

Ministry of Education.

The Ministry of Education was established in 1953 (1373 H). It replaced the Directorate of Education. The Ministry of Education was responsible for planning and developing education in the Kingdom.

The government split the Ministry of Education into several different ministries because of the pressure on the government to diversify its services. As a result a number of Ministries were created to cater to the other sectors in education. The Presidency of Girls Education was created in 1960 (1380 H), the Ministry of Higher Education in 1975, the Institute of Public Administration in 1960, and the General Organization for Technical Education and Vocational Training in 1980. All of these ministries are independent of each other.

The new education system consisted of grade levels. These were six years of elementary school, three years of middle school, and four years of high school (Ministry of Education, 1998).

Curriculum

The high school curriculum has been revised many times. The most recent update allows the students to acquire skills and knowledge in the areas of Islamic

Science, Arabic Language, Social Science, Management Science, Science, Technical Science, Mathematics, Computer Literacy, Library Research, and Physical Science. The students can major in any of the following four subjects; Islam and the Arabic Language, Management and Social Studies Management, Sciences, and Technical Sciences (Ministry of Education, 1998).

Presidency of Girls Education

The ministry that deals with matters related to girls' education is called the Presidency of Girls' Education. It was established in 1960 to develop educational planning for females and to improve the quality of women's education, thus assisting them to be active in the society within the boundary of Islamic law. The range of the girls' education is grades K-12. The education system has six years of elementary school, three of middle school and four years of high school. The first high school for girls was established in 1963 in Riyadh, the capital of Saudi Arabia. The first graduating class consisted of twenty-one students (Presidency of Girls Education, 1998).

Curriculum Development.

The Presidency of Girls' Education has developed a new curriculum for girls that is in use to this day. Curriculum developers continuously design and improve the curriculum so that the learners can develop their skills and knowledge to face existing changes or new problems in the society. The girls' curriculum includes Islamic Science, Arabic Science, Social Studies, Science, English Language, Art, and Home Economics (Presidency of Girls Education, 1998)

Funding Support and Planning

Budget and planning for the Presidency of Girls' Education has changed rapidly since its establishment in 1960, keeping updated and developing the education system to meet girls' needs in the society. The initial budget of the Presidency of Girls' Education was 2 million Saudi riyals (approximately 5 billion dollars) but no more than 15 billion Saudi riyals (approximately 4 billion dollars). The budget increased 254% during the decade from1960 to 1970. This is a good indication of the annual improvement in girls' education, focusing on K-12 in Saudi Arabia (The Presidency of Girls' Education Report, 1999).

The budget hierarchy has changed since the Presidency of Girls' Education was established. Change and development in the society was reflected in the internal structure of the Presidency of Girls' Education organization. It adopted the following changes in the budget hierarchy:

1. It was the budget and organization;

2. It became part of the General Management for Planning and Budget;

3. The last change established was a high position called the Assistant of Planning and Budget (The Presidency of Girls' Education Report, 1999).

It was the responsibility of the Assistant to collect information from all the educational districts in Saudi Arabia in order to study their needs and mentor the spending.

In (1410 H) 1990, the main changes in the Presidency of Girls' Education hierarchy were:

1. General Management for Administrative Development that includes:

    a. Management of Organization;

    b. Management of Educational Training;

    c. Management of Training and Scholarships.

2. Assistant for Planning and Budget (The Presidency of Girls' Education Report, 1999).

All the change that has happened has had a major effect on girls' education, such as staff development that allows teachers to improve and gain new knowledge and teaching skills.

Ministry of Education

The first organization to support education field was called the Directory of Education established in (1344 H) 1924 the budget was 56,650 Saudi riyals (approximately 16,000 dollars) the budget of the Directory of Education continuously increased from one year to another. The Directory of Education ended in (1972 H) 1952 and its budget had increased 226 times since its establishment in 1924. The Ministry of Education replaced the Directory of Education in 1953 (1373 H) (Ministry of Education, 1998). The change was not merely in its name but also in the duties. It was able to face the change in the society and improve quality of education during the stages of learning. In 1953 (1372/1373 H), the first budget of the Ministry of Education was roughly 13 million Saudi riyals (approximately 3 million dollars).   In (1380 H) 1960, the budget increased annually until it reached 115 million Saudi riyals (approximately 35 million dollars).   According to the Ministry of Education (2000, 1420/1421H), the current budget of the Ministry of Education is roughly 20 billion Saudi riyals (approximately 5 billon dollars).

In fact, the change included the internal organization of the Ministry of Education. It was the first hierarchy to represent the new positions of Minister of Education, the High Consult of Education, and Assistant to the Minister of Education. There were new responsibilities toward improving education in all fields that included K-12, vocational education and technical training (Ministry of Education, 1998).

The Changing Environment in Education in Saudi Arabia

Courseware Products. There are many aspects of change in the Saudi environment that impact educational institutions. There are some companies that produce courseware for K-12 in order to enhance their learning and help them to gain information that is illustrated in Table 2.

Table 2

Courseware Production in Saudi Arabia

Company	Grade Level	Subject Matter
Sakar Software	10-12	Science, English, Math Islamic Studies
Dowlog Technologies	1-12	General Science, Math Physics, Chemistry Geography, English, Language
Al-Mareefa	1-12	General Science, Math
Al-Saudi Co.	1-12	Physics, Chemistry Geography, Arabic Language
Sakar Software	10-12	Science, English, Math Islamic Studies

Obeikan Home Interactive	K-9	General Science, Math, Biology, Social Studies Geology, English Language Arabic Language

Note. From *Computer Based Instruction in Saudi Education: A Survey of Commercially Produced*, by B. A. Al-Saleh and S. M. Al-Debassi, (2000).

Al-Saleh and Al-Debassi (2000) provide strong indications in the previous table that there are courseware products that are locally available that can be used in education to enhance learning and teaching and be infused with the curricula. The technological environment has changed in order to be compatible with the advancement in information technology in order to reform schools.

The connection of the Kingdom of Saudi Arabia with the world is of vital importance for several reasons:

1. Increased access to research gives students, teachers, and researchers opportunities to develop their own research in different areas of study.

2. It gives increased interaction among students outside of the classroom with students world wide.

3. It enables all organizations (business, public, non profit, universities) to post their information on the Internet, which provides opportunities for learners to seek information.

4. It allows the schools to develop their own web sites, thereby increasing the communication within the community, as well as providing information for administrators and coordinators of schools to seek information related to information technology and its impact on education.

5. It links the Kingdom with the world over the Internet to maximize an exchange of information between educational institutions and other sectors.

Economics

Approximately $275 billion was spent on education in the fourth development plan. In the fifth development plan the government is targeting to spend revenues generated from the oil industry to improve all the economic sectors in order to raise their productivity Oweiss (1998). According to Oweiss (1998) during the first three development plans from 1970 to 1985, Saudi Arabia spent roughly $550 billion to develop and increase productivity in all sectors, education being one of the sectors.

Teachers' and Principals' Perceptions

The review of literature is based on primarily studies that have been done in the United States' environment by different organizations and scholars that have strong relationships to the research.

Teacher and administrator perceptions toward utilizing information technology in school is essential to determining helpful techniques for implanting information technology methods that support and enhance learning, teaching, and management work. The literature indicates that there is a positive attitude toward using and implementing information technology in the school environment.

Rowand (2000) conducted a study that focused on using computers and the Internet in school. The survey indicated that teachers who work full-time had access to computer technology and the Internet, which represents 99% of full-time teachers, but their access to and utilization of them, was different. Rowand states that of those who used computer technology and the Internet "a lot" to develop course materials, as well as those who integrated computer technology "a lot" in order to keep effective

administrative records, the percentage was thirty-four. Those who utilized the Internet for lesson plans and did their research represented less than ten percent.

Students were involved in using computer technology applications, such as word processing or spreadsheets. Thirty-one percent used them for drill and practice. In addition, Rowand (2000) notes, "Secondary school teachers were more likely to assign research using the Internet" (p. 4). According to Rowand (2000), when the teachers were asked about the potential of their feelings toward using computers and the Internet in their classroom, 23% felt "well" and 10% felt "very well."

Ertmer et al., (1999) studied teachers' beliefs about the role of technology in the elementary classroom in regard to the effectiveness of information technology in teaching and student learning. The study focused on seven teachers with a variety of teaching experience, training programs and the use of software. They interviewed all the teachers and their questions focused on how information technology was used in the classroom to improve contents. Teachers were asked to provide examples that supported successful information technology implementation in the classroom. The results of their research were comprised of three parts.

Using computer technology as a supplement. Three of the interviewees used computer technology to motivate students to complete their assignments. They used computer technology as a reward in the classroom. One of them said, "I see the classroom computer not as a teaching tool but kind of as a reward kind of thing, like when kids are done with their work." The other four teachers' perceptions indicated that computer technology was essential for students to learn. Also, they believed that one of their duties was to be connecting technology with curricula in order for students to recognize its effectiveness (Ertmer, Addison, Lane, Ross, & Woods, 1999).

Using computer technology to support the existing curriculum. Teachers' perceptions indicated that information technology enhances and enriches curricula. Ertmer, et al., (1999) provided examples that represented teachers' opinions toward the role of information technology in curricula. One of the interviewees responded, "I select a variety of CDs that they put in and use depending on the skills I want them to work on that day" (Ertmer, Addison, Lane, Ross, & Woods, 1999, p. 63). Another reportedly did not use computer technology to teach skills, but as she stated, "More to reinforce what I have taught" (Ertmer, Addison, Lane, Ross, & Woods, 1999, p. 63). Besides, another one asserted, "I use it more to just reinforce what I am doing, kind of like a drill and practice session" (Ertmer, Addison, Lane, Ross, & Woods, 1999, p. 63).

Using computer technology to facilitate an emerging curriculum. Ertmer, et al., (1999) found during their study that teachers who used computer technology encouraged students to work together to solve problems. Computer technology helps students to gain new concepts that assist them in building their knowledge. Lola was one of those interviewed in the study. She asserted that computer technology should be fully integrated into curricula and "be a key part of the instruction in the classroom" (p. 64).

Ertmer, et al., (1999) point out that they found many reasons to incorporate computer technology in the classroom:

1. To increase students' motivation.

2. To make content interesting.

3. To prepare for using information technology in the future.

4. To increase students' attention to learning in the classroom to help solve problems.

Chiero (1999) conducted a study that investigated teachers' perceptions of the use computer technology and its role at their work place. Participants were 142 secondary teachers. The interview was conducted with fifteen of them by phone, of whom 58.5% were female and 41.5% male. The subjects ranged in age from twenty-five to seventy-two yeas of age. Moreover, their experience ranged from one year to forty-six years. Their experience at utilizing computer technology ranged from zero to twenty-nine years and the average was 7.3 years. Most of the respondents used a computer both at home and at school; however, their access to the Internet was limited. They used computer technology in a variety of tasks, such as developing instructional materials and administrative work that assessed the performance of their assignments properly. Computer technology made them more creative, improved their proficiency, maximized their accessibility, and enhanced their experience as educators.

Chiero (1999) noted that 23.2% of the respondents were beginners, 40.8% had moderate experience, and 35.9% described themselves as experienced. As well as in this study, Chiero found that 52.9% of the respondents used computer technology to develop and create instructional materials.

When Chiero (1999) asked about using computer technology in their work, 48.6% responded that computer technology was important to accomplish their activities. Also, of the respondents who answered that computer technology was essential to gather information, 22.8% believed it was somewhat important, 35.8% believed it was important, and 25.2% believed it was essential. Most of them viewed the use of computer technology to gain information to support their work as important. Chiero (1999) declared that the majority of subjects (92.9%) reported that computer technology was essential for saving teachers time. In addition, the majority

of respondents stressed that use of computer technology positively affected their productivity (76.7%), made them more professional (72.3%), made them more creative (66%), and generally better educators (60.6%).

Body (1998) conducted a study that focused on computers in the classrooms and analyzed their effectiveness on students' learning. Teachers and principals cited other benefits of using computer technology:

1. Concentration and motivation

2. Social and group work skills

3. General computer operation skills

4. Communication skills.

The Wiesenmayer and Koul (1998) studied the integration of the Internet into the classroom to increase the value of teaching. The first of twenty-five studies was in the fall of 1996 and the second in the spring of 1997. They found student's use of collaborative learning in the fall 1996 was 30% and in the spring of 1997 was 43%; communication between teachers and students in the fall 1996 was 22% and in the spring of 1997 was 39%; and the other communication in the fall of 1996 was 34% and in the spring of 1997 was 56%. From the previous ratios, there is an indication that teachers increased their utilization of information technology in their tasks. Likewise, teachers use of the Internet to enhance curricular content in the fall of 1996 was 71% and in the spring of 1997 was 87%. Wiesenmayer and Koul conclude in their study that "Teachers from all over West Virginia perceive the Internet as a major tool for teaching collaborative and investigative practices of science and scientists" (p.227). The increasing use of the Internet during1996 and 1997 by teachers, indeed, reflected the teachers' implicit perceived willingness to adopt information technology in their classroom and out of school.

MacNeil, et al., (1998) investigated administrators' perceptions of the implementation of information technology in restructuring schools. The study included principals and assistant principals who represented 112 school districts in southeast Texas. Only sixty-four responses were returned, or 57.14%. MacNeil, et al., (1998) found in their study that those administrators supported infusing information technology in schools. They asked how important technology was in the school. The result was 67.2% who reported that technology was very important and 90.6% responded that infused technology in school was important. This indicated that administrators asserted that implementing information technology in school is very important, and that it would have a significant impact on its outcomes. That makes its implementation an imperative matter.

Consequently, Sharp and Walter (1997) sent surveys to three states (Illinois, Massachusetts, and Texas) and 325 administrators and they received a 71% return. This study examined many different issues, one of them computer technology. They asked the subjects to rank them based on their importance. When they asked the administrators which issues were more important than in 1995, the respondents ranked the issues for these questions as followed:

Technology/computers   63.9%

School finance in general   61.3%

State testing programs   54.8%

School finance equity   50.9%

The majority of the respondents ranked computer technology as the most important issue.

Furthermore, Chiero (1997) carried out a study that related to computers present in K-12 teachers' use of computer technology and their perspectives.

Additionally, Chiero (1997) indicated that respondents were 77% female, and 23% male. Their ages ranged from twenty-three to forty-nine years. Their years of experience in teaching ranged from one to twenty-five years. In addition, their experience using computer technology in the classroom ranged from zero to twenty-five years. In fact, the respondents were from different skill levels. The majority of teachers were from elementary schools (70.6%), with middle school teachers representing 11.8%, and 17.6% representing high school teachers. When they were asked about their experience with computer technology, 2.9% ranked themselves as computer experts, 73.6% as having moderate computer experience, and 23.5% had difficulty with computer literacy. Moreover, Chiero indicates that most of the respondents used information technology that included computer technology for creating instructional materials, tests, and work sheets, excluding 5.6% of the subjects. There were 58.3% that used computer technology for seeking information about specific subjects. In addition, there were those who used computer technology to develop their lesson plans, 47.2%.

Chiero asserts from this study, "Responses to the items measuring attitudes toward computers were overwhelmingly positive with little variation" (1997, p. 117). The Office of Technology Assessment (1995) (as cited in Faison, 1996) reportedly found the numbers of teachers using information technology over what was expected in the U.S.A. The study included 1,000 teachers from K-12. They found during the period of 1994-1995 school year that of the 85% subjects who used information technology, 58% used CD-ROM, 16% used the Internet and 12% used other on-line services that were provided by using computer technology. In addition, they estimated that of the computers in schools at that time, approximately 5.8 million computers were utilized for instruction. In the past two years, there had been rapid

growth in many aspects of information technology, such as modems, CD-ROM, and local area networking.

Stellwagen (1999) conducted a study that focused on the implementation of information technology in the school. Her study was implemented in Hinsdale South High School in Darien, Illinois. The project provided by Stellwagen was helpful in motivating ten teachers to infuse computer technology in their classroom in order to enhance cooperative learning among students.

Stegal (1998) studied principals' viewpoints. The study included 54 principals of elementary schools in south Texas and 54 schools. Stegal found in this study that 31% of the schools had access to the internet, 85% supported curricula with computer technology, 81% of schools had computer teachers, and 59% integrated computer technology into the school budget. Stegal asserts that 74% of all participants strongly agreed that information technology was essential for schools, whereas 26% of the principals agreed that information technology was important. In general, all principals agreed on the importance of information technology for their schools. Also, 96% of the participants agreed or strongly agreed that they had a strong interest in computer technology.

Lewis (1997) focused on teachers' perceptions toward utilizing information technology in schools. The study included elementary, middle and secondary schools in Tennessee. Lewis reported teachers in high school and middle school had positive perceptions and agreed or strongly agreed in their responses that included nine items that represented features of information technology in the 21st Century. The items included accomplishing tasks fast, improving quality of the productivity, job execution, and its effectiveness, making jobs easier, controlling the work, increasing productivity and providing more features for the classroom rather than its

disadvantages.   Indeed, that all the previous studies give testimonies that information technology is important enough to be integrated into schools. Both teachers and administrators asserted that information technology is the baseline for school environments, which work to supplement classroom and administrative jobs.

Constructivism and Information Technology

Parkay and Glen (2000) provide a clear definition of a constructivist model: "views of learning; therefore, focus on how learners make sense of new information—how they construct meaning based on what they already know" (p.168). In fact, learners who utilize a constructivist approach in their learning should be able to develop new knowledge based on analyses and synthesis of information. They can link prior knowledge with the new knowledge to develop optimizing knowledge that enables learners to create new ideas, processes or models. (Parkay & Glen, 2000; Roblyer & Edwards, 2000) point out that the constructivist theory focuses on students capabilities that should enable them to deal with real problems and bring up reasonable methods to manipulate problems.

De Caprariis (2000) commented that the notion of "constructivism" emphasizes how learners construct the meaning of learning or how they process information to solve their problems, as well as the need to gain information and explore solutions.

Constructivism is a learning theory that is based on the cognitive root and is derived from Piaget, Bruner and Vygotsky's work. Piaget and Bruner support the cognitive theory, whereas Vygotsky concentrates on the social cognitive theory (Maddux, et al., 2001). Constructivism as a learning theory focuses on the knowledge of the person and how the learner constructs knowledge. Based on this learning theory knowledge is not transferred from teachers, but constructed by the learners.

Students can construct their own knowledge based on the experiences they have had and the current skills that they add to their knowledge. The learners have to organize, manage, and develop their experiences and understanding in the shaping of knowledge that can be interpreted by finding out a realistic solution for it. (Fosnot, 1996; Jonassen, 1996).

Teachers do not deliver knowledge to students. In fact, according to the contemporary theory of constructivism, teachers have to use an appropriate approach that encourages students to learn and seek information that helps them to develop the meaning of learning that constructs their knowledge and view of the real world. This suggests that students are active learners. They have to develop different knowledge and link the prior knowledge with the new knowledge in order to create advanced knowledge. This makes them thinking people with the ability to solve their problems or develop new concepts.   According to Jonassen, et al., (1999); Fosnot (1996), "…a constructivist view of learning suggests an approach to teaching that gives learners the opportunity for concrete, contextually meaningful experience through which they can search for patterns, raise their own questions, and construct their own models, concepts, and strategies" (p. ix). In fact constructivism is completely opposed to the behaviorist theory because it views students as active learners not passive learners.
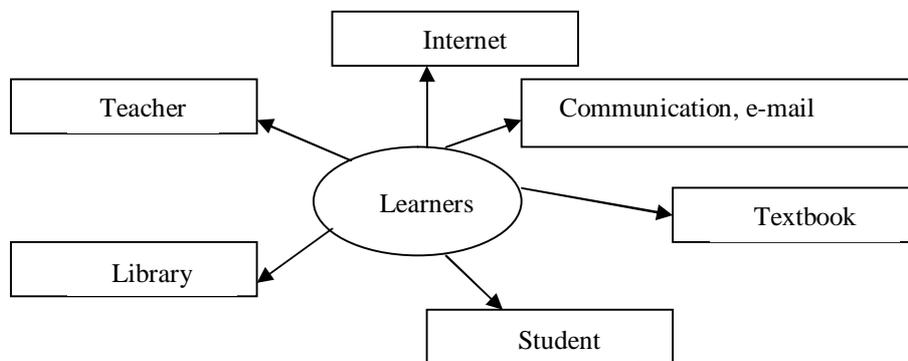
Knapp and Glenn (1996) point out,

Our emphasis on student inquiry is based on growing research, which asserts that learners "construct" their own understandings/ knowledge from the information they acquire. This is referred to as the constructivist approach to learning, and it differs from the traditional

approach, which assumes a teacher can "deliver" knowledge to a
learner. (p. 112)

The constructivist approach emphasizes the importance of the learners.
Driscoll (1994) indicates, "… constructivist theory rests on the assumption that
knowledge is constructed by learners as they attempt to make sense of their
experiences" (p.360). According to this theory, learners have to seek information in
order to construct their knowledge and develop their decisions. Students are the
center of learning. They may use computer technology to gain their information and
use the technology communication tools that support collaboration and interaction
among students. In fact the constructivist theory describes the learner as able to
active and acquire information from different resources to develop his or her
knowledge as shown in Figure 1.

Figure 1

Learning Based on the Constructivist Theory

Morrison et al., 1999; Ryba and Anderson, 1993; Knapp and Glenn, 1996;
Jonassen et al., 1999; Dwyer, 1996; Leflore, 2000 all mention that it is the power and
role of students in the constructivist theory that make students able to work as if they
are in the real world. The characteristics of the students are:

1. Students are active and able to develop relationships between variables and test hypotheses instead of merely listening to the teacher or simple learning (Schunk, 1991).

2. Students work as a group, cooperatively and collaboratively, because students posses different knowledge, skills, and experience. They can exchange information with each other to enhance their learning. This model emphasizes cooperative and collaborative learning instead of working alone.

3. Students seek information from various resources, not only the textbook, in order to acquire information and discover their learning.

4. Students use communication tools such as e-mail, chatrooms, and listserv in order to increase their interaction and participate outside of the classroom. This provides vast information.

5. Students are active learners and have the capabilities to develop their own knowledge.

According to Fosnot (1996) " Teachers who base their practice on constructivism reject the notion that meaning can be passed on to learners via symbols or transmission, that learners can incorporate exact copies of teachers' understanding for their own use." (p. ix). The researchers agree that with this approach the knowledge is not "Cut and Paste."

Morrison et al. (1999), Ryba & Anderson (1993), Knapp & Glenn (1996), Jonassen et al. (1999), Dwyer (1996), and Leflore (2000) all indicate that the roles of teachers are:

1. Teachers have to give students a chance to become learners themselves because the students are not containers that are to be filled by the teachers.

2. Teachers must create course activities that encourage students to seek and manipulate their information and create their own abilities to choose an appropriate solution for their projects.

3. According to this theory, teachers work as facilitators in the classroom to give students suggestions when they are stuck in order to refresh their intellects. Roblyer, Edwards & Havriluk (1997) point out "… teachers act as a guide to students while they set their own goals and "teach themselves" (p. 70)

4. Teachers must divide the students in the classroom into groups in order to set their goals and objectives.

5. Teachers must choose appropriate resources for students.

Computer technology plays a critical role for implementing constructivist strategies because student learning is not only based on the textbook. They may use computer technology, which makes the information available anytime and anywhere, making the topic dynamic.

Maddux & Cummings (1999) view the constructivist model as a popular notion in the field of information technology and education that gives students new authority with which to learn the use of information technology to support content.

The web allows learners to learn from different perspectives and to gather information from various locations in the world. In addition, students learning from one article on the web are able to move to another link that provides more information related to the topic. The web provides students with vast information that is needed for developing solutions to the problems they face. The web permits learners to interact with the society and contact knowledgeable people and obtain addition information through different kinds of communication, which are both asynchronous and synchronous tools. Learners can use the web to refresh their intellectual ability

and reconstruct understanding. In fact, the web structure encourages learners to locate more than one resource (Smith-Gratto, 2000).

Leflore (2000) points out that the web in the classroom is a significant axis to assist students to develop their models. This includes various information forms, different layouts, both linear and non-linear, that can help students to understand the meaning of learning. Their models begin to reflect their internal thinking and how they process information.

Moreover when teachers use information technology, such as a web-based course, teachers develop course materials and objectives that include different resources that encourage students to synthesize and organize information that works as a baseline for producing new knowledge. (Bannan & Milheim, 1997; McCraw et al., 1995) indicate that information technology plays an important role in increasing the effectiveness of the classroom and creating the student centered learning processes, which changes the role of the students from passive to active learners. Wiburg, et al., (1999) suggests that "Teachers, through the constructivist use of technology, were able to provide multiple ways for students to learn and to demonstrate their knowledge. The visual, sound, and kinesthetic capabilities of the computer proved especially helpful for students who were learning English while also learning content" (p. 209). Beal (2000) indicates that a constructivist approach gives students the chance to discover learning and develop meaning when they are able to use tools such as email, listserv, and the web to increase their communication and to gain additional information. Finally, Beal (2000) states that the skills the students have learned appear to be very transferable to the workplace. According to Roblyer & Edwards (2000) computer technology based on CD-ROMs is another means of supplying a vast amount of information based on multimedia concepts.

The Humanistic Model

According to (Sowell, 2000; Lefrancois, 2000; Schunk, 1991; Elliott et al., 2000) Maslow developed a pyramid that consists of five levels. It begins with basic needs such as food and continues on to the highest level, which is self-actualization. Maslow's theory focused on individual growth. Each person must complete the previous level before moving on to the next level. In addition, he or she cannot skip a level to go to another level. These levels are:

1. Physiological needs such as food, air, and water, which are necessary for each person.

2. Safety needs, such as freedom from anxiety. Students need protection from fear and a secure school environment.

3. Belongingness needs, such as receiving love from other people, working with them as a group, making friends.

4. Self-esteem that reflects others' judgments. According to Elliott et al., (2000) this level represents "the reaction of others to us as individuals and our opinion of ourselves" (p. 336).

5. Self-actualization needs. In this level a person is creative, self-fulfilled, able to lead people and be respectful toward them.

In fact, Maslow's theory is vital in learning because each person needs to acquire information that enhances their thinking and problem solving. The constructivist theory supports student learning that encourages learning from diverse perspectives. Without acquiring information, the teacher, administrator and/or the student cannot grow.

Additionally, teachers and administrators should work together in order to develop and assist their schools in advance. Moreover, students need to work as a

group to exchange information that assists them to grow their classroom and meet their acceptance needs level. In this research, is essential to combine humanism and constructivism together and used them as the structure of the research because the humanistic theory is based on individual needs. This, in turn must be supported by the decision makers. Teachers need to acquire information technology in order to be able to integrate it with curricula. Students need to develop their knowledge in the information age to face and solve problems. Administrators need to acquire information that enables them to lead and restructure the school. Finally, teachers, administrators and students need to learn information technology so that they can enhance their knowledge. It is important for administrators and teachers to up-date their schools to meet students' needs, such as information technology, which increases their effectiveness in their society.

The Innovation of Change

Innovation and School

Kozlowski (2000) affirms that change is not merely integrating information technology into school environments. Change should increase students' learning and achievement. Change must be planned to include all the elements that have an impact on the students' learning and achievement. The teachers' attitudes toward infusing information technology into curricula, and selecting appropriate courseware and how to choose suitable resources from the web that enhance the content are also important elements. A change in the administrator's attitude to become more aware of how technology can enhance learning and teaching in order to infuse technology into the curriculum is necessary. Kozlowski states, "Technology is being infused to nurture innovative efforts and prepare learners to live and work in a rapidly changing global community" (p.35).

Eden et al., (1996) assert that we live in a global world where information technology plays a significant role in providing pressure to change. Leaders of organizations have to plan expectations for the future in order to update the internal environment. Eden et al., (1996) state that it is important for leaders to prepare for this change, "The world is constantly evolving, creating the challenge for individuals and organizations to deal with change and for schools and universities to prepare people for change" (Eden, Eisenberg, Fischer & Repenning, p. 40). Moursund and Bielefldt (1999) indicate that to develop a reasonable change model schools must focus on the adoption of information technology in a school environment, and implementing the change requires that teachers become agents of change. Change in the school environment is an imperative matter that directs schools to apply all the features of information technology for their needs, so that schools can perform missions in the society well (Bielefldt, 1997). Hallinger, et al., (1999) point out employing information technology in the real world requires teachers and administrators to recognize their involvement in the field of information technology and engage them in its use for communication, management and instruction. Students, teachers, and administrators must realize that information technology is an essential part of their future jobs.

Hall and Hord (2001) claim that the charge of change based on "everyone, teachers and principals in a school and personnel in the district office, must consider and view how a school advances as the change process unfolds" (p. 14). Kershaw (1996) declares that educational institutions started to apply information technology as a new innovation to improve their environments, but placing information technology is not enough to implement change. Information technology must involve staff development that will assist the staff in the operation and integration of

information technology into the curriculum. Cosx (1996) indicates that information technology must be infused into the entire curriculum; therefore teachers who do not have skills should change their behaviors to attain skills that enable them to use information technology in their classroom.

It is necessary to reconstruct schools in all aspects so that each member performs his or her duties effectively, including teachers, administrators, students, and parents. Change requires that all those who represent the stakeholders attend meetings to develop the future of the school. It requires developing a vision and a mission statement that will meet the school's needs now and in the long term (Knapp and Glenn, 1996).

Change in an organization is based on the ideas and concepts that reflect all of the members of the organization at all levels. As a result the leadership is able to implement the change and make it happen (Troy, 1996). Chopra (1999) asserts that new innovation or change must have value, which starts from raw materials by thinking and gaining more data in order to develop powerful information that can be used as new ideas to start to transfer the innovation. Juechter (1996) sustains that the leadership of change is accountable for the outcome of the organization based on stakeholders that represent all the levels of management.

Innovation in Schools

Rogers (1995) states that innovation "is an idea, practice, or object that is perceived as new by an individual or other unit of adoption." (p. 11). Chopra (1999) cites that innovation "is about doing something in a new or better way." (p. 17). Based on this definition, diffusion of information technology in school demands the development a of technology plan that starts from the leadership or innovator's idea that has significant positive effect on the school environment, including teaching,

learning, and administration.   The implantation of innovation based on Mouraund's

notion of school (1997) includes:

a.   Hardware, which is important for education, computers, and printers.

b.   Communication tools, such as e-mail, and chat rooms.

c.   Web search information, to provide information for teachers and students to

     support their teaching and learning.

d.   Software, such as CD-ROM, that includes enormous amounts of information.

e.   Connectivity, that allows the connection of all the activities such as library and

     administration.

f.   Curriculum, with integrated information technology so that it can enhance the

     topics and research.

Staff development programs, that enhance the knowledge and skills of

information technology to adopt the new types of information technology in school

activities.   Leadership, or the innovators, should present features of information

technology in how increase teachers and administrators productivity and students

achievement to persuade them (Kershaw, 1996).   Based on Mouraund and Kershaw,

teachers and administrators, realize the new ideas, should visit organizations that have

adopted such ideas. This will show how information technology works as a vital

piece in an organization that makes the staff enthusiastic for involving and adopting

change. They can then recognize its impact in school.   Then the school will start to

assess the budget to ensure implementation of the new innovation.

Resistance to Change

Members of organizations might resist change for various reasons.

Deetz, Tracy, & Simpson (2000) defined resistance as "misunderstood or simply

written off as antiprogressive or technophobia" (p. 147). Tozer (1997) provides

reasons as prevent implementation of change that are shown in Figure 2.

Lack of confidence in plans

Threats to status

Fear of failure

Ingrained norms and habits

Fear of the unknown

Lack of understanding the
reason why

Resistance to change

Conflicting priorities

Fear of loss

Confusion

Perception of self/others

Lack of social proof

Lack of motivation

Lack of information

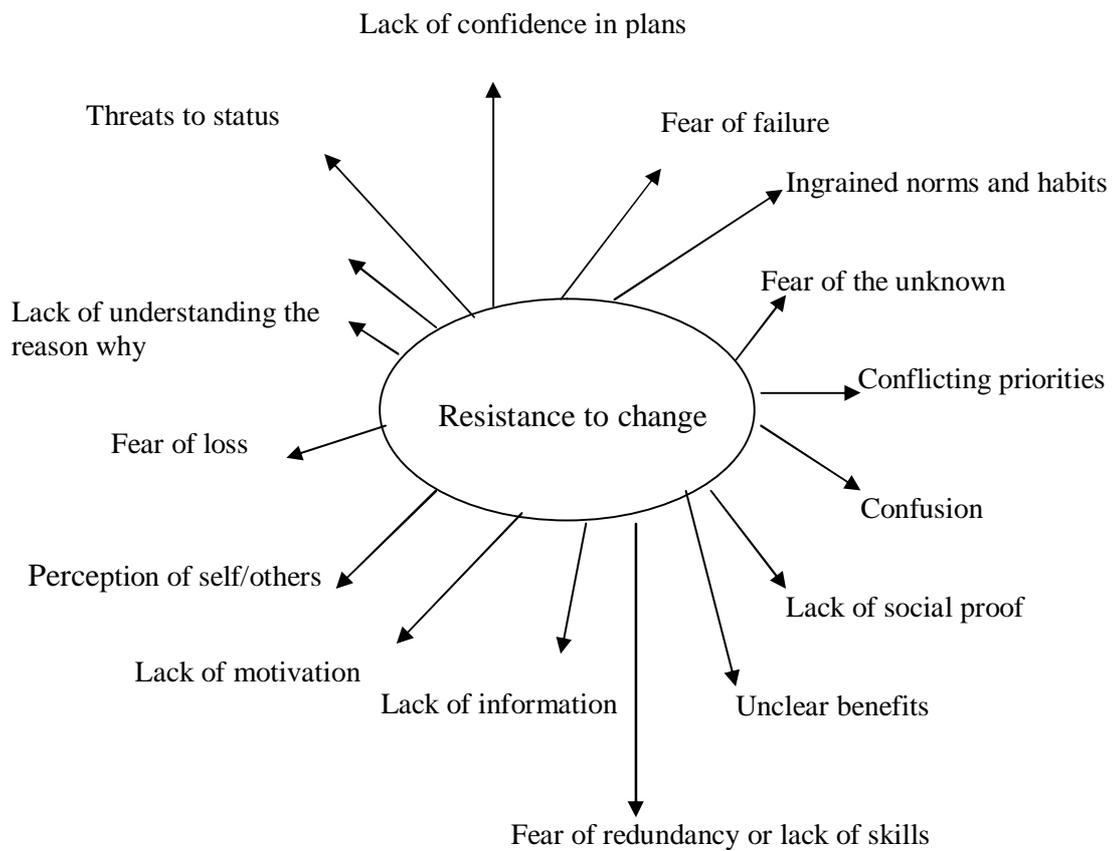Unclear benefits

Fear of redundancy or lack of skills

Figure 2. Resistance to Change

Note. From *Leading Initiatives*, by J. Tozer, (1997), p. 256.

Tozer (1997) proposed three questions which are essential for creating the rationale for a change plan that works as a vehicle to develop comprehensive change programs. These questions are presented in Figure 4.

Figure 3

Initial of Starting the Change Plan
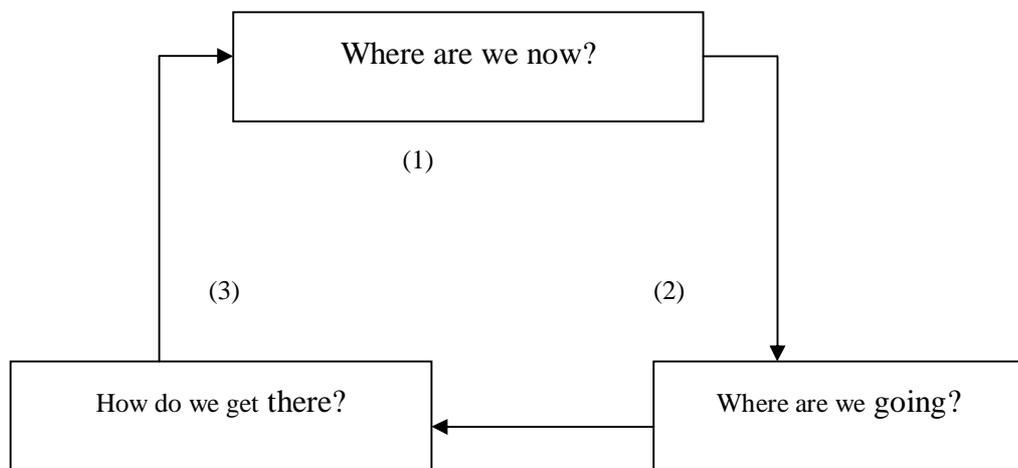
Note. From, *Leading Initiatives* (p. 262), by J. Tozer, (1997), p. 262.

The previous questions are significant and act as baselines for implementing the comprehensive change plan. Change must be planned because it cannot happen overnight.

To implement successful change demands specific stages that work as a road map. The stages direct the decision makers to reach their goals and tackle the plan deviation on time. This prevents serious problems from occurring. The Technology Education Index (1996 & 1997) proposed six steps that assist planners in developing a technology change plan, which is illustrated in Figure 4.
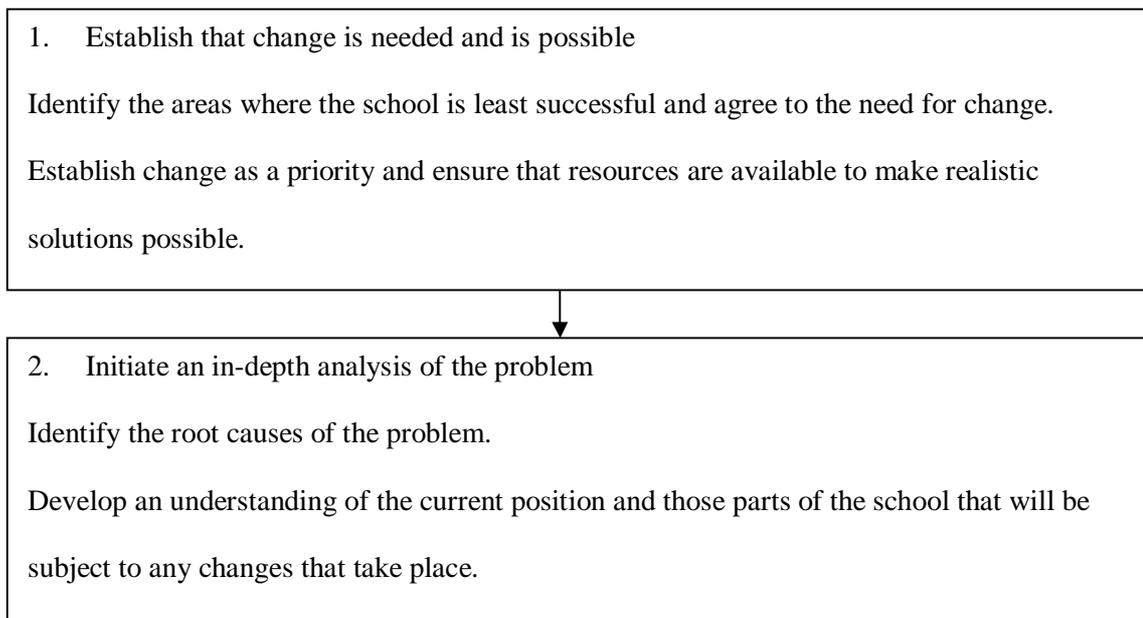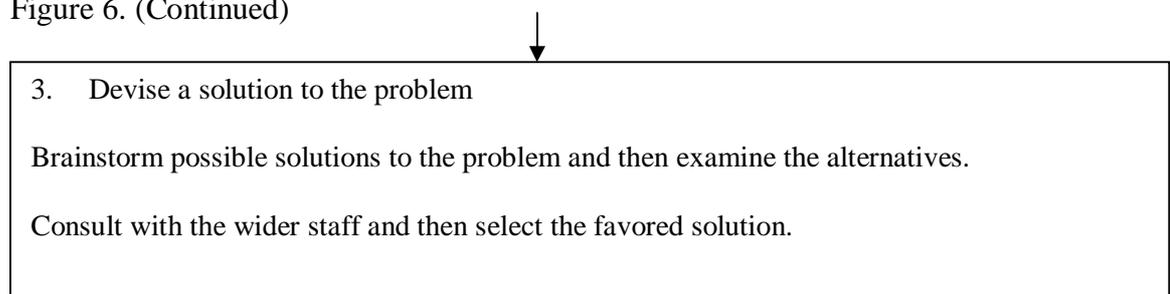
Figure 4

The Process of Change

1. Establish that change is needed and is possible

Identify the areas where the school is least successful and agree to the need for change.

Establish change as a priority and ensure that resources are available to make realistic solutions possible.

2. Initiate an in-depth analysis of the problem

Identify the root causes of the problem.

Develop an understanding of the current position and those parts of the school that will be subject to any changes that take place.

Figure 6. (Continued)

3. Devise a solution to the problem

Brainstorm possible solutions to the problem and then examine the alternatives.

Consult with the wider staff and then select the favored solution.

Note. From *Technology Education Index* [Online]. Available:

http://www.technologyindex.com/education/handbook/change.html

Restructuring Schools Through Change

      Knapp & Glenn (1996) note that school reform should include a change in

curriculum, instruction and school structure. This will assist to build a coherent school

environment. Restructuring a school covers the roles of the teachers, students,

parents, and administrators.   In addition, creating stakeholders is essential in

developing an effective long term school plan. They indicate integrating technology into a school can enhance activities of learning that encourage students to seek information to enrich course topics. The learning meets the students' needs and is able to be implemented in the real world. Whitaker & Moses (1994) point out "Educational restructuring is a fundamental change of assumptions and practices about what schools are for, how they are organized, and how they operate." (p. 2).

Friedman, Director at the Center for Improved Engineering and Science Education, and Professor of Management, Stevens Institute of Technology, Hoboken, NJ, (Cited in Charp, 1997, p. 6) emphasized that technology must be involved in the educational reform process as an essential part in each stage to guarantee that information technology is implemented in revising curricula, establishing new buildings, new computer labs, and in-service training programs.

Leadership

The administrators of schools must understand the importance of implementing information technology in order to make changes in the school environment to convince and encourage teachers to enroll in staff development for acquiring information technology knowledge and concepts (Clark and Denton, 1998). Donova (1999) asserts that successful innovation and implementation of information technology in teaching and learning depends on the administrators' discussion with the teachers. Slowinski (2000) points out "Administrators who implement technology effectively in their schools and communities will contribute greatly to both education and the economy in the twenty-first century." (p. 1) Foley (1997) notes the role that principles play is the keystone to reform in the school. They can be leaders of change for bringing new innovations and managing their powerful processes for reconstructing schools and in motivating teachers to improve their capabilities

through staff development.   Kaufman (1997) indicated, "The role of the school principal is increasingly cited as the keystone of educational reform" (p. 100). Hall & Hord (1987) assert that principals are the pivot of the process of change in their schools. This starts with the planning of the change to its implementation. The leaders of schools draw the strategies that are expected to develop technology in schools, both at the current time and in the future to develop effective efficient school environments that increase student success (Johnson & Bartleson, 1999; Weidner, 1999).

Staff Development

Staff development is the tactical approach to providing the wide range of information technology that is needed by administrators. It assists them to acquire power to support its implementation in the classroom and administration. Investment in staff development programs must be continuous in order for them to follow up the rapid changes that occur in information technology, to encourage them to gain new ideas, to improve their efficiency, and to meet their needs that are critical in improving and increasing student achievement (Carter, 2000 & Schmeltzer, 2001). Schoeny et al., (1999) and the Massachusetts Software & Internet Council (2000) cited staff development as the most effective method in helping teachers and administrators grow and feel confident, and to fully enhance school performance.

The previous researchers asserted that professional development is the gateway to change for teachers' and administrators' behaviors toward putting technology into real use for school activities. Staff development is a value matter that should be discussed when integrating information technology in various schools activities.

Pan (1999) pointed out that,

Infusing technology in teaching and learning has become a national

norm. Presently, most classrooms have some computers, and in some

schools, computers have become a required component in the

curriculum. Computers are generally deemed to have potential for

enhancing teaching, learning, and teachers' productivity. Teachers

generally are expected to have good computer skills and know to

integrate [information] technology effectively into the curriculum.

However, in reality, after advocating computer technology for over

two decades, only a few schools have effectively integrated technology

into their curricula, and still many teachers do not feel comfortable

about using computers and even hold resistance or skepticism toward

the usefulness of technological development (p. 81).

Additionally, Pan (1999) finds the best solution for solving and eliminating

resistance to infusion of information technology is to incorporate the staff

development programs into the teachers' training to assist them to acquire new skills

and knowledge. Staff development should support them in integrating the new

technology into the curricula. Hardy (1998) asserted that preparing teachers is

necessary for proficiency in utilizing and infusing information technology within the

curricula.

Information Technology Staff Development and Human Needs

Information technology is needed by all school staff, including teachers and

administrators, to develop different levels of information technology that enable them

to recognize its integration in the school. Bailey and Pownell (1998) created a

hierarchy compatible with Abraham Maslow's that represents the teachers' needs to

be able to diffuse information technology in the classroom and to be a leader in

information technology in the future that are implemented in Figure 5. Each level required specific needs that should meet before moving to the second level. The leaders of staff development programs must understand teachers' needs in order to develop technology programs that are compatible with their needs. Bailey and Pownell (1998) suggest specific needs for each level, these are:

Level One: Physiological Needs

The leaders have to ask this question, what do teachers need to create basic needs of technology integration before they move to the highest level? (Bailey & Pownell, 1998)

Teachers needs several basic needs for enhancing their technological foundation, these are:

a. Time. Teachers need time to be involved in new sessions and practice using technology, so that they can develop their skills and infuse information technology into the classroom. If they don't have enough time they cannot learn and gain new skills (Bailey & Pownell, 1998).

b. Technology plan. The purpose of a technology plan is to improve school outcomes. It should include what teachers need so that they can implement it into their activities sufficiently. Bailey and Pownell (1998) suggest questions which are necessary in this level, such as "Where do I fit in the over all technology plan?" (Bailey & Pownell, 1998, p. 49). "How am I expected to use the equipment?" (Bailey & Pownell, 1998, p. 49).

c. Technology Staff Development. Teachers must enroll in staff development in order to support their skills of using and diffusing information technology in their teaching (Bailey & Pownell, 1998).

d. Hardware and software. Equipment should be available in school that allows teachers to use computers and various of software and access the internet. Availability of information equipment increases teachers' use of its benefits (Bailey & Pownell, 1998).

e. Technology support. It is important for schools there be an information technology coordinator that supports computer use in schools (Bailey & Pownell, 1998).

Level Two: Safety and Security Needs

Teachers need to be safe and secure. Bailey and Pownell (1998) suggest a question which is, "What kind of basic safety and security needs do people have before they can move to higher levels of self actualization?" (Bailey & Pownell, 1998, p. 40). This level is composed of:

f. Congeniality. Teachers must feel comfortable that there is a way to access their information, such e-mail and students records (Bailey & Pownell, 1998).

g. Technophobia. Teachers should not fear utilizing information technology in schools. Staff development must encourage them in the use of information technology (Bailey & Pownell, 1998).

h. Administrative Support. Teachers are very worried about the continuing support of using information technology annually. Bailey & Pownell (1998) report a question that is asked by teachers which is, "How do we know the board will support us a year from now if we make this effort to integrate technology into our teaching?" (Bailey & Pownell, 1998, p. 50).

i. Confidence in Infrastructure. The information technology system in a school must be highly configured and maintained to protect the loss of information. Thus, teachers will feel confidence in the system (Bailey & Pownell, 1998).

Level Three: Belonging Needs

       Bailey and Pownell (1998) provide a question that support this level which is "How do we get teachers to feel a sense of belonging as they gain greater confidence and skill using the technology?" (p. 5) In order for teachers to meet this level of need during staff development they should perform these things.

j.   Peer Interaction. The leaders and stakeholders have to discuss how teachers using technology in their classroom will know what they can do and what they cannot do with the students and which is the appropriate technology for students. The interaction among teachers and stakeholders gives them confidence that allows them to express their opinions about using technology in the classroom (Bailey & Pownell, 1998).

k.   Technology Committees. Teachers must be involved in information technology planning.

l.   Teaming. Teachers have to work with the other teachers in one team to develop a project that can be used in teaching and learning. Bailey and Pownell (1998) provide a question that supports teaming which is, "Can we plan a unit together that we could use to teach the steps of information literacy using the Internet?" (Bailey & Pownell, 1998, p. 50)

m.   Community Belonging. Teachers should feel positively that all the stakeholder support using technology in school. There is a question that supports the idea which is, "Does the board of education know what the technology needs of the schools are?" (Bailey & Pownell, 1998, p. 50)

Level Four: Esteem Needs

       This is one of the highest levels in the hierarchy of what feeling the other people have toward using information technology in school.

Peer Recognition. When teachers are observed by others how they are using technology they try to develop more advanced skills.

n. Team Leadership. Teachers who lead in integrating technology are encouraged to improve themselves because the other people trust them.

o. Teaching Competence. When the students learn more how to use technology in learning that reflects well on teachers' skills and their desire to improve student learning. Bailey & Pownell (1998) provide a question that focuses on this point, "Are students learning more with technology because of my skills with technology?" (Bailey & Pownell, 1998, p. 50)

p. Technology Innovation. Teachers have to develop new knowledge of how to innovate new methods to enhance teaching and learning.

q. Extrinsic Rewards. Whether or not teachers successful are realized in internal and external schools. Bailey and Pownell (1998) provide a question that focuses on this point, "Have my efforts been recognized and rewarded by others?" (Bailey & Pownell, 1998, p. 50).
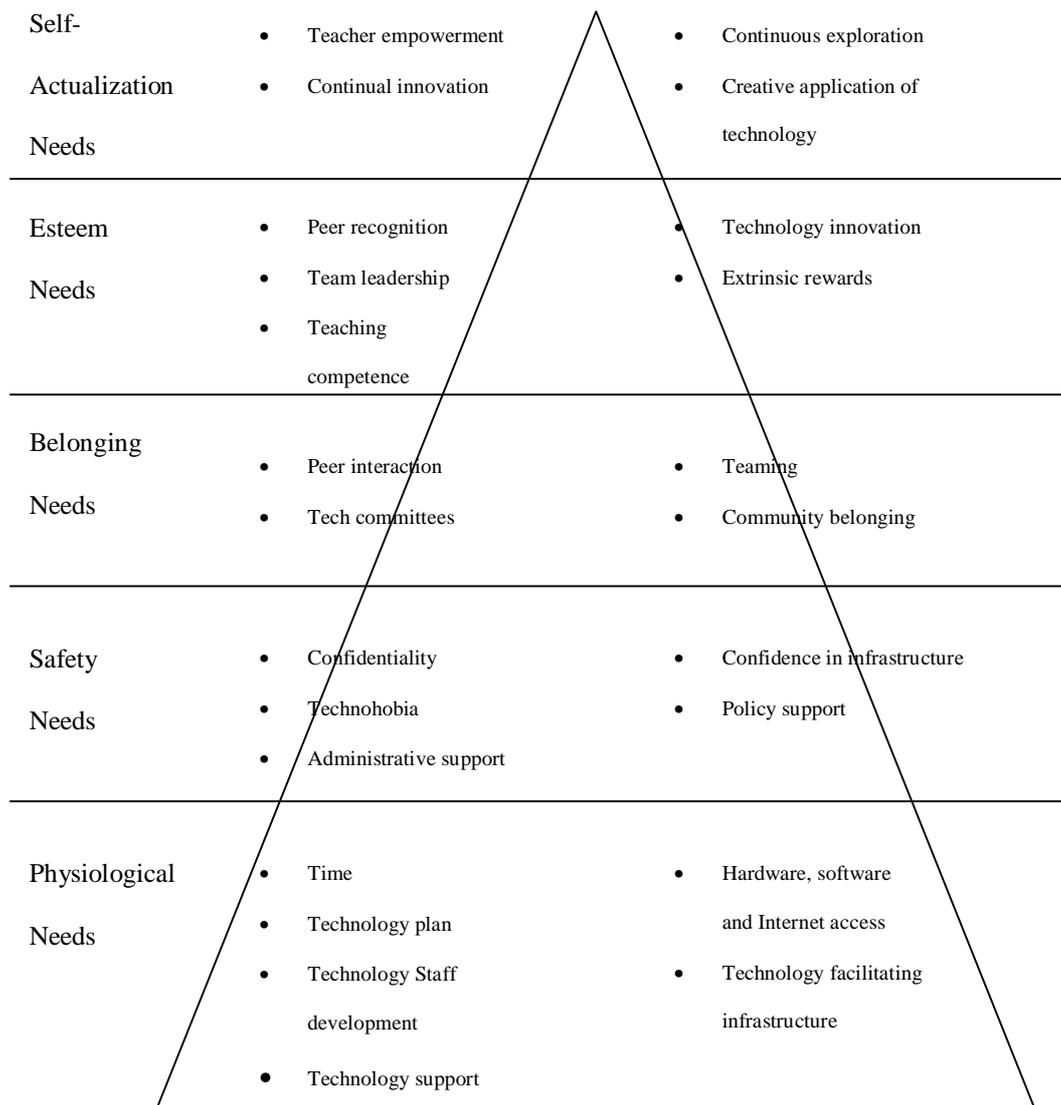
Level Five: Self-Actualization Needs

This is the highest level in the hierarchy. Teachers at this level will have the characteristics of creativity and respect from others.

a. Teacher Empowerment with Technology. Teachers responsible for making a decision to choose technology to support student learning. Bailey and Pownell (1998) provide a question that focus on this point, "How can I take advantage of all these technologies to improve student performance?" (Bailey & Pownell, 1998, p. 51).

b. Creative Application of Technology. Teachers are able to use information technology in difference ways to support teaching and learning.

Finally, developing staff development must be planned on assessment that helps to improve information technology staff development that will become compatible with teachers' needs, because they have different knowledge and skills. When this is the case, the programs are successful.

Figure 5

Maslow's Adapted Hierarchy Shows Priorities in Technology Staff Development and Support Programs

Self-Actualization Needs	• Teacher empowerment • Continual innovation	• Continuous exploration • Creative application of technology
Esteem Needs	• Peer recognition • Team leadership • Teaching competence	• Technology innovation • Extrinsic rewards
Belonging Needs	• Peer interaction • Tech committees	• Teaming • Community belonging
Safety Needs	• Confidentiality • Technohobia • Administrative support	• Confidence in infrastructure • Policy support
Physiological Needs	• Time • Technology plan • Technology Staff development • Technology support	• Hardware, software and Internet access • Technology facilitating infrastructure

Note. From Technology Staff Development and Support Programs, by Bailey &

Magnitude of Staff Development

Staff development must consider the teachers' and administrators' needs. As a result, teachers and administrators will be able to improve and renew the school environment in various directions. These include curriculum and instructional plans, which will ensure development of an effective learning environment (Nelson, 1998). In fact, both teachers and administrators should be involved in staff development program sessions.

Fruitfully implementing an information technology plan relies on meeting all of the needs of teachers, administrators and the students (Benson, 1997; cited in Brennan, 1997). Benson argues that "for any technology implementation plan to be successful, it must allocate sufficient time and resources for a focused staff development program." Costall (1997) indicates that staff development is the main method for implementation and diffusion of information technology in schools.

The equation provided by the Massachusetts Software Council (1994) (Cited in Whitfield and Templeton, 2000), asserts the relationship between the information technology plan and staff development. The equation is:

Technology − Training = Junk.

The preceding equation has an implicit meaning, which is:

Technology + Staff Development = Effective Implementation of an Information Technology Plan in School.

Information technology planners must discuss the needs of teachers and administrators that are significant for assuring implementation of the information technology plan successfully.

Levin et al., (2000) indicates that replacement hardware and software in schools does not guarantee its integration in tasks. When teachers and administrators develop new knowledge and intense skills of information technology, they are able to use computer technology (CT) in instruction and administrative work. The teacher's responsibility in the classroom is to use new technology in teaching and learning by utilizing the current technology, such as computer technology. They aid learners in acquiring information from different resources that assists them to improve and construct their knowledge. Teachers must acquire new skills and knowledge that develops new structures of thinking. Sharp & Walter (1997) state that "the importance of technology and computers has increased tremendously in the last few years as superintendents are pressured to purchase the latest equipment, hire computer coordinators, train teachers to use the equipment, and connect everything to the network" (p. 8).

Staff development is imperative for teachers and administrators in order to update their skills and knowledge. This has a positive impact on increasing their capabilities to implement information technology effectively in their classroom and for administrative work. Indeed, in order to perform their activities successfully they must "become an integral part of the curriculum of universities and other institutions preparing school administrators" (Telem, 1991, p. 605).

Beaver (1991) notes that administrators have a significant function in implementing computer technology in the schools. They "need to develop the

understanding necessary to guide their instructional technology programs and to have

the hands on experiences that training on administrative uses of technology provides."

Administrators needed to maximize their computer proficiency to increase their

insight so that they can assist their schools to identify their needs for computer

technology in instruction and administration (Beaver, 1991).

Yaghi (1996) conducted a study that focused on three groups, school

administrators, computer teachers and supervisors, and subject matter teachers, in

order to determine the importance of training teachers to acquire skills in computer

education. The outcome of the study showed there was no significant difference

among the three groups, indicating the value of training teachers to gain advanced

skills in computer technology. They were assisted in performing computer education

programs (CE). Yaghi found "The three groups clearly believe that training in the use

of computers should involve all teachers, and not be limited to computer teachers"

(1996, p. 145).   Yaghi (1996) indicates that once teachers know how to operate a

computer, and they will be motivated to use it and be able to ingrate it into the

curricula. Teachers are the key to successful implementation of computer technology

in the classroom. It is required that all teachers receive staff development to gain

enough skills to motivate them to make the new technology easy to implement.

Meyer, et al., (1999) stated, "Teachers need not only understand instructional

software from a user's point of view, but also how to teach with it" (p. 4).

Jameson (1999) stated, "Teacher training in technology is no longer optional.

Every educator must become proficient in technology" (p. 31). Jameson primarily

focused on teacher training in the use of technology. He believes the technology is

essential for teaching, implementing curriculum and increasing student learning. He

also adamantly recommends that technology should be part of teacher evaluation.

Staff development plays a critical role in enhancing the use of information technology (IT) in schools, maximizing confident use and reducing teachers' and administrators' awareness. Using staff development is an appropriate way to become skillful in the use of technology (Hope, 1997; Bishop-Clark & Grant 1991). Hall (1999) indicates that there were many studies that suggest the support of training programs in utilizing information technology and the allotment of at least 30 percent of the budget for technology. Hall said, "The president's Committee of Advisors on Science and Technology recommends that at least five percent of a district's budget be allocated to technology" (1999, p. 30).

According to Whitefield and Templeton (2000), importing computer technology into the classroom is not enough to gain its fruit; teachers are the main element in incorporating computer technology into instruction. In this case, the necessity of training programs takes place to enthuse teachers about its implementation. Frelberger (1996) confirms this with a strong statement related to the importance of staff development: "A commitment to technology integration also includes a commitment to teacher training" (Cited in Whitefield & Templeton, p. 72)

Thuriow (1999) cites successful staff development that provides various and in- depth knowledge of computer technology that allows teachers to acquire new experiences that include the technical skills and management by which to integrate them in the curriculum. Administrators need to gain computer technology skills in management and instruction in order to develop the vision required to increase innovation in the schools. A well-designed staff development model depends on the needs of the teachers and administrators to reach the appropriate level of technology that will increase their confidence in performing their tasks.

Bray (1999) states conclusively that implementation of information technology in the classroom is not useful without staff development. Bray reports that "simply placing technology in classrooms or computer labs does not mean that teachers will know how to use it or that the curriculum will be better for its presence." (p. 15)

The National School Boards Association (1995) points out that "a major barrier in the path of bringing schools into the Information Age is the lack of visionary leadership on the part of school leaders." Brooks (1997) reports that administrators did not have enough competence regarding how computer technology is used or configured in order to draw their own recommendations regarding computer equipment. They depended on others' recommendations.

Staff Development Programs (SDP) are valuable for teachers and administrators in schools in that they play a great role in improving their knowledge and skills. Knowledge is not static but dynamic. This impels teachers and administrators to increase and develop their own knowledge and skills to match with different levels of information technology so they can fulfill their tasks properly and adopt change (Guskey, 2000).

Bray (1999) indicates that staff development seeks to provide assistance and support for those who are:

1. The aggressive (gung ho) teachers.

2. Teachers who are more resistant to utilizing information technology in the classroom.

Bray indicates that considering the needs of teachers is fundamental to the successful implementation of information technology in the classroom. However, if the administrators or planners of staff development do not discuss their needs and

involve them in the planning, they will be an obstacle to implementing information technology in the classroom. She noted an interesting stance that was repeated by teachers who were not part of the planning. "You technology people think you know so much, but you do not understand what we have to teach" (Bray, 1999, p. 15).

Hardy (1998) reports that the main barrier to implementing computer technology in school was a lack of staff development, which was a core part of integrating computer technology in school. This means establishing staff development will eliminate the shortage of computer technology use in the schools.

Guskey (2000) pointed out "… Many modern educational reforms require teachers and school administrators to transform their roles and take on new responsibilities" (p. 3). School leaders must realize the main advantage of technology and utilize it in their schools. We are currently in an information age, and leaders should have the foresight to follow up on that and update the schools' environments in order to correspond with their external environments. Weidner (1999) indicates, "School leaders today must use technology to improve the efficiency and effectiveness of their work… Information technology provides options for school leaders to become better at what they do" (p. 28).

MacNeil, et al. (1998), studied administrators' perceptions on the use of information technology as curriculum to enhance and increase teachers' knowledge and experiences by integrating it into the curriculum. Their response is eighty percent who asserts that is necessary for teachers learn information technology as a subject matter during staff development programs.

Models of Staff Development

Sherry, et al., (2000) assert that teachers should acquire computer technology skills that enable them to enrich the environment of teaching and learning. Such skills

require teachers to become involved in staff development in order to build their knowledge and integrate the new technology into their classroom. Sherry, et al., (2000) developed a model composed of four stages. These stages are: teacher as learner, adoption, teacher as co-learner, and rejection. Adoption of this model by the school assisted not only the teachers, but also the administrators to acquire the new information technology. It is a mature model of professional development that ran from the lowest level (the teacher as a learner) to the highest level (the teacher is as a leader).

The First Model

Sherry, et al., (2000), have a model that includes two main parts:

1. The development stages.

2. Strategies for its implementation at each stage.

The model discussed here is composed of five stages that include development and implementation for each stage that ensure its work. These are:

1. Teacher as learner

2. Adoption

3. Teacher as co-learner

4. Reaffirmation or rejection

5. Teacher as Leader

Stage one: Teacher as Learner

In this stage, teachers started to:

a. Seek information from diverse resources, and

b. Construct their knowledge and skills by learning new information and skills.

In order to implement this step, the planner should provide appropriate strategies:

a. Trainees should have enough time to enroll in staff development programs.

b. Support peer training rather than one-shot classes in order that teachers may demonstrate and practice on the contents of the programs.

c. Use in-service training that includes how to integrate information technology with the curriculum and standards.

Stage two: Teacher as Adopter.

In this phase, teachers began to take a positive approach toward computer technology:

a. To use it in classroom in order to know how it works.

b. To exchange their experiences with each other.

To implement this stage, the teacher should follow these strategies:

a. Use online resources that provide technical support any time for technical problems.

b. Obtain technical experience in order to deal with the technical problems that appear.

c. Use the computer lab in school to solve technical problems that provides them real practice.

d. Mentor new users of information technology and facilitate, as well as prove, information that assists them.

Stage three: Teacher as Co-learner.

In this phase, teachers have the abilities to realize and create relationships between:

a. Computer technology and,

b.   Curriculum that helps them to integrate information technology within curricula.

To ensure its implementation teachers should:

a. Get involved in workshops.

b. Use Internet resources that build up their knowledge in order to support instruction and infuse information technology with the curriculum.

Stage four: Teacher Reaffirms or Rejects.

In this stage, teachers are mature because:

a. Teachers have abilities to develop learning outcomes.

b. They are able to assess students' performances.

c. Teachers have optimizing thinking that assists them to develop rational decisions.

To implement this stage teachers should:

a. Be supported by administration.

b. Increase the use of the cognitive approach, which should impact student performance and their models.

Stage five: Teacher as Leader.

In this case, teachers have capabilities that allow them to increase their productivity:

a. To be active members in their school to collect data and share their experience with other peers.

b. To train the new teachers.

c. To transition their skills and knowledge to assist those who need improvement.

To implement strategies at each stage.

a. To discuss each strategy that supports the performance of each previous step.

For implementation at this stage teachers should:

a. Motivate teachers to work as a co-teacher on site.

b. Allow them to have enough time to work with the other teachers one-on-one (mentor).

c. Support teachers and administrators by providing in-house training and support other schools.

The Second Model

In addition, Kozlowaki (2000) built up a coherent model that included five levels that give direction and leading, and connect staff development with the specific level of their needs.   These levels depict courses that serve as a road map and baseline for trainees.

Level One.

Basic computer skills: which includes the beginner skills and knowledge that are necessary for those who want to learn about information technology. This serves as an introduction to computer technology that includes basic operating systems, such as Windows and Macintosh, and basic word processing, as well as employing it to manage instruction tasks, such as students' attendance and grades.

Level Two.

Mastery of an application package: where they are able to master software packages such as Microsoft Office and introduce it in the classroom, enabling students to use it as part of their course activities.

Level Three.

Mastery of using the Internet: teachers and administrators have to acquire an advanced level of the use the web, for instance, skills with search engines and an ability to evaluate information and communicate by email. They must recognize their infusion in the classroom and school activities.

Level Four

Multimedia acquisitions: at this level, teachers have to learn and acquire knowledge and skills of multimedia and which software packages have features to develop courseware with multimedia features such as text, hyperlink, animation, movies and so on.

Level Five

De-emphasis of skills training: focuses on how teachers and administrators impact on student achievement and diffuse all the features of information technology into teaching and learning that enable students to be creative and knowledgeable.

Effective Information Technology Staff Development

The effectiveness of staff development programs depends on many different elements that have direct impact on developing and increasing teachers' and administrators' knowledge, skills, experience and attitude toward information technology. The literature suggests:

1. Staff development programs should be sequential to ensure trainees start from their level and gain new experience that supports them as either teachers or administrators.

2. The programs should help them to acquire new skills and help them to learn the basic computer technology in administrative work and within the curriculum.

3. Information technology is not timeless. It changes periodically and requires the continuing participation of administrators and teachers in processional development in order to improve their skills. (Kemp, 2000)

4. Staff development encourages all trainees to share experiences in order to augment their own new experiences.

5. Teachers who enroll in staff development should start to train the new teachers or administrators (Cort & Disario, 1996; Ferraro, 1999).

6. Teachers needed to learn the new information technology, such as the internet and computer technology. For instance, they should be developing courseware, presenting course materials using available software, such as PowerPoint and HyperStudio, and improving their abilities to access the new systems and equipment in order to increase their willingness to implement it in teaching and learning (Brace & Roberts, 1996).

7. Teachers and administrators should have enough time to enroll in technology staff development to discover and gain new information technology (Brace & Roberts, 1996).

8. Teachers need to be encouraged to adopt information technology and administrators should prompt them to provide opportunities to go through technology staff development programs by identifying its features and its impact on their futures (Brace & Roberts, 1996; Brooks, 1997; Marsh, 1997).

9. Hardware and software must be appropriate to the classroom, labs, or in the staff development sites (Marsh, 1997).

10. Teachers must be involved and share in developing the activities of staff development, either in pre-service or in-service, which ensures their confidence in helping students to learn and participate in using information technology effectively, in the classroom and in the real world or at the work place (Luke, Moore & Sawyer, 1998). Additionally, the preceding authors linked the effectiveness of students' learning with information technology in classroom to the teachers' knowledge and preparation of information technology. They reported, "Teachers need to be better prepared to teach with technology"(Luke,

Moore & Sawyer, 1998, p. 3). Moreover, schools must develop their

environments to support students technologically and "become information

literate and skilled in using computer based tools" (Rakes, 1996).

11. Create prior materials for each part of training programs and choose appropriate

approaches to present the contents of courseware (Garcia, 1998).

12. Staff development programs must be continual so that trainees, either teachers or

administrators, are linked with the progress of information technology. In fact,

with information technology influx, one shot is not enough to gain the new

knowledge and skills of information technology (Garcia, 1998; Shelton & Jones,

1996).

13. Staff development recognizes the level of each person in order to make the

session compatible (Shelton & Jones 1996).

14. Effective staff developing for administrators and teachers relies on adequate

timelines (Lan, He, Ouyang, Zhonghai, & Bao, 2000).

15. The teacher is the main element in the school that must be involved in the

committee that has undertaken the decision to develop schools, either in

curricula, organization, or planning for the future (Nelson, 1998).

16. "Hands-on" is an effective approach to ensure the acquisition of skills and to

experience computer technology (Shelton & Jones, 1996; Boyd, 1998).

17. Staff development needs time to learn about hardware and software (Boyd,

1998).

18. Provide continuous staff developments that give teachers and administrators

opportunities to follow up on modern computer technology (Boyd, 1998). The

administrators should be enrolled in the technology staff development so that

they can develop their vision and become whole information technology leaders

who assist in the application of information technology in school.

19. Staff development should encourage cooperative and collaborative training

    among administrators and teachers, such as one teacher training another teacher

    (Shelton & Jones, 1996).

20. The teacher needs time to attend training programs (Meyer, Steuck, Miller,

    Pesthy, & Redmon, 1999).

Information Technology Plan

Information technology plays a critical function in improving and increasing

the productivity of all realms of society (Provenzo, 1996). Additionally, (Olds 1998;

Stanton 1998; Zilonis 1998; Zimmerman, 1998) indicate the advantages of using an

information technology plan are to:

1. Enable students to access different learning environments.

2. Enable teachers and administrators to access staff development to improve their

   capability.

3. Prove and enhance cooperative and collaborative learning for students, teachers,

   and administrators through networking.

4. Be the key to change student and teacher roles.

5. Enhance the connection between schools and the community.

6. Provide powerful tools that enhance communication among students, teachers,

   and administrators.

7. Enable students to develop an optimal level of thinking to create new processes,

   models, and solutions.

Charp (1997) detects that the use of information technology in education is

gaining irreversible momentum as it cuts across disciplines and enhances learning

opportunities for all ages. Hallinger, et al., (1999) report we are living in the era of deluge of information technology. Rapid change demands evolving a flexible information technology plan that would motivate teachers and administrators to adopt the new revolutions of the information technology age. An information technology plan encourages students to increase and develop their experience by adapting to the information age that is required in the work place.

Foster & Hollowell (1999) stress that,

> Effective information technology planning does not take place in a vacuum. It must be integrated into instructional planning, mission, and goals. At the physical level it must be an integral part of every construction and renovation endeavor of the learning institutions. At the operational level it must meet the demand for access to information technology resources. At the functional level it must serve the institution's community, i.e. students, faculty, researchers and administrators (pp. 9-10).

ParenTech (1999) notes that the Bureau of Labor Statistics pointed out that the United States of America will need from 1996 to 2006, more than 1.3 million workers to occupy the new jobs that include programming, system analysis, and computer scientists, in order to develop a new generation that meets the demands of information technology.

Friedman, Director of the Center for Improved Engineering and Science Education, and Professor of Management, Stevens Institute of Technology, Hoboken, N.J., (as cited in Charp, 1997, p. 6) emphasized that technology must be involved in the educational reform process as an essential part of each stage. This will guarantee that information technology is implemented in revising curricula, establishing new

buildings, new computer labs, and in-service training programs. Haycock & Jopson (1999) report that the West Vancouver School Board started to create school goals in 1995. In 1997 the new board asserted they would continue to infuse technology into the areas of subject matter and student achievement. The new board indicated that there was a clear vision of integrating information technology into instruction that allowed them to create an information technology plan to enhance student achievement and utilize it in the management of school activities. They noticed that "the Board's concern was that there was no common vision for the use of information technology to enhance students' learning…Overarching these issues was the broader concern that the district needed a plan" (Haycock & Jopson, 1999, p.15).

Based on the former authors' research the information technology plan is considered significant for schools, and provides connectivity of schools with the new technology in order to improve their environment. Information technology includes hardware, software, communication tools, Internet, and network. Schools need to develop a reasonable plan that would assist them to use wide range of information technology effectively in teaching, learning, and administrative work.

Brush & Bitter (2000) stated that the workforce needs to attain information technology, not only for improving the current needs of the organizations, such as business and governments, but must go widely to impact on the change of an organization's environment in order to be ready to meet the needs of the society. The Gartner Group (1999) cites that all organizations must be able to deal with new information technology, because by the year 2003 schools will increase its use by 300%. (As cited in Brush & Bitter, 2000, p. 23). All organizations are looking to the high schools and universities to close the gap in the shortage of professional information technology. Educational institutions and high schools have to prepare

students for proficiency and to perform in modern jobs (Gartner Group, 1999). Meyer et al., (1999) declared that it is not merely the purchasing of computers and placing them in the classroom and the labs in order to ingrate and modernize school with the current technology that can be used in teaching and learning and the other activities. Without a doubt, school administrators and teachers must strike up a plan information technology system in schools.

In the period of 1994-95 the New Hampshire State Department of Education investigated the implementation of an information technology plan in the New Hampshire Public Schools and they received 447 surveys out of 459. They found that 38% of schools established their plan as part of a district plan. Whereas, 50% of the schools pointed out their technology plan was in process. In fact there was a good indication toward fostering information technology plans in their schools.

Moursunda & Bielefeldt (1999) state that information technology is composed of

> Computer hardware and software, the networks that tie computers together, and a host of devices that convert information (text, images, sounds, motion) into common digital formats. However, information technology is not just hardware, wires and binary code, but also the effective use of digital information to extend human capabilities. (p. 5)

Development of an Information Technology Plan

There are many different questions that work as an umbrella for creating an information technology plan which are helpful to direct the planners to gather information related to each step of developing a planning strategy. These cover its mission statement, goals, and objectives.

West, 1994; Baule, 1997; Oliver, 1997; Barker and Hall, 1998; McNabb, McNabb, Valdez, and Mark, 1999; Loockard and Abrams, 2001; Bucher, 1998;

Breithaupt, 2000; Lumley and Bailey, 1997 clarify the important questions that should be asked during developing ITP, these are:

1. Is there a leader who is able to connect all the stakeholders in order to gain information that supports information development?

2. Do the stakeholders support change in the school environment and does the leader have abilities to convince them?

3. What kind of support do schools need to enhance using information technology?

4. Is the coordinator important for maintaining the information technology system in the schools?

5. What is the mission statement of the use of information technology?

6. Does the mission statement support students' needs?

7. Is courseware used for enhancing curricular topics?

8. Does the school use the LAN and WAN networks?

9. Are the teachers involved in the decision of developing the plan?

10. Are all the goals and objectives very clear and able to be preformed?

11. When will the plan be implemented?

12. What kind of information technologies do administrators need?

13. What kind of software will be used to enhance the curriculum?

14. Does the library use an automated system and connect with the Internet?

15. What is the information technology plan feature for students, teachers, and administrators?

16. How much does the school spend to integrate information technology into its environment?

17. What kind of information technology do schools utilize to support and enrich curricula?

The purpose of the previous seventeen questions is to create a coherent and reasonable information technology plan that must be valuable for students to improve their achievement in the different curricular areas that assist students to develop ultimate goals. It is essential for teachers and administrators to improve their capabilities. According to Carter (1997), in the past, information technology plans focused on placing computer technology in the classroom, but now the decision makers bring up a new imperative change in its purpose that emphasizes the individual needs and how to integrate computer technology into learning, teaching and curricula in order to increase teachers effectiveness toward meeting the students' needs and increasing traditional classroom productivity.

Characteristics of the Information Technology Plan

Jukes, 1996; Reksten, 2000 and Ward, 1999 indicate that there are properties of an information technology plan that should be recognized by the stakeholders through its development which ensure its implementation and its remaining in the long run. These are:

1. The plan must be documented to ensure its review and update.

2. The plan must be flexible enough to make it easy to adjust part of its goals or objectives that ensure its life, because technology is not timeless.

3. The plan must address student needs and enhance their experiences.

Each part of the information technology plan (ITP) work is integral with each other, therefore, students, teachers, and administrators will gain from its fruitfulness. Unless the characteristics of technology are known, its modification and improvement during the stage of implantation would be difficult.

Coordinator of Information Technology

Meyer et al., (1999) noticed that schools or groups of schools should establish a coordinator job to support technical service and manipulate any problem or troubleshoot any problem that threatens the system during the day by enabling teachers, administrators and the other staff to work with confidence. In addition, Carter (1997) indicates that there is a main reason that pressed schools to initiate a new occupation for coordinator, which is, as Carter (1997) stated, " The computer coordinator position was established in response to the growing numbers of computers in schools and the increasingly widespread establishment of computer labs" (p. 31). According to (Boyd, 1998; Carter, 1997; Lumley & Bailey, 1997; Ager, 1998; Clark & Denton, 1998; Zilonis, 1998; Meyer, et al., 1999; Lookard & Abrams, 2001) the coordinator has critical functions that include groups of responsibilities that ensure information system effectiveness in school. These are:

1. The making of decisions to purchase equipment that include software and hardware.

2. Updating the information technology system.

3. The ability to fix and maintain the system. (Boyd, 1998)

4. Provide teacher training and support to use information technology. (Boyd, 1998)

5. They assist in decreasing the anxiety of the users of information technology in the school environment, because they feel comfortable when they utilize it because there is a coordinator who is capable of maintaining technical problems.

6. Maintain the security system of school that saves the information and gives each employee access to the system up to his or her authority.

7. Technical problems that teachers and administrators face.

Information Technology Supports Administration

Picciano, 1994; Kearsley, 1990; Picciano, 1998 assert that information technology is a potential steppingstone for schools. The lack of integration has negative effects on its activities. Information technology is an effective system that focuses on solving school problems and enhancing its activities.

Hsu, 1995; Forcier, 1996 state that information technology must be part of a school management system, which is called management information system (MIS). This makes the information flow from one department to another and ensures a high quality of information ready any time for decision makers, such as school committees, administrators and teachers. Implementing management information system (MIS) in school management enhances its functions. These include improved quality of reports that are comprised of analyzing information into different formats, such as figures and ratio and provide a real picture about the data. Information technology supports the decisions and makes better and more efficient staff productivity. In addition, the system assists them in retrieving information that they need immediately that saves their time and makes it easy to adjust their information records. Management information system enables staff to record data that include students' and staff names, grades, attendance, final reports, budgets, inventory, library, payroll, course schedule, and communication.

An organization utilizes technology to improve and increase their daily operations daily, so that they are able to provide high quality products that meet clients' desires. Thus schools are the same, as these organizations need to make their operations better by using technology in administrative work in the way that Johnson & Bartleson (1999) mention, "Like any large organization, schools can use technology to improve daily operations" (p. 22). Leach & Smallen (1998) say that

information technology supports administration, registration, and analysis data that assist decision makers.

The authors indicated the use of software that supports administrative daily work, such as students' attendance, payroll, teachers' reports, and course schedules. Moreover, using e-mail provides powerful communication with different communicators, such as parents, teachers, administrators, and providers. Pea (2000) cites that an information technology system in school "can and should be shared, following decisions regarding security and confidentiality, with teachers, parents, and community members." (p. 45)

Information technology provides significant tools to improve schools in many ways that are based on information technology planning toward using it to enhance administrative work. Integrated IT in instruction allows the outcomes to be effective through its tools. These include such communication features as the web (Johnson & Bartleson, 1999; Weidner, 1999).

Inventory

There are many items in schools that should track all the items in the inventory. These include books, instructional materials, and other items that need to be updated. This is information that assists the employee to prepare new orders. Without information technology there are difficulties in updating information daily because it takes time (Kearsly, 1990; Forcier, 1996)

Student records

Schools must have records for each student that includes all her or his information, grades, attendance, monthly report, and the final report. Using information technology enables schools to develop a management information system

that makes certain student information is available any time, which saves time and cost (Kearsly, 1990; Forcier, 1996; Snider, 1998; Kosakowski, 1998)

Budget

With implementing information technology in schools it makes it easy to know their expenses, income, and staff payroll. It provides reports that enable schools to control their expenses and prepare their needs for the next academic year (Forcier, 1996).

Information and Communication Technology (ICT)

Information technology increases interaction between school and district. It provides information for school staff on time; therefore, it makes communication among staff more effective. Communication tools provide immediate response and assist staff to save their time (Forcier, 1996; Pea, 2000). Herschel and Andrews (1997) indicated that new communication technology, such as e-mail, has a positive effect on organizational structure and changes its process, so that information technology makes the interaction among employees effective and helpful for making their decisions. Kosakowski (1998) described the communication tools is "Decreasing isolation by using e-mail and the Internet to communicate with colleagues, parents, and the outside world" (p. 2)

There are two kinds of communication which enhance communication among students, teachers and students, and teachers. The first is synchronous which allows students to communicate in the real world, such as chatrooms. The second is asynchronous, in which communication happens at different times such as e-mail and listserve. Both of them play essential roles in enhancing learning (Belanger & Jordan, 2000; Baker & Gifford, 1997).

Stakeholders of Information Technology Plan

Bucher (1998) defines an information technology plan as created by a team representing all individuals who have an interest in the outcomes. According to Bucher, planning includes different members' insights that will be suitable to develop an accurate plan that ensures the execution of its goals properly without main obstacles. Those members are: administrators, students, teachers, librarians, parents, and business members, members from college.

Ensuring the development and implementation of a practical information technology plan requires the creation of a committee composed of various members: teachers, administrators, parents, and business people, in order to bring up different ideas and concepts that draw the future of district schools that are accountable to construct their internal environments. As a result, students develop needs that are compatible with their environment and ensure their success in life (McNabb, McNabb, Valdez, & Mark, 1999; Moffitt, 2000)

Irwin & Robinson (2000) in their research paper reported that the committee makes a final decision in representing their vision by asserting that infusing information technology into various aspects of schools includes infusion of computer technology into curriculum. These include schools with networks that connect computers in classrooms, establishing computer labs, and utilizing an automated library system that provide useful service. The committee should recommend staff development and set the vision of the stakeholders. Jukes, 1996; Reksten, 2000) assert that an information technology plan must be recognized and understood by three categories: the community and their desire to enhance education through the society that helps the growth of people; the school that must be supported by administrators initially that ensures its continuation; and the district's people, who

must recognize its benefits for students and the society. As a result of their dialogue the information technology plan is capable of being implemented fruitfully.

Mission Statement

The mission statement is the first coherent part of an information technology plan that works as bedrock for the next steps that the school districts intend to perform in the current time and future (McNabb, Valdez, Nowakowski & Hawkes, 1999). Pan (2000) states vision statements "To develop a consensus of the directions in which we should move and to provide a clear picture of what goals we want to be at the end of restructuring effort" (p. 4). According to Reksten (2000) district schools, or whoever undertakes to develop an information technology plan, must have answered this question, which is, how will information technology provide for students and improve their achievement? Reksten (2000) asserted that the planners should have started with that question. The author reported that schools who consider buying equipment, such as software and hardware, before identifying the purpose for it have no vision toward integrating information technology in their schools. The information technology statements are based on the committee discussions of their tendency to use information technology in the schools. The result of their debate must be expected to answer, "How will information technology be used now or in the future?" The mission statement should be flexible and able to change depending on the external and internal school environments in order to be continuous to meet students' needs.

The mission statement not only focuses on the students' needs, but should support teachers' and administrators' needs in order to perform the school goals (Baker and Hall, 1998). Chrisman (1998) pointed out that the Dallas Independent School District developed a mission statement that covered any one, any place, and any time. Information technology is available for students, teachers, and

administrators. Also, it can be accessed at any place to explore and gain information in different formats. Also, it must be available for them any time so they can use communication tools, and the WWW.   Chrisman provided a comprehensive mission statement with a tendency to improve all the aspect of school environments.

Goals and Objectives of an Information Technology Plan

All the studies that focus on creating an information technology plan (ITP) emphasize redeveloping their goals and objectives that are necessary for the purpose of its developing. Goals are the targets that the schools should implement in the long or short run, based on the mission statement. The objectives are more specific statements based on the goals in order to fulfill the goals. When the mission statement changes, therefore, goals and objectives imperatively are changed so that they become congruent with the new mission statement (Picciano, 1998; North Carolina Community College, 1998; Baule, 1997).

Goals

Goals represent what should be done in the future; goals must be attainable in order to perform the plan, which derived from the mission statement but more specific. Lumley & Bailey (1997) reported that "Technology goal statements are statements of focus, direction, and projected outcomes for the schools district." (p. 64)

The goal statement of utilizing information technology is to provide the quality of administrative work, staff development that enhances administrators and teachers' knowledge and skills that allow them to use in the school effectively, and enhance students learning.

An example of possible goals for a school district might include:

1. Provide a network that includes Wide Area Network (WA) and Local Area Network (LAN) that make effective communication among teachers,

administrators and students to exchange information (Brennan, 1997; West, 1994).

2. Provide staff development programs for teachers and administrators to utilize information technology that enhances teaching, learning, and administrative work (Virginia State Department, 1996; Baule, 1997; West, 1994; North Corolina Community College, 1998).

3. The Internet will be connected to all classrooms to provide information resources that enhance teaching and learning (Mountain Brook City School, 1999).

4. Information technology enhances all school activities that include instruction, and administrative work (San Jose & Evergreen Community College District, 1997).

5. Develop an electronic database that enhance the traditional library and make it sufficient to provide information resources anytime, anywhere for students, and teachers (Baule, 1997).

6. Integrate information technology into entire curriculum areas in order to support student learning (Anchorage School District, 1997).

   Objectives

   Objectives are more details than goals and mission statements, objectives should be implemented by students, teachers, and administrators to improve teaching and learning within an organization based on the former goals.

   An example of possible objectives for a school district might include

1. Students will:

a. Be able to use the Internet to seek information from different locations locally and across the world.

b. Be able to use computer hardware and software.

c. Be able to use courseware that enhances their learning.

d. Be able to use communication tools, e-mail, listserv, bulletin boards, and electronic blackboard.

e. Be able to know how to seek information by using search methodology.

f. Be able to develop models by using software such as, PowerPoint, HyperStudio, and Authorware.

g. Be able to design their web page by using different web design tools.

h. Be able to discover learning by using different resources of information in order to synthesize and develop optimizing solutions.

2. Teachers will:

a. Be able to develop courseware.

b. Be able to develop their web page that supports instruction.

c. Be able to integrate information technology with the curriculum.

d. Use web resources to enhance curriculum content.

e. Be able to use communication tools to exchange information among themselves in different schools that increase collaborative learning and improve their knowledge related to new technology.

Strategies of Implementing Goals

Baker & Hall (1998) identify many strategies that are essential for performing goals of an information technology plan. These are:

a. Be integrated with the Internet in order to support teaching, learning, and administrative work.

b. Provide a computer for each teacher in his or her office.

c. Provide appropriate computer labs that include computers (hardware and software) that are suitable for each grade.

d. Provide courseware that enhances each subject matter.

e.   Provide communication tools such as e-mail, listserv, and bulletin boards for each student and teacher.

f.   Support administrative management by using computers for grades, attendance, budget, and inventory.

g.   Provide computers that make the library accessible with the world and students able to locate books and information.

h.   Develop a web page for each school that represents its mission.

i.   Provide staff various sessions of training programs to enhance using information technology such as the Internet, and integrating technology into curriculum.

j.   Estimate an appropriate budget that supports the implementation of each type of information technology.

Information Technology Infrastructure as Part of the Technology Plan

Security System

A security system is required that gives different privileges of accessibility for each program, that prevent users to access any database that is not part of their needs, as well as making a filter of web sites that inhibits the viewing of them as well as protecting the system from hackers. Gollmann (1999) states computer security "deals with the prevention and detection of unauthorized actions by users of a computer system." (p.9). McNabb, McNabb, Valdez, & Mark (1999) point out that a security system is imperative to keep the system effective and protected against any peril of the contents, software, information, and functions.

Thus, it protects the system from internal staff and external people who do not have authorization. It does this by using a special mechanism, such as a firewall, or by procedures, for instance log names and passwords (Laudon & Laudon, 2001; Hallberg, 2001). Forsyth (1998) points out that information through the information

system in educational institutions must be secure and allow the authorized users, such as teachers, students, and administrators, to access information. Foster (1998) indicates that the security allows:

a.   Teachers and students to access course materials.

b.   Students to access test materials at a specific time.

c.   Teachers to access and update students' records.

Integrated Library with the Information Technology System

Hudson County Community College in Jersey City (1998) reported that learners and teachers needed to be able to access and connect all the resources of information, not only that available at their libraries, that assists them academically to support their learning and research. The libraries are the great entrance to the information that must be supported by the information technology system that gives them abilities to seek information across the world in remote areas. Linking the libraries through the wide area network and updating their system enhanced their growth, because information grows daily.

Based on the preceding information, in order for school libraries to be more effective for students, instructors, and other members, they must adopt these imperative points as follows:

1.   Develop a database that includes all books, periodicals, and other publications.

2.   Link libraries with the Internet that enables users to seek information.

3.   Develop a web page for each library that includes accurate resources that assist the searchers to find their needs.

4.   Link the libraries with the local libraries.

Networking

The Network system is the heart of an information technology plan that makes all of its elements connect together and work as one coherent system. The networking systems play a critical occupation in connecting local systems and making it one unit, as well as linking schools with the external environment and remote areas. It makes activities in all organization more at sections in any organization composed that increase the effectiveness of employee's productivity (Cox, 1999). West (1994) reports that networks bring up the core benefits of configuring all the components, and affirmed "Without wide distribution, your students, faculty, and staff cannot access information when they need it. Without full integration, your hardware and software components will not be able to share information across the network, thus limiting access" (p. 27).

Mingle and Ruppert (1999) assert that networking systems allow information to gush in various formats from different departments and users in and outside schools that give the participants opportunity to utilize each other's information. Baule (1997) points out that networking is the great pathway to exchange information and make it available on time for the users. Vietzke (1997) reports that networking is necessary for teachers, students, and administrators that provide powerful accessibility at any time from school and home that permit them to access their information and allow parents to connect with the school by sending e-mail. Cummins and Sayers (1995) provide a message that discovered the essentials of the network, which is "In the world of the 21st Century, decision- making and problem solving in virtually all spheres business, science, community development, government, politics will depend on electronic networks that span diverse national and cultural boundaries" (p. 12). Hamilton (1998) believes that networking LAN and

WAN make the effectiveness of the connection between schools and districts so that they can update information and exchange ideas and concepts that support developing school environments.

Wide Area Network (WAN)

WAN provides connectivity for schools with the remote areas in one state and links them with the world. Thus students, teachers, and administrators are able to seek vast information that they need. It is also called the Internet and connects millions of computers around the world and helps the users to exchange information among them. Winship & McNab (2000) provided a specific definition for the Internet that described its entity, which is " an international network of computer network" (p. 1).

Local Area Network (LAN)

According to Bucher (1998) Local Area Network (LAN) connects more than one computer or several computers in one room, one building, more than one building or link locations for several miles. It is essential to use tools such as Novell, and Windows NT, which enhance the local network among workstations.

(Vietzke, 1997; Bucher, 1998) indicate that there are benefits of adopting a LAN.

1. Provide connectivity for all the workstations with printers.

2. Allow them to share software instead of installing it in each computer. In this case the coordinator will save a lot of time.

3. Manage the system and not allow the users to enter other files.

4. Allow users to connect with information, such as a library.

Internet

The Internet was invented during the cold war in 1969 by the Department of Defense (DoD) in order to connect many places together and exchange information. At the time was known as ARPANET, which means Advanced Research Projects Agency. In 1990 the Internet replaced ARPANET after the end of the cold war, which was called the information superhighway (Gunderson and Anderson, 1999; McArthur and Lewis, 1998).

According to Maddux (1999) Internet has grown very fast in the last ten years in all organizations. Jonassen, et al., 1999; Reksten, 2000) define the Internet as the connection of millions of computers around the world and exchanging of the information supported by protocols. Gunderson & Anderson (1999) state the Internet is "an international network of computer networks that allows its users to share information and to communicate interactively" (p. 5) In addition, the Internet is the network of the networks. That means an organization has a network, and a country has different networks that connect with the world networking. It permits information to transmit through any location that is connected with the Internet. Hutchinson and Sawyer, 2000; Lockard and Abrams, 2001) point out that the Internet includes:

The World Wide Web (WWW) or the Web.

The web is the fastest growing of the Internet categories, which is increasing by 4% monthly in the number of users (Hutchinson & Sawyer, 2000).

Communication Tools.

Which are composed of e-mail, listserv, bulletin boards, chats, and newsgroups, which focus on the discussion of specific topics for all the subscribers (Hutchinson & Sawyer, 2000).

Telnet.

It provides primary service that allows users to log into their account from a remote area that gives them the opportunity to view their information from anywhere and whenever they need it (Hutchinson & Sawyer, 2000).

File Transfer Protocol (FTP).

It allows the users to connect remote computers and transmit information. According to Lockard and Abrams (2001) users are able to upload and download information.

Hardware and Software

Part of the information technology plan is to identify appropriate hardware and software that works effectively to perform its goals. They have to write their specifications that lead schools to accurately purchase what they need accurately. Both hardware and software have strong relationships that cannot allow us to disconnect each of them from the other, and must be compatible. Consequently, the plan makes certain they work together properly.

Merrill et al. (1996), Picciano (1998) points out that hardware is the tangible part of the computer that includes corporeal parts such as hard drive, motherboard, drive A, and monitor, as well as all of the parts that must be configured together that give users the ability to interact with it effectively.

Merrill et al. (1996), Picciano (1998) Software is the intangible part of the computer that has instructions. It is the vital parts that are deemed the soul of computer technology such as, C++, Word Processing, Database, Authorware, and so on, that allow users a fruitful computer environment.

Summary

The review of the literature focused on many aspects that must be discussed in order to make the study more coherent for the readers and to allow them to understand the major valuable elements that should be discussed through educational reform. The literature review provided information about educational organizations in Saudi Arabia that include the Ministry of Education and Presidency of Girls' Education, how these organizations were established, and what their functions are now. The discussion also covered information technology in higher education in different educational institutions.

Discussion of the Saudi educational environment was vital to give an indication of the growth of various aspects of that environment. Information technology is growing rapidly, including the Internet, the World Wide Web, and communication tools such as e-mail. Computer technology is also replacing manual work. In fact, the business and public environments are growing, acquiring more information technology, which will influence the school environment in its use of information technology to increase and improve students' learning and to meet their needs.

The second part of the study included the perceptions of teachers and principals toward utilizing information technology in various school activities. They confirm the significance of using information technology in teaching, learning, and administration.

The third part encouraged the discussion of change and how leaders must work to develop new ideas and processes to improve learning and teaching, as well as how to convince teachers to support the change. Constructivism is important for use in Saudi schools in order to encourage students to learn and acquire information that helps them to develop their optimal knowledge. Staff development must be discussed in order to provide rational information that assists teachers and administrators to acquire the knowledge and skills of powerful models to develop teaching and administration concepts. An Information Technology Plan (ITP) is important to develop students' needs based on the mission statement, goals, and objectives of the plan. It was discussed intensively that administrators are able to develop their vision toward the future through planning.