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COMPUTER TECHNOLOGY IN JORDANIAN SCHOOLS: A PROPOSED PLAN FOR APPROPRIATE ADOPTION

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of the Ohio State University

By

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*****

The Ohio State University

1995

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DEDICATION

This dissertation is dedicated to:

My parents, Mohammed and Salha, who taught me about life;

My brother, Ahmad, in recognition of his care, encouragement
and continuous support; and

My wife, Bayan, for her patience, love, and understanding.
I wish to express my sincere appreciation and heartfelt thanks to my adviser, Dr. John C. Belland, who has generously donated his time, guidance, insight, and support. His constant encouragement, as well as, his belief in my ability served as an inspiration during this study and throughout my doctorate degree program at The Ohio State University. To Dr. Belland, my mentor, my adviser, and my friend, I owe my successful completion of this dissertation.

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I owe special appreciation and love to my parents, Mohammed and Salha, my brothers, Kasem, Ahmad, Ali, and Mahmoud, and my sisters, Nemat, Fatemah and Sabah for their constant encouragement, love, support, and regular prayers. To my wonderful wife, Bayan, and my two lovely children, Mohammed and Salha, I extend sincere thanks for their patience, unfailing support, and willingness to endure with me throughout these years of study.

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CHAPTER I
COMPUTERS IN EDUCATION

Introduction

The rapid growth of computer technology has been a major breakthrough of the last three decades or so (Hausman, 1985; Pradhan, 1981). Since 1958; the year when three IBM researchers in New York conducted the first computer assisted instruction (CAI) experiment, the computer has been utilized as a means of instruction in education (Matovich, 1973). Increasingly, computers find their ways to schools in large numbers (Bork, 1985). Different CAI modes (drill and practice, tutorial, modeling and simulation, problem solving, and instructional gaming) have been used in instruction in many technologically advanced countries, especially the United States (Ahern, 1982; Bork, 1982; Makrakis, 1988). Enthusiasm about computers and the instructional advantages they offer in the classroom encouraged Marvin Minsky, a computer enthusiast, to say that "computer can probably do anything brains can do" (Minsky, 1984, p.34). Similarly, Hausman (1985) stated that "computers now can do many things thought to be
distinctively human" (p.27). At present, discussions about computers in the developed world center on how computers should get into schools and how they should be used (Marshall, 1984). These discussions do not debate the inevitability of computers in schools of the developed world. The question of whether computer technology should be in schools has become of less or no interest to researchers throughout the industrialized world (Marshall, 1984).

This movement towards a computerized society and computerized schools in the industrialized countries has crossed the borders of developing countries. The argument put forward by Marshall in this regard makes it sound crystal clear: He states that "as industrialized nations move rapidly towards a computerized society and computerized schools, less industrialized, 'developing' nations will begin to feel some panic at being left behind... The 'panic' will undoubtedly be followed by many requests by third world areas for aid agencies to fund efforts at introducing computers into third world schools" (Marshall, 1984, p.377).

To a large extent, Marshall is correct in his theory about introduction of computers in third world schools. Educational authorities in third world countries find themselves under great pressure to computerize. Plans for purchase as well as policies for implementation of computers
have been put forward by educational authorities in third world countries (Hawkridge, 1990; Lind, 1991).

Often times, educational authorities in third world countries have adopted computer education policies with little or no information to guide them in their efforts. Even in the most industrialized countries, there are many questions about computers and schooling that need answers, and educators still have little information to guide them in answering these questions (Pelgrum & Plomp, 1991).

According to Pelgrum and Plomp (1991), many countries throughout the world are facing a myriad of issues regarding the functions of computers in education: "What is the place and role of computers in schools? Is there a need for separate courses in computer literacy and computer science? How can the computer be used effectively in existing subjects? What will be the effect of computers on student learning, on teachers' behavior, on the school and classroom organization?" These, as Pelgrum and Plomp assert, are important questions about computers and schooling. However, they believe that "we have little information to guide us in answering them" (P.1).

Research related to the general utilization of computers in developing countries (i.e., use of computers in places other than school such as Engineering, Medicine,
Banking, Industry etc.) reveals that developing countries are spending millions of dollars on hardware and software purchases from highly technologically developed nations (Chellenor, 1984; Stewart, 1985). Developing countries are doing so in order to come to terms with the "information age", or to move towards computerized society as Chaudhry and Fakhro (1986) put it.

In their study about computer education in Bahrain's secondary schools, Chaudhry and Fakhro (1986), indicate that there are serious deficiencies in the applications of computers in the fields of engineering, medicine, and industry. They also point out that the general public's knowledge of the computer's capabilities and limitations is still in its infancy. Nevertheless, they assert that many proposals for introducing computer technology into schools have been put forward, in order to improve education through CAI and to have computer "literate citizenry". Along these lines, another study by Abu-Jaber (1989) shows that many developing countries have expressed their interest in integrating computer technology into their schooling systems, as computer technology in schools is being increasingly viewed as an educational necessity.

Jordan, a relatively advanced country in the Arab world, has commenced a major project to put computers in
schools in 1984/85. Learning about computers has become compulsory for all students at the tenth grade of basic education (Jaradat & Abu-Sheikha, 1992). Future plans for more integration of computers in schools are being developed (Hawkridge, 1990).

In his reflection on computers in education in the United States Bork (1985) writes:

A future with computers as the dominant educational delivery system seems inevitable for reasons both good and bad... It remains to be seen whether such a future with computers leads to an improved educational system or to a deterioration in our already troubled current system... Unfortunately, currently many mistakes are being made in computer use... [however] it is interesting to note that schools continue to buy computers in sizable numbers, even in a time of monumental financial problems.... [because] many parents feel that their children are receiving an inferior education unless computers are available. This reflects the fact that society currently sees computers as magical devices, ones people hope will solve the major social problems... Unfortunately when computers arrive at these schools, often there is little understanding of how to use them. Teachers are seldom trained to use computers in education, and the few available training programs are often weak... very little good curriculum materials using computers is currently available; much is poor. Therefore, the computer in the school is only too often a disaster rather
than the educational boon anticipated. Teachers and administrators and finally students and parents should come to understand that the computer is no magic panacea but a tool that requires the same careful use as any other educational device (Bork, 1985, pp.2-3).

In Jordan, El-Hmaisat (1989) points out that Jordan's overall goal for utilization of technology was meant to accelerate development in different aspects of life. He lists a number of problems facing the Ministry of Education in regards to educational technology utilization in schools. Some of Jordan's problems are similar to those reported by Bork in the United States. However, with reference to the experience of Jordan's educational system with computer technology, El-Hmaisat concludes that this experience is still new, and that learning from others' experiences would be helpful.

Computers in education in developing countries: Who decides the process of adoption?

Computers in developing countries were first used in business, banking, service and government agencies, and their subsequent introduction into schools was characterized as haphazard (Hawkridge, 1990). Hawkridge notes that rare are those countries where adoption of computers in their
schools was based on well-developed, rational decision-making process carried out by authorities responsible for education. Even in the United States, in the 1960s and 1970s, efforts to introduce computers into schools were not done by local, state or Federal education authorities; they were the private sectors and commercial enterprises that led the way to furnish private schools with computers (Carnoy, Daley & Loop, 1987).

Based on their observations about computer education projects in most schooling systems of twenty three (23) developing countries, Hawkridge and his colleagues (1990) conclude that putting computers in schools has been done in the absence of central policies orchestrated by Ministries of Education. Instead, they maintain that computers are put in schools as donations or gifts from foreign governments or computer companies, international development agencies such as the USAID, the British Council or the World Bank which sometimes stipulates that developing countries computerize the public sector as one of the conditions to receive aid as in the example of Uganda (Ujulu, 1988).

The modernization model associated with a more general Western development ideology, seems to dominate national policies and strategies adopted by developing countries to use computers (Rahim and Pennings, 1987). In other words,
Rahim and Pennings suggest that the rhetoric of modernization may be viewed as the driving force behind computerization in developing nations.

In educational settings, the forces driving introduction of computer technology into schools have a little to do with education itself (Hebenstreit, 1989; Rich, 1991; Roszak, 1986). Hawkridge (1990) and Rich (1991) note that imposition of computers upon schools by outside pressures and/or intimidation practiced by (businesses, interest groups, politicians, computer companies, the World Bank, etc.) leads to a state of confusion regarding educational goals and expectations. When no imposition is enforced, computer presence in schools might be interpreted as a de facto manifestation of its presence in the larger society (Mumford, 1970). Also, Harlow (1984) points out that success of computer application in a certain area in society might prompt its extension to schools.

Another driving force for adoption of computer technology in many developing countries is related to high hopes and wide expectations placed on computers to contribute to national development (Benmokhtar, 1984; Gupta, 1981; Pradhan, 1981). Policy makers in many developing countries view computer technology as the fastest way to achieve economically mature status. It's a recapitulation
model which says if people in the United States, Western Europe and Japan got to such high sophistication in using computer technology, then people in developing countries would get to that level of sophistication by doing things exactly the same way developed nations did (Professor John C. Belland, personal communication, August 15, 1995).

According to Hawkridge (1990) and Jamin (cited in Lind, 1991, p.10), the process of computerization in third world countries' educational systems is still at an early stage. Compared to the industrial countries, it is fair to say that computer use in third world schools has not reached the take-off stage (Hawkridge, 1990). Other researchers make arguments similar to Hawkridge's. In their description of the experience of Bahrain's educational system with computers, Chaudhry and Fakhro (1986) point out that Bahrain's experience with computers in schools is still in its infancy. In their article "Educational Technology Utilization in Jamaica's secondary school system", Jennings-Wray and Wellington (1985) imply that Jamaica's experience with computers in school is still in the beginning. El-Hmaisat (1989), in his article about utilization of educational technology in Jordan's schools, concludes that the experience of computer education in Jordan is still new
and that Jordan can learn from other countries' experiences in this regard.

Also, as described by Hawkridge (1990) and latest reports issued by the Ministry of Education (Jaradat and Abu Sheikha, 1992) and Abu Sheikha (1994), one might well suggest that Jordan's experience with computers in schools is still at an early stage. In view of Rogers' five-step innovation-decision process (knowledge, persuasion, decision, implementation, and confirmation), one might also suggest that computers education in Jordan's schools is still at the knowledge stage (Rogers, 1983).

Considering the feasibility of all the views and arguments presented in the preceding pages, it seems that clear awareness and comprehensive understanding of the significant questions related to the use of computers in schools by Jordanian educators is very important. Reviewing relevant research and writings may provide some insights for putting the foundations of a plan to guide the "appropriate" adoption of computer technology in Jordan's schools. As part of careful preparation for the introduction of computers in Jordan's schools, examination of what relevant research says about the question of computers and schooling, is necessary. This is useful in order to avoid probable mistakes made by others.
Computer Technology in Education: Need for Critical Examination

Fundamental to critical examination of computer technology in a country like Jordan is awareness that the predicted power of computer's potential for instructional activities may not be truly realized in the absence of careful, far reaching, critical questions being asked about computers in education (Roszak, 1986). In his book the Cult of Information: The Folklore of Computers and the True Art of Thinking, Roszak writes:

... the cult of information ... is as much the creation of the academies and laboratories as of the marketplace. Gifted minds in the field of computer science have joined the cult for reasons of power and profit. Because the hucksters have enlisted so many scientists in their cause, there are tough intellectual questions as well as political interests that need to be examined if we are to understand the full influence of the computer in our society... If the educators are also finally swept into the cult, we may see the rising generation of students seriously hampered in its capacity to think through the social and ethical questions that confront us as we pass through the latest stage of the ongoing industrial revolution (pp.xi-xii).
Roszak (1986) continues to say:

No technology has ever unfolded its potentialities as swiftly as computers and telecommunications are doing ... Information technology [represented by computer and computer related technology] has the obvious capacity to concentrate political power, to create new forms of social obfuscation and domination. The less prepared we feel to question the uses to which it is put, the more certain we are to suffer those liabilities (p.xii).

Fortunately, many are those well-meaning educators who have started to question the use of computer technology and to aggressively voice their critical concerns about computer's utilization in education (Apple, 1987; Baker, 1985; Belland & others, 1991; Bowers, 1988; Damarin, 1988 & 1991; Davey, 1984; Dreyfus, 1979; McIsaac, 1993; Muffoletto & Knupfer, 1993; Rothe, 1991; Scheffler, 1986; Selfe, 1988; Sloan, 1984; Streibel, 1986; Taylor & Johnsen, 1986; Weizenbaum, 1976 & 1983).

Historically, educational innovations have always been debated, contested, negotiated and compromised (Simon, 1960 & 1974; Grace, 1978). Even though the desirability of learning with and about computers is sometimes taken for granted (Beynon & Mackay, 1989), the introduction of computers into schools has not escaped this contested
character (Johnstone, 1987). Johnstone maintains that the whole issue of the introduction of computerized instruction into schools may be viewed as an area of debate and controversy. He states that "attitudes towards the introduction of computers into education have varied from the enthusiastic and utopian to the dismissive and pessimistic." Dunn and Morgan (1987) claim that "the only thing they can say with confidence about the role of the computer in education over the next few years is that it is surrounded with question marks and uncertainty."

Similar to other educational innovations, the introduction of computers into schools has both advocates and critics (Anderson, 1993). Two of the most enthusiastic adherents of computers in education are Lee Tuscher and Seymour Papert (cited in Harlow, 1984, pp.45-46). According to Harlow (1984), Tuscher and Papert regard the computer as the Answer to the plight of the school. "Tuscher holds that the computer will completely change the way the school approaches teaching and learning, while Papert sees the computer as either revolutionizing the schools or providing a teaching/learning modality that will replace them" (p.46).

Harlow (1984) rejects the claims made by Tuscher and Papert. He states:
"the computer presence [in schools] will not, and cannot, constitute the Answer. The computer within the school... will require a great deal of practice, experimentation, and trial and error before its most productive place can be determined... [and] that the computer's effectiveness is not guaranteed by its mere presence in schools... if the mental set is one of computers are here; our problems are over, then the computer will end up alongside the classroom television monitor on the wall away from the windows" (p.46).

However, Harlow (1984) considers that the computer in education does offer considerable promise. Such notion is supported by Rich (1991) who concludes that the impact of computer technology on education is related to its promising potential for change and improvement, and by Bork (1984) who concludes that while the computer itself has the potential for improving education, at the present time, its effectiveness in education is an issue regarded as very much in the balance.

Computer advocates have very often presented computers in education as inherently better, as necessary, beneficial and as an agent of reform that will revolutionize education as well as cure all educational ills (Hausman, 1985; Minsky, 1984; Papert, 1980). Marvin Minsky (1984), as one of the most widely recognized advocates of computers, claims that computers can probably do anything human minds can do.
Computer critics, on the other hand, having noted the limitations and sometimes problems associated with computers in education, suggest that the change triggered by computer introduction into schools has come fairly quickly, and that adoption of computer technology by educational authorities at all levels is truly unprecedented (Beynon & Mackay, 1989; Dreyfus, 1979; Harlow, 1984; Rich, 1991; Selfe, 1988; Weizenbaum, 1976).

Besides challenging the assumption that computers are inherently better, necessary, beneficial, and good in education, computer critics concern themselves with unmasking computer technology as a neutral, nonhistorical, and nonsocial object (Bowers, 1988; Muffoletto & Knupfer, 1993; Rothe, 1991). Also, common among computer critics are notions such as: the need for careful and/or cautious planning for the introduction of computers into schools (Selfe, 1988); resisting technological momentum (Taylor & Johnsen, 1986); and development of opposition discourses about technology and thought (Hlynka & Belland, 1991).

Muffoletto and Knupfer (1993) state:

The computer, as we understand it, is more than an electronic machine. The computer is a socially and historically constructed object referring to a world view grounded in the efficient production, dissemination, and control of knowledge. It is a viewpoint
located within a social, political and historical landscape... educational computing technology refers not only to the hardware of instructional and management systems, but includes the software that embraces the curriculum, and the intelligence and ideologies that guide the use of computers in educational environments (p.1).

Raising similar concerns about the use of computer technology in education, particularly about cultural values and hidden messages associated with computer programs, Murphy (1991) holds that computer technology is a newly developed technological world-view; that is not neutral or value free (Bowers, 1988). In his book, The Cultural Dimensions of Educational Computing: Understanding the non-neutrality of technology, Bowers (1988) argues that computer technology cannot be neutral, and that in the process of computer programs development, the mind of the designer (including her/his assumptions, ideas, orientations and biases) is reflected in the form the designed text takes. To Bowers, the computer is viewed as a mediator of culture. In the last chapter of his book about educational computing in third world countries, the preceding arguments are reinstated.

Supporting arguments made by Bowers and Murphy above, Marina McIsaac (1993) asserts that the notion that technology offers a value free, neutral means for
disseminating information encounters unexpected opposition. She indicates that as scholars started to fully realize the impact computer technology has on the work place, the family, and the school, they are attracted to a thoughtful examination of the social, economic and political impacts such a technology has on peoples thinking and their cultural values. For instance, appearing on the ABC world news, Wednesday, August 24, 1995, Bill Gates presented his latest hype in Microsoft Works - Windows 95 - as if it was the only rational thing humanity was coming to experience.

Commenting on instructional programs designed in North America, Australia, England and other European countries, and meant to be used in Africa and Asia, McIsaac (1993) points out that, because of non-relevancy to the local African or Asian cultures, results are often unsuccessful. In many cases instructional programs are purchased by African or Asian countries but never used because they do not fit the local cultures.

Other scholars pinpointing the significance attached to computer software is Nick Evans (1986) who in his reflection on the future of microcomputers in education insists that the "software used on the computer machine is the focal point and that the computer hardware should not be continually the center of attention" (p.2).
Another scholar is Professor Edward Feigenbaum of Stanford University (cited in Rahim & Pennings, 1987, pp.4-5) writes:

The central issues of the fifth-generation computers are software not hardware, knowledge not logic and numbers, and symbolic manipulation rather than arithmetical manipulation (p.5).

The call for critical examination and/or debate about computer technology in Western cultures is highly emphasized by two of the most outspoken and articulate critics of computers. In his book, Computer Power and Human Reason, Joseph Weizenbaum (1976) states that "there are signs that a full-scale debate about the computer is developing. The contestants on one side are those who believe that computers can, should, and will do everything, and on the other side those who believe there are limits to which computers ought to be put to do" (p.11). Weizenbaum himself and Dreyfus (1979) represent those who assert that computers have serious limitations.

If educators are to maintain control over the educational process, then they must be prepared to understand and appropriately use the technology available to them. Addressing the issue of the function/s of the
computer as well as the role/s of people in the educational setting of the future, Weizenbaum (1976) states the following:

Man faces problems no machine could possibly be made to face. Man is not a machine... although man most certainly processes information, he does not necessarily process it in the way computers do. Computers and men are not species of the same genus (p.203).

...relevant issues are neither technological nor even mathematical, they are ethical. They cannot be settled by asking questions beginning with 'can' (p.277).

In his article, "A Critical Analysis of the Use of Computers in Education," Michael Streibel (1986) implies that educators must beware "the computer... is not just another 'delivery system' but an environment that has certain values and biases associated with it" (p.137).

Responding to Streibel, in her article "Recontextualizing Computers in Education," Suzanne Damarin (1988) points out that Streibel fails to consider the effects of computers on society at large, and that he analyzes the effects of computer-based lessons without reference to the many other social and political variables which shape the larger educational context called schools"
Although both are concerned about people's relationships to computers, Damarin approaches this issue from another aspect. She states:

If a purpose of formal education is... to 'prepare others for life long learning' it appears that the learning of what we hope is a long life ahead must in some way accommodate the reality of computers. Perhaps the best means of preparation for this life is to help learners distinguish clearly between human reality and computerized representations for reality (p.150).

Empahsizing the hidden effects of computers on teachers and students, Michael Apple (1987) points out that computer technology embodies a form of thinking in the classroom environment where a more technical orientation (i.e., the "how to") will replace deep critical political and ethical understanding (i.e., the "why"). Under such circumstances, Apple argues that the focal point of the classroom discourse will be the technique rather than the thoughts and substance.

In his call for critical examination of computer technology in the classroom, one might well conclude that Michael Apple (1987) says it all when he writes:

The new technology (computer technology) is here to stay. Our task as educators is to
make sure that when it enters the classroom, it is there for politically, economically, and educationally wise reasons, not because powerful groups may be redefining our major educational goals in their own image. We should be very clear about whether the future promised by the new technology to our teachers and students is real. We need to be certain that it is a future where all our students can share in, not just a select few. After all, the new technology is expensive and will take up a good deal of our time and that of our teachers, administrators, and students. It is important that we question whether the wagon we have been asked to ride on is going in the right direction (p.6).

Rationale for the Study & Significance of the Study

School systems have witnessed an array of solutions and innovations that were proposed to transform the schools (Harlow, 1984). Some innovations proved to be educationally effective, and some did not. Some survived and some did not. Harlow reminds educators of teaching machines, back to basics, television in the classroom, and programmed instruction as examples of such innovations. If educators had jumped onto every innovation bandwagon passing by school buildings, their entire educational experience could be described in one word as chaotic (Patterson & Patterson, 1983). Fortunately, Patterson and Patterson maintain that educators have developed highly sensitive "junk detectors." Sometimes through trial and error, and sometimes through
training and experience educators have been able to detect innovations that hold promise, as well as those that proved to be not useful in educating their youngsters (p.15).

Currently, education is encountering computer technology innovation. Patterson & Patterson (1983) write:

"Educators' "junk detectors" send them mixed messages. On the one hand, educators insist that a primary ingredient in any student's learning is the skillful, compassionate guidance of a humane teacher. They also doubt that a machine cannot duplicate the humanistic element found in effective teaching. On the other hand, educators see, hear, and read about computer technology more than any other innovation in recent history" (p.16).

The community is beginning to ask tough questions about the place of computers in classrooms, and parents, children, and many members of society are getting into the act (Bork, 1985). Educators are caught in the middle; being pushed into exploring the computer technology innovation that they still know little about (Pelgrum and Plomp, 1991), and, at the same time, being pulled by the strength of their professional experience that tells them not to be hasty about jumping onto the computer technology bandwagon (Apple, 1987).

This study is needed for the following reasons:
1. Jordan is a country that is surviving under immense financial difficulties. Money for education is scarce even to provide for basic schooling needs. Even if educators are ready to use computer technology in schools, computer technology is still relatively expensive to acquire. The funds available for the Ministry of Education are limited. As the description of Jordan's experience with computers will show, public schools regulated by the Ministry of Education will be at the mercy of foreign aid. This may create a strong dependency on computer technology producing countries, at least in the short run (Hawkridge, 1990). Lack of financial resources to provide for computer integration in schools is a serious concern in Jordan's educational system. In Smith's book *Insult to Intelligence* (1986), he directs the attention of the reformers towards the fact that computer use in school has not been entirely positive, and that the small amount of funds available to schools should be spent wisely.

2. Computer technology is not only a delivery system for conveying instruction. It is a cultural environment that has certain cultural values and hidden messages associated with it (Streibel, 1986). It may not be easily adopted in Jordanian schools.
3. As mentioned earlier, a host of educational innovations has been introduced into education with the hope to transform the schools and make education more effective (Harlow, 1984; Rich, 1991). Language laboratories, educational television and films, teaching machines, and programmed instruction are common examples. Because schools as well-established, well-developed stable social organizations that are normally resistant to change, many educational innovations left little impact on school's traditional life which, in many aspects, continued to be the same (Clark, 1983). Today, it's not surprising to see film projectors, slide projectors, TV sets, and language laboratories equipment retired and stored in schools' basements as dust collectors. To avoid dumping computer equipment into the school basement in the long run, one might very well suggest that, it is very critical to plan for computer use in schools carefully and comprehensively.

4. In Jordan, as in many developing countries, computer education is linked to national development (Gupta, 1981). Policy makers in Jordan need to realize that the computer technology model is linked to a more general Western development ideology that may be inappropriate for development plans in developing countries (Rahim & Pennings, 1987). Policies regarding computerization processes may be
sound and effective in one country, but may be inappropriate under the social and cultural conditions of another country (Jennings-Wray & Wellington, 1985; Marshall, 1984; McIsaac, 1993). Computer-based systems, successfully used in one place, may not necessarily be equally successful in another place, particularly, if differences regarding norms of rationality, value systems, and cultural traditions exist between the two places (Gritzner, 1981; Lind, 1991).

Statement of the Problem

Computer technology is designed based on models, values, conceptions and assumptions of mainly Western cultures (Kim, 1983; Lind, 1991). As such, there are cultural values, assumptions, perspectives, biases and world-views associated with computer technology (Apple, 1987; Murphy and Pardeck, 1991; Rothe, 1991; Streibel, 1986). Invented in countries that are economically, socially, and culturally different (Hungwe, 1989; Lai, 1983; McIsaac, 1993) computer technology as it is, may not be easily adopted in other cultural settings. Computer technology needs to fit the economical, social, cultural, and ideological conditions of adopting countries to be effective (Bowers, 1988; Marshall, 1984; Muffoletto & Knupfer, 1993). Furthermore, computer technology normally associated with advanced and wealthy
societies, it may be beyond the economic means as well as the technological know-how of less advanced and less wealthy nations (Chandra, 1984; Lai, 1983).

Applying the preceding arguments to educational settings, it could be much better if adoption of computer technology in Jordanian schools is based on social, economic, cultural, and ideological factors emanating from the local conditions of Jordan. The problem of this inquiry is therefore: Can a theoretical plan be developed to guide appropriate adoption of computer technology in Jordanian schools? Such a plan integrates considerations of local culture and history, economy, and the education system of Jordan, as well as, other feasible factors extracted from the presented literature.

**Purposes of the Study**

Effectiveness of computer technology is not guaranteed by its mere presence in schools (Harlow, 1984). A host of very critical issues must be considered (Apple, 1987; Bowers, 1988; Chandra, 1984; Lai, 1983). Fear of being overtaken or bypassed by other nations (national pride) may not make educators rush to jump onto the bandwagon of computer technology while they are not ready (Patterson & Patterson, 1983). Computers must be used wisely and
integrated with care into schools (Apple, 1987; Bork, 1985. One might well suggest that educators may take a ride in the bandwagon of this new technology, but they must guard against being seduced into using computers simply for their own sake. Computers may not be placed in schools for symbolic reasons (i.e., just to say we use modern technology in schools). Unless computer education addresses and enhances the fundamental goals of Jordanian schooling system (including basic skills development, and the realization of human potential) the computer may wind up as just another expensive gadget. Educational planners must weigh carefully the educational and social implications of computer technology before they can hope to use it constructively (apple, 1987). The purposes of this study include:

1. To describe the history and culture of Jordan;
2. To describe the educational system of Jordan;
3. To review relevant research and writings in order to capture some significant questions about computer technology and schooling; and based on analysis of presented literature,
4. To develop a plan to guide appropriate adoption of computer technology in Jordanian schools.
Methodology of the study

This dissertation involves literature review and analysis. It then uses the review and analysis to posit a plan for appropriate adoption of computer technology in Jordanian schools.

Basic Assumptions

This study is based on some assumptions about computer technology in education like the following:

1. Computer technology is a cultural product of mainly Western thinking and reasoning. It may not be appropriate to be applied in other cultural traditions without adaptation.

2. Viewing computer technology as one of the quick-fix initiatives, currently heralded as necessary for empowering schools to cope with the information age, may be inappropriate.

3. Extravagant claims have been made for technological solutions to educational problems. Great expectations have been heralded for computers to revolutionize and solve the problems of education. Despite their remarkable capacity for storing, retrieving, and manipulating all sorts of data stored in them, computers in education may not be the cure
for all current educational ills and/or the solution for all educational problems. There is no technological panacea; there are only some technological solutions to some educational problems. Some times, the kinds of problems that educational systems face, are mainly human problems. Human problems need human solutions, not machine solutions.

4. The computer is a rich and complex tool. It has the potential to be of particular value for education. But the question is: Are schools ready for the integration of computers in their programs? Furthermore, are computer technologies within the financial means of schools to acquire?

5. Like any other educational tool, the computer comes with inherent advantages and disadvantages. Computer technology is more appropriate for some uses than others.

6. Like any educational medium, the computer can be used well or poorly. It can be over-emphasized or ignored.

7. Computers are tools. It is well-known that tools are never neutral. Tools create a culture of tool users who have to operate them on the tool's terms.

8. If computer technology is to be appropriately
utilized in the educational setting, today's educators must be aware of and/or sensitive to the implications of this multifaceted technology.

9. Similar to other technological innovations, computer technology has certain capabilities as well as certain limitations. In education, the computer can be educators' helper, not master. It can be a new helper that can assist educators by doing things they have never before tried to do themselves. Recognition of its capabilities as well as limitations is rendered a must in order to best be served by it. This new helper (computer) may not replace teachers in sympathetic, compassionate, and intuitive interactions with students. The computer is an add-on tool in education that is deemed to replace nobody.

Definition of Terms

There are some key terms in this descriptive inquiry that need to be explained. They include: Third world or developing countries, and computer technology.

Third World or Developing Countries

According to Longe (1981) "the nations of the world have reached different stages of development and they have
been categorized into developed and developing nations. The developed nations are relatively affluent. The others, the poor nations, [third world nations] are preferably called the developing nations (p.189). However, not very often though, the term underdeveloped countries is used in place of third world or developing countries.

In 1981 the United Nations issued a report through UNESCO, one of the United Nations working agencies, revealing that third world countries include: all countries in Central America; all countries in Africa (except the country of South Africa); all countries in Asia (except Japan and the Asian Republics of what used to be the U.S.S.R.) and areas in the Pacific Ocean (except Australia and New Zealand), (cited in Lai, 1983, pp.6-7).

According to Chandra (1984) the third world or developing countries "are normally made up of rural areas where industrial and economic growth is slow and where the use of technology is very limited" (p.101).

Generally speaking, leading features of the third world or developing countries include: Poverty; rural or agriculturally based economy; labor intensive economy; underdevelopment of the manufacturing and service industries; high illiteracy rates; high unemployment or underemployment; and high population growth rate. Compared
to advanced nations, the third world countries fall far behind in almost all aspects of social and economic development. In different places of this inquiry, the terms third world countries; developing countries; developing nations are used interchangeably.

**Computer Technology**

In this inquiry, the term computer technology is simply used to refer to the hardware and software parts of computer as well as any computer related technology which employs and/or utilizes computers in its operation such as interactive video, E-mail, and telecommunications.

**Delimitations of the Study**

Delimitations of this study could be the following?

1. No empirical research is conducted. Surveys, observations, interviews, and experiments are not used.

2. Analysis of gathered literature about the history and culture of Jordan, the educational system of Jordan, and relevant research covering some significant questions about computer technology and schooling, may yield information which is different from that collected in surveys, observations or experiments.
3. Description of the culture of Jordan as an example of the global Arab culture may be viewed by some as inaccurate. Some may suggest that there are sharp differences among countries of the Arab World. Therefore, the informative purpose of this study may be limited to Jordan only.
CHAPTER II
JORDAN: SOCIETY AND CULTURE

1. Geography and Historical Setting

The total area of Jordan is estimated to cover almost 40,000 square miles. This is the land laying beside the Jordan River which brings to the Western mind the place where Jesus Christ—Peace Be Upon Him (PBUH)—was baptized.

Jordan is bordered on the north by the Yarmouk River, which flows into the Jordan River just south of the sea of Galilee, and by Syria; on the east by Iraq and Saudi Arabia; and on the south by Saudi Arabia.

The only access Jordan has to the sea is at its southwestern corner, at Aqaba Gulf on the Red Sea; a coast of a mere few miles.

More than four fifths of Jordan's area is desert, geographically and climatologically part of the Syrian and North Arabian Desert, with an average rainfall of less than 5 inches annually, all of it occurring in the short, cool winter season of December to March. The long, hot summer season (from April to November) is rainless, with great
temperature differences (especially in the uplands) between the very hot daytime and the cool nights. Jordan can be roughly divided into five zones:

**Zone 1.** The North Uplands, which receives sixteen or more inches of rain, extends from the Syrian border to beyond the Amman-Jericho road. This is the best land at present under cultivation, supporting numerous fruit trees as well as cereals and vegetables. In the Ajlun mountains there are oak, pine, olive trees, cypress, and acacia forests.

**Zone 2.** The zone receiving 8-16 inches of rain stretches from the Jericho road of Wadi Araba and extends east of zone 1 up to the Syrian border including Irbid and Ramtha plains. The crops grown do not differ greatly from those of zone 1 except that cereals occupy a larger proportion of the total area.

**Zone 3.** The zone receiving 4-8 inches of rain lies east of the Hijaz railway. In it, cultivation was irregular and consisted almost wholly of cereals. But recently, hundreds of wells have been dug and many irrigated farms have been constructed and different kinds of vegetables are cultivated.
Zone 4. The area east of zone 3, consists of steppe and desert country. In this area farming is impossible and only pastoral nomadic tribes can find subsistence.

Zone 5. The Jordan Valley, which is a trough-like depression, varies in width from 2 to 16 miles and runs in a north-to-south direction. This area consists of very good land, suitable for intensive farming under irrigation. The Jordanian government established a special authority to supervise this irrigation and different kinds of vegetables and fruits are cultivated.

The Dead Sea occupies the central portion of the depression of the Jordan Valley. It is the lowest point on earth, its surface being 1290 feet below sea level while its bottom, in its larger northern basin, is 2598 feet below sea level. The total length of the Dead Sea from north to south is about 55 miles, and its width from east to west is 10 miles. The Dead Sea is an inland lake without an outlet, and its water level is maintained as a result of the balance between the inflowing waters of the Jordan River and a number of smaller streams from the east. Owing to the very high temperature through most of the year, the rate of evaporation from the Dead Sea is very high. It has been estimated at 8.5 million tons of water per day. The mineral content (magnesium chloride, and sodium chloride, calcium
chloride, potassium chloride, and magnesium bromide) of the Dead Sea is very high, more than 27 per cent by weight near the surface, increasing to more than 33 per cent near the bottom. Owing to this high concentration of minerals in the water, no animal or plant life can exist in the Dead Sea, hence the name was bestowed upon it.

South of Jordan Valley is Wadi Araba where the depression rises gradually until it reaches sea level about to the Gulf of Aqaba. This region consists of barren desert and is of no agricultural value, but its mineral resources are appreciable (Patai, 1958, pp.3-8).

Historically, Jordan as an independent political entity, was the product of events which followed the First and Second World Wars. Not until after the latter did the country acquire its present boundaries, population, and full independence. For four hundreds years before that, Jordan was a held and administered province of the Ottoman Empire. Still earlier it had been defined as southern district of Syria. With no natural boundaries to set off the territory around it, Jordan never stood alone, nor did it occur to its people to think of themselves as "Jordanians" (Harris, 1958, p.1).

Jordan came into being in 1921 when Prince Abdullah, the second son of Al-Sharif Hussein, King of Hijaz, appeared
in Amman in February of that year with the purpose of launching a campaign against the French to restore the rule of his brother in Syria. He was dissuaded from this project in a series of conferences in Jerusalem with Winston Churchill, then Secretary of State for British colonies. Prince Abdullah accepted the rule of Jordan which was constituted in 1946 as the Hashemite Kingdom of Jordan (Harris, 1958, pp.15-16).

2- Population

Jordan's population is divided into three discrete and fundamental occupational sectors: pastoral nomads, village agriculturalists, and townsmen. These three types of occupations and residences represent distinct modes of life which from early times have differentiated the populations of the Middle East (Patai, 1958, pp.210-216). Until the sixties, the numerically dominant type was the village peasantry engaged in sedentary agriculture. Since then, large numbers migrated to towns as a result of getting jobs in the army and civil service, but they still keep close to their village and desert sub-culture.

a. The Bedouin Tribes

Jordan's area is about 80 percent desert. As a result, for ages a large number of the population has lived a nomadic life, and has been called "Bedouin", a term which
was coined as a result of living in "al-Badiah" or the desert.

The rainy season is short, normally about two months, and the summer is long, about seven months, but the bedouins manage to stay in the desert or the fringes of the desert for around eight months. Only by living in small groups and moving about can people make a living there.

In the last decades, dramatic changes have taken place in the structure of Bedouin life, the size of their populations, and the relations with settled people. In many areas, the advent of the truck, which replaced the camel in many places, the Mercedes, which replaced the horse of the tribal heads, the lure of the city lights and the charm of television and radio, have all diminished nomadism. But the Bedouin is recognized as he lived for over 2,000 years and has left his imprint on Arab culture (Polk, 1991, p.6).

The Jordanian nomads classify themselves and the people known to them in several ways. A broad distinction is made between the sedentary population- villagers and townsmen alike. In the opinion of the nomads, only they themselves have the right to be called Arabs, a name denoting people of noble blood.

In Jordan and elsewhere in the Arab world both the structure of the nomadic tribe and the terms applied to the
tribe and its subdivisions vary greatly. In size, the tribe may consist of only a few families, as in some tribes in the Jordan Valley, or it may number 3,000 tents.

The tribe (qabilah) is usually subdivided into two or more subtribes (ashirah). Each subtribe, in turn, is commonly divided into two or more subdivisions (hamulah), and finally the (hamulah) into more related extended families. Throughout this structure kinship is reckoned through the male line. As a rule each tribe claims that it is composed of the descendents of a single ancestor, whose name it often bears.

Leadership in nomadic tribal society is vested in the heads of successivly larger kinship aggregates. Generally, among the extended families making up a lineage, one family has the hereditary right to the headship of the lineage, and one of that family's senior males-usually but not always the most senior, depending upon such factors as wealth and reputation for ability-heads the lineage. The leadership role, however, provides a general criterion- which is simply that the tribe is headed by a sheikh who is subordinate to no one, while the sheikh of any subdivision is subordinate to a tribal sheikh.

The sheikh is assisted by the majlis, the tribal council. Composed of the heads of the various subdivisions
of the tribe, the majlis meets daily in the guest tent of the sheikh when the tribe is encamped. At its sessions, there is informal discussions of such questions as when to break camp, where to find grass, news of other tribes, and cases of litigation. No vote is taken, and the sheikh in his capacity as chairman is able to influence the deliberations only through the force of his personality, wisdom, and understanding.

It is the sheikh's duty to represent his tribe, to rule on water rights, to act as arbiter and judge in litigation, to give consent to marriages and divorces, to protect the feeble, to receive guests, to make the first move in breaking camp, to protect the honor of the tribe, and to work for its welfare.

The influences of the twentieth century are leading to the decline of nomadism. They are bearing hard on the nomad and are hastening a major process of social change which has been affecting him for many centuries. That process is sedentarization. In the past, the transformation of a nomadic camel-breeding tribe into settled agriculturalists might have taken as long as three hundred years, today, under the pulls and imperatives generated in the new urban centers and the larger world beyond, a generation or two may suffice. Another motivation for spontaneous sedentarization
is created by attraction of modern life to which some of the nomads are exposed in their contacts with the towns and through development of governmental and industrial enterprises in the desert and steppe areas. The replacement of the camel caravans by motor vehicles and railways has greatly diminished the role of the nomads in the economic life of Jordan. Bedouin political authority, primarily through the army, is a force to be reckoned with, and the economic and social problems of the Bedouin population loom large in the life of the country. Moreover, the historical values of nomadic society continue to influence the popular ethos of Jordan and the rest of the Arab World. The efforts to translate the ideas and values into meaningful terms in the context of modern life is in Jordan and other Arab states, not merely a romantic exercise, but a part of the struggle in this part of the world to articulate a renewed Arab identity in national terms (Harris, 1958, pp.46-69). While some continue to portray the Bedouin as a menace to civilization and source of values and norms that hinder the assertion of a shared Arab culture, others romanticize them as representative of certain essential Arab characteristics - the spirit of independence, integrity, and generosity (Barakat, 1993, p.49). The tendency to romanticize or condemn Bedouin culture seems to overlook the notion that
Bedouin value orientations have their origins in the peculiar desert environment. As modern states and political movements use all sorts of pressure and enticements to encourage Bedouins to abandon their traditional nomadic way of life and settle down, the future of the Bedouin way of life will vanish (Barakat, 1993, p.54).

b. The Peasantry and the Village

The Jordanian village shares its basic characteristics with thousands of others dotting the arc of cultivatable land extending through Lebanon, Syria, Iraq. Beyond the broadest generalizations, however, the details of the village pattern vary from the picture of village life. Among these factors are the strong influence of nomads and semi-nomads even in the most agricultural parts of the country; the establishment of new villages by the influx of peasants from other areas; the marked decrease in recent decades of collective land ownership; and religious and ethnic diversity which, though not so marked as in some other Arab countries, is nevertheless noticeable.

Jordan's rural population shows little class stratification. The notion of a hereditary aristocracy, by which the Bedouins distinguish noble tribes from baseborn groups, finds little expression in the actual organization of the village, although families and individuals frequently
claim to be of noble descent. For the majority of Jordanian villagers, the harsh and arid land has yielded too little bounty to permit the growth of any wide difference in economic situation. The few who have acquired real wealth have been able to move to the cities.

The basic principles of kinship organization which are present among nomads are also found in the villages: male descent, paternal residence and authority, the extended family, and the lineage are all present. The individual villager is bound to other members of his lineage by a network of mutual obligations; which is strongest within the circle of the extended family that operates as a unit and defines the individual identity depending upon the circumstances of the particular situation. In the village with a single lineage, the two operating principles coincide, but where there are multiple lineages, rivalry within the village is common, and in relation to each other the inhabitants of such a village view themselves as members of this or that lineage. In dealing with the outside world, however, the village is capable of acting as a unit, and the particularity of kin group is then transcended by the cohesiveness of the village as a total entity.

As the tribe among the nomads, the extended family, uniting a group of closely related males and their wives and
children, has long been the important unit of the Jordanian village. The traditional pattern of bonds among husband, wife, and children were strong, but they existed within the framework of the extended group; the interests of which were expected to come first. The authority of the senior male, shared residence, common property, and daily economic cooperation all combine to make the extended family the center of the individual existence. Western influences and the changes of the modern period are eroding the unity of the extended family, and this process, most active in the towns, but present in the village as well, is reducing more and more Jordanian families to their simpler dimensions of husband, wife, and children (Harris, 1958, pp.59-64).

The land is the source of village's most cherished values. Besides being their livelihood it provides them with a deep sense of well-being and continuity. To own land brings security and belonging; to lose it represents defeat and uprootedness. Directly associated with the land are such village values as fertility, continuity, patience, and spontaneity. Land features abundantly in villagers' imaginations and in their collective memory; it is celebrated in their songs, poetry, folktales, and dreams. Certain natural phenomena, such as rain, springs, valleys, mountains, as well as trees, flowers, herbs, and fruits
(grapes, figs, dates, oranges, and so on), have special meanings for Jordanian villagers. This is particularly true in the case of those who have lost their land or have found themselves in exile, such as the Palestinian refugees in Jordan and other Arab countries. The love of the land of Palestine is very clear in Palestinian literary writings such as those of Gassan Kanafani and Mahmood Darwish (Barakat, 1993, p. 58).

The villagers' sense of belonging is defined as much by attachment to the family home (beit) as it by attachment to the land. A famous Jordanian proverb is: "The place where your head has been dropped is the dearest." It means the land where you have been born is the dearest place in the world.

Though these special village values are still dominant, they are being weakened and altered by the forces of the present. The agricultural toil of the village seems less rewarding than formerly to the peasant who has been to the city and has encountered more amply compensated ways of work. The cohesion of the extended kin-group tends to break down as more individuals, through choice or the force of economic circumstance, strike out on their own, and the old forms of paternalistic authority become less compelling as the wage-earning husband finds himself more dependent on his
own efforts than on the cooperative economic activity of a circle of relatives (Harris, 1958, p.65).

The impact of the modern world has begun to be felt in Jordan's villages; change is taking place and its directions must be studied by the Jordanians.

c. The City: Urbanization of Society

The urban pattern is best defined in terms of its distinctive functions rather than mere population size, although the size of urban populations clearly distinguishes cities from tribal and village clusters. City functions in Jordan include serving as the center of economic, political, religious, and cultural activities. Defining the city in terms of its political and commercial functions underscores its integrative role internally, as well as the level of the larger society. The proportion of people living in cities has increased from 10 percent at the beginning of the twentieth century to more than 40 percent in 1970s and currently it may be about 50 percent. Besides this rate of growth, Jordanian cities are also demographically characterized by (1) a selectivity in rural-urban migration that favors those who have jobs in the government or economic fortune; (2) the dominance of the capital city, Amman, which overshadows other cities and the rest of the country; (3) a lack of city planning, especially after the
1970s which witnessed high rate of people migrating from the village and the desert to the cities; (4) a duality between old and new cities; and (5) the emergence of slums and "hut and tin" cities, especially, after the influx of huge numbers of Palestinian refugees.

As to social organization, what the tribe is to the Bedouin and the extended family is to the village, neighborhood and institutions are to the city. As the tribe and the extended family give way to more elaborate forms of economic and social organization, a clearer social class structure begins to take place. The complex network of interrelated functions (be these commercial, political, religious, educational, social, or cultural) requires the development of particular forms of organization. Essentially, these forms involve the emergence of factories, markets, government bureaucracies, houses of worship, educational institutions, mass media and related communication and transportation networks, hospitals, entertainment industries, hotels, clubs and other tourist facilities (Barakat, 1993, pp.61-67).

The specific social formation that has emerged with these specialized sectors may be seen as characteristic of Jordan's urban society. Yet what is peculiar to Jordan's cities are those features of tribal and village loyalties
which still influence urban activities. In his article "Tribe vs. Islam", Mamoun Fandy analyzed the results of the Jordanian parliamentary elections in 1995 and came to the conclusion of the superiority of tribe and village organizations over ideologies including Islam (Fandy, 1994, p.40). Social relationships in Jordanian cities continue to be regulated by primary group norms, such as the identification of the residents with their former rural districts and kinship relations. The social and interpersonal relations and activities are also strongly influenced by kinship and localism of the former districts which the city people migrated from. Dwellers' values are clearly embedded in a balanced social structure based on the interrelationship of class, family, localism and religious establishment. The high class in Jordanian cities constitutes a well-developed class of notable families who have their power in village and the desert. They place a high value on "strive and search" of high ranks in the government, material profit and power. Such strive emphasizes realistic evaluations, moderation, cunning, cleverness, opportunism, and innovativeness. The ultimate objectives have always been expressions of affluence and trapping power.
d. Ethnic Groups

In Jordan, there is no serious problem of ethnic minorities to divide the country. There are, however, two divisions of ethnic groups: the ethnic majority and ethnic minority.

The great majority of the Jordanians are Arab Moslems. The only non-Moslems are a minority of native Christians who belong principally to the Greek Orthodox, Greek Catholic or Roman Catholic church. Religious division has no ethnic significance.

There are also, ethnic minorities of Circassians, descendants of Sunni Moslem families who emigrated from the Caucasus after the conquest of that region by the Russians in the nineteenth century. The Circassians may be distinguished from their Arab neighbors by their fair skin and their more methodical methods of farming.

Another minority group is the Chechens, who came to Jordan about the same time as the Circassians. In recent years a tendency to assimilate to the Arabs has become noticeable through intermarriage and displacing Arabic for the dialects spoken by the Circassians and the Chechens (Harris, 1958, p.28). Recently both groups have representatives in the Jordanian Parliament.
e. Nature of Relationships Among Tribes, Village and City

The examination of tribe, village and city in the context of social integration requires the exploration of three issues which present themselves as relevant: the extent to which these interrelationships are characterized by conflict or cooperation; the images exchanged by these three groups; and sources of common values and norms.

The literature on the nature of the relationships between tribe, village and city tends to emphasize complementarity, separateness and contradictions. Some studies tend to focus on the more cooperative aspects of their relationships, such as the trade or exchange of basic commodities. Bedouins, for instance, depend on villages and cities for their supplies of rice, flour, coffee, tea, sugar, clothes and the like. They also depend on them for educational, health, religious, and political services. Villagers and city people depend on Bedouins for cattle, the transportation of their products and protection against raids and invasions. More recently, Bedouins have served extensively in the Jordanian Army, national guard, and security forces. Similar examples of cooperation and interdependence between villages and cities also exist. On the one hand, peasants depend on the city for their
products. As large-scale farming has become more complex and mechanized, they have needed to borrow money from urban banks and to buy machinery manufactured in cities. On the other hand, city people have bought land and invested money in rural areas. In some areas, like the south and the north of Jordan, villages serve as summer resorts and tourist spots.

Other studies concern themselves with the contradictions and conflicts in Bedouin-rural-urban relation. In Jordan these contradictions manifest themselves in family bias, local loyalties, and competition for state jobs and civil services. But these negative images coexist with some highly positive ones. Urban people appreciate Bedouin courage, hospitality, and noble character. City people seem to yearn for the simplicity, quiet, ease, and natural beauty of village life. Bedouins and peasants, in turn, tend to be fascinated by the city and its affluence and pleasures. These mixed feelings indicate ambivalence in the attitudes held by the three historic subcultures, an ambivalence that results from increasing closeness and overlapping value orientations (Barakat, 1993, pp.65-69).

3. The Extended Family

The traditional Jordanian family is not merely a unit in which children are born, raised, and prepared for life in
the larger community. Constructed on the principles of
descent in the male line and the authority of the eldest
male, it unites several generations in a tightly cohesive
group whose members throughout life cooperate in securing a
living, look to each other for aid and protection, and
accept the discipline imposed by the family head (Harris,
1958, p.2). Kin ties do not end with the extended family
but reach out in a widening ring of real or fictitious
relationship through the lineage or clan, composed of a
number of extended families, and in the case of Bedouins, to
the tribe. It is these concentric circles of kinship-
operating with varying degrees of strength in the town, the
village and the desert that still give the Jordanian his
primary identity. Not some civic concept of national
citizenship, wealth, education and appointment to civil or
military office can raise a man on the social ladder, but
their acquisition; most often comes through family efforts
and connections. The effect of this system is to divide the
society into many competing, only some times cooperating,
kin-groups. These, rather than the community or the country
at large, make the limits of the individual's strongest
allegiance.

Events of the last decades have brought about a sudden
multiplication of Jordan's urban population, and modern
influences have presented the people with problems and opportunities which the unmodified family institution was unable to solve or grasp. The familial principle nevertheless remains strong, and family exclusiveness can be expected to yield only slowly to more inclusive patterns of community organization (Harris, 1958, pp.2-3).

A comprehensive understanding of the Jordanian family cohesiveness and transformation requires an examination of (1) the characteristic features of the Jordanian family; (2) patterns of marriage and divorce; and, (3) placement of the family within society, and in relation to other social institutions.

(1) The Basic Characteristics of the Jordanian Family:

The traditional family in Jordan, as in the Arab World generally, constitutes an economic and social unit because all members cooperate to ensure its continuation and improve its standing in the community. Enterprises such as shops, factories, business, and fields are commonly owned and operated for the benefit of all. Until recently, when the state began to provide services for its citizens, the family undertook such diverse tasks and responsibilities as education, training, defense, welfare, employment and religious upbringing. The success or failure of an individual member becomes that of the family as a whole.
The sexual misbehavior of a girl, for example, reflects not only upon herself but her father, her brother, and her family as a whole. Thus the "crime of honor" which sometimes still occurs in tightly knit communities, is an attempt to restore the family honor and place in the community by killing a sister or daughter who has been detected in sexual misconduct.

One's commitment to the family may involve considerable self-denial. Parents deny themselves for the sake of their children. Sons may do the same for the sake of parents, sisters and brothers. Ideally both parents and children are totally committed to family itself.

Another characteristic of the Jordanian family is patriarchal authority where the father has authority and the responsibility. The wife joins his kin group and the children take his surname. The father expects and unquestioning compliance with his instructions. Barakat assumes that the father has traditionally maintained his authority and responsibility because he has owned the family's property and provided the family's livelihood (Barakat, 1993, p.102).

In fact it is not enough to consider the economic factor to explain the father position in the family. Arab traditions and literature, historically, recommend strongly
the respect of the father. However, recent changes in family structure have contributed to the democratization of husband-wife and father-children relationships. These changes have occurred in response to the socioeconomic, cultural, and educational developments in Jordan. This means that the patriarchal tradition is in a transitional period.

(2) Marriage and Divorce Patterns:

Marriage, in Jordan's society is a family and communal or societal affair more than an individual one. This principle is seen in most patterns related to marriage, including arranged marriage, age of marriage, the dowry (mahr), the morals of marriage, and the rejection of civil marriage.

Divorce is, Islamically, permitted but disliked. The husband is strongly advised not to divorce his wife unless in absolute emergency. But, traditionally, husband can easily divorce his wife, whereas it is impossible for a wife to divorce her husband against his will except by consent of a court of law in extreme cases of neglect, maltreatment, nonsupport, indefinite absence of the husband, or impotence.

(3) The Family and Society:

It has been noted that the family is at the center of socioeconomic activities in Jordan as it is in Arab society in
Persons and groups inherit their social class through the family. The family has served as a society in miniature, or the society is the family generalized or enlarged. Stratified and patriarchal relations are common in different institutions as a whole (Barakat, 1993, pp.97-119).

4. Religion in Jordanian Society

Most people living in Jordan are Moslems. Some are strict Orthodox. Others are little more than Moslem in name. But all regard their religion in a way that sometimes is difficult for the modern western to grasp. Religion in Jordan as it is in the Arab society, is something to be taken seriously like strong medication to purge the spirit. It is a part of the Moslem daily life. He/She quotes the Koran and Hadith (the Holy Book & the Prophet's (PBUH) Sayings) extensively in his/her daily conversations to stress that it is governing his/her actions. Some quotations appear in writings of authors, interlace speeches of politicians and statesmen, and illustrate legal decisions. Anyone who wants to understand the Jordanian or the Arab, his psychology and his attitudes, should read the Koran, the Hadith and the religion that has been built around them. In the Moslem view, if a person incorporates the Koran into his family affairs, his politics, his business, and other aspects of his daily life, he is
described as paying attention to the word of God (Isenberg, 1976, pp.26-27).

Politics, economic development, and religion are interwoven such that a new mosque may be included along with a hospital, school and university in building plans. In Jordan universities, the minarets of mosques rise amid the college buildings. During the holy fasting month of Ramadan the entire social life has to be re-scheduled and re-shaped. All attention is focused upon complete religious practices. Young boys and girls are brought up to study and respect the Koran. It is ordinary for anyone who passes by a mosque to see boys sitting on carpets circling around a sheikh (religious teacher). All sitting cross-legged and holding copies of the Koran. The religious sheikh reciting a verse from the Koran while the youngsters repeat in a sing-song style. These boys would know the Koran by heart before they reach their teens. Their education would be based upon it, and its laws would become a part of them, and leaves them with a sense of guilt should they fall away from the rules of Islam later in life (Isenberg, 1976, pp.28-32).

The core of faith of Islam is (Ibadah) which means: full obedience to God (Allah) because of His full love. Ibadah is transmitted into practical life through three aspects: The ritual aspect, the social aspect, and the
universal aspect. The fundamental article of the ritual aspect is (Shahadah): "Testifying that there is no God but one God (Allah), and Mohammed (PBUH) is His Messenger." The fundamental article of the social aspect of Ibadah is Justice and altruism. Justice with the enemies and altruism with the companions. The fundamental article of the universal aspect of Ibadah is knowledge or seeking the truth. The Moslems are guided to enter the laboratory of the universe and discover its components and laws so as to witness the evidences of God's (Allah) greatness through His creation. The ritual aspect of Ibadah is manifested in daily life through a series of worships like making prayers five times a day, fasting the month of Ramadan, and making pilgrimage to Mecca. The social aspect of Ibadah is manifested in daily life through social practices of Islamic guides: like paying Alms, political Islamic law, and Jihad (literally, exertion) or a permanent struggle to make the word of God (the Koran) supreme among humankind. The universal aspect of Ibadah is manifested in daily life through intellectual and academic activities in schools and universities (Al-Kaylani, 1988, pp.83-118). Islam recognizes all the messengers like Abraham, Moses, Jesus Christ and other previous prophets.
To study religion in Jordan and Arab society, one needs to distinguish between religion as it is in the text holy Books, and the interpretations of these texts by the scholars and religious practices of the masses or regular people. The last group tends to mix their practices of religion with their traditions. Patai failed to grasp such contradiction between Islam and tribal traditions when he came to the conclusion that "tradition, in Jordan, as in all Arab countries, is intrinsically interwoven with religion" and all traditions are religious and, conversely, all religion is surrounded with tradition (Patai, 1958, p.222).

5. Economy of Jordan

During the 1970s and early 1980s, the economic achievements of Jordan have been considerable, as its citizens enjoyed high standards of living. Growth rates at that period were well in excess of 10 per cent per annum and a modern infrastructure was established, with a good network of surfaced roads, an international airport near Amman, and excellent port facilities at Aqaba which serve Iraq as well as Jordan. The agricultural sector has been transformed, especially in the Jordan Valley. The traditional agriculture has been modernized in the north of the country, with increased yield of tomatoes, citrus produce and olives. Production of wheat and barley has also risen, though it is
insufficient to satisfy domestic demand. The major problem of the 1980s has been marketing, with overproduction rather than underproduction of certain items, notably tomatoes, aubergines, and cucumber. These used to be marketed in the Gulf states, but these states now produce their own vegetables. Efforts have been made to diversify agriculture, and encourage crops where there is a shortage of local supply and a need for imports.

Jordan's other primary products have been developed, notably phosphates and potash. These raw materials account for around one-third of all Jordan's export receipts, but prices are prone to severe instability in international markets.

Most manufacturing industry in Jordan is small scale, and primarily oriented toward the domestic market.

The service sector of the Jordanian economy is well developed with a well-organized banking system whose assets are almost as large as those of Syria, a much more popular country. Amman also has the second most important stock market in the Arab world after Kuwait. The Jordanian capital never inherited Beirut's financial entrepot role as a banking center after the Lebanese civil war as some had hoped. Instead, the business went to London and mediation
between the Gulf states and Europe became less important with the development of modern telecommunications.

The tourist industry is the main service sector activity, but the number of visitors, most of whom come from other Arab countries, remains below 2 millions. Around 300,000 Europeans and Americans visit Jordan annually, often combining business with trips to Petra and Jerash and Jordan's other antiquities (Wilson, 1991, pp.2-4).

As a result of unbalanced sources and the challenge of enormous needs, Jordan depended on foreign aid since the early years of independence.

Jordan's balance of payments is characterized by a chronic trade deficit that dates back to the early 1950s. Remittances and aid which used to inflow from the Gulf have created distortions and contributed to some of the characteristics of superficial luxury of Jordan's society (Wilson, 1991, p.4). But all these outside aspects collapsed after the Gulf wars, especially after the war of 1991. Jordan, then, turned to be a society of high consumption but little production. Jordanian expatriates are increasingly returning home, mainly as a result of the last Gulf War and of political disagreements with the gulf countries, and partly as a result of recession in the Gulf countries with the slump in oil prices. Jordan's main
resource is its people, and those who work abroad bring monetary benefits to the economy. Skills used and acquired in the Gulf countries are seldom used later for the benefit of Jordan, and in a sense the brain drain causes lasting damage, as many of the most talented migrate, and even when they return, they seldom use their brains in a way which could aid economic development. The mass returning of Palestinians to Jordan from Kuwait after the last Gulf war accumulated huge numbers of jobless people, and unemployment jumped up to, approximately, 48 percent. Jordan's economy, now, is under severe recession, and how to get rid of it is the biggest challenge to the country.

6. Values and Culture

The Jordanians of today are the sons and grandsons of people who, together with the Syrians, Palestinians, Lebanese, and Iraqis, formed the Eastern Arab population of the Ottoman Empire until the end of the First World War. Any attempt at analyzing the dominant culture and values must therefore start with the general Arab society and only secondarily deal with the question of specific Jordanian subculture within this general picture.

There are several values which have for hundreds of years been extolled in the Arab World. Some of these values are older than Islam but continued through the stream of
culture until the modern age. Most of these values still fire the imagination and influence as well as the behavior of the people of Jordan and other Arab states, acting as a powerful motivation in social and individual endeavor (Patai, 1958, pp.280-281). The relative importance of these values varies among the major ecological groups. These traditional values are strongly upheld in the desert and the village. In the cities under the impact of modern technology and other influences, many traditional values are on their way out.

Among the nomads, the desert dwellers, independence, freedom, leisure, honor, pride in noble blood, bravery, generosity, hospitality, protection of the weak, vengefulness, forgiveness, familism, are all felt and verbalized as the chief virtues, interests, and motivations.

The mores of the village are greatly influenced by several of these nomadic values, while others are absent. Independence and freedom, for instance, are pale. In most villages many generations of semi-serfdom under the rule of feudal landlords and their callous representatives have taught the peasants submission instead of independence, and acceptance of the role of "followers of the powerful" instead of freedom and leisure. Proverbs, or popular sayings advise: "whoever marries my mother will be my
uncle". This means: I will submit to whoever has power in government or elsewhere. Another saying advises: "If you pass by a group of people worshiping a calf, collect grass and feed it." It is clear that such values justify subjugation and acceptance of any kind of authority. Most other nomadic ideals are present in the village as well, with the possible exception of familism, which in the village assumes a rigid, almost compulsive form.

Tribal competition takes the form of inter-village strife, an area of tension among constituent families for the local jobs and ranks, especially, for the municipality of the village, or the election for parliament. According to the values, the candidacy for such jobs is not for common interest. It is for the honor of the family.

The city differs more from the village than the latter does from the nomadic tribe. Here, hand in hand with other pronounced class differences one finds a wide range of variations in orientation: at one extreme are those population elements closely allied in interests to the villagers—these are mainly villagers newly arrived in the city, and portions of the conservative lower and middle class groupings. At the other extreme a conscious rejection of most of those values and motivations is found among the westernized upper crust and the middle class modernized
intelligentsia. In between these two extremes are the majority who are careful to retain the Islamic positive values and are open-minded to the positive values of modern life.

In many cases old values are retained in the city but given new interpretations. Freedom, independence, and leisure, for instance, are values that have high priority in Jordanian society but that have taken on a specific coloration in each of the three major population elements. For the nomad, freedom means to roam the desert unhindered, and in general to do as he wishes and likes. Independence means absence of interference by any outside power which is not part of the traditional tribal structure. It means independence from any state or governmental authority. But it does not mean independence from the authority of the head of the family and the heads of the successively larger kin groups, because subordination to these authorities is part of his social order. Leisure means the absence of the compulsion to toil unceasingly, like the peasant or the artisan, time to spend in the council tent, to listen to stories, drink bitter coffee, and rest between the strenuous rides or other activities (Patai, 1958, pp.282-283).
For the village peasant, freedom, independence, leisure have a different meaning. The landless villager aspires to acquire land and attain freedom and independence from the small holder. The small holder who has barely enough land to sustain his family yearns for the freedom and independence that would be his if he had three times as much as land. Independence from employment, being one's own master, owning one's land and house—these are appreciated by all. Leisure means to the village people the ability to celebrate his occasional festivals, wedding parties, and mutual visits with the family members and friends.

In the city, while freedom, independence, and leisure remain ideals, their connotations are again different. Here freedom and independence tend to acquire modern meanings borrowed from democracy and political arenas.

City dwellers seek freedom and independence in a national sense, strive for the liberation of the country from actual or probable interference by outsiders and manifest a strong emotional reaction to any semblance of political or economic imperialism, colonialism or dictatorship. Leisure also takes on a new meaning in the city: New mass-produced media of entertainment, national theatres and Hotel halls. Amman today offers about as much choice of entertainment as any western city of similar
proportions. Cafes with blaring radios, TVs, sport clubs, swimming pools, musical parties, arts festivals etc., provide additional amusement and opportunity for spending one's earned income.

With respect to culture, Jordan has always shared a degree of cultural unity with the Arab Middle East. Obvious among the unifying factors that make it possible to speak of an "Arab World" are the Islamic religion, The Arabic language, and the Arab culture.

The faith represents a shared body of values and guidance for individual conduct and group relations which gives a distinctive character to culture and life. For Jordanians and most Arabs this broadly integrating feature of Islamic and Arab culture has in some degree worked to retard the development of the kind of national separateness implied by recently drawn political boundaries.

Arabic language, in its written and read forms, provides a common medium of communication in the whole Arab area despite differences among local dialects. Moreover, Arabic, the language of the Koran and of the whole literary tradition, has acquired a deeply social effect which gives intensity to a general sense of Arab identity (Harris, 1958, pp.1-2).
The integrating factors of religion, language, and the rule of a national government crosscut the social differences among nomads, peasants, and citymen, but do not transcend them. Yet there is a solid awareness of the world beyond Jordan's boundaries. There is a strong feeling of the Arab unity; as the existing boundaries among Arab countries are viewed as a harmful achievement hammared by the imperialistic powers.

7. Education

Despite limited resources available, the wise leadership of Jordan realized that investment in education is a critical means towards development and modernization. Educational authorities in the country give great importance to the development of the educational system. This is witnessed in the rapid growth in numbers of students, teachers, schools, and higher educational institutions since 1952 when his Majesty, king Hussein ascended the throne. School education followed the 6:3:3 model until 1988 when compulsory education cycle was expanded to ten years. Generally speaking, education in Jordan is centrally controlled and regulated by the Ministry of Education. Majority of high school graduates continue their higher education in the fifty community colleges and twelve
universities available in the country. Details of Jordanian educational system (including its general objectives, structure and organization, and its problems) are presented in a separate chapter of this study.

8. Jordan's Society and the Challenge of Change

The changes which are remaking Jordanian life are most rapid in the cities, slower in the villages and among the nomads. Technological innovation is not restricted to the urban centers but is present in the irrigation and cultivation projects, and modern methods which benefit rural communities. Wealthy Bedouin tribes are using modern agricultural machinery and supervised peasant labor on their domains. New political ideologies are competing for the allegiance of people whose political activities until recently was restricted to the control processes of kinship group and local community.

Three major factors have contributed to change in the traditional tribal structure of Jordanian society: sedentarization, education, and communication. Any of these phenomena can be viewed as fundamentally different from the others and as either a cause or effect of each other. Because of the interactive nature of the three, each had a distinct, significant, and relevant impact on social change.
Two factors of change deserve special mention are government and change itself. First, throughout the Middle East, governments have been the sponsor and mediator of change, at least in its initial stages. Many of the questions that political scientists, historians, economists, and sociologists raise in this regard, demonstrate the lack of broadly based classes to introduce and mediate social change. Second, it is important to recall that the rapidity and intensity of social change in countries like Jordan tend to create short-term disequilibria that in turn cause additional change (Jureidini, 1984, p.30).

The government in Jordan has encouraged the settlement of the Bedouins through a variety of techniques. The effects of sedentarization are far-reaching. Providing education and other social and developmental services intended to create an identification with the state. It is clear that settled tribes are much easier to reach. Settled groups also have a greater vested interest in the state than nomads, who can move to another environment when adversity looms. Settled population tend to redefine their concepts of community.

The government in Jordan invests in education, and uses it as a means of change. Education has a direct impact on attitudes and perceptions of people because it provides a
new range of employment opportunities and a vehicle for government participation and influence. Education, also, exposes its recipients to new ideas and approaches and provides new choices and alternatives. In Jordan the way of life associated with education and the concept underlying it contribute to aspirations of social mobility and to the absorption of tangible measures of social mobility. A new set of values is acquired, and while these new acquired values may not replace immediately the tribal modes, they do supplement and gradually erode the latter.

Modern society cannot be dissociated from far-reaching implications of mass communications, which shaped it far more than one realizes. Jordan, like other developing countries, is dramatically affected by the communications revolution. Supervising a major study of Jordan's Bedouin population 1978, Kamel Abu-Jaber notes that even nomadic tents have television antennas and cassette players and transistor radios (Jureidini, 1984, pp.36-37).
CHAPTER III

THE EDUCATIONAL SYSTEM OF JORDAN

Introduction

Included in the description of the educational system in Jordan will be: Jordan's educational system general objectives; its general structure and organization; preschool education, basic education, secondary education, and higher education. Added to that, a brief mention of problems facing Jordan's educational system will be provided. After this, a fairly comprehensive presentation of Jordan's experience with computers in schools is described. This will consist of: A brief discussion of published research about educational technology and/or computer utilization in Jordan's schools and in other countries, a brief mention of the problems facing the Ministry of Education in Jordan regarding utilization of educational technology in general.

Based on Hawkridge's documentation of Jordan's experience with computers in schools, a description of the following issues will be presented:
- reference to His Majesty King Hussein's initiative, and subsequent efforts by H.R.H Crown Prince Hassan to put computers in Jordan's schools;

- description of Jordan's first steps to put computers in schools;

- listing of educational aims of the newly established Computer Education Directorate;

- description of problems and difficulties that accompanied the computer education development project in Jordan's schools;

- future planning for computer education in Jordanian schools; and

- presentation of the attitudes of teachers, principals, parents, and students towards utilization of computers in schools.
The Development of Education in Jordan

Jordan in Brief

Jordan is a developing country that emerged as a modern state in 1921. It gained its political independence from the British Mandate in 1946, the year when Emir Abdullah bin Al Hussein was proclaimed King. Among the Arab counties, Jordan is considered as one of the most advanced countries of the Arab world. In 1952, his Majesty, King Hussein became the king of the Hashemite Kingdom of Jordan, who led the country to an advanced state of development and modernization.

Jordan is located near the Eastern end of the Mediterranean Sea. It has a total area of 89,888 square Kilometers. A large segment of Jordan's area is desert. Fertile land is used for farming as well as for seasonal crops following winter season.

Jordan is part of the Arab world. Majority of the population are Moslems; the rest are Christians. The official language of the county is Arabic. The population of Jordan jumped to 4,152,000 by the end of 1993, with an annual population growth of 3.8 percent. Urban areas accommodate 77.9 percent of the population. 42.7 percent of Jordan's population are below the age of 15. The main groups of inhabitants that Jordan's population consists of
are: the villagers who farm for living; the urban population who work in the public or governmental agencies, private businesses, and the Bedouins who are increasingly settling down in permanent houses. Jordan has been governed by a parliamentary system and constitutional hereditary monarchy since the establishment of the state in 1921. The upper house of the senate and the House of Representatives represent the legislative power in the country (Abu Sheikha, 1994; Bermanet & Zash, 1988).

Development of education in the Hashemite Kingdom of Jordan has been well documented in a national report prepared by Mohammad Abu Sheikha, the General Director of Planning, Research and Development at the Ministry of Education. This national report was submitted to the International Conference on Education held in Geneva in 1994.

Description of the various aspects of Jordan's educational system in this chapter will basically be according to information presented in Abu Sheikha's report. Where applicable other resources will be cited.

According to Abu Sheikha (1994), "the education system in Jordan is based on the whole aspirations to freedom, justice, human and economic development to achieve a significant level of productivity and modernization. It is
also based on the constitution which emphasizes the preparation of human Arab-Islamic moral and spiritual values and the identity of Jordan people... the education system was subjected to over-all comprehensive assessment process by holding the first National Conference on Educational Development in 1987 under the patronage of His Majesty, King Hussein... the conference set forth the basic guidelines and principles of the General plan for Educational Reform [for the years 1989-1998]" (p.13).

The structure of the school system in Jordan followed the 6,3,3 model: six years in primary schools; three years in preparatory schools; three years in secondary schools. The recently declared law of Education No. 3 for 1994 expanded basic compulsory education cycle to ten years instead of nine. Comprehensive and applied secondary streams of education were reduced to two years.

General Objectives of Education

"The general objectives of education in the Kingdom emanate from the philosophy of education". These objectives are manifested in building up a citizen believing in God, affiliated to his country and nation, endowed with human virtues and perfection, and having a full developed personality in its various aspects, physical, mental, spiritual, and emotional and social, whereby the student, at
the end of the educational cycles, will become a citizen capable of:

1. using Arabic language in self-expression and for easy, smooth communication with others;

2. conscious assimilation of facts, concepts and relations connected to the natural, geographic, demographic, social and cultural environments, both locally and internationally, and utilizing them effectively in his everyday life;

3. assimilation of the elements of heritage, and deriving from them the crucial factors to comprehend and develop the present;

4. assimilation of Islam and ideology and law, and comprehending consciously its values and trends;

5. openness to human cultures for commendable values and trends;

6. mathematical thinking and using numerical systems and mathematical relationships in scientific fields and every day life affairs;

7. assimilation of facts, concepts, principles and theories dealing with them, using them to explain the phenomena of the universe, and utilizing them for the service of human beings, solving their problems and providing for their happiness;
8. conscious assimilation of technology, acquisition of skills in dealing with it, and producing, developing and utilizing it for the service of society;

9. collecting, storing, retrieving, processing and producing data, and using it to explain phenomena, anticipate various probabilities of events, and make decisions in various fields;

10. critical, objective thinking and following the scientific method in observation, research and problem solving;

11. facing requirements of work and being self dependent by acquiring general and specialized vocational skills;

12. assimilation of health regulations and practicing related habits and sport activities for a balanced physical growth;

13. appreciation of aesthetic values in the various arts and in life;

14. clinging to citizenship rights and shouldering its responsibilities;

15. feeling of Islamic and national dignity;

16. utilizing the special capabilities and free times in developing knowledge, creativity, initiative, persistence in work and innocent recreation;
17. appreciating the humanness of man, fashioning positive trends and values towards oneself, others' works and social progress, and following democratic principles in individual and social behavior; and
18. personal adaptation, acquisition and assimilation of social and moral behavior in dealing with others and with the vicissitudes of life" (Abu Sheikha, 1994, pp.16-17).

General Structure and Organization of the Educational System

Overall, the educational system in Jordan is centralized under the supervision and regulation of the Ministry of Education (El-Hmaisat, 1989). The Ministry of Education is responsible for all major educational decisions related to school curricula, educational planning, and administration of general examinations. Several directorates and offices, located in the Ministry's central office, are entrusted with carrying out as well as following up the myriad responsibilities and functions of the Ministry of Education. However, adopting the principle of decentralization, the Ministry of Education divided the country into district education directorates run by general directors accountable to secretary general of the Ministry
of Education and in charge of implementing educational policies in the local directorate area (Bermanet & Zash, 1988).

Although schools in Jordan are run by the Ministry of Education, it is important to note that a small percentage of total school enrollment is in schools run by other ministries or private agencies such as: Ministry of Defense, Labor, Health, Tourism, Islamic Affairs, Universities and by the private sector (Abu Sheikha, 1994; Bermanet & Zash, 1988).

As described by Abu Sheikha (1994), the structure of the educational system in Jordan is divided into:

1. Pre-school education
2. Basic education
3. Secondary education
4. Higher education

In pre-school education children aged four and five are expected to: acquire sound health habits; develop positive social relationships; consolidate attitudes towards school life; be prepared for smooth transition from home to school. All pre-school institutions are run according to the Ministry of Education policies, by-laws and objectives, however, pre-school education is non-compulsory offered by private and voluntary sectors.
At the age of six children begin their basic education stage, where they receive a basic and well-balanced education in the social, emotional, intellectual, physical, and spiritual aspects of their personality development. Children spend ten years in this basic education cycle that is expected to create the basis for successful learning at higher forms of education.

Having completed the basic education cycle, children move to the secondary education phase where they spent two years (16-18). Expected to have gained a broad based, general and undifferentiated education during the ten years of basic education, children are provided with specialized cultural, scientific, and vocational experiences which meet the existing and anticipated needs of society. Secondary education is designed to prepare children either to take up higher levels of education or to enter into the world of work. Admittance to the secondary education is according to children's interests and abilities.

Successfully completing the secondary schooling requirements, school graduates apply for admission in institutions for higher education which consists of two levels:

1. intermediate level for two years in community colleges and similar institutions; and
2. university level for at least four years of study in state owned or private universities which amounted to twelve universities, seven of them owned by private sector. Students not admitted to Jordanian universities travel abroad. Around 35 thousand Jordanian students study abroad in different countries.

Finally, added to these four stages of formal education in Jordan, is the literacy and non-formal education which aims to reduce illiteracy to about 8% by the year 2000. Eventually, however literacy programs and non-formal education is meant to eradicate illiteracy in accordance with the framework of actions approved by the world conference on Education for All.

Problems Facing Jordan's Educational System

In brief, major problems facing the Educational System in Jordan can be listed as:

1. lack of funding for Education; money is scarce;
2. limited resources in terms of equipment and educational materials;
3. lack of qualified personnel;
4. high demand for admission to secondary schools and universities; and
5. due to the population explosion, the Ministry of Education is faced with the dilemma of trying hard to expand the number of teaching personnel and educational facilities fast enough to keep up with this fast population growth (Bermanet & Zash, 1988).

Computers in Jordan's Educational System

Talking about the introduction of computers into Bahrain's secondary schools, Chaudhry and Fakhro (1986) write "in most countries there is a feeling that we are going towards a 'computerized society'; i.e., a society where computers are going to play a fundamental function in all professional activities and also in our private homes. This can be summarized as a computer on every desk" (p.439).

Like other countries the Ministry of Education in Jordan embarked on a major project to introduce computer technology into schools. Brief references to Jordan's experience with computers in education are located in very few reports and research articles.

In a national report about the development of education in Jordan, Jaradat and Abu Sheikha (1992) indicate that computer education provided by the Ministry of Education has become mandatory for all tenth grade students of basic education. They also report that "computer instruction aims at acquainting pupils with the basic elements of the
computer as well as with the programming languages. Pupils are prepared to gain insight into the future use of computer in life and study. The plan aims at providing all basic schools with computer units. At the secondary level, computer instruction will be optional" (p.42).

In the 1994 national report about the development of education in Jordan, in his reference to computers in education, Abu Sheikha (1994) reports "training courses and workshops have been conducted in August of 1992 for educational supervisors, school principals, heads of personnel divisions and computer instructors with the aim to: enable trainees to acquire skills required for the utilization of computer for educational and administrative purposes; familiarize educational staff with computer knowledge" (p.42).

Discussing the historical development of educational technology utilization in Jordan, El-Hmaisat (1989) indicate that Jordan's utilization of technology was meant to accelerate development in different facets of life. In El-Hmaisat historical description of educational technology utilization in Jordan's schools, four areas were included: 1. audiovisual aids and educational materials; 2. educational television; 3. educational radio; and
4. computer education.

El-Hmaisat's conclusion was that the experience of Jordan's educational system with computers was still new, and that learning from other countries' experiences would be helpful. However, El-Hmaisat lists a set of problems facing the question of educational technology utilization in Jordan. These problems include:

1. "shortage of instructional media and materials";
2. "shortage of qualified personnel in the area of instructional media, production, design, etc.";
3. "lack of facilities, labs, workshops, appropriate buildings";
4. "shortage of financial support"; and
5. "teacher's perception of instructional technology as a tool; not as part of the curriculum" (p.19).

Another scholar from Jordan who investigates the factors affecting the use of media in instruction by faculty members in Jordanian community colleges, supports the findings of El-Hmaisat (1985). In his article, Abu Jaber (1987) indicates that lack of instructional media, lack of knowledge, abilities and training of faculty members about available equipment and their utilization, lack of promotion and salaries, and lengthy procedures for requesting instructional media are the major factors deterring media
utilization by faculty members in Jordanian community colleges (p.29).

However, besides those brief references to the experience of Jordan's educational system with computer, it is the belief of the author that the comprehensive description of Jordan's experience in this regard presented by Hawkridge and his colleagues (1990) is one of a kind. Therefore, in the following section about computers in Jordan's schools, I will borrow from it extensively.

The experience of Jordan as a developing Arab country with computers in education has been well-documented in a book titled "Computers in Third World Schools: Examples, Experiences and Issues" authored by David Hawkridge, John Jaworski and Harry McMahon. In this book experiences of twenty three developing countries with the use of computers in education were described. Descriptions of these experiences were mostly based on the authors' observations during their long visits to some of these counties. Jordan was one of the countries that have been visited for this study. Following will be a summary of Jordan's experience with computers in schools as described by Hawkridge and his colleagues.

According to Hawkridge et al., (1990) Jordan has taken several steps towards the utilization of computer technology
in its schooling system. The first steps towards computer education in schools were taken by the Ministry of Education in the year 1984/1985 when two secondary schools were included in a pilot project (Hawkridge et al., 1990). Later, an extended project to be carried out in collaboration with British government and educational agencies aimed at introducing computer education to around 200 secondary schools by the beginning of the year 1990 (Hawkridge et al., 1990). Naturally, the working teams and/or steering committees have encountered a host of obstacles and problems throughout the various stages of the project. Nevertheless, the desire of the educational bodies to develop computer education in schools is ever-growing. Computer education is viewed as having a function in achieving national goals which ultimately contributes to the national development. It (computer education) is viewed as essential to provide students with experiences that will help them to cope with the roles of today as well as develop enough flexibility to obtain the new skills required for tomorrow.

On the occasion of the opening of the National Assembly in 1985, His Majesty King Hussien called for the re-evaluation of the educational system in the country in light of the new scientific developments and technological
breakthroughs; particularly computer innovations. Later, efforts for the developments of computer education were culminated by the presentation of a national systematic plan at the first National Conference for Educational Development in 1987. That plan was prepared under the leadership of His Royal Highness Prince Hassan. This reflects the desire to introduce computer technology into the schooling system at the highest level of leadership. Creation of the Computer Directorate as part of the Curriculum and Educational Technology branch of the Ministry of Education is an evidence of the desire to incorporate computer technology in schools. The Computer Technology Directorate is entrusted with the implementation and/or enactment of the national projects/plans for the development of computer education. Educational aims of the Computer Education Directorate which is part of the Ministry of Education are as follows:

- "to prepare and qualify students for living in an advanced technological environment where computers and information systems form the basic foundations for development and to encourage the process of technology transfer,"

- "to increase the effectiveness of educational operations through developing the educational methods and techniques of teaching,"
"to develop the students' mental skills and their ability to learn through using the computer as a tool,"

"to develop the team-work spirit among students through working in groups,"

"to identify the role of the computer in developing the society and to become aware of the practical application of computers,"

"to improve and develop the Jordanian potential as a leading distinguished center in the Arab world in areas of computers in school and the production of educational software" (Hawkridge et al., 1990, p.154).

Description of the Problems/Difficulties that Accompanied the Computer Education Development Project in Jordan

Again, according to Hawkridge et al., (1990), as a developing country Jordan is confronted with lack of technical expertise among educators (educational, administrators, principals, curriculum developers, teachers and other educational bodies), which is very much needed to come to grips with the complexity of issues pertaining to computer education. Even the technically oriented staff working in the Ministry of Education lacks the necessary training and skills to handle the fast growing, ever-
changing computer hardware. In many cases, expertise of the technical staff with computers comes from local in-service training sessions, or workshops held in England or elsewhere. Of course, no matter how proficient the technical staff in English or other foreign languages, the overall benefit of such workshops will always be limited because of the language barrier, on the one hand, and on the other hand, because of the limited time of hands-on experiences available to the staff during those workshops.

Added to the problem of lack of technical expertise to deal with imported hardware is the complex problem of inability of curriculum developers and software designers at the Ministry of Education to produce Arabized software. Curriculum specialists lack basic awareness training to figure out which part of the curriculum would benefit most from use of computers in support of students' learning. Even the question of converting already made foreign software to be acceptable in the cultural environment of Jordan is indeed still a difficult one. As such, the computer education development project in Jordan suffered from sudden decisions made by foreign software companies to stop producing Arabized software. Such state of affairs caused long delays and led the hardware supplier to change
hardware specifications in order to meet alternative software.

Less serious problems that accompanied development of computer education in Jordan included: significant differences of opinion among different parties concerned with the project with regards to the length of computer education provision course, the content of the course, its objectives and the functions that computer education can play in supporting desirable educational reform in the first place. Also, provision of a stable electricity supply, delays in machines installation, lack of coordination among different bodies involved in the development of the project, and finally, confusion and/or lack of clarity of the roles attached to various representations working on the project. Such representations included people form the Ministry of Education, the Ministry of Planning, the Royal Scientific Society, and the British Council in Jordan.

Despite the existence of the aforementioned problems/obstacles, the computer education project made its way, and decisions were made to establish a one year, two lessons per week to teach about the broader field of information technology for 16-year-old as a main subject course. This information technology foundation course was intended for students in the first year of secondary school.
And as a result of raising the school leaving age to 16, all students will have the experience of learning about the broader field of information technology. Before raising the school leaving age to 16, only intermediate students going on to their secondary education had the experience of learning about information technology. In other words, all school students will have the experience of learning about information technology before they leave school.

**Future Planning for Computer Education in Jordanian Schools**

As identified by Hawkridge et al., (1990) the Ministry of Education future plans for the next coming years entail: focusing on the information technology basic course, widening the scope of the computer education development project so that all secondary schools in the Kingdom are included, extending the curriculum of the information technology basic course, and finally experimenting with developing and implementing computer-assisted instruction across school curriculum. Decision for or against incorporating (introducing) computer education into earlier school stages will be made contingent upon careful evaluation of the students experiences with computer education in secondary schooling.
The Attitudes of Teachers, Principals, Parents and Students Towards Computer Education in Schools

Still, as described by Hawkridge et al., (1990) attitudes of students, parents, teachers and school principals and administrators towards computer education were mixed. As with any educational innovation, students were very excited and enthusiastic for computers. In general, students tended to react positively to the presence of computer in school by going to the computer room in their free time to continue their studies or to play computer games more often. From their side, despite their limited or even no knowledge of computer technology, parents were supportive of the innovation. Some parents, the rich parents of course, showed their enthusiasm and support to the computer education development project in schools by willing to purchase computers for their children's home use.

In particular, teachers' reactions towards the computer education project ranged from some being very positive to the innovation to those who are indifferent and not even willing to be involved at all. Overall, the teachers who were selected for training were very enthusiastic and positive in their reaction to the innovation. However, they were discouraged by a host of problems such as: difficulties with local power supply, software/hardware incompatibility,
and the effects of heat, dust on machines workability. And finally, attitudes of school principals and administrators ranged from welcoming the innovation as a form of change to being neutral or negative. It appeared that negative attitudes towards computer education among school principals were largely due to lack of knowledge about computers and their potential implications for educational uses.
CHAPTER IV
COMPUTERIZATION IN DEVELOPING COUNTRIES

INTRODUCTION

In this chapter of the literature review, a description of computerization in developing countries will be presented based on research available. Also, included in this chapter are: Discussion of the general issue of technology transfer from the developed to the third world countries, problems facing educational systems in the third world, and considerations for computer technology adoption in third world schools.

The remarkable growth of computer technology as witnessed in technologically developed nations has been described as a major achievement of the past several decades (Hausman, 1985). Computers are heralded as capable of doing many things thought to be distinctively human (Hausman, 1985; Minsky, 1984). Viewed as one of the most widely publicized optimist speakers of future computer accomplishments (i.e., what computers will be able to do), Marvin Minsky writes that "computers can probably do
anything brains can do. They just need the right information" (Minsky, 1984, p.34). Portraying the invention of computers as an innovation of momentous magnitude, Herbert A. Simon states "nobody really needs convincing these days that the computer is an innovation of more than ordinary magnitude, a one-in-several-centuries innovation and not a one-in-a-century innovation or one of these instant revolutions that are announced every day in the papers or on television. It really is an event of major magnitude (Simon, 1982, p.37).

In many industrially advanced countries computer technology infiltrates to almost all sectors of life (Burnham, 1983; Friedrichs & Schaff, 1982; Lind, 1991). In the United States alone, Hentrel & Harper (1985) state that the number of computers in use is expanding at an estimated 24 percent each year, and that in the decade or so since the computer invention, computer technology has found its way into some one million businesses, schools, and homes. (Certainly, the number of uses as well as growth rates of computer technology are very much bigger now in 1995). Hentrel and Harper (1985) also assert that there is an increasingly growing recognition in those technologically advanced countries of the need for "computer literate citizenry."
Implications of developments in computer technology for the world of education are staggering (Hickey, 1983). Realizing these implications of computers for education, Bork writes:

We stand at the beginning of a major revolution in the way people learn......we are moving rapidly toward a future when computers will comprise the dominant delivery system in education for almost all age levels and in most subject areas. Not since the invention of the printing press has a technological device borne such implications for the learning process (Bork, 1985, p.1).

The decade of the 1980s or so has witnessed an emergence of an unprecedented interest in the use of computers and computer related technologies in schools (Pelgrum & Plomp, 1991; Rich, 1991). Many industrial governments (mainly in Western countries) introduced large numbers of computers into their schooling systems (Bork, 1985; Hawkridge et al., 1990; Zakariya, 1982). Describing this ever-growing momentum to put computer power in schools, Rich (1991) states that "educational authorities at all levels have put great efforts into equipping schools with computers, training teachers and students in their use, and experimenting with various aspects of computer-assisted instruction." Ever since, the use of computers in schools
has grown rapidly. The latest hype or example of the potential of computer technology to address educational challenges is the Internet (the information superhighway as described by the American press). Already, there are widespread enthusiastic claims of how education will be transformed by incorporating the Internet in today's classrooms and other learning situations (Kellogg & Viehland, 1995).

This widespread use of computers in schools in Western countries has been done with the hope that utilization of computer technology in schools will contribute to the social and economic development of those countries, seeking ways to improve schools as well as find solutions to existing educational problems, and support desirable educational reforms (Baker, 1985; Hawkridge et al., 1990; Hefzallah, 1990; Noble, 1991). A widely recognized assumption held by governments of many developed countries is that production and consumption of information will be the primary source of economic and social development (Carnoy, Daley, & loop, 1987). As computers are very powerful and fast information processing tools, they are viewed vital for the production and dissemination of information (Hawkridge et al., 1990).

To put things in a general perspective, today's computer experts believe that: computers would eventually be
able to solve a myriad kinds of problems that humans cannot solve; that people will depend on computers for managing the complex life affairs of the future; that adoption of computers in schools will be a rational way of dealing with today's educational problems or illnesses; that expectations among educational authorities at all levels are high that computers will not only cure education's illnesses, but they will also transform learning and teaching; and that indications are that drastic computer technology developments will continue for a long period of time (Baker, 1985; Bork, 1985; Dertouzoz & Moses, 1979; Friedrichs & Schaff, 1982; Hausman, 1985).

In many respects, whether in education or other life sectors, developing countries followed the example of Western countries in their efforts towards computerization in society (Hawkridge, et al., 1990; Lind, 1991). In Lind's book *Computerization in Developing Countries: Model and Reality* (1991), he points out that advances in computer technology witnessed in many life sectors in the developed countries have not left developing countries unaffected. Longing for computerization to achieve social and economic development in developing countries has become an issue of much concern (Nag, 1981). A strong wish for speeding up the
use of computers in developing countries is expressed in the following statements:

Trying to describe an infrastructure and policy framework for development of computer technology in its totality in developing countries, Gupta (1981) argues that it is now an accepted fact that there are various arenas in a developing country where the pace of development can be speeded up significantly by the use of computers (Gupta, 1981, p.61).

Emphasizing the need for regional computer cooperation in developing countries Benmokhtar (1984) asserts that there are many in developing countries who found their hope in the computer revolution. They see in it a way to realize their dream to overcome poverty and mediocrity and to reach a society of equity and welfare (Benmokhtar, 1984, p.127).

Commenting on what many experts think of computers in third world education, Wali (cited in Marshall, 1984, p.377) points out that many experts think the computer is the panacea to all Nigeria's problems even before knowing what the problems are.

Governments of developing countries have in general hesitated to follow the Western lead of using computers in schools. The reasons for developing countries' hesitation to put computer power in schools were diverse, but mainly
those reasons were very much related to financial difficulties as well as other cultural factors related to each country (Hawkridge, 1990).

Recently, it is noted that governments of developing nations find themselves under pressure to use computers in schools, and that educational policy makers there insist that they can no longer escape considering computer technology in their educational systems (Lind, 1991; Marshall, 1984; Rahim & Pennings, 1987). Addressing a group of top decision-makers in the African country of Tanzania, a Professor from the University of Science and Technology in Ghana wrote "we paid the price for not taking part in the industrial revolution of the late 18th century because we did not have the opportunity to see what was taking place in Europe. Now we see that information technology has become an indispensable tool. We can no longer sit down and watch passively (cited in Hawkridge, 1990, p.7). A widespread assumption prevails in developing countries that it is natural to view computer technology as an emerging technology with major implications for the educational process (Lind, 1991; Rahim & Pennings, 1987).

The experiences of developing countries with the use of computers in education vary according to local factors pertaining to each country, as well as acknowledgment of the
need to introduce computers into educational systems (Hawkridge et al., 1990). However, overall, governments in developing countries share relatively the same concern regarding the need to consider the implications of computer technology for education (Lind, 1991; Rahim & Pennings, 1987).

In his book, referred to above, Lind (1991) discusses two things that characterize the diffusion of computers in developing countries: One is the high degree of confidence exhibited by many policy makers who perceive computer technology as a blessing for their societies. He likened this perception of computer technology to Pandora's box full of hopes and promises about contributing to the process of development and progress. The other thing is the almost total absence of a critical debate looking into whether and to what extent computer technologies, generally produced in Western countries, can be applicable in developing countries cultural contexts. He points out that the enthusiastic attitude towards computers in developing countries, may not be in proportion to real achievements. Lind regards this enthusiasm as so high to the extent that it is more or less taken for granted that Western technology is generally applicable in Southern cultural contexts. Ending his
discussion in this regard, in a candid and/or honest manner
Lind states:

One of the basic characteristics of modern computer technology is its total association with the most advanced industrialized countries, being an integrated part of the scientific and technical development. By imitating this technology many developing countries hope to take part in a comparable technical and economic development and this imitation process includes not only the skills necessary to handle the equipment, but also the conceptual thinking that surrounds and accompanies technology. [This] conceptual thinking is not neutral, neither semantically nor culturally, nor from a social, technical or economic point of view, but is closely related to a particular society, or group of societies, sharing a common value system (Lind, 1991, p.8).

To those two things which characterize computer technology diffusion into developing countries, Lind goes on to say that:

The use of computers in many developing counties is characterized not only by low utilization but also by limited benefit to the user (p.19).

Trying to discuss the different kinds of problems computer users in developing countries face, Lind classifies
these problems into three categories. Following is a discussion of these categories:

**Operational Problems:**

Computer users in developing countries encounter operational problems because of technical constraints as well as inadequacy of skills or expertise of personnel, necessary to run installed computer systems. Low utilization of installed hardware as well as lack of indigenous software production in developing countries are due to such operational problems. As an example of the operational problems, Lind reports that when the Indian government introduced the British BBC computers into schools, it was noticed that the selected equipment did not work properly, as it was not designed to work under high degrees of temperature and humidity that characterize weather conditions in many parts of India. Of course, other manifestations of technical problems similar to those evidenced in India may be witnessed in other developing countries. These may include: dusty climate, sand storms, uncertain or sudden outages of power supply, lack and/or chronic shortage of spare parts for installed computer systems or anything electronic in general. In schools in developing countries technical problems may range from non
availability of air conditioning or cooling units to nonexistence of electric outlets in the classrooms.

Contextual Problems:

Here, Lind explores the question of fit between computer systems designed based on models, values conceptions, and assumptions of Western cultures, and computer applications in developing countries. He claims that a weak fit exists between models of mainly Western culture design and applications in developing countries. Other contextual problems that influence computer utilization in developing countries include: semantic discrepancies in the wording and understanding of emerging phenomena, references to different value systems, and different concepts and interpretations of rationality. He raises the question that computer programs developed according to models originating from a Western view of problems and solutions and/or Western perception of reality may not be always compatible or synonymous with the actual practices and information needs in developing countries.

To further illustrate the influence of contextual problems on computer technology utilization in developing countries Lind provides two examples:
In the first example, Lind writes:

A European consultancy firm has been commissioned [by a West African country] to implement a new computer based clearance system at the customs authority. At a ceremony, as the new system is officially handed over to the authority, it turns out, however, that a very specific feature is missing. The feature is an extra key on the keyboard with a very particular function, namely to reduce customs duty by a predefined percentage each time the key is pressed. The function is required on those occasions when the officer on duty finds reasons to reduce the customs duty, calculated by the computer according to formal tariffs. The situation occurs, for example, when the officer receives a sufficiently valuable gift from a client! The necessity of this feature is very obvious, because without it the customs officers are reluctant to use the system. The consultant team must postpone the opening ceremony until the missing feature has been included (Lind, 1991, p.4).

This example, Lind thinks, tells important things: First, the way actual reality works in a developing country must be embodied in the computer solution. The computer solution adopted must reflect how reality works in the adopting country. Second, applicability of computer-based solutions may be culture specific. Even very good computer-based solutions,
proved to be effectively successful in one setting (context), may not be similarly successful in another context.

Third, when two value systems or norms of rationality representing two different cultures meet, a clear conflict appears. A dichotomy may surface when two different value systems are to be unified in one computer system. The same computer solution may not fit into both cultural milieu.

In his second illustration of the influence of contextual problems on computer technology usage in developing countries, Lind borrows an example given by Narasimhan (1984) where he differentiates between two types of application software: the first kind is software products (packages), and the other is software-supported system. Narasimhan asserts that even software in the form of packages, such as accounting programs designed as defined solutions to well formalized problems, require some modification before they are practically applied. However, Narasimhan writes:

[Software as a product] is, in general, the simpler of the two cases to cope with. Software supported systems, on the other hand, almost always have to be tailor-made to suit the specific end-user environments. Even if similar systems are in use elsewhere, transporting them, modifying them, and
fitting them to match local needs, may not be easy. In fact, in many cases, local specifications may be a preferred solution. The structures and expertise needed to create such systems may have to be dealt with on a case by case basis. Also, transfer of knowledge in these system design areas is likely to be less straightforward. But precisely these application areas are the ones of great immediate importance to developing countries. It is in meeting these needs in these application areas that available software production models in the developed countries are likely to be of very little relevance.... information processing practices, and software packages created to implement such practices in the developed countries cannot, therefore, be transported to developing countries and made to function effectively in a straightforward way (Narasimhan, 1984, p.8).

**Strategic Problems:**

According to Lind, strategic problems in developing countries refer to the widely spread of the computerization process, and how the insufficient resources that are competing with other important demands, are to be best used. Selection of appropriate computer applications in areas such as basic needs of the population (food production, transportation systems, weather forecast and agriculture) are examples for strategies.
Technology Transfer to the Third World

The general issue of technology transfer has some implications for the specific case of introducing computer systems (a technology developed in the West) into third world educational systems (Marshall, 1984). In many third world countries, technology transfer is increasingly becoming a popular development slogan (Siddique, 1989). Much of the evidence supports the notion that third world countries view technology as essential if they wish to modernize their infrastructures, survive in economic terms and compete internationally (Rwegayura, 1988). Increasingly, third world governments consider computerization as a means of development and social change (Nag, 1981).

In applying above said arguments to educational contexts in third world countries, this technology transfer is about educational technology in general, and today's computer technology in particular.

Discussing educational technology utilization in Jamaica's secondary schools, Jennings-Wray and Wellington (1985) state that the rhetoric of technology originating from technologically advanced countries tends to [mesmerize] educational authorities in third world countries into believing that a transfer of technology from the
technologically advanced world will be the panacea for all their educational ills. In their conclusions Jennings-Wray and Wellington write:

Technology appears to have so mystified us, however, that we in the third world tend to overlook the fact that in first world countries the imminent change in the curricula of schools ushered in by new technological possibilities "like the report of Mark Twain's death, turned out to be grossly exaggerated" (Meighan and Reid, 1982, p.353). In the UK and North America, these authors observe, 'movements' such as the 'sputnik' revolution and programmed learning, 'have come and gone... leaving little trace of their passage' (ibid). Simpson (1983), moreover reports that CAI in the UK 'has rumbled along the runway for years now, not quite able to take off' (p.20) and he posits that no way can he see CAI replacing the need for books in the classroom (p.181).

Jennings-Wray and Wellington (1985) also point out that factors such as inadequate provision of infrastructural requirements, continuous reliance on foreign aid, and unrealistic assessment of the real costs of innovation have led professional educators in third world countries into viewing anything that originates from highly industrialized countries as good.

Another important issue Jennings-Wray and Wellington point out to, is that the third world countries need to
demystify technology and take responsibility for beginning to develop educational innovations appropriate to socio-economic realities of third world nations. Reflecting on above said matters, they go on to say:

There is, however, a more serious problem that we in the third world have to address. We need to undergo a 'demystification' of technology. There is a tendency for us to think that 'technology' is the radio, TV, satellite or microcomputer. These, however, are simply the embodiment or products of technology. Technology is really the thinking, the rational and creative capacity that man uses to initiate and develop such products. It is not to be confused with the products themselves. Many third world countries have yet to realize this... third world countries court technology as long as foreign aid is forthcoming. And this will continue to be so until we in the third world recognize technology as a way of thinking which is within our capability and through which we can generate the kinds of product which are both best suited to the needs and peculiar contexts of our educational systems and in keeping with the stage of economic development of our nations struggling with their peculiar social problems (p.182).

It has been argued that the developed, mainly Western countries, carry out technology transfer to serve their intrinsic objectives, rather than the needs of the third world countries (Gritzner, 1981). Cultural invasion might
be one of those objectives. As an example, Arab participants at 1985 conference in Damascus note that developing countries, as consumers of technology rather than producers of it, are exposed to the dangers of cultural invasion (UNESCO, 1985). Reflecting on the same notion, Ghosh (1984) notes that developing countries may risk regressing towards being colonies once again.

It is generally accepted that commercial companies, particularly multinationals, constitute one of the important routes by which technology is purposefully transferred to third world countries (Veldhuis, 1979). The crucial point to note, however, is that successful transfer of a technological innovation requires the transmission as well as absorption of a large body of information, whether it is scientific, technical, or organizational (Teece, 1976). Teece claims that importing sophisticated pieces of equipment/hardware without the information back up of operational maintenance skills is of little or no help to the third world nations.

Recently, the issue of technology transfer has become about transfer of information and/or technological knowledge which according to Elmandjra (1985) needs to be examined before being transferred to third world countries (being
only recipients) to ensure its relevance as well as appropriateness to their cultural environments.

Wondering whether technology transfer to the third world will be boon or bane, armed with the courage and honesty of the concerned scholar, Gritzner (1981) raises the question that technology transfer across cultures has to be viewed with caution and alarm. He suggests that:

The Western industrialized world cannot turn its back upon those of the world's peoples who desperately seek our developmental assistance. Future aid, however, must be based on a comprehensive understanding of its potential impact of technology transfer upon the recipient culture and the physical environment and resource base on which they depend for survival. No longer can we, or those upon whom our technological assistance is imposed, afford a gun-slinger's "quick-draw" approach to aid and development; it is often given and received with little prior thought or humanitarian concern for the ultimate consequences of such action. In the third world, "bigger" is not always "better", and "more" may simply magnify and expand existing problems [such a state of affairs takes place] regardless of how well-intended such developmental "aid" might be (p.192).

Part of what Gritzner hopes to convey is: As the development process is a long-term process, it can only be achieved by long term events. It is important that technological aid from the industrialized world be based on
a comprehensive understanding of its potential impact on the recipient countries. And equally important is that this aid be done on long-term basis. Simply quick fix or "quick-draw" approaches to aid and development do not work. In so doing, Gritzner, maintains that "we are not helping them help themselves, but rather are imposing upon them our own technological systems and often our ideological, sociological and economic systems as well" (p.192).

It is generally recognized that transfer of technology from the industrialized world to the developing world, is one of the ways to close the gap between the two (Chevion, 1981). In his article, Chevion regards the transfer of computer technology, in particular, as a most efficient vehicle for transfer of technology in general, and for closing the developmental gap between the industrialized and the developing worlds. To him, the transfer of technology, in particular, becomes effective when both the giver and the taker of technology share some characteristics of affinity and proximity. This proximity, Chevion suggests, "Is in the level of development, in cultural customs, understanding, mentality and proximity in time as related to the levels of development of the giver and the receiver" (p.205). To illustrate his point, Chevion uses Israel as a country which stands in the middle of the
developmental ladder (i.e., In Israel there is a certain
degree of resemblance and closeness to the industrialized
world on the one hand, and to the developing world on the
other hand).

**Technology Transfer: What might be done to make it more
effective?**

Ernst (1979) contends that technology transfer
continues to reaffirm the superiority of developed over
developing countries, rather than narrow the gap between the
two. This, according to Ernst, is because transfer of
technology is not the result of some kind of global welfare
policy striving for an improved distribution of technologies
to bring about a worldwide improvement in the quality of
life. Indeed, for the main part, cross-cultural transfer of
technology is an important element of the strategies of
private firms, essentially multinational corporations, which
are forced to internationalize their overall cycle of
capital reproduction on a growing scale. As a consequence,
a dependency syndrome is deliberately maintained by these
private firms in order to multiply benefits to themselves
(Jennings-Wray and Wellington, 1985; Marshall, 1984;
Veldhuis, 1979).
To ensure a safe or effective technology transfer, developing countries should be selective in the type of technology they choose in order to meet a prescribed set of objectives and criteria relevant to them (Chevion, 1981; Gritzner, 1981). To Chevion and Gritzner, and surely others, the choice of technology should be made with a view to enhance the developing country's resource base, to suit its socio-economic setting, to pave the way for its socio-economic development, to make possible the exploitation of their natural resources, and to be consistent with natural factor endowments. It should also meet certain environmental constraints (Lind, 1991), promote self-reliance (Gritzner, 1981), promote indigenous research capabilities (Deodhar, 1981; Hungwe, 1989), and finally help the developing countries move from being consumers of pre-packaged, ready made technological products to producers of technology. Developing countries should be selective not only in the choice of type of technology, but also in its mode of implementation. Moreover, it is important as Shayo (1986) suggests to involve not only the decision makers in both developed and developing countries but also the field implementers of any imported technology. Naturally, in their choice to introduce foreign technology, developing
countries have to consider their specific local cultural factors.

Probably, one criterion should be that only the most perfected technology be imported so that the importing country does not repeat the mistakes of the exporting country. The assumption that "What has worked for us will surely work for them" viewed as the basis for much of the industrialized world's efforts to aid third world countries' development, has been proven to be naive, according to Gritzner (1981) who also believes that typical problems with poorly envisioned technology transfers are basic: "we export technology that they do not understand to cultures that we do not understand" (p.192). At a time when many third world countries encounter monumental financial difficulties (actually some countries face dangers of famine, hunger and diseases), one might suggest that technology transfer directed to basic "bread and butter" applications and fields in these countries, might be more productive.

In their article about the educational technology utilization in Jamaica's secondary schools, Jennings-Wray and Wellington (1985) report that less than one third of students in a secondary school in Jamaica can afford to buy the necessary textbooks. In view of this context, which may be witnessed in many third world countries' educational
systems, one might well conclude that "in such a context, one questions whether any heavy investment in electronic media technology in the school system represents the wisest ordering of priorities in developing countries" (p.182).

Paradoxically however, a prevalent belief among the proponents of computers in third world schools dictates that application of computer technology will help third world nations to improve their education, and to develop faster in all areas (Wali, 1981). In an article titled "A Nigerian View of Computer Education" Hafiz S. Wali describes his own children's experience with computers and discusses computer education implications for third world countries. He contends that the use of computers is germane to educational needs even in rural African regions. Still, other proponents of computers in third world countries may propose that the application of computer technology will help third world nations "leap frog" (a term used by Schramm, 1977) into equality with the technologically advanced world.

**Description of Some Educational Problems in The Third World**

Before I discuss educational problems of the third world countries, it is helpful to describe the socio-economic conditions prevailing in these countries.
In 1980 the director of the United Nations Development Program (UNDP) released some estimates characterizing severity of the kind of problems third world countries have: According to those estimates more than 600 million individuals (men, women and children) experience a deficit in minimum caloric intake every day, while 800 million people are doomed to use impure water, and 500 million are denied basic shelter.

Similarly, Brauer (1979) reported that in a survey conducted by the German Foundation for International Development, the following estimates characterizing life in third world countries were found:

20% of the people were not well-fed; they were undernourished, 30% of them live without safe water and health care. 40% of the working force were unemployed or underemployed, and 50% of third world inhabitants over 15 years old are illiterate.

Not only that, but in a report released by the World Bank in 1979, it was stated that:

"even if the developing countries were to succeed in doubling their per capital growth rate and industrialized nations merely maintained theirs, it would take almost a century to close the absolute income gap between them, so great are the differences in
the capital and technological base of the two groups" (cited in Longe, 1981, p.190).

Also, in the 1979 United Nations conference on science and technology it was observed that:

"Developed countries continue to dominate the field of science and technology to the extent that around 95% of all research and development is executed by them, while developing countries, which represent 70% of the population of the world, have only 5% of the world's research and development capacity. Disparity of development level between different countries was directly linked to the disparity in their scientific and technological capabilities".

The above mentioned estimates and observations directly refer to the continuation of underdevelopment in third world countries which has some implications for computer technology utilization in them. Longe (1981) asserts that the gap in development and in the prosperities of the rich and the poor countries continues to widen. Now, in 1995 there is nothing on the horizon to disapprove Longe's assertion. Recently, the world has witnessed extreme cases of hunger and starvation in some underdeveloped countries such as Somalia, Ethiopia, and the Sudan; where TV pictures depicting human misery in those countries were abhorring (ABC World News, January 6, 1995).
The above examples and observations suggest that educational problems of third world countries can be contextualized within the general poor socio-economic conditions existing in those countries.

Generally speaking, third world countries are made up of large rural areas where the rate of economic and industrial growth is very slow (Chandra, 1984). In these countries socio-economic conditions can be characterized as: few skilled people, high unemployment or underemployment, extreme cases of poverty, rural way of life, ample supply of labor, lack of infrastructure, many diseases, widespread malnutrition, high illiteracy rates, lack of basic needs: clean water, food and shelter, and exploding population growth (Chandra, 1984; Hawkridge, 1990; Howe, 1975).

The third world population will continue to grow, creating new demands for educational facilities, and placing enormous new pressures on the capacity of third world countries' educational systems. Longe (1981) notes a continuing growth in the numbers of students seeking education at all levels in the third world countries. He cites the example of Nigeria where huge numbers of students (ranging between millions admitted to primary schools and tens of thousands admitted to community colleges and universities) seek admissions to schools.
In the period between 1959-1993 a national report issued by the Ministry of Education in Jordan, shows a dramatic increase in the numbers of students: 128,743 in 1959 to 1,179,833 in 1993.

A third example comes from India. Not very much has been achieved in India's war against poverty and misery; a war excacerbated by excessively exploding growth in population. In his introduction to a book titled *Underdevelopment Educational Policy And Planning*, investigating the educational problems of India and its implications to the third world, Joseph Lauwerys writes:

Every year nearly 12 million babies are born [in India]. Half die before reaching the age of 15, but even so the population increases each year by a figure equal to that of a small European state like Belgium or Holland. So food production, houses, clothing, services [including schooling] have to be continually increased in order simply to maintain present standards. The chances of progress are being washed away by a flood of babies (Mukherjee, 1967, p.iii).

The examples of Nigeria, Jordan and India provided above are not exceptions among the countries of the third world. Other third world countries may witness similar growth in numbers of students seeking admission to schools; with the implications this student population explosion has
on the poor socio-economic conditions prevailing in these countries.

Although some of the statistics and/or observations made by International agencies provided in the preceding pages may be somewhat out-of-date, they still show the magnitude of the problems existing in these counties.

In brief, socio-economic conditions of majority of the third world countries may be characterized as follows:

Shortly after the colonial powers left and third world countries achieved their independence, their problems began to surface. These problems were many, and the means available for third world countries were (and still are) very limited. In proportion to the exploding numbers of their population, inhabitants of third world countries receive very little or no services (including medical, social, recreational, cultural and the like). Individual's calorie intake in their food supply (including men, women and children) is about one-third less than that of their counterparts in advanced countries. Other basic needs such as pure and clean water, health care and housing are less available. In Egypt for example, thousands of people live in old pharaoh cemeteries. Poverty, hunger, and even famine and starvation, lack of opportunities for improvement and/or
better accomplishment have been characteristic features of the common people in the third world countries.

Due to underdevelopment and poverty conditions third world countries suffer from acute shortage of foreign exchange (Mukherjee, 1967). In the majority of the third world countries hard currency needed for commercial exchange with the Developed countries is scarce. Almost all third world countries are surviving against immense financial difficulties. Their debt records to the World Bank or the rich countries speak for themselves. The immediate need of foreign aid for third world countries was most successfully articulated by the Hon. S. Prawairanegare (Governor of Indonesia) when he stated:

...most of us underdeveloped countries have still no water to swim in, struggling as we are for a mere glass of water. I hope not to be misunderstood. What I am pleading for on behalf of the underdeveloped countries is not a privilege from the fund but a fair treatment, which is not always identical with equal treatment. Aid is good for those who can get it. Trade is good for those who are in a strong bargaining position. But the only thing which underdeveloped countries request is a fair treatment, a fair share of the world's income, based on a good understanding of our needs, not from the viewpoint of bare commercialism, but from that of human idealism. This may not be quite in line with the ideas of our founding
fathers, something of which I am not quite sure, but certainly quite in line with the ideas of our Father [he means Allah] who created us (Mukherjee, 1967, pp.5-6).

Under such circumstances hinted to above, educational opportunities are extremely limited. Even admission for primary or basic education grades is still a problem in some third world countries—especially the ones which recently received their independence. University education is either not available or sharply inadequate.

Derived from the general description of the socio-economic conditions of the third world countries presented in the preceding pages, is the delineation of some educational problems in these countries. Such educational problems might in many ways be due to the economic poverty prevalent in third world countries. A brief description of educational problems in third world schools is useful as it may provide a clear understanding of the socio-economic, cultural context in which computer technology will be adopted.

However it is necessary to note that educational problems are not manifested in most of the third world countries with the same intensity. For instance, some oil exporting countries in the Middle East have their educational problems, but these are in no way related to
poverty due to poor economy. There is a noticeable shortage of teachers in countries such as Saudi Arabia, Kuwait, Oman and The United Arab Emirates. And for long time, these countries have been depending heavily on Jordan and Egypt to provide them with teachers for all educational levels; primary grades to university education. The point to be emphasized here is that variations exist among third world countries in terms of their socio-economic conditions and the types of educational problems.

Previous description of the socio-economic conditions in the third world countries may have some implications for education. Following is a discussion of some educational problems of the third world as listed by Kwok-Wing Lai (1983) in his investigation of the applications of computers in education in these countries.

1. The Problem of Illiteracy

The economic poverty witnessed in the third world leads to educational poverty. This educational poverty is manifested in the high rates of illiteracy existing in third world countries. As mentioned earlier, 50% of individuals over 15 years old in third world countries are still illiterate (Brauer, 1979). This statistic may be out-of-date. However, it is still valid as an indicator of the magnitude of the problem of illiteracy prevalent in the
third world. Indeed, many educational authorities in the third world give great importance to literacy programs and non-formal education to reduce and finally eradicate illiteracy phenomenon. In accordance with the framework of actions approved by the world conference on "Education for All" organized by the United Nations, the country of Jordan has reduced the rate of illiteracy to 16% in 1993 (Abu Sheikha, 1994). Other third world countries may have similar efforts to face the problem of illiteracy, and some improvement may have occurred. However, the "Education for All" ideal espoused by the United Nations world conference in education is still very far from being a reality in the third world. Moreover, illiteracy problem continues to represent a considerable strain to the national economy of the third world, and its ramifications on the national scene of third world countries are evident: high rates of unemployment, or underemployment, low production, lack of opportunities for improvement, political unrest due to unemployment or out of need for basic necessities (UNESCO, 1982). Illiteracy problem is most serious in Africa where Mungazi (1982), in his study of the problems that have retarded the full development of education in Africa during and after the colonial period, points out that African
education is characterized by underdevelopment and large scale educational poverty.

Of course, different countries have different definitions of illiteracy. For instance, in the Western countries especially in the United States, literacy is gaining a new dimension. Speaking of the next great crisis in American education, Molnar (1978) points out that ignorance of computer technology will eventually render people as functionally illiterate as ignorance of reading, writing and arithmetic does today. In third world countries, literacy has not yet gained this new dimension (i.e., computer literacy or sometimes computer competence). The UNESCO (1979) definition of illiteracy is still valid one for characterizing illiterate individuals in the third world. This definition dictates that an individual is functionally illiterate when that individual "cannot engage in all those activities in which literacy is required for effective functioning of her/his group and community and also for enabling her/him to continue to use reading, writing and calculation for her/his own and the community's development" (p.18).

As educational systems in most third world countries are still young (30 to 40 years old since independence), and since mandatory primary education has recently been
enforced, the problem of illiteracy will last in the third world for long time to come (Lai, 1983).

2. The Problem of Enrollment

Longe (1981) notes a continuing growth in the numbers of children seeking admission to schools at all levels in third world countries. The examples of Nigeria and Jordan provided earlier where large numbers of students are admitted to schools at all levels each year, are not exceptions. In other third world countries quite large numbers of students are admitted to educational institutions at all levels. Indeed, a report issued by the UNESCO (1981) shows that enrollment ratios of all levels of education in third world countries have made slight improvement. However, overall enrollment ratios in third world countries are still significantly low compared to enrollment rates in the advanced countries (Lai, 1983). Reasons for low enrollment ratios in education in third world countries are very much related to the economic poverty of these countries in general, and, in particular, due to the poor living conditions of families who need their children to help in the farming or agricultural work in the fields.

3. Rise of Educational Cost

Indeed, the third world countries realized the educational poverty prevailing there as a legacy of the
colonial era. Viewing "education as an essential tool for gaining a foothold in a competitive world" (Mungazi, 1991), third world governments began to invest in education. Millions of dollars are spent to improve the educational sector, and to provide for the rising educational costs for individual students who are in schools at a considerable strain to the national economies of the third world countries (Hungwe, 1989). In a typical classroom in a new school in Jamaica, Jennings-Wray and Wellington (1985) point out that only one third of the students can afford to buy the necessary textbooks. They continue to say Jamaica is not an exception; other third world countries are probably like Jamaica, where neither the governments nor students and their parents can afford to pay the rising costs of education.

4. **Low Quality Education**

A leading feature of third world countries is their economic poverty. Owing to poor economic conditions in third world countries, education there is still underdeveloped, and large scale educational poverty prevails in education at all levels (Lai, 1983; Mukherjee, 1967). This in turn leads to a considerably lower quality education than that available in wealthy countries (Lai, 1983; Longe, 1981; Mukherjee, 1967). Year after year, United Nations reports
indicate that "the total number of persons living in poverty and distress increases rather than diminishes.... in the field of education-in spite of considerable progress in many less developed countries.... achievements have not been enough to justify complacency. In spite of the effort to eradicate illiteracy, the number of people who cannot read and write still tends to go, simply as a result of the population explosion" (Mukherjee, 1967, p.43). However, these statements have been made in 1967, they still to a certain extent portray much of the state-of-affairs of the third world today.

Related to the quality of education in third world countries Lai (1983) discusses the student-teacher ratio, and training of teachers, and concludes that (a) as the teaching load of teachers is heavy and the number of students in the classroom is large (35 students and more), teachers have not enough time to spend with students on individual basis; and (b) teachers in the third world schools lack adequate training, although teacher training [better use professional development] in the third world is perceived as a priority that requires much attention. Overall, professional development for all teachers in all grade levels in third world education is still a dream yet to be realized. Certainly, conclusions reached by Lai
contribute to lowering the overall quality of education in third world countries.
Considerations For Computer Technology Adoption in Third World Countries

Before putting computer power in the third world schools some important questions need to be considered. These according to Lai (1983) include: economic considerations, cultural considerations, and educational inequality.

1. Economic Considerations

It is widely believed that computer technology goes where the money is. Computer technology is highly capital intensive. A leading feature of third world economy is its underdevelopment and large scale poverty (Howe, 1975; Longe, 1981; Mukherjee, 1967). Despite the sharp reduction in computer costs, computer technology is still expensive and is beyond the financial capacities of school systems in third world schools (Lai, 1983). In third world countries which mainly have a labor-intensive economic base, capital is scarce (Hawkridge, 1990). This coupled with paucity of foreign exchange makes it impossible for schooling systems in third world countries to purchase the latest versions of computer technology, and to keep upgrading this technology as the time goes by. All what schools in third world countries hope to get is some kind of old or obsolete machinery discarded by industrial countries in the name of
technology transfer (Pipe & Veenhuis, 1976). Earlier in a separate section the issue of technology transfer was discussed in detail. Discussing it here in detail will be unnecessary repetition. Only in brief, as Lai (1983) in his study points out that when capital intensive products and production methods are transferred from industrial to third world countries, the utilization of resources is inefficient, and the production cost of technology imported from the former to the latter is therefore higher.

Educational poverty in third world countries is mainly due to poor economic conditions. Discussion of this point was detailed in the section about educational problems in third world countries presented earlier. In view of the severe economic conditions prevailing in the third world countries (with some exceptions of course: Oil exporting countries), "well-meaning people in industrial countries question whether third world nations, let alone their schools, need computers at all. They point to the poverty, the rural way of life, the ample supply of labor, the lack of infrastructure, the crying basic needs for shelter, clean water and food. They do not believe that computers have a role to play in national development" (Hawkridge, 1990, p.4).
It is not surprising that public expenditure on educational media and technology is not much in third world schools, as funding allocated for importing technology is scarce (Hungwe, 1989). Therefore, from the economic viewpoint, computer technology—still an expensive commodity for most third world countries in general, let alone their schools—may not be appropriate and/or advantageous in these countries. Whether capital-intensive technology should or should not be used in third world schools is an important question that can be impacted by economic considerations in these countries.

Related to the economic considerations, social conditions of the third world countries were described earlier in the section about general problems encountering third world nations. Very often, the socio-economic conditions in third world countries are treated together.

2. Cultural Considerations

Computer technology as a recent form of educational technology may be less effective/less appropriate to third world education, because of basic differences in cultural backgrounds between exporting and importing countries of this technology.

As So Oak Kim puts it "essentially educational technology is a way of thinking schematically and
systematically about learning and teaching... educational technology is a product of American and Western European thinking and this may not be appropriately applied in other cultural traditions" (So Oak Kim, 1983, p.3). Pena (1983) a Latin American educator (cited in Lai, 1983) suggests that:

One of the reasons why educational technologies which were introduced to Latin American education have failed, has been the manufacturer's lack of awareness of the impact technology has on any culture. He continues to say that any new educational technology cannot be successfully implemented if its development is not a response to the indigenous people's own problem, but rather as the result of the expansion movement of other people... [and] even if [computer technology] is to be used in the third world, it may have to be modified and designed to solve the third world problems. It has to act within the social and cultural environment of the third world and its economic possibilities" (p.93).

Pena's arguments presented above are supported by So Oak Kim (1983) when he asserts that technology must be made appropriate and/or suited to the factor of costs of economy where it is to be used, and this appropriateness has to be a function of local appreciation of what is relevant in the adopting culture. Also, supported by Hungwe (1989) who emphasizes the need of educational media and technology to
be culturally appropriate in order to provide the learner access to meaningful knowledge. This entails adapting of imported technology and media to fit existing local conditions, and serve indigenous needs.

As has been discussed in the section of technology transfer presented earlier, and probably somewhere else in the dissertation, the issue of cultural appropriateness of imported technology to the third world schools is of paramount importance. In the example of Jamaica's utilization of educational technology (including computers) in secondary school system, in their conclusions Jennings-Wray and Wellington (1985) brilliantly state:

There is a tendency for us [in the third world] to think that 'technology' is the radio, TV, satellite, or microcomputer. These, however, are simply the embodiment or products of technology. Technology is really thinking, the rational and creative capacity that man uses to initiate and develop such products. It is not to be confused with the products themselves. Many third world countries have to realize this (p.182).

In view of this, and based on the preceding arguments concerning the need of technology to be culturally appropriate in order to be effective in third world countries, as things stand, one may suggest that, from the perspective of cultural considerations, computer technology
(mainly Western social form of reasoning) is still inappropriate in third world schools.

Not only third world researchers, but also Western scholars alluded to the significant question of making technology, in general, and computer technology, in particular, appropriate to the cultural settings of adopting countries in order to be effective (see Bowers, 1988; Marshall, 1984; McIsaac, 1993; Muffoletto and Knupfer, 1993). Some of what these scholars had to say in this regard is presented elsewhere in this inquiry.

3. Educational Inequality

The rural way of life as a leading feature of third world societies has been documented (Chandra, 1984; Hungwe, 1989; Mukherjee, 1967). Usually, majority of third world population lives in rural areas where resources are limited and opportunities for improvement are less than in urban cities. In education, city schools are more catered to in third world countries than schools in rural regions (Lai, 1983). When it comes to computer utilization in third world schools, probably, only the richer schools, usually, located in big cities will be able to purchase computer technology (including hardware and software). Another reason for city schools to benefit more of computer technology is their access to universities located in the larger cities. This,
of course, in and of itself leads to more disparities of resources between urban and rural areas in third world countries (i.e., a new form of educational inequality). Even disparity between students from different social classes may be enlarged as a result of the use of computer technology in schools (Jennings-Wray and Wellington, 1985). Hativa (1988) and Pogrow (1993) go even further when they claim that the use of computer may, in fact, widen the gap between high (good) or low (poor) achieving students.

Another scholar investigated considerations involved in the implementation of computer technology in the third world countries is Peter Chandra (1984). Before Chandra discusses these considerations he writes:

"computers" and "developing" countries seem to be an apparent contradiction. Computers are normally associated with modern technology in an advanced and wealthy society. Computers appear to be the symbol of high technology and industrialization. On the other hand, developing countries are normally made up of rural areas where industrial and economic growth is slow and where the use of technology is very limited. [He continues to say] even in developed countries, considerations of cost, training, support and employment are critical in any decision to incorporate the use of computers. These considerations are intensified when one considers the use of computers in developing countries. As such it has never received
serious attention. This is even more so in the field of education where resources and expertise are generally more backward when compared to the industrial and commercial sectors of a country" (p.101).

Chandra (1984) raises a very important point that touches the heart and soul of my dissertation inquiry. He asserts that carrying out relevant research work before introducing computer technology to a country is very important. He maintains that it is fundamental that the problems and considerations, involved in implementing computer technology, are examined in great detail.

Its relevance to this study is interpreted as follows: a call for continuous research work in Jordan, as it is in the beginning steps for major introduction of computers into schools, will be one of the pillars the proposed theoretical plan is based upon. Valid is Chandra's view which emphasizes the significance of conducting research to examine the likely implications of a technological advance in a society. Such examination is needed in order to avoid some of the technological innovations' secondary or hidden effects. Indeed, Chandra is quite right when he claims that: "some technologies may cause such high eventual costs to society that the short-term benefits they offer are not worth acquiring" (p.105).
Some of Chandra's proposed considerations for the implementation of computer technology in the third world are similar to ones discussed by Lai (1983) earlier. Added to the economic considerations; cultural considerations; and educational inequality presented in the preceding pages, is a brief discussion of the following:

Technical Considerations

These considerations (sometimes called problems) include: the lack of electricity in third world countries, especially in the rural regions, where electric voltage is not kept constant; the problem of actual installation of computer equipment in the field because of transportation, distribution, etc.; and the problems of lack of maintenance, lack of spare parts and lack of proper back-up system.

Training and Expertise

Worldwide, Chandra (1984) believes, there is a shortage of skilled personnel in the field of computer technology including educationalists as well as computer specialists. But in the third world, Chandra is quite accurate when he suggests this shortage is more acute.

Commercial Considerations

Interestingly, Chandra (1984) speaks quite frankly when he declares that financial profit is the primary motive of commercial companies selling computer technology to third
world countries. That is expected, but the problem, as Chandra puts it, "arises when computer companies insist on marketing only a limited choice of computers whose hardware and software are incompatible with other brands other than their own" (p.106). Because rental of equipment is not customary in third world countries, what happens, according to Chandra is that "equipment declared obsolete in one country is refurbished, polished and supplied to another country for sale" (p.106).
CHAPTER V

Summary, Analysis, Plan Development and Concluding Remarks

Summary

Designed to propose a feasible plan for appropriate adoption of computer technology in Jordanian schools, this study is divided into five chapters: Chapter one includes: A general introduction about computers in education, a brief statement about the forces driving introduction of computer technology into schools in developing countries, and some discussion about the need for critical examination of computer technology in education. Also, included in this chapter are: a presentation pinpointing the rationale for the study and the reasons this study is needed; definition of the research problem; description of the purposes of the study, research methodology and basic assumptions; and definitions of key terms used throughout the document and delimitations of the study.

Devoted to a comprehensive discussion of Jordan's culture and society, chapter two describes the following:
Geography and historical setting of Jordan; the population of Jordan including the Bedouin tribes, the peasants the citymen, the ethnic groups, and the relationships existing among the tribes, villages and cities in Jordan; the concept of the extended family as a bedrock of the traditional Jordanian society; religion in Jordanian society; economy of Jordan; cultural values extolled by Jordanian subculture as part of the global Arab culture; the educational system in Jordan in brief, and finally, Jordan society and the challenge of change.

In chapter three, a comprehensive description of the educational system in Jordan includes: Jordan's educational system general objectives; its general structure and organization including pre-school education, basic education, secondary education, and higher education. A brief mention of problems facing Jordan's educational system is provided. Provided in this chapter is a fairly comprehensive presentation of Jordan's experience with computers including published research about educational technology and computer utilization in Jordan's schools; problems/difficulties that accompanied the computer education development project in Jordan; future planning for computer education in Jordanian schools, and the attitudes
of teachers, principals, parents and students towards computer education in schools.

A description of computerization in developing countries comprises chapter four. Two things that characterize the diffusion of computers in developing countries are emphasized: One is the high degree of confidence exhibited by policy makers who perceive computer technology as a blessing for their countries national development, and the second thing is the almost total absence of a critical debate looking into whether and to what extent computer technologies, generally produced by Western countries can be applicable in developing countries cultural contexts.

Problems encountering computer users in developing countries are discussed in chapter four. These problems are classified into three categories: Operational, contextual and strategical problems.

A major segment of chapter four is a discussion of the general issue of technology transfer from the developed to the third world countries. In this section, the following key points are emphasized: First, technology transfer, in general, has became a popular development slogan, and is viewed by developing countries as essential for modernization. Transfer of computer technology, in
particular, is considered by developing countries as a means of development and social change. **Second**, transfer of technological products declared obsolete in developed countries to third world nations has been described as inappropriate and criticized by most of research reviewed in this regard. **Third**, some suggestions to make technology transfer more effective are provided.

Another major section of chapter four involves a presentation of some educational problems in the third world countries. Such problems include: the problem of illiteracy, the problem of school enrollment, the rise of educational cost, and educational poverty.

Finally, considerations for computer technology adoption in third world countries comprise the last major section of chapter four. These considerations include: Economic considerations; cultural considerations; educational inequality; technical considerations; training and expertise, and commercial considerations.

Chapter five includes a summary of the study, analysis of the literature, plan development and concluding remarks.

**Analysis of the Literature**

Based on description of Jordan's culture and society provided in literature reviewed in chapter two, a scrutiny
of this literature uncovers the following values, features or characteristics of the people and/or society of Jordan:

1. Community oriented;
2. Male dominated/male oriented: women are less equal, have less voice, have less power;
3. Extended family based: loyalty for the tribe, clan, kindred or kinfolk;
4. Less stressful;
5. Less competitive;
6. Slower pace of living;
7. More conservative;
8. Generally a religious society: Allah (God) fearing individuals, seeking refuge in Allah, and striving to please Allah as the ultimate goal;
9. Public vs. private: public bears more meaning than private, more value is attached to Al-Jama'ah (group), based on social and religious orientations and beliefs (Allah is with Al-Jama'ah);
10. Respect for age and authority figures;
11. Care for societal reactions to individuals' acts or behaviors;
12. Rural/agriculturally based economy; and
Analysis of materials provided in the description of Jordan's educational system reveals the following features:

1. A high value is placed on education as a means of change and national development;
2. Large public and private investment in education;
3. Emphasis on development of socially acceptable behaviors, skills, and relationships;
4. Emphasis on group rather than individual instruction;
5. Emphasis on building good human relationships (brotherhood, sisterhood, etc.);
6. Cooperative, collaborative spirit is valued and encouraged more than competition; and
7. Acquisition of factual knowledge and information.

Related to this analysis are the problems facing the issue of educational technology utilization in Jordan's schools listed on page 87. As these problems have some bearing on the proposed plan for appropriate adoption of computer technology in Jordanian schools, a brief synopsis of them is provided. These problems include: Shortage of instructional media and materials; lack of qualified personnel in instructional media; lack of media labs, facilities and workshops; paucity of financial support, and vagueness in the perception of instructional technology among teachers.
Description of Jordan's experience with computers in education reveals similar problems: Lack of technical expertise among educators at all levels, inadequacy of curriculum developers and software designers at the Ministry of Education to produce culturally appropriate software. It is also noted that the question of converting already made foreign software in order to fit the cultural environment of Jordan is indeed still a difficult one.

Also, noted are the potential problems associated with educational software packages designed by other cultures which very often require the use of a specific computer platform. As various computer platforms facilitate use of different programming languages and are based on different operating systems, a hardware problem associated with incompatibility among these platforms is foretold.

Finally, other less serious problems (mainly technical ones) are observed throughout the different stages of Jordan's computer education development project.

Synthesis of research on computers in education reviewed in this study leads to a number of conclusions obtained by a great many prominent researchers in this field:

- the question of computers in education is still an area of debate, and that the microcomputer revolution has created
the most controversy (Hlynka & Belland, 1991; Johnstone, 1987). The role of the computer in education is still surrounded with question marks and uncertainty (Dunn & Morgan, 1987).

- there are important questions about computers and schooling that educators have little information to answer them (Pelgrum and Plomp, 1991).

- overall, research about computers into classroom generates more questions than answers (Beynon & Mackay, 1993). It is not yet certain whether computer technology is part of the solution or part of the problem in education (Apple, 1992).

- research findings about effectiveness of computer technology in education still do not validate making definitive statements about the most effective uses of computer technology (Roblyer, 1988) who claims that "most literature in this area is rich with claims but poor in actual data" (p.87). While the computer itself has the potential for improving education, its effectiveness in education is an issue regarded as very much in the balance (Bork, 1984).

- assumptions that computers in education are inherently better, necessary, beneficial, and good are challenged, and that conceptions of computer technology as neutral, value
free, non historical, and nonsocial object are uncovered (Bowers, 1988; Mc ISAAC, 1993; Muffoletto & Knupfer, 1993; Rothe, 1991).

- computerization is often taken for grated in third world countries (Jennings-Wray & Wellington, 1985), where a high degree of confidence is exhibited by policy makers who perceive computer technology as a blessing for their countries national development (Lind, 1991), and that the pace of this development can be speeded up significantly by the use of computers (Gupta, 1981).

- in western countries, the taken for granted notion or givenness of computers in education, largely resulting from pressures outside the educational sector pushing for computerization, is regarded as an illusion (Scheffler, 1986), and is questioned (Bork, 1985). Educational applications of the computer are not regarded as given or foreordained for education (Scheffler, 1986).

- current transfer of technology, designed and produced by technologically advanced cultures, to less developed nations is viewed as inappropriate (Jennings-Wray & Wellington, 1985). Viewed as a quick fix approach to aid and development, current practices in technology transfer do not help third world countries, but rather impose on them advanced countries' technological, ideological, sociological
and economic systems (Gritzner, 1981). Moreover, superiority of developed countries over third world countries is reaffirmed (Ernst, 1979).

- application of computer technology which is mainly a Western cultural product in African or Asian countries for example, prompts a thoughtful examination of the social, economical, political, ideological and other cultural factors of the local cultures (McIsaac, 1993). Technology in general, and computer technology in particular, has to fit the cultural environment of adopting countries in order to be productive (Lind, 1991; McIssac, 1993).

- similar to any other innovation introduced into schools, using computers in education has both advocates and critics (Anderson, 1993). Some view the introduction of the microcomputer across the curriculum as an inspiration, others see it as an intrusion (Baker, 1985), who concludes that "for all the good intentions, zeal, enthusiasm and sincerity of those engineering the transformation in learning and teaching by introducing microcomputers into the classroom, debate, and dialogue, critical awareness and careful evaluation are essential. Instant conversion and blind faith need to be tempered by spectral doubt and open minded agnosticism" (pp. 450-451).
Plan Development

Based on the description of the economy of Jordan, the government of Jordan as many governments in third world countries has decided to integrate computer education in schools while undergoing through very difficult financial situation. The rush to use computers in education is accelerating continually, and is increasingly controlled by commercial or other interests outside the educational sector (Bork, 1985). In Jordan as in many third world countries it seems difficult to keep up with the fast pace of computer acceleration. Although the computer education development project has been in process in Jordan's schools for the last ten years or so, one may conclude that it is not late to propose a plan for appropriate adoption of computers in schools there. As Baker (1985) notes debate, dialogue, critical awareness and careful planning and evaluation are essential in order to reinvent thinking about computerization in society in general, and in schools in particular. One may suggest that regardless of time constraints, decisions to integrate computer technology into schools may be based on realistic assessment of a host of significant issues and concerns relevant to the adopting country. Educators comprehensive awareness as well as clear understanding of these issues and concerns are essential
before, during, and after putting computer power in schools. Within this spirit (i.e., generating awareness and understanding among educators) a plan for computer technology adoption in Jordanian's schools is proposed.

As such, based on research reviewed in this inquiry and consequent analysis of this research, as well as, the researcher's knowledge and understanding in educational computing, a plan for appropriate adoption of computer technology in Jordanian schools is envisaged to embody the following:

1. Computers are multipurpose machines that do a lot of different things. They have been very fruitful in terms of the way in which they have supported business, industry, government agencies and information industry in the United States, Western Europe and Japan. But this does not necessarily mean that when computer systems are introduced into Jordan, especially into the schools in Jordan, that they are used the same way as in Japan, the U.S. or Western Europe. Adoption of computer technology ought not be according to a recapitulation model. Even though this adoption is going to be difficult, one probably wants to put some kind of computerization in Jordan's schools. It ought not to be old technology from the West. It probably needs to be highly networked, because access to information is
going to be a key to development. It is knowledge capital rather than factory capital that's going to bring somebody forward and leads to economically mature status.

2. If there is to be computerization in Jordan, it needs to be thought through in terms of the culture of Jordan as a subset of global Arab culture. For example, when a computer system is used in Jordan, one might suggest that a function that does an instantaneous translation from English into Arabic is needed. Another example might be development of an Arabic version of "world script" that goes into the system folder, and instantly arranges everything on the screen in Arabic. In so doing, one may not need to be highly proficient in English in order to use computer technology.

Another thing in Jordan's culture and society that impacts computer technology there is the concept of extended family. Since the society is mainly built on the extended family, a computer technology application that fits the Jordanian or, more broadly the Arabic culture, is computer networking like an internet. Although people of Jordan generally prefer face to face interaction, computer networking might be used there. However, other unintended or secondary effects may arise as electronic communications may replace personal interactions. All of a sudden the
kinship becomes less important than the connectedness, and that an electronic family replaces an extended family. As the extended family in Jordan is diminishing, people in Jordan and elsewhere in the Arab countries may find internet type of communications to be useful in maintaining contacts among kinfolks. Moreover, computer networking does not take an expensive computer to do the intercommunications. What it takes is a good and stable telephone system and keyboarding skills by individuals. When the telephone infrastructure is in place, there could be very low cost computers which would serve this kind of communication and access to information by individuals in different places of society. In a country like Jordan where it is still economically difficult to purchase expensive sophisticated computers in large quantities, a bold step in this regard can be taken by the government to license or produce its own small portable and battery/solar-charging system operated computer that can be easily linked to a big network.

Valid is the notion that portable computers are still fancy, expensive and may not be within the economic reach of schools in Jordan. However, it may be the expensive, up-to-date workable computer technology that Jordanian schools need to acquire. Obsolete, refurbished computers dumped
onto Jordan’s schools in the name of technology transfer may not work.

Production of portable computers through joint venture projects with computer companies or technologically advanced countries may prove to be a step in the right direction toward computerization in Jordan. It may be difficult in the beginning. It may be economically costly. However, when the demand becomes high for portable computers in Jordan, and, probably neighboring countries, computer companies may compete to establish joint venture projects with Jordan and computer prices may fall down sharply. Although production of portable computer technology in Jordan will probably be encountered with a host of problems and difficulties, one may suggest that if there is a will, there is a way.

Impact of computer networking utilization on three levels of extended families (i.e., tribal subdivisions: Qabilah, Ashirah and Hamulah) can be characterized as keeping the family structure going. Beginning with the nuclear family (husband, wife and children) computer networking may provide easier access to exchange of information or correspondence among them. In terms of the larger extended family what computer networking may do is perhaps enable more continuing contact between aunts, uncles, cousins, grandparents and kinfolks who may not be
physically close. Social ties and relationships among members of the same extended family may be solidified, strengthened and preserved. Computer networking may facilitate learning about family history, what values were important, why certain things were important and others were not or less important, and what it took to make traditional tribal culture the way it has been. Folktales, family stories and heritage that are likely to get lost, as people move to cities or have other kinds of responsibilities, may be told over computer networking and, in turn, kept alive among members of affiliated families. Overall, computer networking may help knit some of the major social structures in Jordan together.

3. As in society as a whole, al-jama'ah (group) work is highly valued in Jordan's educational system. It is education for the collective group more than the individual that education enterprise in Jordan caters to. Cooperative, collaborative endeavors are encouraged and appreciated in Jordan's society and schools. Hence, computer networking might well be capitalized on as an appropriate technology to promote joint or group activities among students. A widely held view of computers is that they function as communication systems that mediate interactions among their users, and that their use as a component in a
telecommunications system offers links, as well as, opportunities for learners to reflect on their own learning, to articulate and formulate new goals, and to use writing skills to create social contexts of collaborative and/or joint activity (Scott, Cole, Engel, 1992).

4. Appropriate adoption of computer technology in Jordanian schools requires that policy makers and educators at all levels spend much time thinking through critical questions concerning computer integration into classroom. It's not enough to simply budget for computers and computer related technologies. Answers to the following questions should be sought: "What is the role of the computer in the school curriculum and in the instructional program per se?", "Why do schools need computers?", "How will schools use them?", "What do schools hope to accomplish with computer-assisted instruction?", "In what time frame?", "Is there a need for separate courses in computer literacy and computer science?", "What will be the effect of computers on student learning, on teachers' behavior, on the school and classroom organization?". As these types of questions are not often posed, the end result of computer education projects is usually a set of seemingly unrelated, fragmented activities and/or efforts with no sound direction or purpose which
leads innovation adopters into a reactive rather than a proactive method of operation.

5. It has been noted elsewhere in the dissertation that technology transfer basically involves transferring old, relegated, obsolete technological products designed by technologically advanced culture to less fortunate nations. Such a process is viewed as inappropriate (Jennings-Wray & Wellington, 1985), and does not fit the cultural, socio-economical and ideological settings of adopting countries as this technology is built on American and Western European thinking (Kim, 1983). As "technology is really the thinking, the rational and creative capacity that man uses to initiate and develop technological products" (Jennings-Wray & Wellington, 1985, p.182), it will create a terrible distortion and dissidence when placed into other environments with different cultural traditions because of misfit. As such, in order to be of some value to Jordan's educational system, one may suggest that computer technology adoption in schools does not follow the traditional technology transfer model which reaffirms superiority of advanced nations and maintains dependency syndrome.

6. There is a tremendous gulf between the rich and poor countries. Rich countries have an enormous percentage of research and development. Rich countries are increasingly
becoming information based countries, and technology especially computer technology provides access to information. The government of Jordan in general and educational authorities in particular realized that. But the problem arises as computer technologies are still expensive and beyond the financial capabilities of Jordan's schools. Moreover, they (computer technologies) place extraordinary demands on the government of Jordan and other third world countries which are doomed to a decrease in quality of life, a decrease in share of the world's resources, a decrease in voice and probably a worsening of overall living standards. Against these circumstances, the government of Jordan may need to develop low-cost technologies that are easy to make and which complies with indigenous needs. An example mentioned earlier is that due to economic constraints and/or paucity of funding to schools, the government of Jordan may produce its own small portable battery-operated computers through joint venture projects with computer companies.

Some countries worldwide have had the experience of working out joint venture manufacturing which has enabled them to have technologies which were designed for their own purposes at a much lower cost. As an example, China might be the country that does joint venture manufacturing the
most. The outcome of China's joint venture projects have been claimed to yield poor quality goods. Regarding computers, when compared to ones available in the United States, the quality of the machines manufactured in China was very low. Hence, on the one hand, one may suggest that joint venture work needs to be approached with caution. Nevertheless, joint venture manufacturing in Jordan has a lot of potential for several reasons: First, establishment of joint venture manufacturing projects in Jordan brings about employment opportunities and incentives for Jordanian labor. Second, hard currency is saved except for purchasing relatively sophisticated components not easily made in Jordan. Third, most importantly, Jordan would have a voice in how the joint venture manufacturing works and/or shares in the decision making process. However, on the other hand, one has to be very certain that there be the highest quality standards in the parts that are made in Jordan including specifications, quality of materials which need to be according to recognized international standards. Otherwise, the experience of Jordan with joint venture manufacturing would be similar to the example of China in this regard. A properly orchestrated computer technology joint venture manufacturing may ensure that adopted computer technologies in Jordanian schools are culturally appropriate, and that
those technologies are within the economic reach of Jordan's schools.

7. The hardware part of computer technology compared to software or educational computing programs may have less impact on Jordan's schools traditional life. It is the software that carries most of the cultural values, assumptions, viewpoints, ideas etc. that need to be dealt with carefully in education. It is also the secondary or unintended consequences that warrant attention in any plan for technology adoption in Jordanian schools. One may conclude that a plan for appropriate adoption of computer technology in Jordanian schools is one which singles out the question of software used on the machine as a focal point that deserves central attention. Software design and/or curriculum materials development warrants special consideration as primal components of such a plan. Instructional designers developing computer based instructional approaches need to put more emphasis on the learning outcomes and not the technology. The "bells and whistles" may not be the important criterion or central issue when developing technology based education systems.

8. Given that no constraints of any kind exist in the educational system of Jordan, appropriate adoption of computers in schools may be one that considers "the computer
as a normal part of any classroom and that its use may be expanded away from separate, computer-laboratory style applications to total integration into and across the curriculum" (Evans, 1986, p.4).

9. Quality of life in Jordan may have to be something kept in mind at all stages. As such, one may suggest that appropriate adoption of computers in Jordanian schools in particular and in Jordan's society in general, is that which treats the basic needs of the people of Jordan including food, housing, clothing, health, social welfare, and education. Other areas worthy of computer technology application in Jordan as a developing country may include: Increasing productivity of food for people and for livestock; increasing productivity in agriculture; conservation of natural resources; weather forecasting to help farmers, and in improving communication and transport.

10. Appropriate adoption of computer technology in Jordan's society as a whole may capitalize on an integrated approach covering research and development as essential to utilize computers in a productive manner. In education, one may suggest that appropriateness of computer technology adoption in Jordanian schools benefits from continuous research efforts looking into: All aspects of learning with computers; Jordanian learners/machine interaction;
development of specialized equipment for students with special needs; ways Jordanian students learn and Jordanian teachers teach, and study of psychosocial impact of computer technology. Other research questions may focus on developing local technologies, and adapting imported technologies to fit local cultural environments. As computer technology is growing at a phenomenal speed, appropriateness of incorporation of this technology in Jordan's schools may require serious attention to considerations of cost, teacher professional development (training), support systems and employment.

11. Description of Jordan's experience with computers in schools reveals that this experience is still new (El-Hmaisat, 1989), and/or in its early stages (Hawkridge et al., 1990). According to Rogers's (1983) five stage model for application of innovation one might suggest that the experience of Jordan's schools with computers is still at the Knowledge stage. As such, appropriate planning for adoption of computer technology in Jordan's schools may take an evolutionary rather than revolutionary fashion due to lack of teacher training and expertise, non availability of "good" educational software and/or learning materials, lack of administrative support, and more importantly, paucity of financial funding available to schools.
12. Related to appropriate adoption of computer technology in Jordan's schools is the notion of codesign of unique computer technology to fit the local culture of Jordan. Every year the government of Jordan and Jordanian universities sponsor many graduate students to learn computer science and related fields in technologically advanced countries. Equipped with advanced knowledge and technical expertise, those local Jordanian experts would be called upon to do everything they could possibly do to codesign, in collaboration with world expertise, unique computer hardware and software that fit the cultural setting of Jordan.

It is important to recognize that technology as a way of thinking is within Jordanian experts' capability. Through this thinking Jordanian experts in collaboration with international or World Bank expertise, can codesign the kinds of products which are best suited to the needs and wants of Jordanian schools.

Initiating codesign of unique computer technology in Jordan, where it is not totally Jordanian expertise nor it is totally outside expertise, could probably lead to regional cooperation among other middle eastern countries that would join with Jordan in a larger scale project to make indigenous technology.
13. Helpful to appropriate adoption of computer technology in Jordanian schools is the kind of computer networking that provides widespread electronic access to information resources of Jordan. Information centers at the Ministry of Education or elsewhere in Jordan, a dissertation abstract, an ERIC system or major national or regional libraries can be easily connected through computer networking. Students in schools and at universities could get instant access to current educational or cultural information through centralized electronic networking.

Such kind of computer networking facilitates sharing of information among universities, different ministries and agencies of Jordanian government including the Ministry of Education, the Ministry of Higher Education, the Ministry of Information, the Ministry of Planning and the Royal Scientific Society. Besides providing instant electronic access to current information resources and reference tools, centralized computer networking coordinates research and development efforts, as well as, spares the possibility of duplicating efforts.

**Concluding Remarks**

The points included in the plan development section are not meant to be prescriptive. Such a plan is not designed to be employed by Jordanian educational authorities to
attain particular goals within a certain time framework. It is not meant to be a step-by-step approach to adoption of computers in education. This plan is meant to be a thought-provoking agenda. Discussions provided in such a plan are meant to act as points of departure for Jordanian educational authorities at all levels to reinvent understanding as well as thinking about putting computer power in Jordan's schools.

As discussed in many places in the dissertation decisions to incorporate computer technology into schooling system in Jordan need to be based on realistic assessment and serious reflection on local factors including: economic, social, cultural, ideological, and technical considerations.

In no circumstances teachers may deny or reject the utility of this new high information technology totally and outrightly. Taking a critical position about computer technology in education may not necessarily mean an anti-technology, anti-computer orientation. In education or elsewhere, one may suggest that it's okay to be critical of technology and it's okay to be skeptical of technology. However, it's not scholarly to be merely cynical of technology. Therefore, a call for a critical examination of computer technology in Jordan's education may be needed to inform teaching practice with a more balanced, realistic
assessment and evaluation of its strengths and capacities, as well as, shortcomings and limitations. It is crucial for educational authorities in Jordan to examine critically and study computer technology in order to understand the implications of this technology introduced in non Western socio-economic and cultural setting. Serious attention, caution, careful planning, and critical examination of computer technology is needed by Jordanian policy makers at all levels, in order to secure appropriate adoption of this technology in Jordan's schools. It may be more feasible for Jordanian authorities to approach computer introduction into schools according to a slowly but surely, not surely but slowly fashion.

One may conclude that one should guard against the belief that computerization always represents progress. Convenience, speed, efficiency, effectiveness, and accuracy may not be necessarily tied to validity, legitimacy and significance. As Johnson & Maddux (1991) conclude the tools and modes of education may not be as important as the content or quality that goes into it.

In leaving this study, it was not my intention to suggest to educational authorities in Jordan, as a developing country, that they avoid present efforts or
future plans to adopt computer technology in schools. Indeed as Marshall (1984) put it:

"It would be a naive person or a fool who would suggest either that less industrialized nations would be immune from the invasion of the wave of 4th and now 5th generation computers or that the school system should not take some of the responsibility for preparing their populace for silicon chip world. It would, however, be equally foolish for third world educators or aid agencies to ignore serious issues regarding generally the transfer of technology from one culture to another and specifically the introduction of computer technology into third world schools" (p.377).


