The Effect of Integrating Computers into English Language Classes on Israeli High-School Pupils' Perceptions of Learning and their Perceived Academic Self-Efficacy

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By

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Abstract

This study examines the impact of the use of computers in English lessons on high school pupils' perceptions of learning and their academic self-efficacy, as well as an examination of the teaching/learning process, and the implementation of the use of computers in the English language classroom. The study was conducted in eight high schools (pupils aged 15 to 16) in the central part of Israel. Though the teaching of English in Israel has been the object of intensive discussion, the influence of the use of computers on pupils' perceptions has not, to date, been examined.

The study reviews the changes in psychological and cognitive perceptions of teaching and learning, including the importance of pupils' beliefs in the process of learning. The various theories of language acquisition as well as the characteristics of computers and their contribution to learners of English as a foreign language are discussed, in addition to their possible influence on pupils' academic self-efficacy. The role of the teacher in implementing changes at school has also been explored.

The research questions which drove this study deal with the impact of the change of instruction in the teaching of English on pupils' perceptions of learning and their academic self-efficacy, the conditions of English teaching, and affective characteristics. The starting point of the study was the desire of policy makers to take advantage of the possibilities computers offer in order to improve pupils' performance in English. The study was conducted using a naturalistic research method (interviews) combined with a quantitative instrument (attitude questionnaires) which was statistically analysed.

I general, teaching English through the use of computers showed that they did not contribute to a change in pupils' self-efficacy. Nevertheless, a change was observed in the dimension *complexity of learning,* in the experiment group, towards a more complex perception of the concept. The lack of change in pupils' perceptions may be related to a lack of change of the learning environment on the part of teachers. Their resistance to a change in their practice may be attributed to insufficient internalisation of the benefits computers offer, and the absence of classroom support in their use.

The major conclusion of the research is that the learning environment as a whole should be changed in order to get the optimum effect of the integration of computers into English lessons.

Declaration

This work is original and has not been submitted previously in support of any degree, qualification or course.

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INTRODUCTION

As a teacher of English in Israel and having taught in high school for thirteen years, I was disturbed to discover that pupils, in the various schools I taught, did not enjoy their English lessons. Therefore, my main concern has been to find means to make English lessons more interesting and relevant for pupils so that their performance and command of the language will improve. Thus, I sought classroom activities, such as games, simulations and role-plays, which would reduce pupils' fears and inhibitions regarding learning English and would increase their academic self-efficacy. Self-efficacy refers to the individual's assumption regarding his/her ability to organise and successfully carry out a particular task, which will result in a desired outcome (Bandura 1997). It is concerned with what people believe they can do under a variety of circumstances. I believed that if the activities I provided met the intellectual level of pupils and their interest they would feel more capable of performing the tasks assigned to them. However, I would often feel frustrated because I could not meet the needs of most pupils, let alone all of them, as classes were extremely large with 40 pupils in a class. Thus, the introduction of computers as an additional component in English language lessons gave me the impetus to explore the process of implementation, and to examine the question whether the individualised instruction computers offer meets pupils' needs, and whether it affects their performance and attitude towards English.

The teaching of English in Israel has always been considered important by administrators and policy makers alike. It is an international language, with 350,000,000 native speakers, another 350,000, 000 second language speakers, and

100,000,000 fluent foreign language speakers (Ministry of Education, 1998). For Israelis a good command of English is considered an asset, as it is the customary language for international communication and for overcoming barriers to the flow of information, goods and people across national boundaries. English is the language most generally associated with international trade and tourism, with higher education and research. In the last decade, the importance of having a good command of English has become even more apparent with the advent of electronic media, especially computer technology and its applications. More and more people have access to computers and they know that in order to be able to communicate with others on the Internet, to be able to maximise the possibilities offered by the World Wide Web they need to know English well (Warschauer, 1998). Hence, there is a need and a demand for good quality English, which will prepare Israeli pupils for the rapidly developing hi-tech world, in which Israel is a leading participant, and for those who need to know English for academic purposes. There is a general consensus that acquiring it is important both for the country's economy and for individuals (Ministry of Education, 1998).

In order to meet the need and demand, and following the Harari Committee Report, (1993) which recommended the training of professional teachers and an intensive integration of computers, a decision was made by the Israeli government to equip all schools with computers so that pupils would improve their academic performance and would be prepared to function in a technologically rich environment. The rationale for that is that Israel is a very small country with no natural resources which will contribute to its economic development. Therefore, in order to foster economic growth Israel needs to take advantage of and use its best available resources - human resources, and equip pupils with the appropriate training in new technologies so that once they finish school they will be ready for the highly sophisticated demands of the world of technology (Ministry of Education, 1998). Technology with the various possibilities it offers should be used as a tool in schools for the preparation of the young for the real world, where they will be expected to perform in a highly demanding technological environment, where many of its components require complex thinking, the best means for achieving it is via learning with new technologies (Harari, 1993; Ministry of Education, 1998). Furthermore, the use of technology in education is perceived as an aid which may help pupils progress in the process of learning.

Some of the underlying assumptions in advocating the use of computers as additional tools in the English language classroom are as follows:

- Computers may contribute in various ways to the development of learners' language skills and cognitive systems of the target language. For instance, in many reading comprehension tasks they can model the cognitive processes required for understanding and production (Cob & Stevens, 1996), they can model problem -solving which a user might undergo in order to complete a task (Dickson, 1985).

- Computers can help pupils in the construction of the target language grammar by structuring pupils' input and output in certain ways, for instance, by focusing the tasks to be performed based on learners' knowledge of the language. The control of the computer environment makes it suitable to language learning as pupils can progress at-their-own-pace. For example, the Internet promotes language learning by enabling pupils from one country to be in touch with pupils who speak the target language, in addition to being exposed to a multitude of other resources (Hoffman, 1996).

- Learning a language with the aid of computers may allow learners to experiment or take risks which in a classroom environment might have been psychologically threatening. For example, the anonymous nature of writing on the Internet seem to encourage a spontaneous form of writing which results in a more creative and natural language than in some other environments (Esling, 1991c; Hoffman, 1994).

- Computers offer a variety in the resources available for teachers and learners; there are concordances with large quantities of language data and tools to examine it. For instance, where teachers may be able to come up on the spur of the moment with a few sentences showing the use of the past perfect a concordance, a program that scans large quantities of text for specified words or phrases and presents them in context, can generate hundreds from a large quantity of source text. Pupils can build their own explanations of how language works, and therefore are more likely to remember the linguistic rules and use them (Warschauer, 1998; Doughty, 1992).

- The use of computers in the language classroom provides pupils with opportunities to practice and receive feedback on their performance, including practice level and types of exercises which are suited to pupils' level (Stevens, 1992, Hubbard, 1996). For example, there are many authentic texts available on the Internet and which can be accommodated for the level, pace, needs, interest and current knowledge of learners, and be used for group discussions and presentations.

Computers are not the only factor which is believed to affect pupils' performance in the classroom; another factor, which might enhance academic-performance is learners' perceptions of learning. Substantial evidence has accumulated showing that pupils' perceptions of learning are significantly related to their academic achievement (Dweck, 1989). A major contrast in the perceptions is that between a "shallow" perception of learning, which sees it as a matter of paying attention, doing assigned work, and memorising, and a "deep" perception, which sees learning as dependent on thinking and understanding. Evidence from studies of achievement motivation has shown that beliefs about learning influence learners' choices and initiation of tasks as well as the intensity and persistence with which they pursue them (Dweck, 1989). More specifically, beliefs about learning English may affect students' attitude to the study of this subject at school, even more so with the introduction of computers into EFL classes (Kasper, 2000). Some students may have a positive attitude towards the use of computers in their English language classes, whereas others may have a negative one.

Studying with the aid of computer technology is also likely to contribute to the enhancement of pupils' self-efficacy (Zimmerman, 1990). Self-efficacious learners feel confident about their ability to cope with problems. They attribute their success mainly to their own efforts, they believe that their own abilities will improve as they learn more. Pupils with low self efficacy, on the other hand, believe they inherently have low abilities, they choose less demanding tasks on which they will make few errors, and they do not try hard because they believe that any effort will reveal their lack of ability (Bandura, 1992). EFL students may lack high self-efficacy for a number of reasons, including experiences of failure because of meaningless and out of context language drills, or their inability to keep up with the pace dictated by the teacher and their peers (Kasper, 2000). Thus, learning English with the aid of computers is likely to provide pupils with more interesting learning experiences, which are tailored to their individual level and knowledge of English and therefore make it possible for them to cope with the activities offered in class. Such a learning environment is likely to enhance pupils' academic self-efficacy for the learning of English, which may result in a higher percentage of pupils passing the Matriculation Examination.

The Ministry of Education attempts to meet the demand for good quality English by extending the range and effectiveness of teaching approaches in schools: the grammar based curriculum, a major part of which consisted of a list of the structural items (grammar and vocabulary) was changed into a communicative one, where English is taught in English, and it aims to produce graduates who can conduct conversations and informal electronic and written communication with other speakers of English wherever they live. Finally, teachers are offered various workshops and courses the purpose of which is to provide them with a wide range of teaching strategies (Ministry of Education, 1998).

The Open University in Israel was one of the pioneers in adopting the Ministry of Education policy for the integration of technology in education. Thus, a wide range of courses are offered by the Open University the purpose of which is to train teachers in the application and integration of new technologies, in accordance with sound pedagogic principles. The underlying rationale for these courses is that appropriate training in the use of computer technology in the English language classroom will provide teachers with the necessary tools for varying their teaching approaches, will provide them with a rich source of materials for teaching for authentic purposes, for example carrying out a project on one's ancestors (Harari, 1993; Ministry of Education, 1998; Warschauer, 1998). Pupils, on the other hand, will probably be more motivated to study English as computers offer more individualised instruction tailored to their needs and knowledge (Stevens, 1992, Hubbard, 1996).

One of the courses offered by the Open University to EFL (English as a Foreign Language) teachers deals with the integration of technology in English language classes. This course was based on the principle of Integrated Group work Methodology (Bejerano, 1994) with the objective of familiarising teachers of English with state of the art computer technology and incorporating it with English teaching methodology. Thus, for instance, in the methodology part of the course teachers learnt about vocabulary acquisition and in the technology part they were introduced to Online Dictionaries on the Internet. Participants were also introduced to various links which can be used as data sources by pupils for carrying out projects.

This research is a quasi-experimental study of eight schools in the central region of Israel, which serves Jewish pupils, whose first language is Hebrew, and come from average economic background, that is according to statistical data they share similar demographic variables (Statistical Abstract, 1999). The research focused on eight tenth grade (15-16 years old) classes (198 pupils) and on their teachers in the various high schools. I decided to investigate English lessons in tenth grade because if perceptions of learning and attitude to English lessons are to be changed, this can and should be done at this stage of pupils' education, where experimenting with an innovative mode of instruction is encouraged and learning can be less achievement-oriented.

The study explored the change in pupils' perceptions of learning and their academic self-efficacy following the implementation of computers in their English lessons. In addition, it examined the impact of computers on their attitude to English lessons. This study also examined teachers' attitude to a novel medium of instruction – computers – as well as the type of activities they designed for their classes in an attempt to discover whether their teaching patterns have changed as a result of the use of computers. The teachers volunteered for this project; four of them took the Open University twelve-week course for the integration of technology in English lessons.

Teachers' willingness to incorporate a new medium of instruction in English lessons led me to attempt to examine the process involved both quantitatively and qualitatively.

The originality and contribution of the research

The current research examines the impact of the use of computers in English lessons in eight schools in one age group, an experiment which had not been undertaken previously. The goal was to examine the change in pupils' perceptions of learning, the change in their academic self-efficacy, their attitude and teachers' attitude to computers, and their performance as a result of using computers.

The importance of this study is threefold: First, research in Israel concerning the use of computers in English lessons is a neglected area. Research is lacking on the subject of the impact of the change of the learning environment in English lessons on pupils' perceptions and classroom performance. Teachers and educators need to be informed whether the approaches and tools they use for the improvement of pupils' performance have an effect on pupils. Second, this study may provide politicians and administrators, who spent millions of dollars on computerising schools, with the necessary information regarding the usefulness of computers for the enhancement of learners' performance. Third, exploring high-school students' perceptions in Israel has been ignored, and I believe that if scholars want to get an insight into the learning of English in Israel, which is considered to be an important subject, students' voice should be heard. After all they are the clients who should be served, and as such they are the ones who know whether the change of the learning environment contributes to their learning. The originality of this research lies in the qualitative and quantitative examination of pupils' perceptions, an examination of their academic self-efficacy, their attitude to English lessons, and the impact of the change of the learning environment on their performance. Finally, this study is conducted in the context of Bandura's theory of self-efficacy, and I hope that as such it will contribute to our understanding of teaching and learning, and classroom practice.

The study consists of three parts: the conceptual framework, the empirical framework and results and conclusions.

Part I: The conceptual framework (Chapters 1-5)

The first part of the study reviews the background concerning the rapid development of computer technology and its becoming an integral part of our lives. Chapter 1 describes the change in the psychological and cognitive perceptions regarding the nature of teaching and learning. Learning is no longer perceived as a process of "receiving" knowledge and teachers are not transmitters of knowledge. Knowledge is constructed by pupils in cooperation with their peers, who are taught the key concepts and basic skills of a particular field rather than teachers attempting to "cover" maximum materials. Pupils are expected to be able to transfer the skills they learnt in a particular situation into a new one. In order to achieve that the learning environment should be changed: pupils should be presented with authentic interdisciplinary problems which can be solved by pupils working in cooperation with their peers.

The chapter also describes the perceptions of the concept of learning and the importance of pupils' beliefs in the process of learning. The impact of pupils' perceptions of the concept of learning is discussed with an exploration of relevant studies. In addition, the factors affecting the development of the perceptions of the concept of learning are reviewed together with models for the changing of perceptions, beliefs and attitudes.

Chapter 2 describes the characteristics of computers and compares it with earlier technologies used in education. The uniqueness of computer technology in the school setting is emphasised in addition to the various educational opportunities it offers pupils.

Chapter 3 reviews Bandura's (1997) concept of self-efficacy - its role and influence on the selection of people's behaviour. Some of the components involved in perceived self-efficacy, such as effort and perseverance and affective responses are described. The development of personal self-efficacy is discussed together with the sources of influence. Finally, academic personal efficacy is introduced.

Chapter 4 describes the various theories of second language acquisition. In addition, the advantages of using computers in the teaching of English as a foreign language are discussed, as well as their contribution to the enhancement of pupils' self-efficacy. Finally, a description of the Open University course for EFL teachers is provided.

Chapter 5 deals with the role of teachers in implementing innovations in schools, and the reasons for the acceptance or rejection of such innovations are discussed. The role of the teacher in the classroom and in the EFL classroom in particular is explored, with an emphasis on the teacher's role in computer assisted language learning (CALL).

Part II: The Empirical Framework (Chapter 6)

This part of the study deals with the design of the study and the methodological issues adopted in pursuing this research. The selection of methodologies emphasises both quantitative and qualitative research strategies so as to provide rich detail. Chapter 6, therefore, includes a description of the research questions, the sample, the variables, data collection and methods of analysis. A pre-post design was used for uncovering the impact of the use of computers on pupils' perceptions of learning, their academic self-efficacy and attitude to the study of English. In addition interviews with both pupils and teachers were held. Examining the variance both quantitatively and by using qualitative methods creates connections among the research questions. On the one hand, the qualitative findings explain and give additional validity to the quantitative findings. On the other hand, the quantitative findings themselves are a "mirror" in which the questions are reflected.

The study is based on data collected from pupils and teachers in the high-school classrooms where the experiment took place. Two types of data were collected: questionnaires and interviews. Diversity in sampling ensured extensive data that cover wide ranges of behaviour in varied situations. It also diminishes bias by increasing the wealth of information available to the researcher. The process of data collection took place over eight months. The qualitative data were collected at the end of the experiment.

Part III: Results and Conclusions (Chapters 7-9)

The findings uncover wide ranges of perceptions and attitudes which reveal the worldview and perspective of those who participated in the study.

The impact of the change of the learning environment on pupils' perceptions of learning is examined in research question 1.

Since computers are expected to affect learners' self-efficacy this issue is discussed in research question 2.

Research question 3 summarises data on teachers and pupils. The question deals with the learning materials and activities teachers use in their respective classrooms, and in particular the type of activities teachers from the experiment group introduce in computer lessons. Teachers' attitude to the Open University course and their attitude to computers is also addressed. Their attitude to the course and the incorporation of computers in their lessons is positive.

Pupils' attitude to computers and the extent to which they use them for school-work was examined, in addition to their preferred media for learning English.

Research question 4 examines the impact of learning with computers on pupils' attitude to English lessons. Chapter 9 presents the conclusions of the study.

Chapter One - Perceptions of the Concept of Learning

In the introductory chapter it was argued that a key element in any question about learning a language or about learning through computers is centred on the word 'Learning'. In particular, it was suggested that learners' perceptions of what it is for them to learn and their views about their ability to learn are key features. In this chapter pupils' perceptions of learning will be explored with a view to presenting models to help describe how perceptions can be changed. This will contribute to later discussions about how learners' perceptions of themselves as learners of English and users of computers might be changed or developed.

With the advent of learner-centred teaching approaches it has become apparent to professionals in the field of English as a Foreign Language (EFL) that a greater emphasis should be placed on pupils' perceptions of learning (Nunan, 1988; O'Neil, 1991). Nunan (1989a) maintains that "no curriculum can claim to be truly learner-centred unless the learner's subjective needs and perceptions relating to the process of learning are taken into account" (p.177). Kumaravadivelu (1991) argues that learners bring with them into the language classroom their own perceptions of what constitutes language teaching and learning, and Breen (1989) says that all learners are capable of critically evaluating the tasks assigned to them by their teachers. Language learners, thus, hold beliefs about learning in general, and about language learning in particular; how language should be taught, what exercises are effective, and which are not so effective. Learners also have perceptions about themselves as language learners, and these perceptions affect their receptiveness to the ideas and activities presented by the teacher in the language classroom (Wenden, 1986a; Horwitz,1988; Abraham& Vann,1987).

The significance of pupils' beliefs in the process of learning

Psychologists and educational scholars (Zimmerman, 1993; Alexander, 1995: Galloway *et al.*, 1998) refer to the decisive significance of pupils' perceptions about the process of learning. It is becoming apparent that pupils' success at school is not solely determined by cognitive factors, such as their knowledge or learning strategies, but also by affective factors such as motivation and perceptions. Pupils, who believe that their success derives from external sources such as luck, cope less effectively with school work than pupils who attribute their success in learning to the efforts they put into the learning process or their level of intelligence (Galloway *et al.,* 1998). Also, pupils who believe that knowledge is fixed and acquired via dissemination from experts blind themselves to opportunities for knowledge construction, as well as the validity of multiple points of view. On the other hand, pupils who believe that knowledge can be conditional, constructed, and acquired through their own inquiry are in a much better position to acquire the authentic thinking practices of scientists, historians, and other professionals (Hofer & Pintrich, 1997).

This attitude towards pupils' perceptions primarily derived from the central position Cognitive theory placed on previous constructs in the process of learning new topics (Dole & Sintra, 1994). Learners rely on their previous knowledge when they have to deal with new tasks, or when they attempt to understand new things. However, this knowledge is not merely cognitive, rather it includes perceptions, beliefs and values (Alexander, 1995). Therefore, when scholars explore pupils' knowledge they almost invariably refer to their beliefs (Dole & Sintra, 1994).

William Perry Jr. (1968), who was an educational psychologist and student counselor at Harvard, was the pioneer in investigating students' own perceptions of their learning and development, not so much in terms of academic achievement as in overall changes they experienced within themselves. The study, which was conducted in the fifties and sixties, involved a questionnaire and in-depth interviews conducted at the end of every year with Harvard undergraduates. The findings suggested that students go through nine stages of development of epistemological beliefs. In the early stages, students see knowledge as either right or wrong, however, as students progress, they begin to perceive knowledge as correct relative to various contexts, they begin to believe that most knowledge is complex, tentative and reasoned out. The right-wrong belief became subordinated to relativistic thinking. At the final stage of the development students realise that there are multiple possibilities for knowledge and that there are times when one must make a strong commitment to some ideas. Perry's study has also shown that students perceive teachers as knowledgeable authorities.

Based on the analysis of the data Perry developed a model (which will be presented below), which served as a paradigm for other models based on more recent research and with different populations. His study was followed by Baxter-Magolda (1992), who focused on college students' viewpoint, and its features are expressed in terms of learner processes. The third study was conducted by Belenky *et al.* (1986), who interviewed non college as well as college women, so their analysis includes the perspectives of disenfranchised women such as welfare mothers. The Belenky *et al.* model is based on the metaphor of "voice", which they determined as more useful than the usual metaphor of "seeing" to describe the cognitive characteristics associated with learning and understanding.

In brief, these three models posit a series of stages or "ways of knowing" that characterise a student's modal intellectual processes at a given time. While the details vary, all of these schemes move through three broad modes of knowing: *dualism*, where knowledge consists of right or wrong facts, transmitted from an authority figure to the student; *multiplicity,* where one's opinion or inner voice is considered a source of authority, and consequently no more or less right than another's opinion; and *justified belief,* where personal beliefs are critically evaluated against external evidence.

Scholars who followed Perry in their investigations of pupils' epistemologies, notions of what constitutes knowledge and how one gets it, that is, how pupils perceive effective learning, point out that pupils, even very young ones, do not come to school as blank slates, rather they normally have firm ideas with regard to the world and life (Poster, *et al.,* 1982). Therefore, in some studies the emphasis is on the personal and perceptual factors which affect learning, for example, motivation, interest and beliefs (Garner, *et al.,* 1989; Hidi, 1990; Otero & Kintch, 1992).

Dweck and Legget (1988) studied the influence of students' beliefs about a single dimension, the nature of intelligence. They found that some students have a predominant belief that intelligence is a fixed entity, whereas others believe it is incremental, that is, that it can be improved. Students with a fixed entity theory of intelligence perceive the goal of an academic task is to document their intelligence.

Students with an incremental theory of intelligence perceive academic tasks as an opportunity to improve their intelligence. When engaged in an easy task, these two types of students performed similarly. When confronted with a difficult task, students holding the entity theory interpreted the situation as negative documentation of their intelligence. They displayed "helpless" behaviour by engaging themselves in self-talk, such as "I'm failing"- they continue to persevere with their initial strategy for solving the problem, but finally stop trying. Students with incremental theory, on the other hand, perceived the difficulty of the task as a challenge. They engaged in positive self-talk, such as "I have to try harder and longer", and use alternative study strategies.

Studies in social sciences (Schommer, 1990) and physics concentrated on exploring the level of understanding of texts from these fields by asking pupils to write a short paragraph based on their conclusions from their reading of the text; by testing pupils in order to evaluate their knowledge and by ranking of their understanding of the reading text. Analysis of the data has revealed that the more pupils believed in quick learning, the more they tended to draw superficial conclusions from the text, they tended to score low grades in the test, and to be overconfident in their understanding of the text.

Pupils' belief about the speed of knowledge acquisition was explored in Schoenfeld's (1983, 1985) study of high school students' geometry proofs. He conducted protocol analysis of geometry students' problem solving, and noted that students seemed to be functioning with a set of underlying beliefs. Similar to Dweck (1988) he found that students seemed to believe that only the gifted, or those who are very special can derive theorems or can be creative in mathematics. In addition, he noted that some students seem to believe in quick, all-or-nothing learning. They spent 10 to 12 minutes working on a problem, and if they did not get it by then, they assumed they would never get it.

Another study (Songer & Linn, 1991) investigated secondary school pupils' perceptions of science studies and the impact of these perceptions on the development of an integrated understanding of thermodynamics. They were asked questions about scientists' work, the nature of scientific knowledge, and the relevance of science to life outside the classroom and school. The pupils who held a complex integrative view of science connected science learning within the classrooms to science in everyday life. They identified the relation and interconnection between scientific terminology, understood thermodynamics and did much better than those with an opposite approach to the study of science.

Leach e*t al.* (2000) conducted a study the purpose of which was to explore students' understanding of the nature of science, and to consider the nature of science students' epistemological reasoning. The sample consisted of 731 European science students studying in academic streams in upper secondary school and the first two years of university. Students' responses to a paper-and-pencil questionnaire were analysed for consistency. The written questions yielded some insights into students' views. There is evidence that the majority of students in the sample draw upon different epistemological representations in different contexts, and that students used different forms of reasoning in response to different questions.

However, some scholars (Pace, *et al.,* 1989) argue that perceptions and beliefs do not always have positive impact on one's understanding of new topics. They may interfere with the understanding of a new topic which does not match the beliefs or values pupils hold. Thus, it can be said that belief systems and pupils' perceptions are important factors in the process of academic learning (Williams, 1994).

Perceptions regarding the nature of learning

Because pupils' general belief systems affect their attitude to learning, a growing emphasis has been put on the importance of pupils' beliefs regarding learning itself as an essential factor in the process of learning (Dole & Sintra, 1994; Schommer, 1994). Thus, scholars have been investigating pupils' beliefs regarding learning and the impact of these beliefs on the process of learning (Dweck & Leggett, 1988; Schommer, 1993; King & Kitchener, 1994; Hofer & Pintrich, 1997).

For instance, Schommer and Walker (1995) argued that if pupils believe that learning comprises small units of knowledge, which are not connected, they are likely to believe that if they remember these small units of knowledge, then they will understand subject matter which will lead them to the acquisition of new knowledge. If they believe that understanding means memorising isolated items in the process of learning, these students are likely to select learning strategies which will lead them to this kind of "understanding". Thus, they might resort to strategies of rote learning as their main learning strategies.

A belief in simple knowledge, that is the belief that the pieces of knowledge are isolated and are not connected, was found to be a predictor of students' ability to understand texts in medicine, physics and mathematics. In a study conducted in laboratory conditions, aimed at investigating American medical students, Feltovich, *et al.* (1989) found that beliefs regarding the nature of knowledge and learning affected their understanding of complex medical terminology. The main obstacle to the understanding of complex terminology was their tendency to simplify and place new information in new separate structures rather than incorporating it into existing ones. These students tended to oversimplify complex structures, relied on single mental representations and divided knowledge components into isolated units. These findings were supported by Hammer (1994) who found that some students view physics as weakly connected pieces of information to be separately learned, whereas others view physics as a coherent web of ideas to be tied together. Some students equate learning physics with retaining formulas and problem-solving algorithms, while others think that learning involves relating fundamental concepts to problem-solving techniques. Some students believe learning consists primarily of absorbing information, while others view learning as building one's own understanding.

Some scholars (Rayan, 1984), who explored the area of pupils' perceptions of learning, maintain that beliefs concerning the nature of knowledge and learning develop steadily step by step. Others (Jenhng, *et al.*, 1993; Schommer, 1994; Schommer, 1990) argue that personal beliefs concerning the nature of knowledge and learning are organised as independent multiple systems, which form a general frame of reference to the concept. Their argument is based on the premise that the human belief system is a very complex one. That is, any belief system, including that concerning the nature of knowledge and learning, is too complex to be treated as unidimensional. Therefore, the answers to the questions how pupils perceive effective learning, how pupils perceive the concept of learning, or what is pupils' belief system regarding the process and nature of knowledge and learning, are affected by the multiplicity of these dimensions.

The dimensions of the concept of learning

The concept "belief systems" of learning suggests, then, that more than one element has to be taken into account when exploring pupils' perceptions. Based on the three models mentioned above and taking into account other research in the field it is possible to suggest eleven perceptual dimensions to the concept of learning (Perry, 1968; Belenky, *et al.,* 1986; Baxter-Magolda, 1992; Perkins, 1992, 1993; Pea, 1993; Salomon, *et al.*, 1993; Salomon & Almog, 1994; Schommer, 1994; Bereiter & Scardamalia, 1995). Each dimension has a range of possible values:

1. **The structure of learning** (Schommer, 1989; Baxter-Magolda, 1992) - It refers to the perception of learning as a personal enterprise or a collaborative effort.

2. **The source of knowledge in learning** (Perry, 1968; Baxter-Magolda, 1992) - Beliefs in this domain range from perceiving the teacher and books as the main sources of knowledge in the process of learning, to beliefs that there are multiple sources of knowledge such as expert teachers, data bases and so on.

3. **The role of the teacher in the process of learning** (Perry, 1968; Baxter-Magolda, 1992) – refers to beliefs which perceive the teacher as an authority in the learning process, on the one hand, and perceiving the teacher as a tutor or a guide leading pupils to the acquisition of knowledge, on the other hand.

4. **Learning tasks** (Perry, 1968; Baxter-Magolda, 1992) – where the nature of the task depends on whether learning is seen as a process of problem solving or as a process which merely involves reading, and obtaining knowledge from the instructor.

5. **Learning aids** (Baxter-Magolda, 1992) - where the nature of learning is perceived as a process which involves studying only with books and notebooks, or as a process which involves other learning aids, such as computers.

6. **Speed of knowledge acquisition** (Schoenfeld, 1983; 1985) – Refers to beliefs which perceive knowledge acquisition as quick and immediate - where the emphasis is on the product – or to perceiving it as slow with an emphasis on the process.

7. **Effort in Learning** (Perry, 1968) – Refers to notions according to which minimum intellectual effort is required in the process of learning, or to notions where learning is perceived as involving a great deal of effort.

8. **Control in the process of learning** (Dweck & Legget, 1988) – believing that being a good pupil is mostly a matter of fixed natural ability, or believing that most people can become better at learning.

The range of perceptions of learning in this category may vary from seeing learning as an inborn ability for learning to a changeable capacity for learning.

9. **Complexity of learning** (Perry, 1968) - where the nature of learning is seen as mainly consisting of absorbing information, or is seen as relying crucially on constructing one's own understanding by working through the material actively, by relating new material to prior experiences and knowledge.

10. **Generality of learning** (Perry, 1968) - Refers to notions of learning and understanding as all-or-none, or to believing that learning and understanding are a long process which is subject to change.

11. **Determinism of learning** (Perry,1968; Baxter-Magolda, 1992) – This dimension probes the extent to which pupils navigate between the two extremes of absolutism, thinking all knowledge is set in stone, and extreme relativism, making no distinctions between evidence-based reasoning and mere opinion.

These eleven dimensions do not cover the whole meaning of the concept of learning, but they include the most central aspects of this concept.

The dimensions of learning can be conceptualised on a scale of values ranging at one end from the belief that learning is a simple process, which is in congruence with the traditional pedagogical psychological views; and at the other end, there is the belief that learning is a complex process that requires a great deal of effort, a view congruent with new pedagogical psychological views.

Direct and indirect effects

It can be said that the effect of beliefs, regarding the nature of learning and knowledge on the process of learning, are both direct and indirect (Belenky *et al.;* 1986; Mischel & Shoda, 1995; Hofer & Pintrich, 1997). The direct effects focus on the selection of strategies for coping with problems or for coping with a certain learning assignment. The indirect effects, on the other hand, are manifest in pupils' achievements following the use of particular strategies. Studies from the area of reading comprehension can support this argument. There are findings which support the argument that beliefs can directly affect the process of learning: pupils with a strong belief regarding the determinism of knowledge tend to draw absolute conclusions from an initial reading of a text (Schommer, 1990).

The indirect effects of beliefs on the process of learning were found in a study which explored American junior college students' beliefs concerning the complexity of the learning process (Schommer, *et al.*, 1992). Students were asked to report the number of classes they had taken in various disciplines, as an indicator of prior knowledge. Then a reading text was given to the 86 students, with the purpose of exploring their level of reading comprehension via the use of achievement test. In addition, students' selection of strategies for the understanding of the text were explored. The students were asked to write a concluding paragraph for the passage. A mastery test composed of 10 multiple-choice items which tested the recognition and application of key ideas in the passages was administered. Accuracy of comprehension was assessed by asking students to rate their confidence in understanding the passage. This was followed by a comparison between students' confidence ratings and their test performance.

The findings of the study indicate that the more students believed that the process of learning is complex, and that the acquired knowledge in this process is also complex, the higher their grades in the achievement test. The more pupils believed that learning is a complex process, the more complex were the learning strategies they used. The more complex their learning strategies were, the higher their scores in the achievement test.

The development and shaping of the perception of the concept of learning

Studies exploring the development of the concept of learning indicate the influence of environmental variables on the shaping and development of the concept of learning and knowledge (Schommer, 1994). At a very early stage of their development children start learning: they gradually become aware of certain things regarding learning. They begin to understand that there are things which are easier to study than others; they begin to understand that there are different reasons for learning and that there are various ways of doing it. This observation of the process of learning and experiencing it with the help of parents, friends or teachers, forms the basis to what is known as meta-cognition, that is knowledge of learning (Williams, 1994).

The development and shaping of the perception of the concept of learning

Some scholars (Hattie, 1992; Schommer, 1994) maintain that beliefs concerning knowledge and learning are affected by pupils' parents' perceptions. Parents' perceptions of knowledge and learning depend on their education, their social status and the type of work they do. At a later stage of children's development teachers and school become the mediators of learning experiences, and therefore they may influence the development of beliefs about knowledge and learning.

It can be said that beliefs about learning are influenced by experiences (Schunk, 1995; Schommer, 1994). Despite the fact that there are not many studies in this area, there are some indicating the importance of experience in shaping personal beliefs.

Moss (2000) conducted a case study, in a public high school in New England, the purpose of which was to describe how technology was utilised within a student centred project and to examine students' beliefs about their use of technology within an innovative environment. Seven students were selected and interviewed individually six times throughout the year. The findings of the study indicate that teachers and students held different perceptions as to what was valued in class in terms of learning. Although teachers supported student learning of computer skills, they viewed gains in content knowledge as critically important. However, as they perceived their role as facilitators in the learning process and not as disseminators of knowledge, they did not provide pupils with the necessary guidance. On the other hand, students generally believed working primarily on computer skills was what was expected of them and felt justified focusing their energies in that area. Content was seen as secondary by many students.

Elby (1999) conducted a study aimed at helping students to develop substantially more sophisticated beliefs about knowledge and learning. The sample consisted of two groups of learners from California and Virginia. The subjects from California were physics students at a small, comprehensive high school serving a middle-class community in the San Francisco Bay area. The 30-member class consisted of 12th, 11th, and 10th graders. Fourty three percent were female. The class was diverse in terms of interest and ability. Twenty-seven students completed the pre- and post-assessment – EBAPS (Epistemological Beliefs Assessment for Physical Science) test.

The subjects from Virginia were 76 physics students at a large high school for gifted and talented students near Washington D.C. Fifty percent of the students were female. A State-mandated curriculum required the teacher to cover large numbers of topics. This core curriculum was "enforced" by shared, department-wide midterm and final exams. Fifty-five students took the pre- and post-assessments.

In California and Virginia the teacher taught two different curricula to two different sets of students—a non-honors, slower-paced course and an honors, faster-paced course. Both curricula contained common elements.

The high school textbook begins by introducing formal definitions and equations, followed by a few examples and real-life applications. By contrast, the teacher was trying to teach students that learning physics often involves *starting* with real-life examples and common-sense intuitions, and building upon them to make careful definitions, to figure out equations, and so on. During this process, the teacher urged students to unearth and examine their own intuitive ideas, refining them when needed, an activity the textbook supports only in the most cursory way. So, the textbook and the teacher broadcasted conflicting messages about how to learn physics.

The students spent most of their time working in small groups on activities and problems, parts of which resemble tutorials, and real time physics labs. But epistemological considerations pervaded every aspect of the course, including homework- and test-question selection, homework-grading policy, class discussions, and even labs. Because the teacher believed that a student cannot learn about "understanding" without having the personal experience of understanding chunks of interconnected material, the courses covered fewer concepts and problem-solving techniques than they would have in the absence of this epistemological agenda.

The findings showed that the California and Virginia students achieved significant—and according to EBAPS, comparable—gains in the sophistication of their beliefs about the coherence and "conceptual-ness" of physics knowledge and about the constructive nature of learning, showing that an epistemology-focused course can work for both average and talented students. In addition, the Virginia students also acquired more favorable beliefs about the link between physics and real life outside the classroom, and about the meaningfulness of mathematical equations. The results came at the expense of content coverage, but not at the expense of basic conceptual development change.

In explaining the findings, Elby suggests that teaching isolated pieces of epistemologically-focused curriculum aren't enough. Instead, the epistemological focus must suffuse every aspect of the course. Therefore, the instructor's commitment to an epistemological agenda must go beyond a willingness to implement certain curricular elements. For instance, simply replacing a couple of labs with the epistemologically-focused lab/tutorials may make little difference. There is no reason, he maintains, to think that partial adoption of curricular elements will lead to epistemological change.

In addition, the classroom atmosphere created by the instructor, and the way s/he interacts with individual students, undoubtedly plays a large role in fostering reflection about learning. Elby's main concern was fostering epistemological development, co-equal with fostering conceptual development about physics. Therefore, he always kept epistemological considerations in mind when planning lessons, writing materials, setting policies, and interacting with students.

Schoenfeld's (1983) study indicates the importance of experiences in the process of shaping perceptions. In this study it was found that pupils' beliefs that solving mathematical problems is an easy and speedy process may be the result of the way they were taught. For instance, teachers may emphasise memorising formulas rather than the understanding of mathematical concepts in the process of learning or evaluation of pupils. Consequently, pupils will also put less of an emphasis on these aspects of learning.

Schommer (1994) conducted a study on people of different ages. It was found that demographic characteristics predicted perceptions regarding learning and knowledge. The older the participant was the less s/he believed in the existence of a stable learning ability. The more involved parents were in the process of learning, the less participants believed in quick learning. The less "pushy" the parents were, the less participants perceived learning as a process and knowledge as simple. The less strict parents were, the less participants believed in quick learning. The more participants were allowed to make their own decisions, the less they believed in absolute knowledge. The more educated participants' parents were, the less participants tended to believe in absolute knowledge and a simple learning process. That is, the more parents encouraged their children, in their childhood and adolescence, to thoroughly think, and independently solve problems, the more they tended to hold a complex view of learning once they were adults. When participants' background variables, which derived from their experiences at home, were controlled, it was revealed that experiences at school also contributed to the perceptions regarding learning. Specifically it was found that the more educated the participant was, the less s/he believed in absolute knowledge and learning as a simple process.

Another study (Jenhng, *et al.*, 1993) revealed that college students, studying in different tracks, have different perceptions regarding learning. For instance, graduates of business school believed that knowledge is absolute and "dry", on the other hand, social sciences students believed that knowledge is temporary and changeable. This indicates that experiences in different kinds of learning affect perceptions about the nature of learning.

The above- mentioned studies indicate that experiences in different types of learning can affect belief systems regarding the nature of learning.

Models of changing perceptions, beliefs and attitudes

The interest, in the ways in which perceptions of concepts can be changed, mainly derived from studies which indicated that in the process of learning, many pupils do not acquire new knowledge and do not progress in the process of learning, when this knowledge contradicts existing knowledge or perceptions (Dole & Sintra, 1994). Studies investigating students studying the sciences, and students' reading comprehension (Dole & Sintra, 1994), illustrated the difficulty in learning towards a change of perceptions or concepts, that is the difficulty in learning for "Radical Restructuring" (Vosiniadou & Brewer, 1987). This kind of learning involves the restructuring of knowledge, a change in thinking and the perception of concepts related to this knowledge, and a change of the way these concepts are interconnected. A change in perception may happen, for instance, when a person who has been smoking for many years, becomes convinced as to the destructive effects of smoking, and consequently changes his/her perception of smoking as an enjoyable activity.

Scholars (Petty & Cacioppo, 1986; Chaiken, 1987; Tesser & Shaffer, 1990) from the field of social psychology have investigated the various factors involved in the way beliefs change. The general framework, for the understanding of the processes of change, has been conceptualised by many models and hundreds of studies. From these there are two main models which have been accepted by most scholars in the field: the Elaboration Likelihood Theory (Petty & Cacioppo, 1986), which is a communication influenced theory used to persuade people to think or to believe in something, and the Social Judgment Theory (O'Keefe, 1990). The key point of this theory is that attitude change is mediated by judgmental processes and effects. That is, persuasion occurs at the end of a process where a person understands a message, then compares the position it advocates to the person's position on that issue. A person's position on an issue is dependent on the following three factors: the person's most preferred position, the person's judgment of the various alternatives, and the person's level of ego-involvement with the issue. The more ego-involved people are on a certain issue, the higher the rejection they demonstrate, and consequently, the lower the chances of them being persuaded to accept a change.

Both models present a similar picture of what happens when people change their perceptions following input of new information, and both suggest central and peripheral routes for the change of perceptions.

A model for the change of perceptions

According to the two models people differ in their level of motivation and their ability to think about and evaluate new information presented to them. When motivation is high and people are willing to think about and contemplate the type of new knowledge, then old beliefs or perceptions may change (Petty & Cacioppo, 1986). This is the central, systematic, route for the change of perceptions: it requires people to want to devote a great deal of time and effort for the examination of the new information presented to them. In addition, they are expected to be intellectually able to consider both the old perception and the new one. Once people adopt this approach for the examination of new knowledge then a stable change in their perceptions and beliefs may take place.

The peripheral route involves situations where people do not want to think deeply and analyse the new knowledge presented to them, they cannot do it, or they do not have sufficient information about the subject related to the new knowledge (Petty &

Cacioppo, 1986). Under such circumstances a "host", an "expert" or any other attractive source, such as, pleasant music, good food or an appealing advertisement, which serves as a mediator between people and the new knowledge, may cause them to change their perception. The more the mediator possesses attractive characteristics, for example, s/he is good looking, witty or reliable, and the more s/he resembles - his/her age, his/her external appearance - the people to whom the new information is presented, the more reliable s/he is perceived in the eyes of these people (Fisk & Taylor, 1991). Consequently, these people will be more prepared to listen to and believe the new information. It should be pointed out that these characteristics of the mediator have significance only in the peripheral route, when people are not interested in the new information presented to them. When people do not want to consider, or cannot critically think about the new information, they will respond to these "superficial clues" (McGuire, 1985).

It is easy to see the potential of this model for education: it can be "translated" into teachers' potential influence on pupils in the learning environment. Very often pupils do not want to think, process or critically consider the information presented with regard to a particular subject matter. Under such circumstances they may change their perceptions not as a consequence of their understanding of the subject, but rather as a result of their teacher's influence or their peers'. However, it should be pointed out that when the change in perceptions and attitudes is based only on the peripheral route, with no thinking or deep processing, very often it is only temporary (Petty & Cacioppo, 1986; O'Keefe, 1990).

In the peripheral route the "mediator" does not have to be a human being. Some of the well-known mediators are advertisements on television. Many studies have shown that exposure to information presented by attractive advertisements, and systematic repetition of this information, may change the viewers' perceptions of the information (Fisk & Taylor, 1991).

Many factors, related to the type of new information transmitted in the peripheral route or the central one, were investigated, in order to differentiate between characteristics of information which are likely to influence people to change their perceptions (Dole & Sintra, 1994). Some of these factors are the following:

- The clarity of the new information was found to have influence over people's willingness to change their perceptions. Complex information is more difficult to understand, and therefore requires more cognitive effort and time. People are reluctant to devote much time and energy for the understanding of new information. The harder the processing of the new information is, the less people try to understand it.
- The extent of controversy regarding the topic, which the new knowledge presents, may affect the extent of change in perceptions. The higher the consensus about the topic, the more willing people are to change their perceptions regarding it.
- The structure of the transmitted knowledge: if favourable aspects of the new information are presented, then people are more likely to change their perceptions.
- People's primary beliefs: if the primary belief is moderate and not extreme, people will be more likely to change their perceptions regarding a particular topic.

The central - systematic - route for the change of perceptions in social psychology closely resembles the theory of Deep Processing of Cognitive Psychology (Dole & Sintra, 1994). In their studies of learning, cognitive psychologists found that voluntary thorough information processing results in the reshaping of the information in the process of learning. The more active and serious pupils are in thoroughly processing new information, the more they tend to learn from that information. On the other hand, when new information is not properly processed by pupils, as a result of rote learning, for instance, pupils tend to be passive, and the impact of the experience in the process of learning may be short lived. This may result in a situation where the new knowledge was not learnt.

To sum up, in order for a change in perceptions to take place and remain stable, people have to be active, think, consider, and thoroughly analyse the new information presented to them. In order to carry out these activities they have to be highly motivated and interested.

Changing the perception of the concept of learning

The above discussion has focused on the ways for changing people's perceptions. It has been argued that there are two routes for changing perceptions – the central route and the peripheral route. Having explored the various theories and models for changing perceptions I now intend to take the discussion further by exploring the application of this concept of changing perceptions to the particular case of learning.

When pupils are exposed to a different type of learning environment, they are likely to discover something new regarding learning. This new information may contradict what learners have known up to that point, and consequently they may cease to learn in the new learning environment (Petty & Cacioppo, 1986; O'Keefe, 1990). For instance, a pupil who believes that learning is a process which involves memorising discrete items, and therefore s/he is used to learning by memorising, is not likely to be able to cope with learning which does not require such processes. When pupils' perceptions are in contrast with the new one, which is an outcome of the exposure to the new type of learning, the only way to a significant and lasting change is the central, or systematic, route.

According to Petty's and Cacioppo's (1986) model, pupils' experiences may promote, under certain circumstances, a process of change of the concept of learning. If, for instance, the processes of experiences in the new type of learning are clear, if there is no rejection or a hostile attitude to experiencing the new type of learning, if the primary belief regarding the nature of learning is moderate and not extreme, then pupils' experience may promote a process of change in the perception of the concept of learning. However, it is clear from social psychology literature, and cognitive psychology, that the central route, for changing perceptions in general, and perceptions regarding learning in particular, requires pupils to be active: they have to think deeply about the new ways of learning, they have to be very critical, they have to consider and compare what they know to other ways of learning.

Despite this requirement, most studies indicate that pupils do not tend to devote much thinking to their experiences unless they have a reason, and therefore they are motivated to do that (Dole & Sintra, 1994). The reasons which encourage pupils to put some effort and think critically are numerous: the attractiveness of the experience, the temptation of the experience (Garner, *et al.*, 1989), the challenge of the experience, and many other factors which may cause pupils put in the adequate thinking for the change of perceptions in general, and the perception of the concept of learning in particular.

One of the central factors, which may motivate pupils to think deeply, and consequently bring a change in their perceptions, is the extent to which they are interested in the new experience presented to them. Some studies (Wade & Adams, 1990; Wade, *et al.*, 1993) have shown that pupils' level of interest is a significant factor in the process of learning, therefore when pupils experience a new and interesting type of learning, they tend to devote more time and effort to critically think about the new information which the experience is presenting to them.

In sum, in order for a significant change in the perception of the concept of learning to take place, the experience in the new type of learning has to be clear with "supportive arguments" for this kind of learning. In addition, pupils need to be interested in the new kind of learning: this interest it is argued is supposed to invoke the desire for deep and reflective thinking concerning the new information about the new type of learning (Wade & Adams, 1990; Wade, *et al.*, 1993). Some scholars (Lepper & Gurtner, 1989) argue that the use of computers as learning aids in the classroom may provide pupils with new opportunities for the development of intellectual skills, and consequently stimulate them to change their perceptions of learning.

The use of computers as an enhancing factor in the change of the perception of the concept of learning

Computers offer pupils a new experience of complex learning; the learning activities are based on coping with vast information resources, pupils' ability to select appropriate information, classify it and use it (Salomon, 1996; Salomon *et al.*, 1993). This kind of learning derives from the new psychological cognitive views regarding the nature of teaching and learning which I discussed previously. Experience in this kind of complex learning presents pupils with many reasons which might encourage them to put in effort.

Computers offer a variety of attractive activities, which might arouse interest, and therefore encourage pupils to reflect about the new type of learning they are engaged with. For instance, pupils may be presented with complex and authentic problems, which might rouse pupils' desire to succeed in solving them. Or, the attractiveness of the possibility of pupils working together with their peers: in this way they can share their ideas with their friends. One of the most attractive characteristics of the computer is the fact that it used as a learning aid: it can be found almost in every house, and is perceived by children as fun. The use of a fun aid in the process of learning arouses pupils' interest, and consequently their motivation to put in an effort of thinking about the experience at hand. In addition, the use of computers breaks the routine in the classroom and offers a new kind of learning.

The attractiveness in using computers, as part of the learning process, may affect pupils so that they are engaged in reflective thinking about the new type of learning they are experiencing. Consequently, they may change their perception of the concept of learning.

Summary

The importance of pupils' perceptions of learning and how they affect their success at school were discussed in this chapter. Eleven dimensions of the concept of learning, which include the most central aspects of the concept, were suggested. In addition, the sources shaping the development of perceptions of the concept of learning were explored, and two models for the change of perceptions were introduced. The review of the literature has shown that in attempting to implement an educational change – the incorporation of computers in schools – educators and policy makers have to take into account learners' epistemological beliefs, and their attitude towards the proposed change. The reason for this is that their beliefs and attitude will determine whether they accept the change or reject it.

In subsequent chapters of this study I will argue that the use of computers enables pupils to be active in the process of learning, and in this way to deeply process information, which might result in their changing their perception of the concept of learning.
The following chapter will discuss the use of computer technology in schools, its uniqueness and the pedagogic advantages it offers pupils.

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Chapter Two - Computer Technology in Learning

At the beginning of the 1980s it was already foreseen that computers would have a strong impact on people's lives and that much of children's education would be obtained through computers (Papert, 1980). Indeed we are in the midst of a technological revolution where computers are an integral part of our lives, they can be found in people's homes, they are an integral part of business life, industry and school (Lepper, 1985). Can computer technology affect classroom learning? What learning opportunities are offered by computers?

The uniqueness of computer technology

Unlike computer technology, previous technologies such as educational television or programmed teaching were usually technologies of "transmitting knowledge" (Salomon, 1996; Salomon, *et al.*, 1993). In this sense these technologies were merely an improvement of the traditional methods which endorsed the transmission of knowledge. Therefore they suited the existing character and structure of classrooms, which was based on pedagogical assumptions regarding education as transmitting ready made knowledge or pupils as "empty vessels" to be filled. Consequently, the effect of past technologies was marginal the more they fitted to the existing educational system, which had a view of knowledge as fixed, and the least changes they were expected to bring (Papert, 1987). Computer technology differs in many respects from past technologies. The common denominator for all these aspects is that the use of computer technology involves active thinking (Salomon, 1996). This common denominator is evident in each of the unique characteristics of the computer:

The computer is not the kind of technology which involves the transmission of knowledge, rather some scholars (Lepper & Gurtner, 1989; Salomon, 1996; Salomon, *et al.*, 1993) argue that it has the potential for overt interactivity. It is a technology which enables users to send a message via the screen to a text, and then the text, properly coded, can send a message back to the reader. The reader is far from being a passive respondent to print stimuli, rather s/he is a questioner, judge, summariser, comparer and predictor, depending on the type of text and the reader's prior knowledge and current goals. In this way the meaning of the text for a particular reader is gradually constructed through the dynamic flow of information between the reader and the text. This kind of interaction makes the computer a technology which enables collaboration between learners and computers in the sense of "intellectual collaboration" (Pea, 1987; Salomon, et al., 1991). The computer provides the data pupils need for writing papers, and the latter in turn have to be able to sift through and select the relevant information. "Intellectual collaboration" between learners and intelligent complex instruments calls for cooperative thinking of pupils as they work together to solve authentic problems while interacting with authentic texts (Walker, 1999; Brown, *et al.*, 1993). Bacon and Finnemann (1990) examined perceptions of general language learning, gender, and willingness to deal with authentic input for first year Spanish students at two U.S. universities. They wanted to know whether these perceptions could be associated with comprehension, satisfaction, and strategies used in situations of authentic input. The results suggest that students perceive the value of authentic text to their learning and that they are not constrained in processing it.

Computers enable pupils to experience not only structured learning activities, but also complex ones which are based on coping with vast information resources. They also enable pupils to select appropriate information, classify it and use it in a process of problem solving (Salomon, 1996; Salomon, *et al.*, 1993).

Computers can also be used for experiential learning (Lepper & Gurtner, 1989). Pupils can be involved in simulations of laboratory conditions, where they can be active in conducting very complex experiments which are too difficult or risky to be done in real-life laboratory conditions. Computer technology enables pupils to be involved in activities of planning and designing presentations and educational materials (Walker, 1999). Computers give pupils an access to materials and data bases which they otherwise would not have been able to reach. Making use of data bases can help pupils organise their knowledge in a particular topic, or to combine their knowledge with that of others (Pea, 1985). This might be helpful for pupils in designing educational presentations (e.g. multimedia), as part of the ongoing learning process. In addition to designing educational presentations computers also enable pupils to be involved in planning, in simulations, to have access to electronic libraries and to be in touch with other pupils via e-mail. These characteristics of the computer enable pupils' active learning.

Kromholts (1997) conducted a study the purpose of which was to explore 8th grade Israeli pupils' attitude to the study of science with the aid of computers. The study was based on the following three principles: first, pupils have to experience the design of products as an integral part of their learning, second, pupils' learning should involve both cognitive and affective experiences, third, pupils must produce tangible objects – multimedia presentations. In the study pupils were given an introduction to the subject of "heat and temperature", then they were asked to select a question which would require in-depth exploration on their part. In the next stage pupils used the computer in order to find data concerning the research question, then they formulated guidelines for themselves for the preparation of their multimedia presentation. Pupils' learning involved the location of relevant data and then organising and processing it. The teacher guided them in the various stages of learning by referring them to various data sources, and helping them in solving problems. In addition, pupils were involved in devising the relevant criteria for evaluating their work, in order to improve the learning process by reflecting on their own work. The findings showed that pupils were satisfied with learning which required their active involvement especially as they had a choice in selecting the topic for investigation. They reported that having to produce a multimedia presentation added a fun aspect to their learning of the topic they selected; they could choose the visual and audio means for the presentation.

Computers can be used as tools which promote the achievement of various learning objectives, such as writing, reading and communication skills (Collins, 1986; Lepper & Gurtner, 1989). Word processors reduce the clumsiness and hard work involved in the manual process of writing, and increase the possibility that pupils will edit and review their written work. Spell-checkers, style-checkers and outliners, which help in organising one's ideas before and during writing papers, can also help pupils in the process of writing (Pea, 1985; Salomon & Globerson, 1988; Walker, 1999).

Warschauer (1996), for instance, conducted a study to examine the effects of the use of computers for writing on pupils studying in the language classroom. The sample consisted of 167 university students in 12 ESL (English as a Second Language) and EFL (English as a Foreign Language) academic writing classes in the United States, Hong Kong and Taiwan. Students were given a survey in order to explore their attitude towards the use of computers in their classrooms. The results of the study indicated that students had a positive attitude towards using computers.

Computers can make learning an enjoyable experience (Kromholts, 1997; Schunk, 1991): they enable pupils to be involved in active learning, pupils may receive immediate feedback on their performance, learning with computers opens the possibility of adapting the learning and teaching processes to different kinds of pupils. All of these make studying with computers not only enjoyable, but also more intrinsically motivating for pupils (Brown, 1985; Krendle & Lieberman, 1988; Lepper, 1985).

Thus, computers may not only increase the effectiveness of teaching, but may also increase pupils' motivation for learning. In addition, they may provide opportunities for learning and the development of intellectual skills which are different from those emphasised in the traditional teaching processes (Lepper & Gurtner, 1989).

New perceptions regarding the nature of knowledge and learning

The new psychological and cognitive perceptions regarding the nature of teaching and learning are not necessarily related to computers. They are the result of research which developed independently of computers, but now with the inherent possibilities of computer technology there is an overlap between the two areas. These are new perceptions concerning teaching and learning and which are more easy to apply with the help of computer technology and the different possibilities it provides (Salomon, *et al.*, 1993).

Learning as construction

Many of the new views regarding learning and teaching derive from Constructivist theories (Vygotsky, 1978; Bruner, 1985; Perkins, 1991; Scardamalia & Bereiter, 1991; Spiro, *et al.*, 1991; Phillips, 1995; Prawat & Folden, 1994; Smith, 1995). Proponents of these theories maintain that learning is not a process of recording information, where the teacher "transmits" knowledge and pupils "receive" it, but rather a process of guided construction of knowledge. Knowledge, according to this view, is actively constructed by learners (Prawat & Folden, 1994), and therefore the emphasis is placed on pupils' involvement in the construction of knowledge rather than in the receiving of it (Resnick & Klopfer, 1989).

Such a view requires a shift in the focus of learning and teaching in the classroom: from the traditional method of transmitting knowledge to a more complex and interactive one (Prawat & Folden, 1994). This is based on the premise that construction of knowledge will not take place merely by "telling" pupils about something new. Rather, in order for pupils to be involved in learning which is based on cognitive processes, they need to have the opportunities to re-explore projects or certain topics, to evaluate, check and correct their ideas over a long period of time.

Thus, learning in the process of cognitive construction entails the interpretation of information and relating it to other knowledge, to know when to perform a certain task and to be able to adapt the performance to various situations (Resnick & Klopfer, 1989). In addition, in such a process of learning, pupils are expected to draw conclusions, implications, the creation of mental models and their evaluation (Salomon, 1996). Learning in the process of cognitive construction shifts the focus from transmitting knowledge to deep processing of knowledge.

According to this view, knowledge acquisition is no more important than tasks which involve thinking and problem-solving, rather knowledge acquisition, thinking and problem solving are intellectual activities which have to take place simultaneously (Perkins, 1992). Thinking processes are then the stepping stones of knowledge acquisition, and therefore every process of knowledge acquisition has to be based on thinking, problem solving, connecting new ideas to existing disciplines and drawing new implications. According to this view good teaching is one which encourages processes such as these.

The teaching of English in Israel, however, has been mainly based on the traditional mode of teaching, whereby teachers focus their instruction on the teaching of grammar, pupils practicing the grammatical points introduced by the teacher, reading texts from a textbook, then answering questions about the text they have read, and finally practicing vocabulary drills (Ministry of Education, 1998).

Thus, there is a big gap between the views of learning as a process of cognitive construction and traditional views of teaching: the traditional views of classroom teaching are concerned with the transmission of knowledge, knowledge as an object, problem solving which follows knowledge acquisition, and knowledge acquisition which precedes processes of thinking. Constructivist theories have been developed and expanded, so that there are now many versions.

Learning as a social process

Unlike traditional views, which conceive of pupils as individual learners, despite studying within the classroom, Constructivist theories of learning perceive the process of the construction of new knowledge as a cooperative interpersonal endeavour (Bruner, 1985; Salomon, 1996; Prawat & Folden, 1994). At the root of the view of learning as interpersonal knowledge rests the belief that the thinking process involves not only the individual learner, but also his/her partners in the process of learning. Learning is perceived as a distributed process which is divided between its participants (Salomon, 1996). In collaborative learning pupils have the chance to work cooperatively in order to discuss and solve problems and explain their personal attitudes (Resnick & Klopfer, 1989).

According to this view, learners may draw conclusions and implications in the process of collaborative work, which they would not have been able to reach independently. Learners may also gain personal benefits from collaborative learning: they may help each other refine their work, they may be able to see themselves as capable of problem solving. Pupils' involvement in working with peers may encourage them to expect to be engaged in thinking and critical analysis most of the time (Perkins, 1993). Finally it can be said that intelligence is no longer a product in the sole ownership of individual pupils, rather it develops via interaction and interpersonal collaboration in the process of learning (Pea, 1993).

The basis for the perception of learning as a social interaction can be found in work places where people work in teams in science, industry and administration. In almost any field people work in teams, which is one of the characteristics of today's technology (Salomon, 1996). The traditional image of a recluse researcher is no longer relevant to a world in which people live and work together. Therefore, it is necessary to change the traditional learning process which views learners as separate entities.

Changing the meaning of understanding

Some scholars have maintained that the process of learning aims at understanding, or at the promotion of understanding (Perkins, 1992; Scardamalia & Bereiter, 1989). But what is this understanding that everybody aims at? One of the most important distinctions in this area is the one between knowing a particular topic and understanding it. Knowing involves a state of ownership whereas understanding of a topic involves the ability to "see" beyond the given information (Perkins, 1992). When pupils understand a particular topic, they know how to apply that knowledge. Their understanding is expressed in their ability to explain their knowledge, to provide new examples on the same topic, to apply the knowledge in other situations, to compare between their knowledge and another and to be able to connect between them, to be able to connect knowledge to a wider context and generalise this knowledge to wider "laws" of knowledge (Perkins, 1992). Thus, the above-mentioned manifestations of understanding are based on the view that knowledge is not composed of unrelated segments of information, but rather from a system of connections. Therefore, pupils' understanding is based on forming new links between a new topic and other disciplines. The more dense and complex the chain of links is the better one's understanding is (Brown, *et al.*, 1983). Understanding in the sense of the ability to use knowledge and linking it to other disciplines is different from understanding as knowledge acquisition, as having command of the latter without the ability to apply it does not form the basis for new learning, does not link it to other disciplines, and therefore it is "dead knowledge" (Bransford, *et al.*, 1989).

Some studies indicate that knowledge which was not acquired in a process of linking between topics and generalisation to wider laws of knowledge tend to turn into "dead" knowledge even when it is relevant (Cognition and Technology Group at Vanderbilt University, 1994). Other studies (Adams, *et al.*, 1988; Lockhart, *et al.*, 1988) indicate that knowledge does not turn into "dead" knowledge when it is acquired in a process of active problem solving.

Another aspect of the concept of understanding is that it is not a matter of "I either understand subject matter or I do not it understand at all" (Perkins,1992). This is because there are different levels of understanding: one can understand a little bit of a particular subject, where manifestations of understanding will be few, or one can understand much more and in such a case one's manifestations of understanding will be numerous and varied. It is not possible to understand everything about a particular subject as there is always room for more in-depth investigation of that subject.

The meaning of the concept of understanding has changed in three aspects (Perkins, 1992):

- Good understanding is considered to be one in which pupils can link between learnt topics to other disciplines,
- Understanding is perceived of as the ability to make use of knowledge and skills
- Understanding is perceived as an ongoing process.

This perspective is in contrast with the existing traditional pedagogy according to which students are required to demonstrate their understanding of subject matter taught in class by taking tests which require memorising, rather than real understanding and their ability to apply knowledge. All manifestations of understanding require more in-depth thinking, therefore learning which aims at understanding has to be based on experience rather than on receiving of knowledge and memorising it. It seems, then, that with regard to this component of learning there is a need for changing the learning environment and adapting it to these new views.

Sample materials as a key to additional knowledge

The new approaches to teaching and learning are based on the fact that it is not possible to "acquire", in the traditional sense of the word, all available knowledge, and therefore an attempt on the part of schools to do so is fundamentally inappropriate (Bereiter & Scardamalia, 1989).

The argument is that from the vast amount of knowledge available teachers should focus on the teaching of key concepts and basic skills related to a particular field. That is, teachers should teach communication skills in the broadest sense; skills in seeking out and analysing information including making informed judgments about the quality and validity of the information found. This argument is based on the premise that teaching basic skills will result in pupils' progress in other disciplines, and will later be used for the understanding of new subjects (Bereiter & Scardamalia, 1989; Salomon, 2000). Thus, in history lessons, for example, the focus of lessons is not on learning about wars and Napoleon's conquests, but rather on basic concepts related to the area. For example, a comparison between different wars throughout history may lead to the understanding of the concept of war or conquer, and this then can be used for the examination of the Syrian conquest in Lebanon.

The central principle guiding this approach is that in order for pupils to be able to intelligently cope with a particular topic, there is no need for them to learn a particular topic in isolation (Salomon, 1996). It is preferable to teach integratively and to relate to basic skills and concepts rather than attempting to "cover" maximum materials (Bereiter

& Scardamalia, 1989). The emphasis in this kind of teaching is on interdisciplinary instruction, which serves as a basis for additional learning, and not on studying isolated chapters from history books, where each of them deals with a different topic (Salomon, 1996). It seems then that it is easier to adopt the principle of integrative learning in the computer classroom because of the vast resources it offers pupils.

Transfer of learning

Another central component in learning is one's ability to apply and transfer knowledge and skills acquired in a particular situation in new ones (Salomon & Perkins, 1989). The underlying principle here is that the teaching of a particular topic is meaningless unless it provides meaningful tasks for pupils, who in turn are able to draw some conclusions from their studies to their personal lives or to other topics studied at school. That is, pupils should be able to apply the strategies for problem solution that they have developed in one context to new problem forms.

Transfer of skills is one of the main objectives of education, however it cannot happen without high levels of abstraction and disconnecting it from the learning process while pupils are studying (Salomon & Perkins, 1989). Thus, Feurzeig *et al.* (1981), in their discussion of cognitive outcomes expected from pupils learning to write computer programs, argue that the teaching of a set of concepts related to programming can be used to provide a natural foundation for the teaching of mathematics, and for the notions and art of logical and rigorous thinking in general. Therefore, it is necessary for pupils to be engaged in a type of learning environment which fosters processes of transfer in learning situations.

The new learning environment

The new learning environment, which stands in contrast with the traditional structure of classrooms, has a central standing in the new perceptions concerning the nature of teaching and learning. Before I discuss the planning of this environment I would like to refer to the concept of the learning environment.

The structure of the learning environment

The new learning environment consists of series of interconnected components, all are aimed at enhancing the achievement of learning objectives. Some of the components of the learning environment are related to the environment itself and some to the individual within it. Various scholars (Perkins, 1986; Sarason, 1991; Chen, 1995) maintain that the components of the learning environment are systematically linked to one another and affect each other, therefore it is not possible to isolate one of the components without referring to the others, or to change one without affecting the others. The blending of the components of the learning environment affects its nature and its focus. For instance, pupils' willingness to put effort into studying, their perception of the task at hand and the opportunity for mutual support, are variables which are closely linked to one another.

The components of the learning environment are characterised by their content which refers to factors such as teachers' authority, attitude towards subject matter, teacher pupil relationship and so on.

The different variables, which comprise the learning environment, not only affect each other, but they also give meaning to one another; the significance of the forthcoming exam affects pupils' seriousness in preparing for the exam, which in turn is affected by the importance attributed to the discipline (Chen, 1995).

Thus, Sarason (1991) and Chen (1995), who explored the issue of changing the learning environment, maintain that in a learning environment, which is based on links between contextual and structural components, there is no meaning to the isolation of variables from the environment and the exploration of their influence on pupils' variables. This is because the series of links between the components of the learning environment, and not the content of the environment, make it unique (Salomon, 1992; 2000).

Another principle underlying the organisation of the new learning environment is that the content taught in the classroom derives its significance from the teacher's teaching style or the method of teaching. Therefore, in order to create a significant change in education, there is a need to change the pattern of teaching (See chapter five), and to a lesser extent its content (Sarason, 1991; Harpaz, 1997). According to the third principle, which is suggested by Harpaz (1997), there is a need for a synthesis between approaches which place the curriculum in the centre, and approaches which are learner centred. The objective of education is to make the connection between children and a flexible curriculum which represents cultural achievements via internally motivated learning. A well-shaped curriculum is one which allows pupils to develop, while at the same time directing them in their development (Dewey, 1932).

Planning the new learning environment

The developments in the understanding of the concept of learning, the new approaches to the concept of learning environment and the numerous possibilities computer technology offers brought about various pedagogic approaches, which are characterised by posing pupils with authentic interdisciplinary problems. These pedagogic approaches were the result of constructivist approaches to learning, according to which good learning involves an active process in which the learner collects and organises information, links it to previous knowledge, interprets it, and converts it from information to knowledge. That is, the learner constructs knowledge for himself/herself (Phillips, 1992). The notion of learning as construction is adhered to by Piaget's followers, by those who believe in learner centredness, and adherents of the socio-cultural approach, according to which knowledge is distributed among learners (Resnick, 1991; Pea, 1993, Bruner, 1996).

Thus, the new learning environment is based on the new pedagogic approaches: it offers a change from rote learning to learning that requires thinking; a change from an environment which emphasises individual learning processes to one which puts the focus on interpersonal learning processes; a change from an environment where pupils are recipients of subject matter to a one which is governed by processes of problem solving leading to learning; a change from an environment where the emphasis is on acquiring as much knowledge as possible to one where students learn basic key concepts which will serve as a spring board to additional knowledge; a change from an environment where the computer is used as a learning tool to one where it is used as an intellectual partner in the thinking process (Rorty, 1991).

The pedagogic views concerning the nature of teaching and learning, and the new perceptions regarding the new learning environment are the bases for many projects (Cognition and Technology Group at Vanderbilt, CTVG, 1994; Salomon, et al., 1991; Scardamalia & Bereiter, 1989). Thus, in one of these projects Scardamalia & Bereiter (1994) conducted a study to examine the effect of CSILE (Computer-Supported Intentional Learning Environments), which is based on the above mentioned principles, on fifth and sixth grade school children. The class was studying medieval history, one of the topics being castle defenses. In addition to compiling text notes recording their findings and speculations on this topic, many pupils availed themselves of the graphics facilities of CSILE to produce graphics depicting their understanding of castle defenses. Two students, generally regarded as below-average achievers, took a different tack because earlier they had examined the graphics of their classmates and were dissatisfied with them. Earlier in the year, they had used Interactive Physics in conjunction with CSILE in work on lever problems in elementary physics. Interactive Physics permits simulation of physical systems by assigning physical properties to simple geometric figures. The two pupils decided to use Interactive Physics to represent walls, drawbridges, portcullises, and attacking forces in ways that could actually be run as simulations to see how well they would work. Their CSILE notes referred to these simulations, which other pupils could access. Following these pupils others took up the simulation challenge, shifting the method of inquiry from graphically represented speculation to simulation constrained by laws of physics. This example is notable not as an advance in subject-matter knowledge but as an advance in methodology achieved by the pupils themselves and enabled by the technology.

The components of the pedagogic conception underlying these projects are as follows (Salomon & Almog, 1994; Scardamalia & Bereiter, 1994):

- Pupils are presented with authentic, complex problems which lead to other interdisciplinary aspects.
- Problem solving is done cooperatively.
- Problem solving is not restricted to school hours.
- Pupils' learning should be based on various sources of information.
- Pupils use computer technology for a variety of intellectual activities.

These components are related to the contextual aspects of the technological learning environment, which is based on psychological views concerning the nature of teaching and learning presented above. Nevertheless, the second component - the relations between the components - should be addressed when discussing the nature of the new learning environment. The relationships among pupils and classroom atmosphere are the bases of the learning environment, whereas teacher behaviour, competition and tests are marginal.

In what way are these components and their inter-relationship different from the structure and components of the traditional classroom?

A traditional environment is based on the following processes:

- In the process of learning knowledge is frontally transmitted to pupils by the teacher.

- The focus in learning is on acquisition of extensive knowledge.
- The teacher is the only source of knowledge.
- Learning is an individual process.
- The main learning tools are books and notebooks.
- Learning takes place in processes which involve memorising rather than thinking.

As far as the relations between the components of the learning environment are concerned, the teacher and his/her evaluation of learners, and not classroom atmosphere and interpersonal relations with pupils, are of major importance, and therefore pupils' energies will be directed towards the first.

The components of the new learning environment: pedagogic advantages

Technologically based learning environment

Learning with computer technology in the classroom has some pedagogic advantages (Turkle, 1995; Koschmann, 1996; Kiesler, 1997; Leyman-Weiltzeig, 1997; Rochelle & Pea, 1999):

- The computer does all trivial activities, such as copying.
- The computer offers pupils access to vast databases, such as encyclopedias and libraries, which they can scan, sift through, select from, contrast with or attach (Pea, 1985).
- Computers help in problem solving, integration of knowledge, exploration, model building, simulations of various situations, planning, designing and presentations

of solutions (Kromholts, 1997; Walker, 1999). For instance, the vast data and search engines the Internet provides may help pupils explore the problem of pollution in their country, compare it with pollution in other places and acquaint themselves with some of the measures undertaken to minimise the problem.

- Computers call for group work; pupils can work collaboratively on projects using the resources the Internet offers (Scardamalia & Bereiter,1994; Kromholts, 1997). Thus, for instance, pupils may be presented with a problem, or alternatively suggest their own research problems. In pairs or in groups, they use computer technology to find answers to the problems they are concerned with. They discuss the possible answers presented, decide which are most relevant or acceptable. In this kind of a learning environment more knowledgeable others do not stand outside the learning process (as teachers often do), but rather participate actively (Kromholts, 1997). Further, the knowledge of the most advanced participant does not circumscribe what is to be learned or investigated. There are other sources of information, and participants aim to point the way to other groups and resources that might prove helpful. Similarly, less knowledgeable participants in the discourse play an important role, pointing out what is difficult to understand and, in turn, inadequacies in explanations. To the extent that novices can be engaged in pushing the discourse towards definition and clarification, their role is as important as that of those more knowledgeable.
- Computers enable learners to communicate and exchange information with experts and people outside school (Lepper & Gurtner, 1989).
- Computers enable pupils to study while having fun (Brown, 1985; Schunk, 1991).

For instance, pupils can enhance their learning by playing games related to subject matter studied in class in a non-threatening environment – they are not exposed to either teachers' criticism or their peers'.

Yet, a number of scholars (Postman, 1992; Kraut *et al.*, 1998, Salomon, 2000) pointed out some of the disadvantages of the use of computers. Postman (1992) suggested that computers encourage disorganised- non-linear- patterns of thinking, and maintained that thinking would lack logical order, which derives from laws of hierarchy, taxonomy, or causation.

Another disadvantage of computers is the fact that they "flood" users with information, and without adequate skills for sifting through data users might "drown" in the flood of information (Salomon, 2000).

A third disadvantage refers to the social isolation, and consequently the prevention of the development of social skills, as a result of people using computers for studying at home, and working and shopping from home (Kraut, *et al.*, 1998). Furthermore, the danger of social alienation is reinforced with the substitution of the unifying social and traditional core with various groups of interest, for instance the movement for the abolition of atomic energy. Thus, the Internet becomes a substitute for direct human interaction. Kraut *et al.* (1998) found in their study that the use of Internet for communication reduced participants' social involvement, and the direct interpersonal communication significantly, and strengthened feelings of isolation and depression.

Archer (1998) reports about a comprehensive study conducted in the United States the purpose of which was to explore the impact of the use of computers on fourth and eighth graders studying mathematics. The sample consisted of hundreds of fourth grade pupils. He found that practice and drill in mathematics did not contribute to an improvement in pupils' performance. Furthermore, a similar use of computers in eighth grade caused a considerable – sixty percent - decline in pupils' performance.

Similar unimpressive findings were found with regard to the use of word-processors; Peacock & Beard (1997) explored the impact of the use of word-processors on the quality of pupils' writing. Their findings showed that the mere use of computers for writing compositions had no significant impact on pupils' ability to write well. They concluded that in order to achieve far-reaching changes there is a need to change the whole learning environment and not only to introduce one new element – the computer.

Summary

In this chapter the concept of learning as constructing knowledge was examined and compared with traditional views of learning which see knowledge as fixed. In addition, some of the advantages of computers and the possibilities they offer learners and teachers for implementing constructivist pedagogy were discussed. It was pointed out that in order to effectively apply the principles of constructivist theory while using computers, the learning environment should be changed to one where learners have an active role in the process of learning. The computer can be a useful tool for this purpose as it offers many data bases, which can be used by pupils for exploratory learning and presenting their work in a visually attractive way. Finally, the two learning environments – the traditional and the technologically based – were compared.

In light of the developments of the various psychological and pedagogical theories, and the discovery of the potential of using computer technology in the classroom, for the purpose of encouraging and maximising learners' academic potential, more and more schools are incorporating computers in learning in general and in English language lessons in particular.

As a result of these developments teachers are expected to adapt themselves and their pedagogy to the possibilities offered by computers. The role of the teacher in implementing educational changes will be discussed in chapter five.
Learners' academic experience with computers presents them with a new reality regarding school, teaching and learning. Therefore, their understanding of the changes taking place in their learning and their abilities as learners is one of the factors which contribute to the success of using computers. Thus, in the next chapter I discuss the concept of pupils' perceptions of academic self-efficacy and their significance in the process of learning.

Chapter Three - Perceptions of Academic Self-Efficacy

Background to the development of the concept of self-efficacy

The concept of self-efficacy was developed as a consequence of two central streams in the area of social psychology in the last three decades: researchers' engagement with theories of the self, and cognitive psychology. In this chapter I will briefly describe these two streams.

Theories of the self

The concept of efficacy is a central component in the term self-concept. In the last hundred years many theories concerning the self were developed, because the self is a major constituent in understanding human behaviour. This term refers to the overall feelings, attitudes and perceptions that one attributes to oneself, to one's body, abilities, limitations, successes and failures, fears and ability to cope with problems. The first researcher to define self-concept was James in 1890 (Shwartswalled, 1984). Self-concept was defined as "representing an organised system of characteristics and ambitions which a person attributes to oneself, evaluates them and behaves according to them" (p.72). With this definition of the self, researchers tried to explain a wide and varied repertoire of behaviours.

White (1959) maintained that the self-concept is based on the individual's sense of self-competence, which is primarily based on one's experience, and therefore, the impact of other people's influence is limited. Furthermore, this sense of competence will not only determine the individual's behaviour but also the attitude of others to him/her.

With the rise of Behaviourism, theories of the self were pushed aside as Behaviurism's main concern was a focus on predictable behaviours (stimulus and response), consequently, behaviourism was perceived as ignoring the existence of internal situations. Few behaviourists acknowledged the existence of internal situations and their impact on people's behaviour. Behaviourists' concentration on studying the observable affected research in these processes, that is there was no interest in internal processes. On the other hand, humanistic approaches gave self-concept a central position. Rogers (1951) perceived the self as an agent of one's destiny, and referred to a real self which the individual aspires to reach. Rogers maintained that the self-concept consists of perceptions one has about oneself; what kind of a person s/he is, what s/he is personally, professionally, and socially, what his/her talents and qualifications are, what his/her aspirations are. Maslow (1954), in his theory of the self referred to self-actualisation and described a hierarchy of needs leading to it. At the bottom of the hierarchy there are physiological needs, and self-actualisation needs are at the top. These needs are cognitive (the need to know, understand and explore), aesthetic (beauty), and the need for self-actualisation (to be more and more what people really are).

More recent research (Pajares & Miller, 1994; Michaelis, 1990; Gorney, 1993; Anderson, 1993) in the area of self-concept is concerned with a number of issues such as, the cognitive processes involved in the development of self-concept, the way in which a link is created between past experiences, the present and future expectations, the complexity of the self-concept among different people, and the extent to which successes and failures of others affect self-concept.

Social-cognitive learning theory

The concept of self-efficacy, which is discussed in this study, has been explored and consolidated in the last two decades by Albert Bandura (Bandura, 1977, 1997), who is a clinical psychologist engaged with social learning theories. The difference between Bandura and other classical Behaviourist theories is that he postulated that there are cognitive variables that act as mediating agents between stimulus and response, and therefore his theory is commonly referred to as Social Cognitive Learning Theory. Bandura based his theory on classical Behaviourism, but he also expanded it by incorporating elements from Humanistic theories, which emphasised the importance of the individual's ability to consider options, to make decisions and to influence the environment. That is, Bandura created an integrative theory which falls somewhere between the psycho-dynamic approaches, according to which the individual's behaviour is determined by the internal forces that exist within oneself and govern the individual, and the classical Behaviourist theories, in which, people's behaviour can be interpreted by the external forces interacting. According to social cognitive learning theory the individual's behaviour is a product of a reciprocal interaction between three elements: the individual's behaviour, internal personal factors, and the external environment. A person acquires knowledge from the environment. That knowledge is cognitively processed in light of the individual's need for reinforcement. The individual's conclusions will determine what course of action s/he will take. The individual's behaviour affects the environment and creates a change. Consequently, the environment provides the individual with new and different knowledge. According to this approach humans and the environment in which they live reciprocally shape each other (Bandura, 1977).

Bandura was followed by other researchers who supported his approach; Mahoney (1974) in his discussions concerning changes of cognitive behaviours pointed out that most behaviours are instigated by people's reaction or the interpretation they attribute to previous experiences more than the actual events. He further maintained that most psychologists acknowledge the existence of mediating factors in most behaviour patterns.

Meichenbaum and Goodman (1971) observed that it is not the environmental outcomes that determine one's behaviour but the interpretation one gives to oneself regarding these outcomes. Rotter (1966), taking a slightly different view, maintained that people's potential behaviour is determined by their expectations of receiving what they consider to be significant reinforcements. Like Bandura, he points out that expectations and reinforcements are subjective variables dependent on the specific history of the individual. Rotter also acknowledges that there is room for the influence of common values of the culture. Bandura, on the other hand, places more emphasis on the unique processes the individual experiences.

The concept of self-efficacy is a central element mediating between the influence of the environment on the individual and the actual behaviour and will be examined in this study with regard to pupils.

Definition of Self-Efficacy

The concept of self-efficacy refers to the individual's assumption regarding his/her ability to organise and successfully carry out a particular task, which will result in a desired outcome (Bandura, 1986). A person's self-efficacy is the mediating cognitive factor which "resides" in people and influences their behaviour. People's efficacy will influence their behaviour: whether they will carry out a task, how much effort they will put in, how they feel about it, and if they think they will be able to carry it out successfully.

According to Bandura (1986), factors such as anxiety and self-perception are perceived as affecting people's behaviour, but in fact they are the product of efficacy beliefs. This belief also mediates the influence of factors such as gender and previous experiences. When these factors are under control, the efficacy belief will be the best predictor of one's behaviour. Initially Bandura focused on the environment as regulating individuals' behaviour, but with the aid of the concept of self-efficacy the focus shifted into the internal processes of the individual; to processes which emphasise the change of an internal psychological mechanism by mediating cognitive processes. This, according to Bandura, is based on the premise that cognitive processes have significant impact on accomplishing desired outcomes (Bandura, 1982). In the last two decades Bandura (1977) broadened the definition of the term self-efficacy. Initially he defined the belief in self-efficacy as referring to one's judgment regarding one's ability to carry out a variety of tasks which will result in a desired outcome; the extent to which an individual can organise and carry out tasks in certain situations, which sometimes involve new and even stressful patterns. The emphasis Bandura puts is on the role of efficacy in controlling cognitive and motor abilities which cause people to execute tasks, and he provides many examples from the field of athletics.

In later definitions Bandura (1993, 1997) put an emphasis on a more general future orientated view of the individual and his/her ability: efficacy was defined as one's evaluation of one's ability to carry out various tasks necessary for coping with future situations (Bandura, 1982), and the individual's belief regarding his/her ability to control events and affect his/her life (Bandura, 1989). More recently Bandura referred to self-efficacy as influencing the individual's affective and motivational behaviour, which enables individuals to realise their potential (Bandura, 1993, Bandura, *et al.*, 1997).

The concept of self-efficacy refers to a person's belief in his/her prevailing qualifications, for example skills, knowledge and ability, and a belief in one's ability to achieve desired outcomes. There may be two people with similar qualifications but with different levels of self-efficacy: a high level of self-efficacy may lead a person to reach the desired outcome, whereas low self-efficacy, could prevent a person from realising his/her talents, and consequently will not reach the hoped for outcome (Bandura, 1986, 1993; Zimmerman, *et al.*, 1992).

Following Bandura, other researchers defined self-efficacy while emphasising different aspects in their definitions: Barfield & Burlingame (1974) defined efficacy belief as a personal characteristic, which enables individuals to effectively cope with the world.

Shine-Feder (1995) referred to self-efficacy as the extent to which the individual believes s/he is capable of achieving or carrying out the things s/he is interested in. These definitions emphasise the ability to influence the environment – the extent to which a person feels capable of creating a change in his/her environment and achieve his/her objectives.

Lee, *et al.* (1991) define efficacy as the individual's perceived expectancy to succeed in a task, or to gain a valuable outcome by means of personal effort. This is a cognitive process which involves identifying the goal, evaluation of the effort and qualifications necessary for accomplishment, and actual performance. Fuller, *et al.* (1982) also defined efficacy as the individual's perceived expectations of gaining defined results by means of personal effort. These two definitions emphasise the personal effort the individual is prepared to put in order to reach desired outcomes. Shell, *et al.* (1995), on the other hand, emphasise in their definition the individual's belief in his/her ability to control his/her internal world, and define efficacy as the individual's confidence in his/her ability to pull together the necessary cognitive, behavioural and social qualifications and abilities for a successful performance of a task.

The definitions so far referred to efficacy in general and no distinction was made with regard to various situations. This is despite the fact that Bandura (1977) points out that efficacy beliefs are situation specific. Schunk (1984), following Bandura, emphasised the fact that efficacy belief is situation dependent and defines it as the individual's judgment regarding his/her ability to organise and carry out tasks in certain situations. This evaluation is very important, as it does not entirely depend on the skills one possesses. In order to reach the desired outcome one needs to have not only the skills for carrying out particular tasks but also the *belief* in one's ability to effectively use those skills. Schunk (1984) maintains that efficacious behaviour requires the processing and the constant development of many sub-skills, in order to cope with changing environmental conditions, which mostly consist of vague, unpredictable and stressful elements. Even routine activities are almost never carried out in the same manner. Therefore, individuals' behaviour is mostly dependent on their belief in their abilities under certain environmental conditions. This belief may change when they carry out the same behaviour but under different environmental conditions (Bandura, 1986). For instance, a person, who is asked to give a presentation in a conference, may speak fluently and clearly in front of family or friends, however, when that person has to give that same presentation in the conference s/he might not be able to speak fluently or clearly despite his/her full command of the necessary skills for giving a presentation and the topic at hand. Thus, the same person may function extra-ordinarily well in a particular situation, or may not function at all because of his/her intervening self-efficacy regarding that particular situation.

The difference between self-efficacy and related views

At a first glance the difference between self-efficacy and constructs, such as self-esteem, locus of control, self-concept, competency and self-appraisal is not clear. The purpose of this chapter is to point out the differences between close terms related to the self and the concept of self-efficacy with its unique contribution to the understanding of human reaction mechanism.

The first differentiation, which will be made, is between self-efficacy and **self-esteem**. Self-esteem is dependent on the disparity between the actual self and the ideal self, and according to Rogers (1951) the degree of the disparity indicates individuals' mental health. Self-esteem is the product of a social comparison process individuals undergo between themselves and their affiliated group (Festinger, 1954). Self-esteem is dependent on the value society attributes to this affiliation and on cultural patterns. In accordance with this perception, Bandura explains the difference between self-esteem and self-efficacy; the two constructs represent different phenomena. Self-esteem belongs to the self-appraisal domain of the individual, and is dependent on the way the culture in which an individual lives perceives his/her abilities and qualifications. It is concerned with judgments of self-worth. Perceived self-efficacy, on the other hand, is concerned with judgments of personal capability. Individuals may regard themselves as highly efficacious in an activity but take no pride in performing it well, and conversely, individuals may judge themselves to be hopelessly inefficacious in performing a given activity without feeling any loss of self-esteem because they do not base it on that particular activity. For instance, a person whose athletic skills are low may feel highly efficacious in other domains, which are more significant for his/her daily routine, and consequently his self-esteem will be higher. There is no fixed relationship between one's beliefs regarding one's abilities and the extent of self-worth one attributes to oneself. Very often people are treated according to cultural stereotypes such as ethnic affiliation with no regard to their individual personality. This kind of treatment causes devaluation in their self-esteem despite the fact that their efficacy belief in many domains is high. The link between self-efficacy and self-esteem is that people have composite feelings regarding their capabilities, and these feelings are a component in self-esteem. The difference between self-efficacy and self-esteem, however, is that the former predicts the goals people set for themselves and their ability to attain them, whereas the latter affects neither personal goals nor performance (Bandura, 1997).

Gorney (1993) defines self-esteem as the relative value people attribute to their self-perception according to two sources: the opinion of significant others and the ideal self they possess. Individuals judge themselves in relation to a particular affiliation group, whereas efficacy judgments are dependent on the individual and not on the culture.

According to Anderson (1993) a healthy self-esteem is based on three central perceptions: "I'm lovable", "I'm capable" and "I'm unique", that is efficacy belief is perceived as one of the components of self-esteem but is not identical to it conceptually.

Perceived self-efficacy is also included in the wider concept of **perceived personal control**; the extent to which the individual controls his/her internal resources and is capable of pulling them together in order to attain desired objectives (Michaelis, 1990). Perceived self-efficacy refers to the extent to which the individual believes that s/he controls his/her internal resources so that s/he can successfully carry out the activities which will lead him/her to attaining desired outcomes. This belief has an impact on the individual's ability to cope with activities. The perceived personal control is a necessary element in people's mental health, especially with regard to aspects related to achievements and relations with others (Brim, 1992; Michaelis, 1990). A sense of control can be achieved in two ways: first, via behaviour, when a person performs tasks which delay or change the stimulus or the event. Second, via cognition, when a person believes s/he can successfully cope with threats and difficulties in the environment even if in fact s/he did not do it. Here there is a clear distinction between objective efficacy and perceived self-efficacy (Bandura, 1982).

In this regard a differentiation will also be made between self-efficacy and Locus of Control, a concept which was developed by Rotter (1954) and refers to individuals' belief concerning their ability to control their destiny and direct their behaviour in future. People who receive reinforcements according to their behaviour may develop a belief that they can control their lives (internal locus of control), whereas people, whose reward and punishment is dependent on other people's arbitrary decisions and not their own, may develop a belief in external locus of control. They are likely to believe that the attainment of outcomes is dependent on external forces which they cannot control (Ziv, 1980). Those who possess internal locus of control may believe that if they become active in order to attain their goals they will succeed. That is, possessing an internal locus of control is a necessary condition for efficacy but insufficient, as the individual may believe that s/he can determine the outcomes of her/his actions and at the same time feel incapable of performing a certain task. Another difference between the two concepts refers to the fact that locus of control is a general term, whereas self-efficacy is related to specific circumstances and is situation dependent.

Pajares & Miller (1994) discuss the question of the difference between perceived self-efficacy and **self-concept**. They maintain that perceived efficacy is unique to a certain situation and a particular activity, whereas self-concept is not related to particular circumstances but involves beliefs concerning self-worth which are related to the efficacy beliefs of the individual. The scholars argue that despite the current widespread approach that there are various self-concepts in varied domains (scholastic, social, physical), and despite the fact that in the academic domain, too, there is a distinction between perceived self-efficacy in mathematics, for instance, and history, it is still related globally to a certain domain and never refers to a particular task. The question exploring self-concept with regard to mathematics "Are you a good pupil in mathematics?" refers to various affective and cognitive processes, and is different from the question exploring self-efficacy in mathematics "Can you solve this particular problem?" (p.194). Bandura (1997) also discusses the difference between the two concepts, and maintains that self-concept is a complex view that a person assumes and shapes with regard to oneself, based on direct experiences and evaluations adopted from significant others. Self-concept is measured by rating qualities that the individual attributes to oneself. The problem with it, Bandura argues, is that it is concerned with global self-images, a combination of different characteristics into a single index, which creates confusion as to what is actually being measured and how much weight is given to particular characteristics in the summary. Even if the self-concept is related to certain domains of functioning, it does not do justice to the complexity of efficacy beliefs, which vary across different domains of activities, within the same activity domain at different levels of difficulty, and under different circumstances. A composite self-image does not explain how the same self-concept creates different types of behaviour within one person. Perceived self-efficacy, on the other hand, is highly predictive of behaviour. Bandura's approach to self-efficacy, as dependent on certain circumstances, was adopted by scholars such as Ashton & Webb (1986) and Pajares & Miller (1995).

The concept of efficacy is closely related to the concept of **competency** defined by White (1959). White assumed that individuals have an intrinsic need, which is not biological, to effectively cope with the world. People's activities are dependent on the efficacy beliefs individuals have. The limitation of White's concept, according to Bandura (1997) is that he only provided a general framework without developing a detailed theory which can be tested. For instance, he does not refer to the impact of failed efforts on the individual, nor to the nature of the intrinsic reward of effective action. Bandura also maintains that it is difficult to explore whether the motive for behaviour is the individual's sense of competency or the satisfaction derived from the activity itself. Since efficacy is defined and measured independently of performance, it provides a basis for predicting the occurrence, the generality and persistence of behaviour, but it is difficult to explain the variability of human behaviour in terms of an overall intrinsic motive drive. Bandura further argues that competency is affected by direct personal experiences, whereas efficacy beliefs are also affected by persuasion of others, verbal persuasion, and changes in physiological states.

The difference between perceived self-efficacy and outcome expectancy

Bandura (1977-1997) distinguished between the expectancy of self-efficacy to behave in a certain manner, and between the expectancy for an outcome which will cause such a behaviour. He defines outcome expectancy as people's evaluation that a certain activity will lead to a certain outcome, whereas self-efficacy expectancy refers to the individual's belief that s/he can successfully carry out the necessary activity in order to achieve the desired outcome. That is, perceived self-efficacy is concerned with the ability for action ('Can I do it?'), whereas outcome expectancy is concerned with the existence of the ability to gain desired outcomes by carrying out certain activities ('If I do that, what will happen?') (Lent & Hackett, 1987).

The difference between outcome expectancy and self-efficacy derives from the fact that an individual can believe that a certain activity will lead to a desired outcome, but if s/he is not confident in his/her ability to perform the activity, then outcome expectancy will have no impact on the performance (Pajares & Miller, 1994). Even the fact that an individual possesses an objective ability, which can bring about a desired outcome, it still does not ensure the attainment of an outcome without perceived self-efficacy. The fact that an individual believes that a certain activity will help the attainment of a desired outcome, will not necessarily cause that individual to carry out the activity, if his/her expectations regarding the ability to perform the activity are low (Lent & Hackett, 1987; Hackett & Betz, 1989). Self-efficacy beliefs are concerned with the individual's ability and the process, which is concerned with the performance of an activity with no regard to outcomes. For instance, a man who thinks he can jump to a certain height. This is an example of self-efficacy. The man knows that if he manages to jump to the desired height he will attain social appraisal and prizes, this is outcome expectancy, however, acknowledging the outcomes does not guarantee that he will be able to perform the activity. For this he needs to believe in his efficacy to jump to the necessary height. Outcome expectancy is a necessary motive for performing an activity (Lent & Hackett, 1987; Pajares & Miller, 1994); if a person does not believe that performance will lead to desired outcomes, s/he will not carry it out despite the high self-efficacy s/he has concerning that activity. And conversely, if the self-efficacy is low a person will not perform the activity even if s/he is confident that performance will lead to the desired outcomes. The conclusion is that in order for an activity to take place, it is necessary to have both efficacy beliefs and outcome expectancies, as both are crucial factors and neither is sufficient when it is not accompanied with the other. Hackett & Betz (1989) raise the question whether there is a real difference between the two concepts. Bandura admits that to a certain extent the differentiation is not always clear, and it takes place more in situations where there is no strong link between the activity and the outcomes. In circumstances where such a link does exist, outcome expectancy does not have a significant contribution, and it is the perceived efficacy which explains the activity (Bandura, 1991).

Despite the differentiation between perceived self-efficacy and outcome expectancies there is a link between the two:

- People with high self-efficacy will expect positive outcomes for their activities, whereas people with low self-efficacy will expect a low performance level, and therefore the attainment of unsatisfactory outcomes (Pintrich & De Groot, 1990).
- People with high self-efficacy will keep on trying to perform even if the outcome of their activities does not meet their expectations, whereas people with low self-efficacy will hurriedly give up and will stop performing if they do not attain the expected outcomes quickly (Bandura *et al.*, 1982).
- People who overestimate their abilities will try to perform activities which are beyond their skills. Consequently, they will experience failures and their perceived self-efficacy will be damaged. Whereas people with low self-efficacy will give up coping with situations in which they are able to succeed, and therefore will not experience feelings of success, will not get rewards, and will not allow their efficacy to increase (Pajaress & Miller, 1994).
- The perceived self-efficacy of a person who has experienced a similar activity will increase or decrease in accordance with the experienced failure or success (Schunk, 1983). Therefore, perceived self-efficacy which is based on experience will have a stronger link to past activities. Thus, it is desirable for an individual to have perceived self-efficacy which is slightly higher than the level at which the individual can perform at a certain point in time and under

certain circumstances. According to Schunk such an evaluation will lead the individual to cope with realistic assignments, and will motivate further development of qualifications.

The Role of Perceived Self-Efficacy and its Influence

People's beliefs in general and pupils' in particular concerning their efficacy affect the quality of their psychological functioning in various ways. In this chapter I will discuss the impact of perceived self-efficacy on people's behaviour, and more specifically the impact of the various environmental elements on pupils' self-efficacy.

Selection of behaviour

In their daily activities, people are engaged in decisions regarding courses of action to be taken, and the time and effort which will be involved in taking them. A decision regarding the selection of a particular course of action is partly dependent on one's perceived self-efficacy. People tend to avoid situations and tasks which they perceive are beyond their abilities, but they confidently carry out tasks which they think are within their abilities (Schunk, 1991). Qin (1998) conducted a study in China to explore the role motivation plays in EFL learning at the tertiary level in China, to explore what constitutes learners' motivation of EFL learning, the relationships between motivational components, and how they affect learners' motivational strength and English achievement. Five hundred, second-year students, non-English majors from five tertiary institutions, participated in the study. Qin administered two English language proficiency tests (Matriculation English Test and College English Test Band Four) and one questionnaire. Ten subjects, five high achievers and five low achievers, were also interviewed and were asked to keep a diary for seven days. Data analysis focused on individual differences in major motivational variables.

The findings of the study showed that affective mediators (self-efficacy and language anxiety) were found to function effectively in the process of mediating motivational antecedents (prior L2 [second language] proficiency, causal attribution, and interest in learning EFL) and motivational behavior. Of affective mediators, self-efficacy affected motivational behavior directly and indirectly through goal-setting.

The relation between motivational behaviour and final achievement was also examined. Results of t-test analyses showed that significant differences existed between high achievers and low achievers in almost all indicators of motivational behavior.

The qualitative results helped differentiate between high and low achievers in causal attribution and in motivational behavior. Compared with low achievers, high achievers on the whole were shown to be controllable-attribution biased and exert more motivational behavior. In terms of attribution of language ability, high achievers did not deny the possible role of language ability in learning English, but, in accounting for their successful learning, believed that there was no strong linear relationship between language ability and achievement. In contrast, low achievers held a more positive attitude towards language ability, and some tended to account for prior success partly in terms of possession of language ability or to attribute failure in English learning to a lack of language ability.

Thus, an accurate evaluation of one's efficacy is imperative for a successful daily functioning. An erroneous evaluation of one's self-efficacy may be detrimental: an extremely high perception of self-efficacy may lead a person to undertake assignments which one is unable to carry out, consequently s/he may confront many difficulties and unnecessary failures (Schunk, 1991, Pajares & Miller, 1994). An extremely low evaluation of one's self-efficacy may result in a decision not to undertake what one perceives to be complicated assignments, consequently a person might cut himself/herself from significant and important experiences.

Effort and perseverance

Perceived self-efficacy determines the effort and time people put into coping with obstacles and hard experiences. The higher the perceived efficacy, the more effort will be put to solve problems and overcome obstacles, and perseverance in dealing with them will be longer (Schunk, 1991; Zimmerman, 1993). When facing difficulties, those with perceived low self-efficacy would give up the challenge, whereas those with perceived high self-efficacy would try and apply more effort in order to meet the challenge.

A distinction can be made between the influence of perceived self-efficacy on effort in the process of learning, and between carrying out tasks with existing skills. When one is involved in carrying out learning tasks, a high perceived self-efficacy may "push" a person to put a great deal of effort in preparing for the learning task. In applying existing skills, a high-perceived self-efficacy increases the effort for coping with extremely difficult tasks, which are not attainable if the perceived self-efficacy is low (Bandura, 1986, Schunk, 1991). Qin (1998) in the study of Chinese students' internal structure of EFL motivation found that inter-group differences were shown in four sub-components: amount of time for English learning, attitudes toward English class, doing exercises, and involvement in learning activities outside of class. In general, subjects in the top group had clearer and more detailed plans than those in the bottom group. They not only spent more time in English learning outside of class, but also had more practical arrangements of different types of tasks with different learning foci for each task and corresponding schedules for them. In attending English class, high achievers gave more concentrated attention and more actively responded to the teacher than their peers. In doing exercises, high achievers as a whole treated them as an effective way to practice English outside class and did exercises even if they were not compulsory. Contrastingly, low achievers either held negative attitudes toward exercises or did a very small number of them though they might do quite a lot just before an examination. As far as involvement in learning activities outside of class was concerned, high achievers could take comparatively effective measures in enhancing their language skills including speaking, listening, writing, and reading.

Thinking patterns and affective responses

Perceived efficacy also affects the thinking patterns and affective responses when individuals interact with the environment. Those who perceive themselves as "incapable" of coping with the demands of the environment are constantly "preoccupied" with their personal shortcomings, and therefore their evaluation of potential difficulties is exaggerated (March, 1992; Zimmerman, 1993). This kind of thinking creates tension, which results in ineffective use of one's skills, due to the diversion of attention from the manner in which activities can best be carried out to potential problems and failures. On the other hand, those with high-perceived self-efficacy focus their energy and attention on the requirements of the task at hand, and when they face difficulties they are encouraged to apply more energy (Schunk, 1991).

Barkan (1991) investigated the link between theories people hold with regard to their ability to carry out certain activities and their perceived self-efficacy to function following a failure. The perceptions of 80 Israeli students concerning their ability were examined. The participants were assigned a cognitive task and were given either positive or negative feedback. When their affective and cognitive reactions were examined it was found that those who had low perceived self-efficacy were angry as a result of the failure and were occupied with irrelevant thoughts. Those with the high self-efficacy were more concerned with problems related to the task at hand.
The perceived self-efficacy also shapes everyday thinking (Collins,1982): when people with high self-efficacy face a failure they attribute the failure to their not putting the necessary effort required for the task, whereas people with low self-efficacy attribute their failures to their inability to cope with tasks.

The cognitive domain

Perceived self-efficacy determines the selection of personal objectives to be attained (Pintrich & De Groot, 1990). The higher the perceived self-efficacy is, the higher the personal objectives are and one's commitment for obtaining them. The higher the objectives are, the higher the quality of the action performed.

Perceived self-efficacy can also affect the use and selection of strategies for action (Pintrich & De Groot, 1990): high perceived self-efficacy may encourage people to select complex strategies, and lead to a better use of the selected strategies. In addition, it may help people in developing appropriate strategies for the performance of actions, and thus enable them to deal with difficult tasks. There is a positive link between perceived self-efficacy and the use of appropriate strategies for action and the action itself (Pintrich & De Groot, 1990; Zimmerman, 1993). Despite this link, perceived self-efficacy indirectly affects the action itself via its influence on the selection of appropriate strategies for action (Schunk, 1990). This link between evaluating the use of appropriate strategies for action and perceived self-efficacy is detrimental for the understanding of the action itself (Zimmerman, 1993). Yang (1999) conducted a study to address the question of the relationship between EFL learners' beliefs about language learning and their learning strategy use. Although this study did not involve the use of computers it is particularly relevant to my own study in that it deals with self-efficacy and EFL learning. A questionnaire was administered to the five hundred and five Taiwanese university students who participated in the study. In addition, students were asked to answer two open-ended questions about additional beliefs and strategy use. The findings showed that students' self-efficacy beliefs about learning English were strongly related to their use of all types of learning strategies. That is, students with strong self-efficacy beliefs reported using strategies especially functional practice strategies, the purpose of which was to increase their exposure to English outside the classroom. For example, they would initiate conversations in English, watch television programmes or films in English, or seek opportunities to read English as much as possible.

Perceived self-efficacy also affects expectations for success (Meece *et al.*, 1990; Bandura, 1989, 1997). High efficacy is a good predictor of success in task performance, which has a positive link with grades and actual success. Low efficacy may cause people to concentrate on possible reasons for failure, which undermines the basis for success. In general, high efficacy prods people to use the cognitive structures necessary for effective actions, and effective actions, in turn, via the use of appropriate cognitive structures, reinforces the sense of one's self-efficacy.

Sources of Self-Efficacy

Different scholars (Baron, 1988; Tversky & Kahneman, 1981; Schunk & Rice, 1986; Bandura, 1997) maintain that people's knowledge regarding their self-efficacy is constructed from four principal sources: achievements in previous experiences; vicarious experiences, where people observe others performing; verbal persuasion and allied types of social influences that one possesses certain capabilities. Self-efficacy beliefs can be changed while manipulating each of these sources, therefore, it is necessary to explore them in this study where the impact of a new medium of instruction and learning is investigated.

Achievements in previous experiences

According to the theory of self-efficacy people acquire knowledge, from their previous achievements, which increases their perceived self-efficacy (Schunk, 1991; March, 1990). Achievements in previous experiences are the main source of information about one's self-efficacy, since this kind of information is based on actual experiences, and therefore is the most reliable. Recurring experiences of success enhance one's sense of efficacy, whereas recurring failures decrease it, especially if they occurred before a sense of efficacy is firmly established, and therefore are not a manifestation of lack of effort or are an outcome of external factors. The importance of new experiences for perceived self-efficacy is dependent on the intensity of the prevailing efficacy before the new experience (March, 1990; Martinot & Monteil, 1995). Once a person is highly efficacious occasional failures will not affect his/her efficacy beliefs as one's positive self-efficacy generally overcomes negative perceptions of the self. As the Barkan (1991) study mentioned above demonstrates, people with high efficacy beliefs are likely to attribute failures to lack of effort, environmental factors or the use of inappropriate strategies for solving problems, and do not put the blame on their inability. Therefore, a failure on their part may reinforce their convictions that better strategies should be used in order to succeed better.

The extent to which people will change their efficacy beliefs via experiencing different actions is dependent on many factors, such as: the complexity of the task, the required effort, the amount of external support given, the conditions under which the action is performed and the patterns of failure and success of the performer (Zimmerman, 1990). Not every accomplishment is important: success in an easy task is "negligible" whereas success in a difficult task provides new information regarding one's efficacy. Success with external support does not have the same impact as self-made success. Success with minimum effort in extremely difficult tasks indicates high efficacy. A failure in an action where no effort was put in does not provide sufficient information to the performer (March, 1990). The level of performance, in extremely difficult tasks, provides significant information for the evaluation of efficacy, especially when a lot of effort was put into performance. A failure in such situations indicates inefficacy, whereas success indicates high efficacy (Zimmerman, 1990; Bandura, 1986). People who experience periodic failures but improve over time increase their self-efficacy more than those who succeed in all tasks with the same level of difficulty.

Vicarious experiences

Success in action is not the only source for increasing one's efficacy, rather it is partly influenced by vicarious experiences (Wood, 1989; March, 1992): modeling - observing others successfully perform a particular task can increase one's efficacy beliefs, if the observer has command of similar skills, and therefore believes that s/he too can cope with that task. People convince themselves that if others can carry out a particular task, they themselves can at least succeed as well as they do. Thus, for instance, Bandura (1977) conducted a study the purpose of which was to explore the effect of modeling on people's behaviour. The participants were people who were afraid of snakes. They were asked to observe a man who was engaged in different activities with snakes, and then were asked to perform similar activities with the snakes. Another group of participants was asked to perform the same activities, however, without previously observing the man doing these very same activities. The findings showed that the participants who observed the model succeeded in carrying out the activities more than those who did not observe. In addition, their anxiety level was low and their perceived self-efficacy was higher than those who did not observe. Similarly, observing others experiencing failures can negatively affect the observer's efficacy beliefs.

Verbal persuasion

Efficacy beliefs are based to a certain extent on the faith expressed by significant others in one's abilities (Schunk 1983b; Schunk & Rice, 1986; Meyer, 1992). Verbal persuasion is used to lead people to believe that they possess the capabilities to carry out given tasks. This is because many people cannot rely only on their own judgment of their capabilities. Giving people information about their abilities, for instance, persuading a pupil that s/he can solve 25 questions within 30 minutes, can enhance their efficacy beliefs (Schunk, 1991). Verbal persuasion may be limited in the changes it may cause in one's efficacy beliefs, however it may certainly contribute to a success in action (Pajares & Miller, 1994). A verbal persuasion in one's abilities to perform a certain task may encourage him/her to put more energy into it and persevere in his/her attempts at solving a problem. Consequently s/he gains success and the efficacy beliefs may be enhanced. It seems that persuading people about their abilities to perform a certain task is more difficult than persuading them that they cannot carry out that task. Raising unrealistic beliefs in people regarding their personal capabilities will be proven as a mistake with the attempt to carry out the task. On the other hand, dissuading people from performing certain actions may prevent them from facing challenges, or avoid them altogether (Chambliss & Murray, 1979a, 1979b).

The impact of the verbal persuasion on one's efficacy beliefs is dependent on the confidence a person has in the persuader: the more reliable the persuader is the more likely efficacy beliefs will change. People tend to believe appraisals, regarding their capabilities to perform a task, from people who are capable of performing that particular task, or who are experienced in observing people performing similar actions (Zimmerman,1990). A verbal persuasion is perceived as particularly reliable when performance is appraised only slightly beyond the real ability of the recipient, and thus brings about more effort on his/her part. Success in performance, following verbal persuasion, may enhance beliefs in the appraiser's abilities, and consequently the recipient's tendency to believe him/her regarding other tasks (Pajares & Miller, 1994).

Peers and the cultivating of perceived self-efficacy

Peers and age-mates are the most important sources for vicarious appraisals, by comparison, in the process of constructing perceived self-efficacy (Zimmermman, 1990; Schunk, 1991; Pajares & Miller, 1994). Children shape their personal efficacy by comparing themselves to their peers, who carry out the same action. The basis of comparison is the quality of one's skills in a particular field in relation to the skills of others in the same field (March, 1992). Highly efficacious peers will serve as positive models for mirroring and appraisal by the observers. However, peers are not homogenous, and therefore children select for themselves small groups of peers with whom they have common interest, which will enable them to be highly efficacious regarding that particular interest. Children who do not succeed in selecting a small group of peers may develop a low sense of self-efficacy, which might affect other domains in their lives.

School and the cultivation of perceived self-efficacy

There are a variety of factors, for example school and the classroom, which affect children's personal efficacy and consequently their cognitive performance (Schunk, 1984). In school children acquire knowledge and skills for solving problems, which are necessary for effective functioning in society. Children's knowledge and skills are repeatedly tested and socially compared and appraised. In the classroom, the type and nature of the learning environment and the type of tasks assigned to pupils are among the most important factors, which influence children's academic efficacy (Nicholas & Miller, 1994). The following components of the learning environment, which may influence children's personal efficacy, are by no means exhaustive, but few examples from the literature are in place:

The structure of the classroom is one of the main factors influencing pupils' cognitive self-efficacy. Computers provide pupils with various settings of learning; they can work collaboratively to solve problems, or they can work individually each student progressing at his/her own pace. Pupils' collaborative effort to solve problems is a factor, which can contribute to the enhancement of personal efficacy (Nicholas & Miller, 1994). Coping with abundance and varied databases and the selection of appropriate materials from them can also affect one's personal efficacy. The effort in locating data bases, the selection of desired information, and its application in a process of problem solving can contribute to a change in one's personal efficacy. As progress or success in solving a problem or the cultivation of a new skill can enhance personal efficacy (Bandura, 1982; Schunk, 1991). The influence of the classroom structure primarily derives from the emphasis put on appraisals based on social comparison rather than individual comparison. Studies (Rosenholtz & Rosenholtz, 1981) have shown that self-appraisals of weak learners are negatively affected when the whole class studies the same material and the teacher often socially compares pupils. In this kind of class organisation, which calls for social comparison, pupils do appraise themselves in accordance with group consensus. Once a certain efficacy belief is established it is almost impossible to change it. In a different classroom structure, personal guidance, which is adapted to pupils' personal knowledge and skills, enables them to broaden their capabilities and does not call for social comparison. Consequently, pupils appraise their own progress based on personal criteria of progress rather than by a comparison to the performance of others. A more personal classroom organisation enhances pupils' personal efficacy, and reduces their dependence on the opinions of teachers and peers (Bandura, 1997).

Asking the teacher for help may indicate a low personal efficacy on the part of a pupil (Graham & Barker, 1990). Compared with a peer who does not ask for the teacher's help, a pupil who does get help is perceived as less clever by his peers, with little ability to succeed in future, and is not sought after for collaborative activities. This kind of pupil will obviously be less proud of his/her success. Despite teachers' good intentions to help pupils, they should be aware of the potential damage to learners' personal efficacy when help is given to them by their teachers.

Determining learning objectives has a considerable influence on pupils' personal efficacy. When pupils are studying they are involved in activities which they believe will lead them to reaching their objectives. They listen to instructions, perform tasks, try hard and persevere. The closer they feel they are to reaching their objectives, and until they do reach them, they will be more confident of their capabilities, and thus will perceive themselves as able to cope with the next assignment (Elliot & Dweck, 1988). Setting easy objectives to be reached may enhance personal efficacy in the initial stages of the learning process. Difficult to reach objectives provide valuable information about personal capabilities, as they contribute to the development of skills in a higher level (Schunk, 1991). Even personal goal setting can enhance personal efficacy, as it leads to the highest level of personal efficacy and skills (Zimmerman *et al.*, 1992).

The type of assignment is another important factor influencing learners' personal efficacy. Clearly defined assignments enhance students' self-confidence, and consequently their personal efficacy and perseverance in the process of learning (Zimmerman, 1993).

Many studies (Barkan, 1991; Gorney, 1993; Hadar, 1997) were conducted in order to understand how different kinds of educational experiences affect cognitive and social capabilities. However, educational experiences should not be appraised solely on the basis of the skills and knowledge they provide for pupils. Rather, it will be instructive to examine how educational environments affect pupils' beliefs regarding their capabilities. Personal efficacy is a mediating factor which affects the success or failure in performance, and hence its importance for future success. Pupils with high sense of efficacy are equipped well for coping with future assignments, where they will have to teach themselves and rely on their self-initiative. Even in present experiences, pupils with a high sense of efficacy are more involved with meta-cognitive activities, use more cognitive skills, and persevere more in trying to accomplish assignments than learners with a low sense of efficacy do (Pintrich & De Groot, 1990). In general, pupils with a high sense of efficacy will be involved in the accomplishment of tasks which require higher level activities, for instance, organising subject matter into meaningful units, the selection of relevant material from a variety of sources, and the transfer of knowledge (Schunk, 1991; Zimmerman, 1993; Zimmerman *et al.*, 1992). These activities will lead pupils to better learning and will establish their personal efficacy. Pupils with a high sense of personal efficacy are able to monitor their learning, which affects the selection of their personal objectives concerning knowledge and skills, and perseverance in their efforts to reach these objectives. These pupils are the ones who are involved in high level learning activities (Zimmerman *et al.*, 1992).

From a practical point of view, teachers should consider the affect of the learning environment and their approaches to teaching, not only in relation to knowledge and skill acquisition, but also in relation to the cultivation of pupils' motivation and self-efficacy for learning (Schunk, 1990). Cultivating pupils' efficacy for effective learning at school may lead them to apply more effort and persevere in the performance of assignments and tasks which enhance learning. At the same time, the more progress pupils will make in their learning, the higher their personal efficacy becomes.

In sum, the importance of knowledge regarding pupils' personal academic efficacy is in its being useful not only as an explanation of the link to previous accomplishments, but also as a predictor of present attainments, future ones or perhaps continuing to higher education (Martinot & Monteil, 1995).

Academic personal efficacy

There is a difference between general personal efficacy, for instance 'I know how to dance well', and academic personal efficacy, for example 'I can study math well'. Indeed, general personal efficacy may affect academic performance, but it was found that there is a stronger link between academic personal efficacy, academic attainments and other academic behaviours, than between general personal efficacy and these academic characteristics (March, 1990). In addition, it was found that academic attainments are more strongly linked to personal academic efficacy than to the general personal efficacy (March, 1992). This calls for the need for separate measurement of personal academic efficacy in educational studies, and challenges the use of measurements and scales of general personal efficacy as an important factor in academic experiences. Despite this distinction, the effects and characteristics of general personal efficacy can be attributed to personal academic efficacy. Autobiographic knowledge concerning academic events is related to pupils' perception of their academic self (Martinot & Monteil, 1995). Academic personal efficacy is a layer within general personal efficacy, and therefore it affects, acts and is influenced by the same factors but in relation to the academic domain.

From what I have discussed so far it can be said that at the initial stages of new academic experiences, pupils differ in their beliefs regarding their capabilities to acquire knowledge, perform tasks, understand subject matter and so on. Pupils' initial personal efficacy changes as a result of their talent and previous experience from home. Whilst working on the performance of a particular assignment pupils are affected both by personal factors and environmental ones. These factors function as cues, which indicate for him/her, how well s/he is doing. Pupils use cues for the establishment of their personal efficacy for future learning. When they work on their assignments, progress in their learning, and become more skilled, their personal efficacy for the performance of an action is enhanced (Schunk, 1991). Experiences in later stages of school life can also have an impact on personal efficacy: when pupils face a new task, their initial personal efficacy is determined by their previous experiences in learning. Academic experiences of success or failure contribute to the cultivation of pupils' personal efficacy (Martinot & Monteil, 1995). The process and outcome of the assignment, for instance, teachers' attitude, overcoming obstacles, success or the comparison to peers performing the same task, provide pupils with cues concerning the quality of their learning, and thus help them determine their personal efficacy for the new task. The more pupils persevere in their learning, and the more strategies for learning they acquire, the more enhanced their personal efficacy for learning is (Zimmerman, 1993). The more enhanced personal efficacy is the higher the motivation for action, the effort put for the solving of a problem, pupils' perseverance, and the setting of high learning objectives.

In sum, the learning process and its impact on personal efficacy is a circular one: the more enhanced the personal efficacy, the higher the persistence, the motivation, the effort and the establishment of high level objectives. These in turn make pupils use better strategies, and learning activities in a higher level, for example, transfer of knowledge, organisation of subject matter and location of information, which ultimately help pupils gain better grades and success. Consequently, the initial academic personal efficacy is confirmed, and if the task is complex it is even enhanced. Thus, pupils approach subsequent assignments with higher personal efficacy than they previously had, they succeed in their performance and the process repeats itself. In this circular process it is important to examine the learning environment: the more encouraging the learning environment is for the enhancement of high personal efficacy, as a result of its unique characteristics compared with other learning environments, the more effective it is for future learning, and the enhancement of future capabilities within school and outside it.

In previous chapters I discussed the impact of the learning environment on pupils' perceptions of learning. In addition, the possible impact of the introduction of an innovation - computers – on their perceptions of learning and self-efficacy were explored. As this study is concerned with the influence of a new medium of instruction in EFL classes, in the next chapter I will discuss theories of second language acquisition, which will provide the necessary background for understanding the complexity of learning an important foreign language.

Chapter Four - Theories of Second Language Acquisition

As this study investigates the impact of computers on EFL learners it is necessary to explore not only theories of learning in general, but also theories of second language acquisition, which may shed further light on the learning process of this domain. In this chapter I will review some of the theories of second language acquisition (SLA). These theories differ in what they seek to explain; some are more concerned with the mechanisms that govern how SLA takes place, and some are concerned with the mechanisms that explain why it takes place, or both.

The Acculturation Model

Acculturation is defined by Brown (2000) as 'the process of becoming adapted to a new culture' (p.129). It is seen as an important aspect of SLA, because language is an observable expression of culture. According to Schumann (1978a) the central premise of the Acculturation Model is: '... second language acquisition is just one aspect of the acculturation and the degree to which a learner acculturates to the target language group will control the degree to which s/he acquires the second language' (p.34). SLA is determined by the degree of social and psychological distance between pupils and the target language culture. Social distance is the result of a number of factors which affect the learner as a member of a social group in contact with the target language group. Some of these factors according to Schumann (1978c) and Brown (2000) determine whether the overall learning situation is 'good' or 'bad'.

Examples of 'good' learning situations are when the target language and L2 (second language) groups view each other as socially equal, when the target language and

L2groups are both desirous that the L2 will assimilate, when the L2 group's culture is congruent with that of the target language group, or when both groups have positive attitudes to each other. An example of a 'bad' learning situation is when the conditions are opposite to the 'good' ones.

Psychological distance, however, is the result of various affective factors which concern the learner as an individual. Some of these factors include motivation and ego boundaries.

Social and psychological distance influence SLA by determining the amount of contact with the target language that pupils experience, and the degree to which they are open to the input which is available. Thus, in 'bad' learning situations the learner will receive very little L2 input.

The Nativization Model

Andersen (1983) builds on Schumann's Acculturation Model, and sees SLA as the result of two forces which he defined as nativization and denativization. The first consists of assimilation, that is, the learner makes the input conform to his/her own internalised view of what constitutes the L2 system. When engaged with tasks, pupils simplify the learning tasks by building hypotheses based on the knowledge they already possess, for instance, knowledge of first language or knowledge of the world. The second involves accommodation, that is, pupils adjust their internalised system to make it fit the input (Williams, 1999). They make use of inferencing strategies which enable them to remodel their interlanguage system in accordance with the linguistic features represented in the input language (The term interlanguage

(Selinker, 1972) refers to the developmental stages involved in moving from L1 to L2).

Andersen's model provides a cognitive dimension which Schumann does not take into account. Schumann explains SLA in terms of input and the general function L2 has for pupils. He is not concerned with pupils' internal processing mechanisms.

Both the Acculturation and the Nativist models provide explanations of why L2 learners, unlike first language learners, often fail to achieve native-like competence. L2 learners may be cut off from the necessary input as a result of social distance, or they may fail to attend to it as a result of psychological distance.

However, neither model sheds light on how L2 knowledge is internalised and used. That is, they do not provide an explanation of how SLA takes place. Although the Nativization model does consider internal factors (in the form of the assimilation/accommodation distinction), there is no discussion of how these two operate. In addition, both models fail to provide an account of the role of the interaction between situation and learner.

The limitation of these two models is that they address only naturalistic SLA, where L2 pupils have contact with the target language community. It is not clear whether the models are applicable to foreign language instruction, where no such contact is possible.

Accommodation Theory

Accommodation Theory derives from the research of Giles (1979), who operates within a socio-psychological framework, drawing on the work of Lambert and Gardner. His main concern was to investigate how intergroup uses of language reflect basic social and psychological attitudes in inter-ethnic communication. Like Schumann, Giles is concerned with providing an explanation for successful language acquisition. Both maintain that it has to do with the prevailing relationships between learners' social group and the target language community. However, whereas Schumann explains these relationships in terms of variables that create actual social distance, Giles does so in terms of perceived social distance. Unlike Schumann, Giles sees intergroup relationships as subject to constant negotiation during the course of each interaction.

In addition to determining the overall level of proficiency achieved in SLA, Accommodation Theory also accounts for the learner's variable linguistic output. Giles *et al.* (1977) maintain that people continually modify their speech with others so as to reduce the linguistic social differences between them. Giles, like Gardner (1979) and Spolsky (1992), maintains that motivation is the primary determinant of L2 proficiency, and considers the level of motivation to be a reflection of how pupils define themselves in ethnic terms. This, in turn, is dependent on a number of factors:

- Identification of pupils with their social group.
- Inter-ethnic comparison; whether the learner makes favourable or unfavourable comparisons between his/her social group and the target language community.

- Perception of ethno-linguistic vitality; whether pupils see their social group as holding a low or high status.
- Perception of ingroup boundaries; whether pupils see their social group as culturally and linguistically separate from the target language community.

Accommodation Theory, like the Acculturation Model, does not explain the mechanisms that govern how SLA takes place; it does not account for the developmental sequence. The strength of Accommodation Theory, however, is that it encompasses language acquisition and language use within a single framework. Its limitation, though, is that it is doubtful whether it can be applied to foreign language setting, where intergroup relationships are not an obvious issue.

Discourse Theory

Halliday's (1975) view of first language acquisition, that it should be considered in terms of how learners discover the meaning potential of language by participating in communication, was also adopted with regard to SLA. Both L2 learners and children in the process of acquiring first language, are motivated to acquire and develop the rules of language structure and use, and therefore a parallel can be drawn between first and second language acquisition. In SLA this view of how language development takes place has become known as the Discourse Theory (de Graaff, 1997). The following are the main principles of the theory as proposed by Hatch (1978b, 1978c):

- SLA follows a 'natural' route in syntactical development.
- Native speakers adjust their speech in order to negotiate meaning with non-native speakers.

- The conversational strategies used to negotiate meaning, and the resulting adjusted input, influence the rate and the route of SLA in a number of ways:
    a. the learner learns the grammar of the L2 in the same order as the frequency order of the various features in the input;
    b. the learner acquires commonly occurring formulas and later analyses these into their component parts;
- Thus, the 'natural' route is the result of learning how to hold conversations.

Whereas Schumann and Giles are interested in explaining the rate of SLA and the level of proficiency achieved, Hatch is interested in explaining how SLA takes place. The strength of Hatch's approach lies in the detailed insights it provides into how the process of constructing discourse contributes to the process of building an interlanguage. However, Hatch was not able to demonstrate conclusively that negotiation of input is the necessary and sufficient condition of SLA.

The Discourse Theory, like the other two theories, does not address the nature of the learner strategies responsible for SLA. In her discussion of processes she referred to external processes – those which can be observed in face-to-face interaction – not the internal processes, which can be only inferred by observing how learners perform. Hatch does not look at the cognitive processes that control how the learner constructs discourse, or how data made available through discourse are sifted and internalized (VanPatten & Cadierno, 1993).

The Monitor Model

Krashen's (1981b; 1982) Monitor Model, which enjoyed a considerable prominence in SLA research, consists of five central hypotheses:

The acquisition-learning hypothesis

'Acquisition' occurs subconsciously as a result of participating in natural communication where the focus is on meaning. 'Learning' occurs as a result of conscious study of the formal properties of the language. In performance, 'acquired' knowledge serves as the major source of initiating both the comprehension and production of utterances. 'Learnt' knowledge is available for use only by the Monitor (see the third hypothesis below).

The natural order hypothesis

This hypothesis draws on the SLA research literature that indicate that pupils may follow more or less invariant order in the acquisition of formal grammatical features. The hypothesis affirms that grammatical structures are 'acquired' in a predictable order. Thus, when the learner is engaged in natural communication tasks, s/he will manifest the standard order. But when s/he is engaged in tasks that require or permit the use of metalinguistic knowledge, a different order will emerge.

The monitor hypothesis

The Monitor is the "device" that pupils use in order to edit their language performance (Brown, 2000). It utilises 'learnt' knowledge by acting upon and modifying utterances generated from 'acquired' knowledge. This can occur either before the utterance is uttered or after. In either case its use is optional. Krashen argues that Monitoring has an extremely limited function in language performance.

He suggests three conditions for its use: there must be sufficient time, the focus must be on form and not meaning, and the user must know the rule.

The input hypothesis

It means that 'acquisition' takes place as a result of the learner having understood input that is a little beyond the current level of his/her competence, that is the i +1 level. Input that is comprehensible to the learner will automatically be at the right level (VanPatten, 1996).

The affective filter hypothesis

This deals with how affective factors relate to SLA, and covers the ground of the Acculturation Model. Krashen incorporates the notion of the Affective filter as proposed by Dulay and Burt (1977). The filter controls how much input the learner comes into contact with, and how much input is converted into intake. It is 'affective' because the factors which determine its strength have to do with the learner's motivation, self-confidence, or anxiety state (Spolsky, 1992).

Krashen also discusses a number of other factors, which are as follows: aptitude, role of the first language, routines and patterns, individual differences, and age. Krashen's theory is flawed in a number of respects which will be discussed below: McLaughlin (1978) argues that the Monitor Model is unreliable, because the 'acquisition-learning' distinction is defined in terms of 'subconscious' and 'conscious' processes, which cannot be tested in empirical investigation. In addition, Krashen does not specify in what way the processes responsible for each knowledge type are different from each other.

Morrison & Low (1983) note that Monitoring is limited to syntax, but that in fact pupils have the ability to edit their pronunciation, lexis, and their discourse. Krashen does not give any consideration to Monitoring as a collaborative activity involving both the learner and the interlocutor.

The variable competence model

The Variable Competence Theory proposed by Ellis (1984a) draws on and extends the work of Tarone (1982; 1983),Widdowson (1979b; 1984), and Bialystok (1982). The Model is based on two distinctions – one of which refers to the process of language use, and the other to the product. The theory also proposes to account for SLA within a framework of language use. That is, it claims that the way a language is learnt is a reflection of the way it is used (Spolsky, 1992; Brown, 2000).

The product of language use comprises a continuum of discourse types ranged from entirely unplanned to entirely planned. Unplanned discourse is discourse that lacks forethought and preparation, planned discourse, on the other hand, is discourse that is thought out prior to expression. It requires conscious thought and the opportunity to work out content and expression.

The Variable Competence Model proposes the following:

- There is a single knowledge store containing variable interlanguage rules according to how automatic and how analysed the rules are.
- The pupil possesses a capacity for language use which consists of primary and secondary discourse and cognitive processes.

- L2 performance is variable as a result of whether primary processes employing unanalysed L2 rules are utilised in unplanned discourse, or secondary processes employing analysed L2 rules are utilised in planned discourse.
- Development occurs as a result of acquisition of new L2 rules through participation in various types of discourse. In addition, it occurs as a result of activation of L2 rules which initially exist in either a non-automatic unanalyzed form, or in an analysed form so that they can be used in unplanned discourse.

The Variable Competence Model of SLA attempts to account for the variability of language-learner language, and the external and internal processes responsible for SLA. It incorporates within the same framework a theory of language use, and a theory of SLA. One of its drawbacks is that it fails to incorporate the role of input into the overall framework.

The Universal Hypothesis

The Universal Hypothesis states that there are linguistic universals which determine the course of SLA as follows (Brown, 2000):

- Linguistic universals impose constraints on the form that interlanguages can take.
- Learners find it easier to acquire patterns that conform to linguistic universals than those that do not. The linguistic markedness of L2 rules explains the developmental route.

- Where the L1 manifests linguistic universals, it is likely to assist interlanguage development through transfer.

Linguistic universals have been investigated by the in-depth study of a single language. Those working in this tradition argue that there is a Universal Grammar that constrains the kind of hypotheses that the learner can form and that it is innate (Chomsky, 1975; Williams, 1999).

In both L1 and L2 acquisition the effect of linguistic universals has been investigated primarily in terms of markedness theory. This means that some rules are unmarked or weakly marked and others marked or more strongly marked. Various criteria have been proposed for determining the markedness of a rule. Chomsky (1975) proposes that an unmarked rule is one that requires no or minimal 'triggering' from the environment. There is some evidence to suggest that language acquisition proceeds by mastering the easier unmarked properties before the more difficult marked ones. In SLA there is also some evidence to suggest that when the L2 rule is marked, the learner will turn to his/her L1, particularly if this has an equivalent unmarked rule.

The Universal Hypothesis provides an account of how the linguistic properties of the target language and the pupil's first language may influence the course of development (Williams, 1999; Brown, 2000). It attempts to explain SLA in terms of an independent language faculty, rather than in more general cognitive terms: Chomsky (1975) outlined the unconscious mechanisms that make human speech possible and insisted that a genetically programmed 'language organ' in the brain primed the human infant to master the intricacies of his/her mother tongue. The advantage of the Universal Hypothesis is that it focuses attention on the nature of the target language itself, and it also provides a subtle reconsideration of transfer as an important factor in SLA.

One of the major problems of the Universal Hypothesis lies in the difficulty in defining the markedness construct. Various criteria have been used to explicate it – core versus peripheral grammar, complexity and explicitness. Moreover, it is not clear whether markedness is to be seen as just a linguistic construct or whether it has psycholinguistic validity.

Even if linguistic markedness is a major determinant of SLA (and this is not yet proven, as it is possible that many of the facts explained in terms of markedness theory might also be explained by other factors, such as the frequency of occurrence of different structures in the input), it is unlikely that it will be able to explain the complexity of SLA by itself. In addition, the Universal Hypothesis is based on the assumption that linguistic knowledge is homogenous, and therefore ignores variability.

A Neurofunctional Theory

The theory considered in this section draws on neurolinguistic research. Lamendella (1979) defines the scope of a neurofunctional approach as follows: "A neurofunctional perspective on language attempts to characterise the neurolinguistic information processing systems responsible for the development and use of language" (pp.5-6).

The account of a neurofunctional theory of SLA that is presented below draws primarily on the work of Lamendella (1977, 1979; Selinker & Lamendella, 1978b). The basic premise of a neurofunctional view of SLA is that there is a connection between language function and the neural anatomy (Caramazza, 1997). It is important, however, to recognise that, as Hatch (1983) puts it, "there is no single 'black box' for language in the brain" (p.213). It is not possible to identify precisely which areas of the brain are associated with language functioning. Therefore, it is better to speak of "the relative contribution of some areas more than others under certain conditions" (Seliger, 1982, p.309).

Neurofunctional accounts of SLA (Caramazza, 1997) have considered the contribution of two areas of the brain; the right (as opposed to the left) hemisphere, and the areas in the left hemisphere (in particular those known as Wernicke's and Broca's areas), which clinical studies have shown to be closely associated with the comprehension and production of language. Neurofunctional accounts (Flege, 1999) have also tended to focus on specific aspects of SLA: age differences, formulaic speech, fossilization (when errors become obligatory in the student's output), and pattern practice in classroom SLA.

Right hemisphere functioning is generally associated with holistic processing, as opposed to analytic processing, which occurs in the left hemisphere. Therefore, it has been suggested (Obler, 1981; Krashen, 1981b; Caramazza, 1997) that the right hemisphere is responsible for the storing and processing of formulaic speech. The right hemisphere may also be involved in pattern practice in classroom SLA. Seliger (1982) suggests that the right hemisphere may act as an initial staging mechanism for handling patterns which can then be re-examined later in left hemisphere functioning.

Where the left hemisphere is concerned, there is less clarity regarding the location of specific language functions. In general the left hemisphere is associated with creative language use, including syntactic and semantic processing and the motor operations involved in speaking and writing. However, the extent to which these different functions can be localised is not clear (Hatch, 1983). Some scholars (Walsh & Diller,1981; Brown, 2000) distinguish between two broad types of functioning: lower order functioning, and higher order functioning. The first, associated with Wernicke's and Broca's areas, involves basic grammatical processing, together with the motor operations. The second, associated with a different area of the cerebral cortex, involves semantic processing and verbal cognition.

Lamendella distinguishes between two basic types of language acquisition: Primary Language Acquisition, and Secondary Language Acquisition. The former is found in the child's acquisition of one or more languages from 2 to 5 years. The latter is subdivided into foreign language learning (that is, the formal classroom learning of a L2), and second language acquisition (that is, the natural acquisition of a L2 after the age of five).

Linked to these two types of language acquisition are different neurofunctional systems, each of which consists of a hierarchy of functions. Each system has a different overall role in information processing. Lamendella pinpoints two systems as particularly important for language functioning: The first is the communication hierarchy, which is responsible for language and other forms of interpersonal communication. The second is the cognitive hierarchy, which controls a variety of cognitive information processing activities that are also part of language use. Both primary language acquisition and second language acquisition are marked by the use of the communication hierarchy, whereas foreign language acquisition is marked by the use of the cognitive hierarchy. Pattern practice drills are likely to involve the cognitive hierarchy and hence subject matter learnt in this way is not available in language behaviour that draws on the communicative hierarchy. Thus, the theory posits a different neurolinguistic base for the kind of acquisition and language use typically found in natural SLA and tutored SLA.

Lamendella's neurofunctional theory offers an account of a number of facts about SLA (for example, the inability to use material learnt through pattern practice in spontaneous communication). It is not clear from this theory what the natural sequence of development is. In addition, the distinction between foreign and second language learning is slightly simplistic; it is not so much the type of setting which is important, as the type of interaction which takes place in these settings. Thus, natural communication in a L2 is quite possible in a foreign language classroom.

Language Learning

Many researchers have suggested that language learning is a process which involves the creative construction of cognitive representation of the target language by the learner (Breen & Candlin, 1988; Dole *et al.*, 1991; Pennington,1996). This creative construction is based on both the learner's knowledge of his/her mother tongue and on knowledge of universal rules of language and learning, such as generalisation, simplification, and analogy. The process of the creative construction of a language requires a great deal of effort from pupils, and in-addition it requires them to be actively engaged in order to be able to carry out the problem-solving, hypothesis formation, and hypothesis-testing which it entails.

Learning based on these unconscious and natural processes can be improved by knowledge acquired consciously by pupils; it can be improved in the classroom or by independent study. In the improvement process the pupil deliberately applies learning strategies to control the content, the rate and the conditions of learning. The combination of creative construction and language practice in which the learner's performance is adjusted, enables the learner to gradually build up knowledge and skills for ready comprehension and fluent production of the target language.

Pennington (1996) maintains that in order for pupils to successfully construct the grammar of the target language, they must be willing to experiment, to be able to learn by making mistakes and to receive feedback on their performance in order to improve their knowledge and skills. Pupils need teachers' assistance in the process of the creative construction in order to support their developing knowledge of the target language. The role of the teacher in the process of language learning is to act as a mentor and a resource provider, with the pupils gradually progressing in the "zone of proximal development" so that they will improve their skills and gain independence over time. Vygotsky's (1978) "zone of proximal development" refers to the functions which have not yet matured but are in the process of maturation: functions which will mature in the near future but are currently in embryonic state. The actual developmental level characterises mental development retrospectively, while the zone of proximal development characterises mental development prospectively.

Vygotsky's (1978) social development theory has at its primary assumption that interaction among pupils increases their mastery of the concepts in the tasks assigned to them. That is, learning takes place in interaction among learners, and between teachers and learners, before it becomes mental processes for the individual. Vygotsky states: "Every function in the child's cultural development appears twice: first on the social level, and later, on the individual level; first, between people (inter psychological) and then inside the child (intra psychological)." (p.57).

Cob & Stevens (1996) assert that language learning is a process in which pupils interact not only with input but also with people through various senses and modalities: face-to-face or eye-to-eye (like in everyday conversation), ear-to-ear (like when people talk on the phone), and mind to mind (like in reading and writing). Thus, it is a process in which pupils learn to communicate with others.

From the above it can be concluded that the ideal teacher or teaching method would be one which:

Helps learners develop their specified cognitive representation of the target language.

- Allows pupils to experiment in a psychologically favourable environment.
- Offers input to both conscious and unconscious learning processes
- Offers pupils opportunities to practice and receive feedback on performance.
- Allows pupils to learn according to their own purposes and goals.

- Puts pupils in touch with others.
- Promotes interactivity in learning and communication.
- Exposes pupils to appropriate contexts for learning.
- Expands pupils' "zone of proximal development".
- Contributes towards pupils' independence.

Different scholars (Abraham & Liou, 1991; Doughty, 1992; Cob & Stevens, 1996; Hubbard, 1996; Pennington, 1996; Davis & Lyman-Hager, 1997; Warschauer, 1998) argue that, together with the teacher, the computer stands as an effective tool for fulfilling the above requirements, in addition to the fact that it addresses some of the theories of second language acquisition mentioned above (The Monitor Model, the Acculturation Model, the Nativization Model, and Accommodation Theory), and may contribute to the enhancement of pupils' self-efficacy due to the individualised instruction it offers.

Teaching EFL through computers

Until a decade ago the use of computers in the English language classroom drew the attention of only a small number of specialists, however in the last few years, with the advent of multimedia computing and the Internet, there has been a great deal of interest in the use of computers for language teaching and learning. The role of computers in EFL instruction has become an important issue for a large number of professionals involved in the teaching of English.

Warschauer and Healey (1998) divide the history of computer use in language learning into three main stages, behaviouristic, communicative, and integrative. Behaviouristic computer assisted language learning (CALL) emerged in the 1950s and involved drill and practice, grammatical explanations and translation tests. In the late 1970s and early 1980s, Communicative CALL was developing, focusing largely on the use of the target language with text reconstruction and simulation. As professionals' interest in language teaching in more authentic meaningful social contexts grew (Warschauer 1996b) they moved towards Integrative CALL, according to which the various skills involved in language learning (reading, writing, speaking and listening) should be integrated and also technology should be more fully incorporated into the language learning process. According to Richard-Amato (1988) the integration of these four skills in a lesson is important if teachers want to minimise the difficulties pupils encounter in the process of learning a foreign language. Richard-Amato (1988) maintains that when these abilities are treated as separate sets of skills and subskills to be learned pupils run into difficulty. Similarly Goodman (1982) argues that a language cannot be chopped into small bits and pieces

"....and to spoon feed it as you would feed pellets to a pigeon or a rat .... Language doesn't work that way....language is learned from whole to part...It is when you take the language away from its use, when you chop it and break it into pieces, that it becomes abstract and hard to learn" (p.238).

Kasper (2000) and Warschauer (1998) assert that as technology is fast becoming the basic tool for building the literacies required for success in academic and workforce environments, it is essential to use computer technology as a medium of instruction in the language classroom alongside face- to- face communication and the printed page. The use of computer technology enables language learners to be engaged in authentic projects and teaches them how to use the electronic resources to develop the skills- reading, writing, listening, and speaking-necessary for effective language learning. Warschauer (1998) notes that when pupils use the Internet for searching and reading they develop a nonlinear pattern of exploration and discovery that promotes the cognitive flexibility necessary for the integration and consolidation of knowledge acquired from a variety of sources.

In integrative approaches, pupils learn to use a variety of technological tools as an ongoing process of language learning and use, rather than attending the computer lab once a week for isolated exercises.

Computers and Perceptions of Language Learning

Computers may contribute in various ways to the development of learners' language skills and cognitive systems of the target language. For instance, in many reading comprehension tasks they can model the cognitive processes required for understanding and production (Cob & Stevens, 1996), they can model problem - solving which a user might undergo in order to complete a task (Dickson, 1985). Text-based simulations are another option offered by computers; in these simulations pupils can practice making decisions under different situations, for example, how to find an apartment by reading maps, listening to answering machines, looking at maps and using a wide variety of authentic resources in English.

As much as the modeling reflects the real process which skilled pupils undergo, computers may help learners in developing a cognitive representation of the task, and a better production. Thus, pupils' ability to manipulate language data in multiple media provides them with the raw material they can use to recreate the language for themselves, using their own organising schemes.

Computers can help pupils in the construction of the target language grammar by structuring pupils' input and output in certain ways, for instance, by focusing the tasks to be performed based on learners' knowledge of the language. The control of the computer environment makes it suitable to language learning as pupils can progress at their own pace. For example, the Internet promotes language learning by enabling pupils from one country to be in touch with pupils who speak the target language, in addition to being exposed to a multitude of other resources (Hoffman, 1996). Word processing can help learners in the pre-writing stage to generate and outline ideas. Spelling checkers give learners help in finding their mistakes and recognising the correct spelling from a list of options. The multitude of resources computers offer provide learners with an environment in which both parties "co-operate", making use of learners' strengths and abilities and the computer's resources, for the development of effective writing.

Also, learning a language with the aid of computers may allow learners to experiment or take risks which in a classroom environment might have been psychologically threatening. For example, the anonymous nature of writing on the Internet seem to encourage a spontaneous form of writing which results in a more creative and natural language than in some other environments (Esling, 1991c; Hoffman, 1994). The computer environment, especially when linked to hypermedia (text, graphics, animation, sound and video), is a rich one which enables pupils to enter new worlds (Ashworth, 1996). When using hypermedia pupils can, for instance, virtually experience walking down the street in a foreign country and speak with the inhabitants, or they can use it for writing their assignments, doing their projects, or publishing their own multimedia information for an international audience. Thus, the use of hypermedia helps learners achieve a deep and diversified coverage of the topic they explore.

In addition, computers offer a variety in the resources available for teachers and learners; there are concordances with large quantities of language data and tools to examine it. For example, where teachers may be able to come up with a few sentences showing the use of the present progressive a concordance, a program that scans large quantities of text for specified words or phrases and presents them in context, can generate hundreds from a large quantity of source text. Pupils can build their own explanations of how language works, and therefore are more likely to remember the linguistic rules and use them (Doughty, 1992; Warschauer, 1998).

The favourable psychological environment that computers provide and the fact that they are cognitively accessible to pupils (Pennington, 1991d) makes computer presentation a particularly memorable form of input which can help both conscious and unconscious intake and uptake of information. The computer not only enables teachers to present subject matter (e.g. rules) in a highly relevant form, by using hypermedia and concordancing (Doughty, 1992), but it can also vary the kind of input and the amount of context presented to pupils so that they can study inductively. In addition, the pace of learning can be adjusted so that it matches a natural acquisition order or is just ahead of the learner's current level of knowledge – Krashen's (1982) "i+1" level, which like the Zone of Proximal Development refers to the distance between actual language development (represented by i) and potential language development (represented by i + 1).

The use of computers in the language classroom provides pupils with opportunities to practice and receive feedback on their performance, including practice level and types of exercises which are suited to pupils' level (Stevens, 1992, Hubbard, 1996). For example, there are many authentic texts available on the Internet and which can be accommodated for the level, pace, needs, interest and current knowledge of learners, and be used for group discussions and presentations. Also, there are contextualised grammar and vocabulary drill programs, which provide pupils with the necessary feedback on their computer assignments, and direct them to further practice or move them to the next stage (Cob & Stevens, 1996). A good selection of computer based activities that provide gratification and meet pupils' needs could contribute to enhanced self-efficacy, which is linked to achieving success in the learning process. The advantage of the computer for these kinds of activities is that pupils who get stuck on a word and cannot find the missing word can get a letter or a word as a hint from the computer and carry on with the task. In the conventional classroom they would probably have either given up on the word or asked the teacher for the answer (Davis& Lyman-Hagar, 1997).

In this sense the computer functions as an instrument, which adjusts the amount and the complexity of the input to what pupils can use, and in this way, it avoids the frustration, which pupils sometimes experience, due to information overload. Furthermore, the feedback provided by such a non-threatening instrument may save some pupils the discomfort involved in getting face-to-face feedback. Hoffman (1996) maintains that the natural feedback involved in the use of e-mail for a particular task, or for authentic communication with native speakers, by language learners may indirectly promote their language acquisition, particularly their writing skills, as they get a real communicative response.

The availability of hypermedia allows pupils to select the level and content of access within the system (Dickson, 1985; Martinez-Lage, 1997). In this kind of program maximum control and creativity is gained by pupils, as they are able to interconnect different communications media such as text, graphics, and sound, thus promoting learning by juxtaposing different symbol systems to create different modes of interpreting and understanding information.

The role of computers in networking users puts pupils in touch with other learners and communicators. Networking and hypermedia allow learners to gain access to other users around the globe, in addition to the different kind of information created by these users, and which are available in databases and in the creative products of visual and sound media (Abraham & Liou, 1991; Chapelle *et al.*, 1996).
Thus, computers enable pupils not only to gain access to people but also to their ideas. Even without the advantage of networking, the computer brings people together and encourages communication between communities of learners, for example, as a stimulus for problem-solving, cooperative drafting, and other forms of pair work and group work

Pennington (1991c) asserts that the computer is a highly responsive instrument, which offers learners reliable and high-quality feedback on their performance, generally in a near- instantaneous manner. Moreover, it is a highly interactive medium in that learners must do something, continuously or repeatedly, in order to get a response from it. These "characteristics" of the computer may contribute to pupils' enhanced self-efficacy, which is linked to achieving success in performing tasks, and receiving reliable feedback. Thus, the use of computers in the English language classroom may help pupils develop an interactive style of learning and communication in which the computer or other pupils partner their efforts and help to sustain them. Finally, the computer may provide unique interactive effects in the form of tactile, visual, and auditory feedback that sustains effort and enhances performance (Martinez-Lage, 1997).

The use of computers in EFL classes enables learners to be exposed to different contexts of learning by the use of activities such as simulations, which train performance for actual situations, and group interactions, which train pupils to interact and negotiate meaning that is central to communication and language learning (Pennington, 1996). The computer expands pupils' "zone of proximal development" to a virtually infinite degree, as the medium supplements their knowledge and capabilities, and at the same time adds other forms of supplementation to assist in building information and skills. Pennington further maintains that in this way the computer gives direction to the learning process, and eventually helps pupils gain independence in acquiring the skills modeled and trained by the computer. Thus, the computer provides a bridge to new learning, to actualization of simulated and virtual experiences, and to many kinds of real-time and real-world experiences.

Despite the outlined advantages of the use of computers in the English language classroom there are some drawbacks to using them. One of them is the social isolation that may be imposed on some learners as a result of working with the computer (Kraut *et al.*, 1998). Even though such isolation may be necessary under certain circumstances, for example when pupils have to edit a text using word processing, in other situations it may mean that pupils are working on language in a highly constrained and artificial context (Pennington, 1991c). Another limitation of the use of computers in the language classroom is that pupils may be controlled by the medium, as sometimes happens with grammar-checking or text-analysis software. Such software sometimes simplifies the representation of the content and the structure of the task to be performed to such a degree as to be highly misleading; when using the structures or advice of some of the computer programs, pupils may be wasting their time, be confused or led astray from their learning goals (Pennington, 1992a, 1993a; Pennington & Brock, 1992). Another problem computers may present learners with is their inability to make full use of the software, as the characteristics of software do not match those of the learners or the settings of use for which it is designed, or the design of the software does not require or encourage use of its key features (Chapelle & Jamieson, 1989; Chapelle *et al.*, 1996; Cob & Stevens, 1996).

To summarise, while computers offer pupils various opportunities for promoting and enhancing language learning, their potential may not be realised under certain circumstances due to various types of misapplication or improper use.

Research on the use of computers in EFL classes

Research on the effectiveness of the use of computers in EFL setting has been concerned with many areas relevant to the process of learning a language, for example, students' attitude towards drills and their effectiveness (Schaeffer, 1981; Van Der Linden, 1993), pupils' attitude to the integration of computers in EFL classes (Stenson *et al.*, 1992), the effect of using computers on pupils' writing (Warschauer, 1996; Nichols, 1986; Womble, 1984) and reading (Davis and Lyman-Hager, 1997; Martinez-Lage, 1997), and the question of how students interact with computers (Abraham & Liou, 1985; Dudley, 1995). Since it is impossible to address all the areas explored, in my review I will refer to some of the studies concerned with reading and writing with the aid of computers.

Some of the research on writing has explored how students felt about and performed with word-processors. Warschauer (1996) for instance, explored the effects of the use of computers for writing on pupils studying in the language classroom. In the study there were 167 university students in 12 ESL and EFL academic writing classes in the United States, Hong Kong and Taiwan. All 12 classes, which were taught by seven different teachers, involved the use of computers for writing. Students were given a survey in which they were asked about their feelings regarding the use of computers.

The results of the study indicated that students, regardless of their experience with the use of computers or their gender, had a positive attitude towards using computers in their language classrooms, but there were significant differences between the classes that participated in the study. In order to explore these differences teachers were asked to describe how they used computers in their classes. It was found that the class which had the lowest mean motivation score was the class where computer work was most peripheral to the goals and structure of the course, that is computer work was not mandatory for completion of class assignments. In contrast, the two classes with the highest mean motivation score were the ones where computer work was an integral part of the course. In one class the course was designed around a series of activities which involved e-mail dialogue journals, where students had a collective debate, followed by a discussion and decision-making. In the other, the course was built around a student newsletter that was collectively published by the class on the World Wide Web.

Warschauer (1996) maintains that the differences between the classes derived primarily from the classroom activities and tasks, which were integrated into the ongoing structure of student assignments and interaction rather than included as an informal additional activity.

Other studies, concerned with writing with the aid of computers, showed that students who use word processors have been said to spend more time writing (Nichols, 1986; Womble, 1984), to make more and different types of revisions (Bean, 1983; Hunter, 1984) to improve their attitudes towards writing with computers and to be less apprehensive about the process of writing (Neu and Scarcella,1991; Phinney, 1991).

Another area explored by scholars interested in the effectiveness of the use of computers in language classrooms is reading acquisition, and more specifically vocabulary acquisition: Davis and Lyman-Hager (1997) examined participants' performance and attitudes with regard to computerised L2 reading glosses, that is the meaning of difficult terminology in a text is provided for readers. Forty-two intermediate level students of French read a glossed excerpt of a text from a computer screen. The researchers administered a multiple-choice task, a written recall protocol, and an interview in which they asked participants to indicate their reaction to the program. Students showed positive attitudes towards the computerized glosses. However, the researchers did not find evidence of a relationship between computer use and comprehension. Although different types of glosses were available for consultation, they found that students mostly used the English definition of individual words and expressions. Davis and Lyman-Hager (op cit) assumed that the positive attitude towards the computer-glossed format was based upon three factors: (a) it provided a coherent understanding of a text due to a lessening of the disruption of the reading process caused by conventional dictionary look-ups; (b) it made the participants more independent since they could find definitions by themselves without asking others to help them; and (c) it contained more material than a traditional dictionary.

Al-Seghayer (2001) conducted a study the purpose of which was to explore and compare the effectiveness of video mode and static pictures on facilitating pupils' vocabulary acquisition. The study examined which of the image modalities - dynamic video or still picture - was more effective in enhancing vocabulary acquisition. The participants, thirty ESL students, were introduced to a hypermedia-learning program, designed by the researcher for reading comprehension. The program provides users reading a narrative English text with a variety of glosses or annotations for words in the form of printed text, graphics, video, and sound, all of which are intended to aid in the understanding and learning of unknown words. A within-subject design was used in the study with 30 participants being measured under three conditions: printed text definition alone, printed text definition coupled with still pictures, and printed text definition coupled with video clips. In order to assess the efficacy of each mode, a vocabulary test was designed and administered to participants after they had read the English narrative. Two types of tests were administered: recognition and production. In addition, a face-to-face interview was conducted, and questionnaires were distributed. Results of the tests indicated that a video clip is more effective in teaching unknown vocabulary words than a still picture. Al-Seghayer suggests that video is better at building a mental image, and better at creating curiosity leading to increased concentration, because it embodies an advantageous combination of modalities - vivid or dynamic image, sound, and printed text.

To summarise, the survey of the literature and research makes a strong case for the use of computers in the English language classroom. The studies support the use of multimedia to enhance L2 acquisition because it is a single interactive presentation environment for diverse instructional resources including printed texts, photographs, slides, dynamic audio, and dynamic video. The varied and interactive nature of multimedia instruction makes reading, listening, and speaking both engaging and enjoyable. Additionally, the immediacy of access and student independence makes learning more efficient and effective.

Pupils' academic self-efficacy and the use of computers in EFL classes

Some scholars (Nicholas & Miller, 1994; Kasper, 2000) emphasise the contribution of the use of computers in the classroom to pupils' self-efficacy. Computers enable teachers to provide learners with tailored instruction; they can work collaboratively to solve problems, or they can work individually each student learning according to his/her own academic level and progressing at his/her own pace. Pupils' collaborative effort to solve problems is a factor, which may contribute to the enhancement of personal efficacy. Coping with abundance and varied databases and the selection of appropriate materials from them can also affect one's personal efficacy. The effort in locating data bases, the selection of desired information, and its application in a process of problem solving may contribute to a change in one's personal efficacy; the progress or success in solving a problem or the cultivation of a new skill may enhance personal efficacy (Kasper, 2000). In addition, Kasper maintains that the use of computer technology in the English language classroom, via collaborative learning, not only provides students with the context they need for creating, sharing, applying and critiquing their own knowledge, but it also increases their self-efficacy. This is attained by their active participation in the process of learning, and the nature of collaborative learning where they play alternating roles as knowledge receivers and knowledge providers. Finally, she points out that by being members of electronic learning groups language learners become familiarised with community norms which also helps them develop a sense of personal efficacy.

The change of the learning environment in the EFL classroom in Israel by incorporating computers and computer technology has been introduced only in the last few years. One of the underlying assumptions, which guided the Ministry of Education in its decision, was the belief that the change of the learning environment would contribute to the improvement of pupils' achievement scores in English (The Curriculum for Israeli Schools, 1998). Computers provide pupils with various settings of learning; they can work collaboratively to solve problems, or they can work individually each student progressing at his or her own pace. Pupils' collaborative effort to solve problems is a factor, which can contribute to the enhancement of personal efficacy (Nicholas & Miller, 1994; Kasper, 2000), and consequently to a higher motivation to learn the language.

Thus, following the decision made by the Ministry of Education the Open University in Israel was one of the pioneers in offering courses for teachers of English, the purpose of which is to train teachers with the skills necessary for the integration of technology in their English lessons based on sound pedagogic principles (Harari, 1993). The next section describes one of these courses.

The Open University Course for the Integration of Computer Technology into EFL classes

In 1992, following the Harari Committee Report (Harari, 1993) concerning education in Israel towards the 21st century, the Ministry of Education in Israel made a decision to change pupils' learning environment in their English classes, by equipping all high-schools with computers, in order to improve pupils' performance. The rationale for the decision was that English is solidly entrenched as a foreign language. For Israelis, whatever other languages they may use, English is the customary language for international communication and for overcoming barriers to the flow of information, goods and people across national boundaries. English is the language most generally associated with international trade and tourism, with higher education and research, and with the electronic media. It is the language that, after Hebrew and Arabic, is considered the most valuable asset of a plurilingual Israeli citizen. Because of these reasons English is the foreign language for which there is the strongest local demand, and therefore it is imperative to aim for the highest achievable standards of excellence for the teaching of English as a Foreign Language in Israeli schools (The Curriculum for Israeli Schools, 1998).

In order to achieve the objective of high standards the Ministry of Education decided to introduce computers into English lessons. This followed the recommendation of the Harari Committee, according to which

"…. Every aspect in education is dependent on the qualities, abilities and devotion of teachers. We recommend the training of professional teachers…, the intensive integration of computers in the process of teacher training in all subjects and for all age groups in the educational system…there will be an extensive project for the implementation of computers in all schools for all levels and in all subjects. It will include the acquisition of equipment, the development of software, teacher training, and the establishment of support centers for teachers. Computers should be incorporated as learning tools in the syllabus, they should be actively used in the training of novice teachers in all subjects, and the operation of an extensive project for teacher training in the subject of integrating computers in education" (Harari, 1993, pp.10-11).

Thus, it was apparent to policy makers that teacher training in the use of new technologies was imperative. As teachers are the key figures in organising and presenting subject matter to pupils; if they do not possess the skills and knowledge necessary for the use of computer technology the introduction of such technology is pointless. In order to fulfill this need for adequately trained teachers, the Open University was one of the pioneers in offering courses for the training of teachers of English to incorporate English teaching methodology with computer technology. The rationale underlying the courses was that appropriate training in the use of computer technology in the English language classroom will provide teachers with the necessary tools for varying their teaching approaches, will provide them with a rich source of materials for teaching for authentic purposes, for example carrying out a project on one's ancestors (Harari, 1993).

One of these courses, deals with the integration of technology in English language classes. The course was not based on a particular theory of SLA, rather it incorporated methodological principles derived from both Vygotsky's and Piaget's theories of learning. It lasted twelve weeks, and the 14 participants, who met once a week for five hours, were all experienced teachers of English interested in expanding their knowledge concerning the use of computers in English lessons. The objectives of the course were aimed at expanding teachers' theoretical knowledge for their practice in the classroom, the introduction of up to date EFL teaching techniques, and familiarising teachers with state of the art computer technology and incorporating it with English teaching methodology.

The programme of the course was as follows:

- Reviewing theories of learning and their relation to classroom practice.
- Updating participants with theoretical and empirical innovations in the area of teaching EFL and their practical implications.
- Teaching the skills of computer technology and educational technology in particular for the improvement of teaching-learning process.
- Practice in teaching heterogeneous classes using the integrative approach in teaching. This approach incorporates techniques of cooperative small group teaching, frontal teaching, and individual learning, with the adaptation of the most effective teaching-learning technique to the pedagogic assignment in a heterogeneous class.
- Fostering pupils' individual needs in order to improve their performance in the acquisition of the English language.

The following is a table describing the methodological objectives of the Open University course for the integration of technology in EFL, the technology component of the course, and the assignments teachers did as part of the course.

Table 4.1: Content of Open University Course for Coordinators

Methodology	Technology	Task
• Introduction • Icebreaker • Grouping activity for Technology Round Robin • Learning styles - introduction	**Technology Round Robin:** Word, Internet, Power Point, Video	• Questionnaire • More icebreakers • Task for each station • Reflection and feedback
Multiple Intelligences Task based instruction	Word and Internet: copy and paste. Integrated lesson: Thriller – computer, video, learning styles, songs, clozemaker. ETNI – Hanukah links	• Multiple Intelligence survey • Task based learning through Internet and Word.
Dialogue journals Group work – Cooperative learning Article Reading Jigsaw	Word – tables Web Quests Power point	• Journal Entry • Jigsaw reading and reporting on cooperative learning • Power point presentation
Jigsaw variations Vocabulary acquisition and reentry Vocabulary STAD (Student Teams Achievement Division)	E – mail Word – tables, inserting pictures, comments and footnotes. Internet – Online Dictionaries.	• Sign up for hotmail • Student Teams Achievement Division • Matching exercises and games
Learning Styles Vocabulary and Grammar Graphic organizers	Download pictures and insert in Word Clozemaker Online Java based games & quizzes Creating online quizzes and games (Puzzlemaker, Game-O-Matic)	• Learning styles questionnaire • Cloze passage creation • Create games

Table 4.1: Content of Open University Course for Coordinators (continued)

Brain research as introduction to reading. Story Webbing Reading/thinking skills Pre-while-post activities	Use course book text to integrate computer and present CALL Software	• Use prepared webs to map out stories/texts • Create webs to map a story from a text
Introduction to reading Pre-reading strategies Graphic organizers Story mapping New Curriculum: principles	Drawing tools Graphic organizers on the Web	• Task-based instruction – use webs to map out stories/texts for pre-while-post reading activities • Read introduction to New Curriculum • Find Principles for graphic organizers • Write entry no.2
New Curriculum: 'Why?' & terminology Newspapers: various techniques Reading skills and strategies	Internet Explorer Favourites Hyperliteracy News on the Net Lessons on the Web	• News tasks on and off the Net • Prepare a news activity • Read article
Reading and writing The writing process	Power point Story board File management	• Tasks to build characters and setting • Experience the writing process • Prepare Power point story
The New Curriculum Benchmarks Performance-based learning Alternative assessment	Word – tables CET projects Rubrics	• Rubric creation • Performance-based tasks

Table 4.1: Content of Open University Course for Coordinators (continued)

Grammar and the new curriculum Grammar Games	Grammar practice and games on the Net. Excel Reading graphs and charts Analysing data Writing survey questions	
Accessing information skills Planning a research project: key words Critical thinking: Bloom's Taxonomy	Web searches Eric Database	• Prepare technology lesson • Web tasks

The training programme was based on five stages:

- **Experiencing:** Pedagogic content and assignments were adapted to participants' needs, while making use of techniques of teaching/learning which were suitable for the classes teachers taught.
- **Meta-cognition:** An emphasis was put on the development of participants' awareness of the process of learning by reflecting on it in periodical reports.
- **Theory:** Participants read and discussed academic texts in order to establish the background necessary for the teaching strategies and techniques they learnt.
- **Practice:** The participants practiced the application of the teaching techniques they acquired.

- **Feedback:** The participants experienced peer teaching and giving feedback to peers on their performance.

Typically, each session in the course was divided into two parts: the methodology part, which focused on training teachers of English the principles of constructivism, according to which learning is essentially interactive and learners are placed in the centre of the learning process. The second part of the session - the technology part – focused on the use of various technological aids, such as videos, and computer applications, where teachers learnt how to use and apply different technologies in the teaching of English. These two parts complemented one another. Thus, for instance, in the methodology part of the course, teachers learn about vocabulary acquisition and in the technology part they are introduced to Online Dictionaries on the Internet.

Teachers were taught how to make cloze passages, which is a sort of test that is constructed by deleting every fifth, sixth or seventh word from a passage of prose. Each deleted word is replaced by a blank of a standard length, and the task for the pupil is to fill in the blanks by restoring the missing words. They learnt how pupils could practice with cloze passages and monitor their own progress. They also learned how to use power point, which is a program that is used for presentations, and were introduced to various links, which can be used as data sources by pupils for carrying out projects. Most of the activities teachers were asked to do in the course involved pair or group-work, for instance, power point presentations were done in pairs and jigsaw tasks in groups. In jigsaw tasks a text is divided between participants; each of the participants has to read the part of the text which s/he has and report it to the group in order to reconstruct the text to find a solution to a problem presented by the teacher to the group. At the end of the course participants were asked to submit a project in which they, in pairs, had to incorporate both the principles of English teaching methodology and the application of new technology.

It should be pointed out that the topic of assessment was not included in the programme of the course. In addition, the participants in the course were not offered any type of group or peer support following the completion of their training with the new medium of instruction. No follow up was initiated by the course organisers to find out to what extent teachers were adapting their methodology and adopting the principles of teaching with the aid of computers.

As teachers are key figures in the educational process it is important to examine their role in the implementation of educational innovations. The following chapter will explore various aspects of teachers' involvement in introducing changes into their daily practice.

Chapter Five - The Role of the Teacher

The necessary conditions for implementing educational innovations

In previous chapters the change of the learning environment by the introduction of computers as a new medium of instruction was discussed. The advantages computers offer learners in general and EFL learners in particular were explored, and especially their contribution to the enhancing of pupils' self-efficacy. It was also pointed out that computers could be particularly beneficial for the implementation of constructivist pedagogy. However, in order to maximise the effect of the use of computers for EFL learners it is necessary that teachers adapt their pedagogy to the potential computers offer users. Thus, when attempting the implementation of educational innovations policy makers should take into account the role of the teacher in the enterprise, as teachers' willingness to adopt the innovation and their attitude towards it may be crucial factors in its successful implementation.

In this chapter I will explore not only the necessary conditions for implementing changes, but also the impact of teachers' theories of learning on their teaching, their general attitude towards the introduction of an educational innovation, and the impact of the change on the teachers' role within the classroom.

Hannay and Seller (1990) argue that curriculum development requires from teachers to make decisions that partly arise from their practical knowledge, and to share their meaning with other participants involved in the process. As teachers make practical decisions, they formulate alternative problems and solutions.

Throughout the process the curriculum orientations and the values of the teachers are actively involved. Thus, teachers may ask questions such as 'How shall I act?', 'What should be done?', 'What course of action should be taken?' Scheffler (1973) maintains that the aim of practical thoughts is not only the implementation or expression of specific decisions, but also the formulation of more general intentions and prescriptions, which embrace practical and moral principles. Such expressions and formulations guide decisions, and thereby action.

The role of teachers' personal and professional beliefs, therefore, is an integral component of the curriculum development process. For example, Reid (1978) refers to the stock of knowledge that teachers bring into the curriculum development process, whereas Walker (1978) emphasises the importance of platform in the process. Elbaz (1981) provides a framework to identify components of practical knowledge: rules of practice, practical principles, and image. Rules of practice are recipes of what to do in certain situations, while principles are broader philosophical views. Clandinin and Connelly (1986) suggest that

> "Image, for us, is a kind of knowledge embodied in a person and connected with the individual's past, present and future. Image draws both the present and future into a personally meaningful nexus of experiences focused on the immediate situation which called it forth. It reaches into the past gathering up experiential threads meaningfully connected to the present. And it reaches intentionally into the future and creates new meaningfully connected threads as situations are experienced, and new situations anticipated from the perspective of the image" (p.3).

In the process of curriculum development the question of 'What is?' is explored in order to examine 'What should be?', and therefore the practical knowledge of teachers is an integral component of the process. Practical knowledge will be brought to bear through individual problem framing, suggested alternatives and habits. Further, the rules of practice, principles and image that a teacher brings to the process interact with those brought by his/her colleagues.

Adan (1991) and Shermer (1997) maintain that the success of educational innovations, and in this study the introduction of computers into classes is an innovation, is dependent on interpersonal relations. They argue that conferences and even attractively written materials, the purpose of which is to encourage the adoption of changes, have a limited impact on people's motivation to adopt the proposed changes, as their source is from some kind of a "centre", such as the Ministry of Education. Thus, Adan and Shermer argue, in order for teachers to accept a change there is a need for a sophisticated and continuous dissemination of the idea, which is aimed at the teacher and his/her peers. Interactions between two people or small groups of people seem to have more of an impact on their motivation to adopt a change. Potential users of innovations tend to put more trust in the opinions of their peers who have experience with an innovation and therefore can evaluate the effectiveness of that innovation.

Adan (1991) further argues that many ideas are accepted by the public only after they have impressed the leaders, those who are first ready to adopt innovations. In every group of people there are those whose opinion and advice is more sought after than others, and those who are natural leaders who serve as mediators between new ideas and members of the group. They are the ones who provide information, standards of behaviour or performance, and even encourage members of the group to accept an innovation. Their strength lies in the fact that they are an integral part of the group. Thus, both Adan (1991) and Shermer (1997) maintain that in order for an innovation to be effectively implemented it is necessary to create a system which will make it public and make sure it is used, in addition to the co-operation of all parties involved in the educational endeavour. Members of that system should all be participants in the educational system, such as subject coordinators, inspectors, head teachers and teachers. The advantage of this group composition is that it is homogenous, its members "speak the same language", that is they are all familiar with the reality of school work. Harris (1983, 1985) emphasises the importance of appropriate verbal communication between those who initiate a change and teachers who are the implementers of change. She maintains that the language used by the introducers of innovations should be the same language teachers use to describe their professional reality. Therefore, for an effective dialogue between initiators of change and its implementers, the first have to incorporate practical advice with theories. Harris (1985) further maintains that when theoretical principles are incorporated with specific examples from the classroom, it is easier for teachers to see how the innovation can be implemented.

The success or failure of an innovation is also dependent on the type of relationships between the agent of change, "the centre", and the potential users (Adan, 1991; Shermer,1997). The role of the agent of change is to encourage the environment to adopt the change, and very often the personality and diligence of that agent are crucial for the acceptance of the innovation. His/her credibility and command of the subject of the innovation are helpful factors for its implementation, while its absence may send the whole enterprise into oblivion.

Schwarts (1988) maintains that very often teachers are reluctant to adopt changes proposed by academics because they do not consider knowledge acquired via research as relevant to their daily practice. Thus, she emphasises the importance of cultivating a positive atmosphere at school towards teachers' professional knowledge, by creating channels of communication with academics. An atmosphere of professional discussion and thinking may encourage teachers to make use of proposed changes.

In order for teachers to adopt a proposed change they need to identify with it and internalise its principles; in order to be able to do that they need to familiarise themselves with it by spending the necessary time and energy (Fisher, 1993; Mercer, 1993). However, teachers do not have the resources nor the time to prepare new materials. Few teachers make significant contributions in introducing new innovations in teaching. The average teacher is mostly concerned with selecting parts or sections from the material and adapting it to the conditions under which s/he is working (Adan, 1991; Shermer, 1997).

Thus, the teacher's personality and openness to new ideas is an important factor in the adoption of changes. This refers to the teacher's ability to see reality as it is, to criticise it and be dissatisfied with it, and consequently to want to change it. It requires from teachers an ability to seek information from different sources, to listen, to exchange opinion, to consider and acknowledge different perspectives, select the most suitable ones, and take into account new factors (Arielli, 1995; Shermer, 1997). Following their personal inclinations, teachers may adopt far-reaching changes, even in contrast with the objectives of the innovation and its principles. However, teachers' main strength lies in their ability to reject a proposed change (Shilling, 1992). Despite the hierarchical structure of the educational system it is impossible to effectively supervise the work of the teacher, and his/her class is also his/her castle.

Teachers' work cannot be effectively directed by bureaucratic guidelines and instructions, for they always have much room for independent decisions.

Different scholars (Mercer, 1993; Arielli, 1995; Shermer, 1997) explored teachers' rejection of proposed changes. They argue that to a certain degree educational innovations negatively affect teachers; they make some parts of the existing curriculum irrelevant, and therefore, skills and knowledge, which were acquired via hard work, become useless, and perhaps unprofessional. In addition, they may face difficulty in acquiring a command of the new enterprise, which might deter them from adopting it. In order to overcome this difficulty teachers need to have a great deal of motivation to put in the required work for learning. The greater the difference between the new and the old, the higher the resistance, and consequently, the chances of rejecting it.

Furthermore, a new educational enterprise may undermine teachers' psychological confidence, which is based on the known and familiar (Arielli, 1995; Cambell *et al.*, 1995). Teachers prefer to minimise the possibility of risky situations, which may bring about criticism and negative feedback from parents or colleagues, consequently they prefer to be on "safe ground" by teaching what they have always taught (Shilling, 1992). Nevertheless, the more secure individuals feel in their professional milieu, the less reluctant they are to adopt a change, as they do not feel it may undermine their professional confidence (Adan, 1991). Cambell *et al.* (1995), in their long-term study of in-service support for a technological approach to science education in Africa, maintain that a sense of security can be achieved by well-planned INSET (In-Service Training) support for teachers. They mention four strategies to be used before any impact of an innovation can be expected in the education of pupils: presentation of the 'theory' of the innovation, demonstration of skills involved in implementation, simulated practice, and individual feed-back on classroom practice. They further argue that teachers who are secure in their school knowledge and have the opportunity to reflect on their practice are more likely to see the benefits of new approaches to teaching and learning and have the confidence to try them with pupils. In addition, Cambell *et al.* (1995) point out that the introduction of new teaching methods needs to be preceded by content confidence building and a basic awareness of teaching methodology.

Sarason, (1971) refers to one of the main characteristics of teachers' work which contributes to their sense of insecurity; this is the isolation in which they carry out their professional work. Teachers spend most of the workday with children with hardly any contact with colleagues, and their contact with their superiors is even more limited. The feeling of teachers' isolation is even more intensified with the limited opportunities they have to discuss problems and difficulties they encounter. Kenan (1995) maintains that teachers are apprehensive about bringing up their problems to their superiors, fearing that the latter will get the impression that they are not doing well in their job as teachers. Discussions in teachers' rooms are mostly devoted to organisational problems in the school, and only a few involve discussion of day to day pedagogic issues.

In addition to the personal factors which might interfere with the implementation of educational innovations, teachers are faced with the constraint of preparing their pupils for the Matriculation Examination, which is taken at the end of 12th grade.

Pupils' performance in this national test is an indicator of teachers' professionalism and the skills they possess. Bolon (2000) maintains that testing is viewed by policy makers and the public as a way to improve the quality of schools in an efficient manner. The tests are thought to raise the general level of education throughout the country by holding teachers and pupils accountable to a certain level of standards.

The ability to analyse classroom performance from the Matriculation Examination has brought increased pressure on teachers. Where evaluating teachers in the past was mostly a subjective measure, the Matriculation Examination's results have become a specific tool for administrators to yardstick not only curricula, but also individual teachers. Because so many critical decisions stem from the Matriculation Examination's results some teachers, as early as 9th grade, start preparing pupils for the test by focusing on and equipping them with the necessary skills for passing the exam. Bolon (2000) further maintains that some schools have to hold practice tests in an effort to prepare pupils for the real exam. He points out that as teachers and pupils get closer to the test, teachers teach test-taking strategies, such as timing, and when it is appropriate to make a guess and just be 'test-wise'.

Despite all the constraints involved in the implementation of changes at schools, there are teachers who are prepared to adopt new changes and invest the necessary time and energy for such an adoption (Adan, 1991; Arielli, 1995).
Some of these teachers are motivated by extrinsic rewards; their participation in a project, which is supposed to bring a change in schools, provides them with an opening for new roles at school or the educational system, or they may gain control over valuable resources.

Others may be motivated by intrinsic rewards, such as taking pride in one's professionalism and the desire to be informed and efficient. Arielli (1995) maintains that people who have influence over the process of their work gain a great deal of satisfaction from it, and their responsibility is greater. Their involvement in the process of decision- making increases their identification with their job, which is evident in their willingness to adopt innovations. The individual's desire to participate, to belong, and be accepted is one of the strongest forces that motivate people to adopt new changes (Adan, 1991).

A teacher, who is involved in educational innovations, is perceived as a professional not only by himself/herself, but also by colleagues, superiors, parents and society in general. The support a teacher may get from colleagues as a result of being involved in the adoption of an educational change is an important intrinsic reward, as teachers are more sensitive to their colleagues' criticism than to the demands of their superiors (Adan, 1991). The chances of the success of an educational change are higher if, following its adoption, isolated teachers become a team (Arielli, 1995). They meet, formally and informally, to discuss common professional problems without facing the risk of negatively affecting their professional image, as a result of raising these problems. Consequently, a climate of mutual support, informality, equality and trust is created: teachers' sense of isolation is reduced and instead a strong sense of belonging to the educational system is developed (Shermer, 1997). The advantage of such a situation is that individuals are more prepared to adopt changes and internalise the norms of a group they feel part of. A common background among individuals enhances the tendency for co-operation (Schwarts, 1988).

Clearly a range of factors come into play to determine how far teachers are willing and able to support and promote the introduction of new innovations in their teaching. In light of this discussion it is useful to move from the general to the more particular. That is, to consider the changes necessary in the EFL classroom that would be required to ensure the successful introduction of computers.

The role of the teacher in the classroom

According to Vygotsky's (1978) socio-cultural theory of learning, which was discussed in chapter four, the teacher is an active, communicative participant in learning. In this sense Vygotsky's conception of the role of the teacher is very different from Piaget's (1970) who perceives teachers' role in terms of providing rich learning environments for children's own discoveries, and as facilitators who lead from behind.

Vygotsky (1978) maintains that as children construct their knowledge and understanding of the world not just through direct personal experience and discovery, but also through the intellectual sharing and support of those around them, the role of the teacher in applying is a particular, skilled form of such support. Bruner (1985) elaborates on Vygotsky's ideas and asserts that if a child is able to advance under the guidance of an adult or a more competent peer, then they serve the child as a vicarious form of consciousness until s/he is able to master the task through his/her consciousness and control. When this is achieved and the pupil is able to perform a new task or conceptual system, then s/he can use it as a tool. Up to that point, the teacher performs the function of 'scaffolding' the learning task to make it possible for the pupil to internalise external knowledge and convert it into a tool for conscious control.

The concept of how teachers 'scaffold' pupils' learning through interaction was explored by some scholars (Mercer, 1991; Maybin, *et al.*, 1992; Kromholts &Hes-Markoza, 1997), who examined it from two perspectives. The first is concerned with presentational issues, for instance how and when teachers introduce new ideas into discourse, how they contextualise new information in terms of past experience. It is also concerned with teachers' decisions about how to structure and support learning tasks in order to meet pupils' individual needs and rates of progress.

One type of problem teachers sometimes face at this level has been called 'the teacher's dilemma' (Driver, 1983; Edwards & Mercer, 1987), which concerns both the nature and the extent of the teacher's intervention in the learning process. It is the problem teachers sometime face when they have to reconcile an experiential, non-didactic approach to learning with the requirement that learners follow a given curriculum, and do not waste their time. Kromholts and Hes-Markoza (1997) maintain that teachers should not attempt to step back, and expect pupils to take full responsibility for their learning. Rather, they should encourage pupils to take different courses of action, which will enhance their own sense of responsibility for learning, and consequently become more independent.

Similarly, Mercer (1993) asserts that computers are commonly perceived as offering pupils good opportunities for relatively autonomous learning, but it is still a teacher's responsibility to ensure that pupils' efforts are supported and contextualised.

The second level in which teachers' scaffolding was examined is a deeper level. This level concerns the quality of knowledge, which pupils gain from classroom activities and interactions. Mercer (1993) maintains that the quality of understanding that pupils acquire through the use of information technology in the classroom is not determined by the quality of the 'interface' (quality of interaction and end-user) between the pupil and technology. Quality of understanding, the nature of educational knowledge, is determined by much more complex contextual system which is inseparable from how education is defined in a particular culture. He further maintains that the culturally based contextual system is continually created and re-created in the classroom through the interaction between teachers and pupils.

In addition, Mercer (1993) argues that a teacher's scaffolding of pupils' learning with the computer must be evaluated not only in terms of whether or not pupils acquire certain procedural rules for operating the computer, but also in terms of the quality of understanding they gain of the field of knowledge with which they are concerned (for example, the creative writing process for word processing). This kind of understanding is hard to assess, but it should be pointed out that this difficulty of assessment is not peculiar to computer-assisted learning.

The role of the teacher in EFL classes

The teacher as manager

Scholars such as Breen & Candlin (1988), and Cole & Griffin (1987), maintain that the teacher has two main roles within a communicative methodology in the EFL classroom. The first is to facilitate communication between pupils in the classroom, and between them and the various activities and texts. The second role is to act as interdependent participant within the learning-teaching process. The two roles are closely related and suggest a set of secondary roles for the teacher: first as an organiser of resources and as a resource person of subject-matter for pupils. Second, as a guide for classroom activities and procedures, where the teacher tries to explain to learners what they are expected to do in order to achieve and complete a certain task or activity. In addition, the teacher seeks feedback at different points of the teaching process. Thus, in guiding and monitoring the teacher aims at facilitating and shaping individual and group knowledge, and the exploitation of pupils' abilities in the process of learning. In this way the teacher is able to concentrate on the process competences of pupils.

A third role is suggested by Breen & Candlin (1988) and that is one of a researcher and learner, where s/he can contribute in terms of actual and observed experience of the nature of learning, and the teacher's organisational abilities. In his/her role as participant-observer, the teacher can 'step back' and monitor the communicative process of learning a language.

Breen & Candlin (1988) further maintain that as an interdependent participant in the teaching – learning process, the teacher needs to actively share the responsibility for learning and teaching with pupils. This sharing can be a springboard for negotiation between pupils and teachers regarding the contents to be taught. Perceiving pupils as having important contributions to make, in terms of competence, can enable the teacher to continually seek potential and exploit it (Kromholts & Hes-Markoza, 1997). A requirement on the teacher, Breen & Candlin (1988) point out, is that s/he has to assume that pupils are capable of completing a task and reaching an objective through diverse routes. Teachers need to recognise that learning is an interpersonal process over which no single person can have full control, and that there will be differences between ongoing learning processes. The teacher has to accept that different pupils learn different things in different ways and at different times.

A similar view of the role of the teacher is presented by Fisher (1993) who maintains that teachers have a managerial role and responsibility in their classrooms irrespective of the style in which they choose to carry out that function. This responsibility for managing the classroom is a source of power for teachers, despite its erosion over the last few years, and this power primarily derives from the fact that they are the ones who, to a certain extent, still determine what are suitable topics for study.

Galton *et al.* (1980) in their study of group work with computers refer to the teacher's management function, and argue that in order to achieve the goal of real group work, teachers not only have to plan, provide materials for, and set up a series of group tasks, but also to ensure a high level of involvement on the part of pupils, in addition to a high level of responsible behaviour. The teacher's responsibility in such a situation is to ensure that pupils develop both social and cognitive skills, a certain degree of tolerance and mutual understanding, an ability to articulate a point of view, to engage in discussion reasoning probing and questioning (see figure 5.1). These skills are not innate, they have to be learnt and so taught.

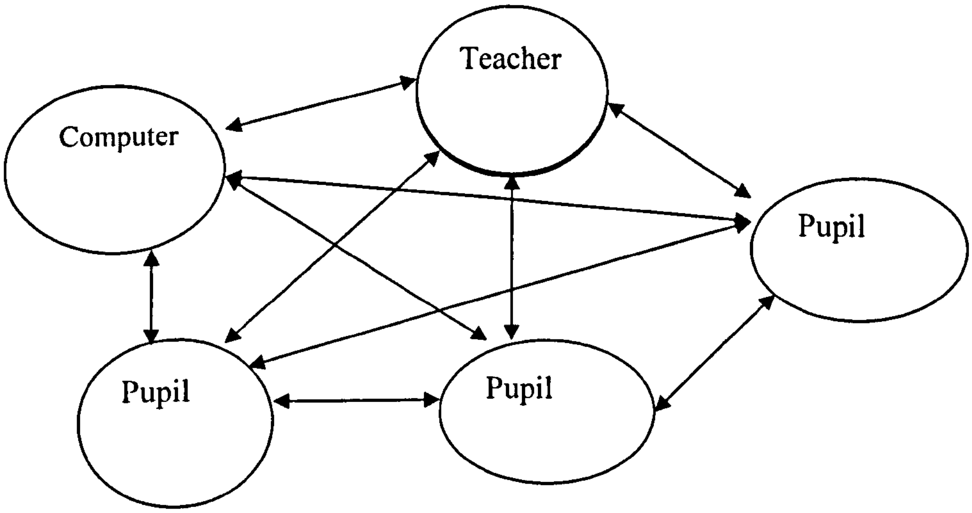


Figure 5.1: The collaborative model

Vygotsky's (1978) assertion of learning as communicative, which was endorsed by Breen & Candlin's (1988) who maintained that EFL teachers' role is to facilitate communication, could have significant implications for the concept of the role of the teacher in relation to the use of computers in the classroom. A communicative approach for learning a language might place less emphasis on the relationship an individual learner has with the computer, as the computer is viewed as an impersonal tool for autonomous learning, and more on the computer as a medium through which a teacher and learner can communicate (see figure 5.2).

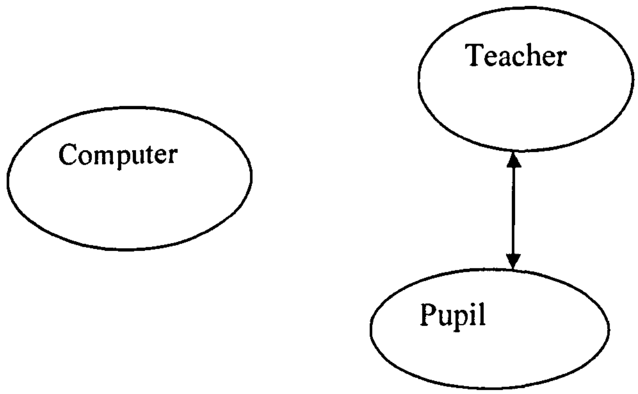


Figure 5.2: Computers are peripheral to the learning process

Cole and Griffin (1987) contrasted two views for computer-student interaction. The first assumes that the computer is an agent, operating as a partner in dialogue. It implies that the student-computer system can be viewed as an analogue to the student-teacher system with the computer replacing the teacher. Within this framework the computer's advantage lies in it providing pupils with structured hints, well-timed feedback, and a wealth of factual knowledge (see figure 5.3).

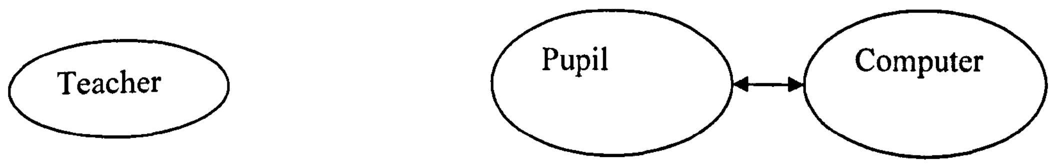


Figure 5.3: Pupil interacts with the computer instead of the teacher

The second view is of the computer as a medium, not replacing the teacher, but reorganising interactions among people, creating new environments in which children can be educated and grow by discovering and gaining access to the world around them (see figure 5.4). The potential of computers, according to this view, is in reorganising instruction within the classroom, and for making possible the extension of education beyond the classroom. Cole and Griffin (1987), like Adan (1991), maintain that this view of computers involves teachers in a new system of possibilities and social demands in the education of their pupils. Such a view often challenges teachers' prior learning, requiring the acquisition of new skills, and consequently extra time on their task of staying abreast of their pupils. They argue that successful introducers of computers into classrooms are as much orchestrators of their pupils' activities as they are occupants of the usual role in a teacher-led group. Effective computer-using teachers are 'Adaptive Experts' (Hatano & Kokima, 1984) in the process of teaching/learning on computers; through combinations of software, hardware, and social support, systems of excellence can be obtained for a variety of pupils.

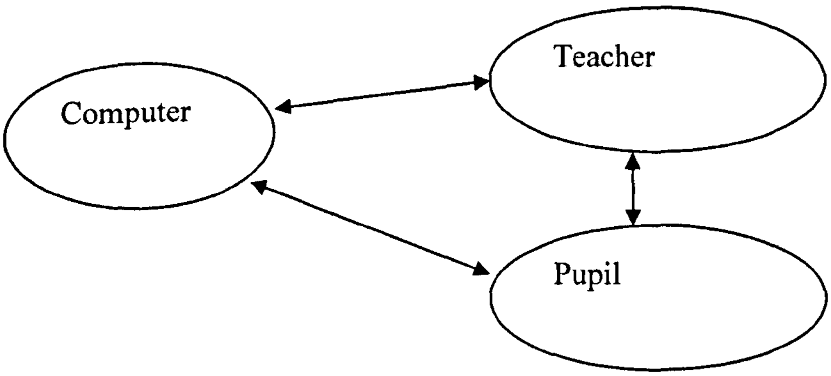


Figure 5.4: Teacher and pupil interact. The teacher acts to mediate or manage computer use by the pupil, AND pupil interacts independently with the computer.

Shavelson *et al.* (1984) observed the activities of 60 primary and secondary teachers who were considered exponents of good practice in computer use, and also interviewed the teachers about their methods. They described orchestrating teachers as those who stressed both cognitive and basic-skill goals, as well as microcomputer use as a goal in and of itself, they used a variety of instructional modes to meet these goals, for example drill and practice, simulations and games (see figure 5.3). These teachers also integrated the content of microcomputer- based instruction with the on-going curriculum, and coordinated microcomputer activities with other instructional activities, in addition they changed their uses based on feedback from students.

Fisher (1993) maintains that by using computer telecommunications (for instance, networking or electronic mail systems) pupils and teachers can draw on a wider range of information and expertise, and can reach a wider and more varied audience. However, for successful collaboration to develop between classrooms or within classrooms, careful organisation is essential. Availability is not enough to ensure improvements in the quality of instruction and learning.

In the following section I will examine how computers have been used by some teachers.

The role of the teacher in CALL classes

Role changing with the computer

Fisher (1993) conducted a study in which a teacher was asked about the impact of the computer on his daily practice. This teacher saw his role as a supporter in what pupils were trying to do, but he also stressed the importance of being able to stand back, in order to allow pupils to develop their own ideas (see figure 5.3). This teacher, for some part of the lesson, abandoned the role of leader or controller of knowledge and moved towards one of coworker or facilitator.

In another study conducted in a secondary school, the English teacher used a computer simulation exercise to promote oral activity with a high ability group (Baron, 1990). The teacher reported that her role during pupils' negotiations was that of facilitator and supervisor, and that there was no teaching done in terms of imparting information or demonstrating skills. The pupils did it for themselves through the situation that had been set up. The computer and the materials allowed them to be autonomous.

In, yet, another study (Franklin, 1990) a teacher of English used a variety of software in the lessons in order to encourage pupils' autonomy. The teacher observed that his input amounted to about twenty per cent of the classroom talk, which is quite a lot when he is expected to sit back and encourage autonomy. He pointed out that most of his contributions were in the form of instructions and questions, and that when he decided to take a close look at pupils' work in order to examine the nature of his instructions he discovered that they were of an enabling nature; they encouraged pupils to think about the task at hand and not only to follow instructions (see figure 5.4).

These two examples suggest a gradual development of pupil autonomy, while at the same time emphasising the importance of an appropriate teacher strategy, which offers support as and when it is needed if effective learning is to take place.

The shift of locus of control was also examined by Fraser *et al.* (1988), who conducted observations of 174 mathematics lessons taught to 17 classes of 12-14 year old pupils, whose teachers possessed a wide range of individual styles and approaches. One of the aims of the study was to show how the presence of a microcomputer

> "suitably programmed for use as a teaching aid, introduces a powerful new factor which, in taking on some of the roles enables the teacher to assume others that are normally difficult to adopt or sustain – particularly those associated with ... more 'open' classroom activities" (Fraser *et al.,* 1988).

Based on their analysis, they suggest that the computer is regarded by pupils as an independent 'personality' which, when suitably programmed, can temporarily take over some of the roles assumed by the teacher, for example, task setting or explaining, and in this way the teacher can adopt other roles, such as counselor, fellow-pupil or resource, which are essential for the promotion of higher level learning activities (see figure 5.3).

McMahon & O'Neil (1990) conducted a study the focus of which was the use of computers as a medium for teachers and pupils to share thoughts and ideas (see figure 5.4). The research was concerned with the use of computers in language development activities in both primary and secondary schools. The study was based on the Apple HyperCard software, which is a versatile program called 'hypertext', which can be used to create, categorise and store sets of texts.

In their research they generated stacks of cartoon-type pictorial sequences with 'speech bubbles', which can either be filled in by the teacher or left empty for pupils to complete. The researchers argue that this 'Bubble Dialogue' technique helps pupils develop their writing skills, and builds bridges between oral and literary uses of language. Another advantage of this kind of use of hypertext facility by teachers is that, by planning and constraining the extent of their own involvement in the production of pictorial sequences and generating texts, children's involvement in the activities can be carefully structured according to their individual needs and rate of progress.

To summarise, in this chapter the role of the teacher in implementing educational innovations was explored. It was suggested that teachers' personality plays a crucial role in the adoption of changes, as they have to be critical of the teaching environment in order to want to introduce or adapt a change. Following this initial stage of awareness teachers need to familiarise themselves with the proposed change, and ultimately identify with it in order to implement it.

In addition, the role of the teacher as an active, communicative participant within the framework of Vygotsky's theory of learning was discussed. According to this theory, teachers are expected to provide pupils with support – scaffolding – in order for them to make progress in their learning. Finally, the role of the teacher in EFL CALL classes was examined, with a view of the teacher as having a managerial role within the classroom, and being a facilitator of communication among learners.

In part II that follows I will discuss the objectives and the design of the present study.

Chapter Six - Research Design and Methodology

In this study the initial focus is on testing a theory using an experimental design, that is, through a quantitative approach which attempts to consider the reality of the relationship between a change in approach to teaching and pupils' academic self efficacy. This can be done by exploring the attitudes, opinions and feelings of the participants. The use of carefully developed questionnaires and other quantitative instruments can support such an investigative study. However, it is also clear that, beyond the purely quantitative there are approaches that can be adopted which, although not designed to measure or gauge such views in any quantitative sense, can give insights into and more information about the views and opinions of participants by providing 'thick descriptions' (Geertz, 1973) of the participants ideas, views and opinions. Here we move further away from the positivist perspective and towards a more interpretivist perspective. Some theorists have criticised the mixing of qualitative and quantitative approaches as a mixing of paradigms, Quinn Patton (1990) for example, cites Lincoln and Guba (1985) as arguing that the only valid approach to the study of people is the naturalistic approach, while Boruch and Rindskopf (1984) argue for the central importance of the quantitative experimental approach. Quinn Patton argues for the pragmatic approach where the selection of instruments is driven by the research question and the purpose of the research. Coffey and Atkinson (1996) take this a step further by arguing against the view that qualitative research constitutes a paradigm in its own right, rather, they 'do not adhere to distinctions between qualitative and quantitative approaches' (p12). In this study a pragmatic approach is taken in which a quantitative study provides data which is complemented by and in turn complements data which is more qualitative in nature.

Experimental design for theory based research

Most problems dealing with human behaviour involve many variables that can be important to a study, however, the limitation of experimental designs is that it is difficult for researchers to manipulate more than three or four independent variables in a study (Borg, 1987; Cohen & Manion, 1994). Nevertheless, Borg maintains that the experiment is the most powerful research design currently available for the exploration of cause and effect relationships between variables. Yet, the experiment may not be a perfect method as even the findings of a well-designed experiment are potentially refutable.

Considering the above I would like to conclude by quoting Karl Popper, the philosopher of science: "But what, then, are the sources of our knowledge? The answer, I think, is this: there are all kinds of sources of our knowledge, but *none has authority* ... I do not, of course, deny that experiment may also add to our knowledge, and in a most important manner. But it is not a source in any ultimate sense" (Popper, 1972: 24).

The Research Problem

In 1993, the Israeli government decided to equip schools throughout the country with computers. The decision was based on the growing awareness of the potential of learning with the aid of computers for pupils; it was believed that computers would contribute to the improvement of pupils' performance and would prepare them to function in a technologically rich environment. In addition, educators advocated the integration of computers into the classroom as they believed they would be suitable to applying constructivist pedagogy, which calls, among other things, for problem solving activities or carrying out projects on various topics. Furthermore, educators argued that the unique characteristics of computers, such as providing immediate feedback to learners concerning their performance at the task they are engaged with, would enhance their self-efficacy. A high sense of self-efficacy is important in the process of learning, as it affects pupils' decision whether to undertake an activity or not. Alternatively, where computers are concerned, pupils' self-efficacy might affect their attitude to using them in the classroom. Therefore, it is necessary to explore pupils' perceptions of learning in general and their perceptions of computers in particular. These perceptions play an important role in pupils' acceptance of the medium as a learning aid.

As this study is concerned with the exploration of Israeli high-school pupils' perceptions, an overview of the Israeli school system is in place.
In Israel attending school is mandatory from the age of five up to 10th grade (age 15-16). The Israeli school system consists of three levels: elementary schools (1st – 6th grade), junior high-schools (7th-9th grade), and high schools (10th -12th grade). For pupils in elementary schools it is their first encounter with the school system. Normally these pupils go to a local school with peers with whom they studied in kindergarten. The atmosphere in many schools is pleasant as the number of pupils is relatively small and teachers know most pupils intimately. The intimacy is a result of a close and frequent contact pupils have with teachers who specialize in teaching many subjects. In their practice these teachers emphasise the development of basic skills necessary for success at school, rather than achievement.

Junior high schools – at this level pupils study at a larger school than the one they attended in elementary school. The number of classes in schools is larger and consists of pupils from different neighbourhoods. Compared with elementary schools, junior high schools are less sheltered in that teachers do not know pupils to the extent that elementary school teachers do. The pace of learning is faster as teachers are more concerned with covering subject matter. Quite a few pupils find the transition from one school to another difficult, and experience a temporary decline in their general performance.

High schools – this level, which is the highest level in the Israeli school system, presents pupils with yet another transition to a new school. High schools are even larger than junior high schools as the number of classes in each grade level, in some of the schools, is more than ten. Many pupils who start this level in 10th grade come to school motivated to overcome this last hurdle of the educational system. They are aware that they have to put a lot of energy into their studies and that their performance at this stage of their learning may affect their final grade on the Matriculation Examination. In particular, they are concerned with their performance in English, as this is a compulsory subject, which most Israeli pupils find hard to cope with.

This study was undertaken with 10th grade pupils and their teachers. This particular age group was selected because pupils at this particular stage of their studies do not face the Matriculation Examination, which takes place at the end of 12th grade. The advantage in selecting this age group is that teachers might feel more able to experiment with new ideas. Pupils, on the other hand, might experience a decline in their academic self-efficacy, as they are new to the school.

The potential computers have for changing pupils' learning experiences, and consequently changing their perceptions of learning and enhancing their academic self-efficacy, present teachers and educators with a challenge which needs to be investigated. This study is one attempt at meeting such a challenge. The purpose of this quasi-experimental study is to investigate the impact of the use of computers on EFL learners in the eight Israeli high schools studied. To successfully investigate it, a number of issues need to be explored. These include pupils' perceptions of the concept of learning; pupils' perceived academic self-efficacy; the impact of learning with computers on their perceptions of themselves as learners of English; pupils' and teachers' attitude to learning English with computers; the type of materials and activities used in the classroom. The specific research questions are as follows:

Research Questions

In this study I distinguish between four main sets of questions: the impact of the change of instruction in the teaching of English on pupils' perceptions of learning and their academic self-efficacy, the conditions of English teaching, and affective characteristics.

The first set of questions deals with the impact of the change of instruction in the teaching of English. This relates to the following:

> **Pupils' perceptions of the concept of learning:** If the use of computers in EFL classes changes learning experiences, and enhances pupils' self-efficacy and consequently their motivation to study, will their perceptions of the concept of learning change?
>
> The second set of questions deals with the following:

Pupils' academic self-efficacy: If the use of computers in EFL classes changes pupils' learning experiences by emphasising individualised instruction, will there be a change in their perceived academic self-efficacy? Will they feel better about themselves as learners of English as a result of using computers? Will pupils who use computers in their classrooms perceive themselves as independent learners?

The third set of questions deals with the conditions of English teaching in terms of the following:

What are pupils' attitudes to the use of computers in English lessons?

What are teachers' attitudes to the use of computers in EFL classes?

How many hours of computer instruction are allocated for the classes examined? What materials and classroom activities do teachers use? What type of activities do teachers assign pupils for working with computers?

What is pupils' preferred media for learning English?

What is the extent of pupils' use of computers outside school hours?

Pupils' affective characteristics is the fourth area examined and deals with the following:

What are pupils' perceptions of English as a subject? What are their perceptions of their English lessons?

What is pupils' attitude towards the various classroom activities presented by the teachers?
What is their preferred mode to learning English?

With the above research questions in mind, the next section deals with the research approach and design.

Issues of Design

Research design

With reference to the research questions, to the theoretical background, and an analysis of relevant research conducted, I designed a quasi-experimental study. Cohen and Manion (1994) note that in quasi-experimental research random assignment is not possible, unlike a true experiment where the researcher can assign subjects randomly to the different treatments or experimental conditions. The limitation of studies with nonrandom assignments is that the experimental and control groups may differ in some characteristics, and thus confounding the interpretation of the research results (Borg, 1987). In order to overcome this problem, Borg suggests that a researcher who uses a quasi-experimental design should report as much descriptive data as possible about his/her experimental and control groups, such as the location of the participating schools, experience level of teachers, socioeconomic level of the schools, average achievement scores of pupils in the different schools. It should be pointed out that in many quasi-experimental studies researchers draw the experimental and control subjects from closely comparable groups, and therefore the results can be given nearly as much weight as if the investigator used a true experimental design (Borg, 1987; Cohen & Manion, 1994).

As the sample in this study was not randomly assigned to the study this research is a quasi-experimental one: learners in the experimental group studied with teachers who took the Open University course for integrating computer technology in English lessons and agreed to participate in the study. The control group also consisted of pupils whose teachers agreed to take part in the study.

Two modalities were used in the present study: Group one - English teaching using computers (the treatment group), and Group two - no computers used in English lessons (control group).

David Krathwohl (1993) developed a model of a research design disassociated from any particular paradigm that reflects the complexity of the process. In this study both quantitative and qualitative research approaches were used; qualitative and quantitative approaches are not being seen as linked to different research paradigms, but rather the various research instruments can be seen as providing practical alternatives, that allow the information that is required, to be accessed in an appropriate manner and in a form that is useful. His model specifies a sequence of steps and links that form a "chain of reasoning". It is depicted as a series of links to convey the notion that each step in the process of testing knowledge is dependent on the soundness of the preceding step. In addition, each step in the chain must follow logically from the one which precedes it, otherwise the total research design is weakened.

The nine steps of the "chain of reasoning" provide me as a researcher with a tool, disassociated from any specific content which enables me to examine the logical structure of the research in order to determine the potential of the research to test whether the knowledge claim is valid in the particular situation observed, and if it is likely to hold true in other situations (generalisability). The nine steps of the chain of reasoning are listed below (Krathwohl,1993):

Step 1 ***Conclusions from previous studies*** - the first step in designing a research study is to review previous research findings (in this study, Part I - The Conceptual Framework).

Step 2 Explanation, rationale, theory or point of view - a knowledge claim gains credibility if it is grounded in a plausible rationale rather than coming out of "the clear blue sky" (in this study, Introduction, The Conceptual Framework and The Empirical Framework).

Step 3 Questions, hypotheses, predictions, models - the next step in testing a knowledge claim is to state it in a form that can be tested and that is related to the previous steps in the "chain of reasoning" (in this study, Research questions).

Step 4 The Design of the study - this step in the "chain of reasoning" involves the design of the empirical test of the knowledge claims. The design needs to be sound otherwise the results of the test will be rejected (in this study, Sampling, Variables, Treatment and Materials, Procedure, Measures).

Step 5 Gathering the data - once the empirical test, or other data collection tool, has been designed (step 4 above) it must be implemented/carried out.

Steps 6&7 Summarising the data and determining the statistical significance of the results - in quantitative research, as the term implies, the data are in numerical form (in this study, Findings). In qualitative research, on the other hand, this is the stage where data are analysed. This stage, Huberman and Miles (1994) maintain, takes place in three linked sub processes; data reduction (i.e. data selection and condensation), data display and conclusion drawing and verification.

Step 8 Conclusion - the researcher must examine the results of the data analysis and decide whether the knowledge claim is supported or not (in this study, Discussion and Conclusions).

Step 9 Beginning the next study - once a study is completed it is reported in some form and thereby becomes part of the research literature (in this study, Summary and Recommendations).

Krathwohl's chain of reasoning model demonstrates the critical importance of each step in designing and carrying out a research study and interpreting the data it generates. It also demonstrates that the process of formulating and testing knowledge claims involves personal judgment, interpretation, creativity and rational persuasion at each step.

This chapter - Research Design and Methodology - is summarised in accordance with the main categories, which typically characterise a report of such research:

1. ***Subjects (sampling)*** refer to the process of selecting a sample from a defined population with the intent that the sample represents the target population. In this study the population comprises 10th grade pupils in eight high schools in Israel. The sampling procedure specifies the type of sample, sample size, geographic area, and socio-economic status.
2. ***Measured variables and Instruments*** refer to the three types of research variables: control variables, experimental variables and to the way the research variables are measured and validated. In the qualitative part of this study interviews were used in order to gather rich data, concerning pupils' and teachers' views, so as to support interpretation and extend insights.

3. ***Treatment and Materials*** refer to the tools which were used in this study which deals with pupils' perceptions of learning, their perceived academic self-efficacy, and their attitude towards the study of English.

4. ***Procedure*** refers to the major steps in the research process. It is basically a description of the steps and action taken in conducting the research.

5. ***Data Collection and Analysis*** refer to the instruments used to collect the information and to the different methods used for the interpretation of the data; in quantitative studies the different statistical methods used to determine the statistical significance of differences among the groups. In the qualitative part of this study this refers to content analysis of interview data.

In the next chapter pupils' and teachers' views concerning the learning and teaching process in an environment where English as a foreign language, and with the aid of computers (experiment group), is taught, will be discussed.

Sampling

A total of 198, 99 from the control group and 99 from the experimental group, 10th grade pupils (age 15-16) from eight different urban schools in the central part of Israel participated in the research. Distribution of the population by groups and schools is presented in Table 6.1.

Table 6.1: Distribution of population by Groups and Schools (N = 198)

Research Group / School	Group 1 – Experimental Group	Group 2 – Control Group	Total
School 1 **O**	N = 23		
School 2 **R**	N = 20		
School 3 **H**	N = 24		
School 4 **A**	N = 32		
School 5 **Kl**		N = 13	
School 6 **E**		N = 34	
School 7 **KS**		N = 20	
School 8 **El**		N = 32	
Total	N1 = 99	N2 = 99	**198**

All pupils come from an area where incomes are average (Central Bureau of Statistics, 1998), and were placed in a class to take the five point (the highest level) Matriculation Examination in English.

The pupils were clustered into two groups:

1. **N1 = 99** pupils in the experimental group (Group 1 - computers used in English lessons).
2. **N2 = 99** pupils in the Control Group (Group 2 - no computers used in English lessons).

Measured variables and instruments

The research comprised an experiment to determine the effect of the use of computers in English language lessons on 10^{th} grade pupils' perceptions of learning, their academic self-efficacy, and their attitude to English lessons. The experiment involved the manipulation of the treatment variables and subsequently observing the effect of this manipulation on the dependent variables. The research employed three types of variables - treatment variables, dependent variables and control variables.

Treatment variables (also known as 'independent variables', 'experimental variables', or 'intervention variables') refer to the two research modalities: Group 1 - computers used in English lessons (treatment group), Group 2 - no computers used in English lessons (control group). These are fully described in the following section.

Treatment and materials

Dependent variables (also known as 'criteria variables') are the variables measured to determine the effect of the treatment. The dependent variables are measures of pupils' score on the questionnaire. These dependent variables were measured before the subjects had undergone the intervention and after it. The questionnaire was given to pupils at the beginning of the school year and nine months later - at the end of the school year. Following the initial statistical analysis eight pupils from the experimental group and ten from the control group were interviewed in order to get their perspective of the learning process. In addition, all eight teachers - four from the experimental group and four from the control group - were interviewed, for the purpose of obtaining data on teaching conditions and additional data on pupils' learning English with computers.

The process described above is summarised in Table 6.2.

Table 6.2: The Research Procedure

Stage	**Description**
Stage 1 - Pre-test	Perceptions and attitude Questionnaire is administered at the beginning of the school year.
Stage 2 - Experiment	Group 1 - computers are used in English lessons. Group 2 - no computers used in English lessons.
Stage 3	1. Interviews with pupils from both groups 2. Interviews with teachers from both groups
Stage 4 - Post-test	Questionnaire is re-administered to all subjects at the end of the school year.

Data Collection and Analysis

Table 6.3 describes the data collection: Research variables vis-à-vis research groups.

Table 6.3: Data Collection

Groups Variables	Group 1 Experimental Group	Group 2 Control Group
Questionnaire	+	+
Computers in English lessons	+	-
Pupil Interviews	+	+
Teacher Interviews	+	+

The instruments used for data collection in this research were as follows:

Quantitative instrument

Questionnaires – The advantage of a questionnaire, as well as the standardisation of the data, stems from the fact that it is easy to handle and can provide a great deal of data (Sabar, 1995). In addition, the questionnaire, unlike interviews, is the only tool that provides uniformity in questions and interpretation of the data is not related to the attitude and concepts of the researcher.

In order to evaluate the change in attitude the 84 item questionnaire (Appendix A) was administered twice to tenth grade classes: at the beginning of the school year, that is the third week of September, and at the end of the school year, when pupils in the experiment group had spent the year studying with computers. The questionnaire was used to collect data on pupils' perceptions of learning, their perceptions of their academic self-efficacy, their attitude to English lessons, and the type of activities pupils find useful for their progress in English. Additional background data were gathered about pupils' school grades in English, and availability of computers.

The questionnaire was originally developed by a group of researchers from Haifa University, under the supervision of the General Regional Supervisor of the Ministry of Education. It was designed to address the various dimensions of learning. Items relating to self-efficacy were based on Bandura's (1986), Schunk's (1990; 1991), Pintrich & De Groot's (1990), and Zimmerman's (1990) models, with the purpose of addressing the different dimensions of learning, and converting them into specific courses of action required from pupils in order to successfully cope with the process of learning.

The questionnaire (see Appendix A) was piloted, and administered to 432 pupils, in 1995, in four high schools in Haifa (in the north of Israel), to determine whether the questions were clear, whether the options were appropriate, and to examine the structure of the questions in terms of readability. Statements found to be either too easy or too difficult were eliminated. Care was taken to construct questions which addressed the dimensions of learning, academic self-efficacy, and attitude to English lessons

The questionnaire was found to be reliable both in scope and objectives.

Table 6.4 shows the questionnaire items sorted by categories.

Table 6.4: Questionnaire items sorted by categories

Topic	Number of Items
Background data	4
Pupils' grades	1
Perceptions of the concept of learning	20
Perceptions of academic self-efficacy	18
Attitude to English lessons	12
Attitude towards the use of computers	3
The extent of the use of computers	2
Pupils' preferred media for learning	10
Pupils' preferred mode for learning English	18
Total	**84**

Pupils' perceptions of the concept of learning were tested through statements which addressed the eleven dimensions of the concept of learning. The rationale for these statements is the attempt to create a learning environment, which is based on the new perceptions concerning the nature of learning presented in the theoretical section of the study, and the attempt to apply a more complex learning environment. Thus, pupils were asked to relate to the different characteristics of complex learning. For example, in a complex perception of the dimension "the complexity of learning", pupils make connections between different disciplines and do not memorise or review subject matter from a particular discipline. For this dimension the following statements were constructed: 'When I learn I make the connection between new things and the things I already know', 'The trick in learning is to know how to relate topics'.

These statements were constructed based on the new meaning of the concept of learning. Thus, some of the dimensions have more than one statement and others have only one. In order to construct the statements a factor analysis was performed.

Factor analysis

Factor analysis is a statistical technique that helps the researcher to deconstruct a set of variables into coherent subsets of smaller number of variables. These new subsets are called factors. The factors are relatively independent of one another. The creation of subsets is based on the inter correlation matrix of the variables in the original set. Variables that are correlated with one another but largely independent of other variables are combined into factors. Factors are thought to reflect underlying processes that have created the correlations among them (Tabachnick & Fidell, 1989). After orthogonal rotation the values in the loading matrix are correlations between variables and factor. Thus the collection of variables into factors is based on the magnitude of these loadings. The criterion for meaningful loading is decided by the researcher - usually 0.3 or larger (Tabachnick & Fidell, 1989). Table 6.5 below shows the results of factor analysis for the sixteen items that measure perception of learning. For each factor the table shows the loadings of the items that have the highest loadings on that particular factor and have no higher loadings on any other factor. Variables which did not correlate with others were not included in tables 6.5 and 6.6. Hence the discrepancy between the number of items mentioned in table 6.4 and tables 6.5 and 6.6. Based on the factors shown in table 6.5 I collected items to create nine elements of the perception of learning.

Table 6.5: Results of factor analysis for the sixteen items that measure perception of learning – factor pattern

	Factor's Loadings									
Items	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Learning is a personal matter and has nothing to do with a group.	0.81									
Good learning is a result of individual hard work and not a result of group work.	0.79									
One can study well only when it is done alone, because group work may interfere with my own progress	0.58									
I have to try hard when I study.		0.87								
There's no learning without serious intellectual effort.		0.68								
In order to study well I should memorise subject matter.		0.5								
Good learning means acquiring a great deal of knowledge on a particular subject.			0.81							
Pupils will study well only if they get a grade for their learning.			0.59							
When I study it takes me a long time until I feel that I am making progress.				0.88						
The trick in learning is to know how to relate topics.					0.77					
When I learn I make the connection between new things and the things I already know.					0.67					
One can study only from the teacher and not from another pupil.						0.84				
In learning one either understands or one doesn't.							0.91			
I prefer to study with books and notebooks rather than with a computer.								0.94		
In order to study well you need to use subject matter.									0.97	
Good learning involves problem solving.										0.88
Variance explained by each factor	**1.73**	**1.54**	**1.47**	**1.26**	**1.23**	**1.16**	**1.11**	**1.11**	**1.08**	**1.05**

Although the sample in my study is similar to the original group in age and other background features, I decided to repeat the process of factor analysis in order to identify new constructs, that is, which items form coherent subsets. As a measure for the coherence, or to use another term, the internal reliability of the subsets, I used the Cronbach alpha.

Cronbach alpha

Cronbach alpha is a measure of internal consistency reliability for a group or a scale or test items. It can be applied to dichotomous as well as multiple scored items. It is a very general reliability coefficient, encompassing both the Spearman-Brown prophecy formula as well as the Kuder-Richardson 20 (Carmines & Zeller, 1994). The value of Cronbach alpha depends on the number of items in the group and on the inter-correlations among the items. As Carmines & Zeller show "a 2-item scale with an average inter-item correlation of 0.2 has an alpha of 0.33. However, a 10-item scale with the same average inter-item correlation has an alpha of 0.714." (Carmines & Zeller, 1994). In this study the alpha is sometimes computed for very small groups of items (two or three items), and the inter-correlations among the items (for each group), though significant at a level of 0.001 or lower, are sometimes low (ranging between 0.21 and 0.51). This causes some of the scales to have values of Cronbach alpha smaller than the usually acceptable values (0.7 or higher). Nonetheless I decided to construct indexes based on these scales because the inter-item correlations are significant at a level of 0.001 or lower and the correlations with total (for each of the scales) is higher than 0.35.

The following are statements for the *perceptions of learning* and their alpha values:

Structure of learning. Alpha=0.63

- Learning is a personal matter and has nothing to do with a group.
- Good learning is a result of individual hard work and not a result of group work.
- One can study well only when it is done alone, because group work may interfere with my own progress

Effort in learning. Alpha=0.59

- I don't have to try hard when I study.
- There's no learning without serious intellectual effort.

Complexity of learning. Alpha=0.34

- The trick in learning is to know how to relate topics.
- When I learn I make the connection between new things and the things I already know.

Pupils' academic self-efficacy was examined through statements, which addressed the concept of learning, and the academic self-efficacy required for coping with learning processes according to the dimensions of learning. The statements were designed in relation to the dimensions of learning, which were converted into specific ways of coping with the process of learning. For instance, the dimension of "the structure of learning" was "translated" into an ability to study in a group, on the one hand, and an ability to study individually, on the other: 'I study better on my own than when I study in groups', 'It is hard for me to study in a group'. The statements were negatively presented in order to avoid the tendency for agreement; it is easy to agree with a statement which refers to an ability to do something, but it is more difficult to object to such a statement. Generally, pupils tend to agree with positive statements (Dweck, *et al.*, 1995), and therefore the statements were negatively constructed. The pupils answered by selecting one of six options on a Likert scale.

Table 6.6 below shows the results of factor analysis for the statements of self-efficacy.

Table 6.6: Results of factor analysis for the seventeen items that measure self - efficacy – factor pattern

	Factor's Loadings					
Items	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**
When there's a lot of material on a subject I need to write about, I don't always know what is most suitable and what I should select.	0.73					
I don't always use the most suitable material for the papers I write.	0.65					
Planning my learning is a difficult process which I find hard to cope with.	0.62					
I don't always know where to look for material I need for writing papers.	0.58					
When I study it is hard for me to organise subject-matter according to categories or topics.	0.51					
It is hard for me to do well in exams.		0.73				
Compared with other pupils in my class I don't always expect to do well in my studies.		0.67				
I'm not sure I'll get a good grade at the end of the school year.		0.63				
When I try to solve a problem it is hard for me to decide whether I'm doing the right things to solve it.			0.67			
It is hard for me to cope with the problems and assignments in school.			0.59			
It is hard for me to decide in advance what I'm going to do in order to cope with a task the teacher assigned, and to check if I'm doing things as I planned.			0.58			
I study better on my own more than when I study in groups.				0.89		
I enjoy working as part of a group				0.79		
I won't always be able to cope with the problems and the assignments the teacher gives.					0.71	
When I face a difficult learning problem, I worry that I might not be able to solve it.					0.59	
It is hard for me to find material for the papers I have to write.						0.76
It is very hard for me to connect new topics I study to topics which I studied in the past.						0.62
Variance explained by each factor	**2.55**	**2.33**	**1.61**	**1.51**	**1.48**	**1.43**

The following are self-efficacy statements and their cronbach alpha values:

Individual study versus studying in a group; two items, alpha=0.65

- I study better on my own more than when I study in groups.
- I enjoy working as part of a group.

Expectation for success; three items, alpha=0.68

- It is hard for me to do well in exams.
- Compared with other pupils in my class I don't always expect to do well in my studies.
- I'm not sure I'll get a good grade at the end of the school year.

Obtaining information; seven items, alpha=0.75

- It is hard for me to find material for the papers I have to write.
- When I study it is hard for me to organize subject matter according to categories or topics.
- I don't always know where to look for material I need for writing papers.
- It is very hard for me to connect new topics I study to topics which I studied in the past.
- When there's a lot of material on a subject I need to write about, I don't always know what is most suitable and what I should select.
- I don't always use the most suitable material for the papers I write.
- Planning my learning is a difficult process which I find hard to cope with.

Coping with problems; five items, alpha=0.7

- It is hard for me to cope with the problems and assignments in school.
- When I face a difficult learning problem, I worry that I might not be able to solve it.
- When I try to solve a problem it is hard for me to decide whether I'm doing the right things to solve it.
- I won't always be able to cope with the problems and the assignments the teacher gives.

- It is hard for me to decide in advance what I'm going to do in order to cope with a task the teacher assigned, and to check if I'm doing things as I planned.

Pupils' attitude to English lessons were examined through questions relating to feelings, such as, 'How important is it for you to know English?', 'Do you like to study English?'. Similarly, the items on the attitude towards the use of computers were presented as a question: 'To what extent do you feel that computers help you in your study of English?' The pupils answered by selecting one of five options on a Likert scale.

The technical aspect of the use of computers was also examined: pupils were asked about the frequency of using computers for homework.

Items testing pupils' preferred media for learning English and their preferred mode for learning. Diverse means were related to: learning with books, worksheets, homework, computers, tests and quizzes. Regarding their preferred mode for learning, pupils were asked whether they like to study alone, in pairs, or in groups.

In analysing the questionnaire the MANOVA procedure was performed in order to test the significance of the main effects and the interactions between them.
The following sections relate to the validity and reliability of the questionnaire.

Validity: There are several types of validity. 'Construct validity' is the extent to which the items test what they are supposed to test. 'Criterion validity' is the magnitude of the connection of the test with one of its external criteria. 'Content validity' is the extent to which the test is a good representation of the content it is meant to measure. Nevo (1981) points out that this is the most important type of validity in measuring the validity of tests. In the past the three types of validity were considered separately. Nowadays, all are included in structure validity (Birenbaum, 1997). This is an integrative term which relates to the interpretation or the meaning of scores.

Messick (1994) points to two possible factors which may threaten validity. One is under-representation of contents, and the second, the inclusion of irrelevant components. Under-representation of contents refers to cases where, for example, the instrument relates only to some of the contents, cognitive processes or possible reactions that we want to investigate. Irrelevant components are elements including lack of motivation, test anxiety or misunderstanding the instructions.

Reliability: The reliability of a research instrument relates to the amount of error and variance in the measurement and data collection (Nahmias & Nahmias, 1982). High reliability is achieved when similar data are received in repeated activities. Reliability refers to identifying and assessing the influence of incidental sources on error in test scores, as compared to variance which refers to consistent sources of error that can cause variation.

"Concern for reliability comes from the necessity for dependability in measurement" (Kerlinger, 1964:442). In this regard, Nevo (1977) says that the "reliability of a test is the extent of its precision as compared to other tests of the same type on the same population" (109). Birenbaum (1997) notes that reliability relates to the extent that measurements received from the test are precise. The assumption is that in every testing situation in the behavioural sciences error exists, therefore the product will not be identical in quality from one measurement to another, no matter how controlled the conditions are. The reason for this diversity may be connected to pupils' aims or to test conditions. One must take into consideration that participants may, for whatever reasons, lie, distort the truth or conceal vital information. Consequently, the data may be incomplete, inaccurate or biased. The variance in some pupils may be greater than in others and no individuals are completely consistent from one test to another. For this reason and others, which are connected to the process of evaluation, test scores always contain errors.

The amount of error is the difference between the expected grade of the individual on a particular test and the actual grade. Measurement errors are not consistent and cannot be predicted but there is consistency in factors, such as anxiety that will cause decline in performance that can influence the performance of a group or an individual. This is not considered to indicate lack of reliability. Rather it is considered a source of irrelevant variance which lessens the validity of the instrument. Measurement errors lower the usefulness of the test by limiting generalisability. As these errors are not constant and cannot be predicted, it is not possible to subtract them from the expected scores but they can be measured in a number of ways.

The next section will deal with the instrument used for collecting qualitative data.

Qualitative instrument

Interviews – Stake (1995:64) refers to the interview as "the main road to multiple realities". The interview is an additional tool that helps to provide further insight into occurrences observed. This method is unique in that it involves the collection of data through direct verbal interaction between individuals. The principal advantage of this direct interaction is its adaptability. The interviewer can make full use of the responses of the subject to alter the interview situation. The interview permits the researcher to follow up leads that show up during the interview, and thus obtain more data and greater clarity. Bell (1993) indicates that one of the advantages of interviews is that, unlike questionnaires, they allow the interviewer to follow ideas, to understand attitudes and opinions, to probe interviewees' responses and to ensure that they are developed and clarified. Interviews can provide a true picture of the respondents' opinions and feelings, and yield rich data which can often illuminate questionnaire responses. This can be obtained by careful motivation of participants and maintenance of rapport; sensitive information such as negative aspects of the self or negative feelings towards others is not likely to be revealed by interviewees if other methods of investigation are used. Thus, interviews allow the researcher to systematically gather descriptive data in the participant's own words and to access the unobservable. This enables the inquirer to develop insights into how the participants interpret and make meaning of the world. Guba and Lincoln (1985) describe interviewing as the backbone of qualitative research. One of the limitations of interviews, however, is that they are subjective and therefore there is a danger of bias. To overcome the problem of reliability and validity a repeated examination was held and in cases of doubt, a telephone inquiry was made directly to the interviewee to clarify unclear aspects.

There are three major interview methods: the unstructured open ethnographic interview, the focused directed interview, and the standard structured interview. In order to allow respondents to talk freely about what is of central significance for them, and at the same time to ensure that all topics crucial to the study are covered, focused interviews were used in this study (Stake, 1995). In this type of interviews the framework is established by selecting topics around which the interview is guided. Respondents are allowed a certain degree of latitude within the framework. The interviewer asks certain questions, but the respondents have the freedom to talk about the topic and provide their opinion in their own time. The interviewer can ask questions or probe at the right time, but if respondents move from one topic to another, the interview can continue without interruption (Bell,1993).

Interviews of 18 pupils from both the experiment group and the control group were carried out; eight pupils from the experiment group and ten from the control group. In order to select pupils for interviews the following procedure was adopted: after the administration of the questionnaire pupils' scores on the attitude to computer items, and their scores on self-efficacy items, were computed in order to identify pupils with high or low scores in both these domains. Five pupils from each class, two who scored high and two who scored low, and one with an in-between score, were approached for the purpose of the interview. For various reasons quite a few of them were reluctant to participate in the interviews.

At the outset of the interviews (see Appendix B) the objective of the interviews was explained to pupils, assuring them that everything they imparted to me in the course of the interview would be confidential and would be used only for the purposes of the study. The interviews were recorded by means of an audiotape and transcribed. I found this means of recording useful as it helped me focus on pupils' responses rather than on the mechanics of writing. Questions asked were graded; I started with easy questions, such as 'Do you like studying English'? and gradually the questions became more demanding, for instance, 'What kind of activities are easy for you when you study English'?

The fact that interviews were held at school after school hours contributed to the small sample of interviewees, as pupils were not prepared to stay at school after they finished studying. Therefore, this is not a representative sample of self-efficacy and perceptions of learning.

The purpose of these interviews, which lasted approximately 25 minutes, was to illuminate, complement and extend data obtained from pupils by means of questionnaires (Sabar, 1995). This more detailed method of inquiry enables a richer description and so fuller exploration of the feelings, ideas and opinions of the teachers and pupils who participated. This approach provides a form of triangulation which goes beyond the mere aggregation of information from different sources. Thus, Coffey and Atkinson (1996) maintain that "We can use different analytical strategies in order to explore different facets of our data, explore different kinds of order in them, and construct different versions of the social world...the combination of juxtaposition of different research techniques does not reduce the complexity of our understanding. The more we examine our data from different viewpoints, the more we may reveal – or construct – their complexity" (p 14). Finally, by running the data analysis on the qualitative, this element of the study can stand on its own – it is not simply an adjunct to the main, quantitative, part.

The interviews were conducted like friendly conversations in order to create close association between the researcher and the interviewees, and to build an atmosphere of trust that enabled free flow of information. In order to avoid embarrassment, interviews with teachers and pupils were held separately. At the outset of each interview, the researcher introduced herself and explained the objectives of the interview: a description of English studies in tenth grade with a focus on the use of computers in the experiment group. Questions were asked systematically, usually beginning with general questions and leading to more focused ones. There were no Yes/No questions and leading questions were avoided. The interview questions were of three types, as follows:

Descriptive questions allowed the researcher to gather samples of information from the interviewees. Pupils were asked questions like: "Which of the activities you do with the computer do you like most?", "What kind of activities/assignment are easy for you when you study English?", "How do you like to study?"

Analysis questions provided information on the way the interviewees organised their work. An example is a question posed to a teacher: "How do you integrate computers into English lessons?", "To what extent do you feel that the use of computers in the classroom helps you progress in your English lessons?".

Comparison and contrast questions exposed organisation of interviewees' knowledge. For example, a pupil was asked "What can you do now, in your English lessons, that you could not do before?", "Now that you are using computers in your English lessons, do you like to study English better than before?".

During the interviews, which were held individually with each pupil, the researcher encouraged participants to talk about themselves as pupils, and their motivation to study English.

Interviews of teachers - The objective in interviewing the eight teachers, four from the experiment group and four from the control group, was to obtain another source of data so as to complement the data obtained from pupils by means of questionnaires and interviews. The interviews lasted approximately 45 minutes, and were held either at school or at home. The questions in these focused interviews dealt with issues concerning the research questions: teachers were asked about their attitude to and experience with computers in English lessons, and their appraisal of the benefit of the use of computers. Classroom teachers were also asked about the type of activities they use in the classroom. In addition, the four teachers from the experiment group, who took the Open University course for incorporating computer technology into English lessons, were asked about the effect of the course on their daily practice.

The privacy of all participants was protected.

It should be pointed out that although focused interviews are more methodical than other modes of interviews, the problems of validity and reliability remained. The focused interviews with pupils complemented pupils' questionnaires, and the focused interviews with teachers complemented those held with learners.

In this study no observations were held due to teachers' sensitivities and resistance. The general argument against me observing them was that my presence would disrupt the lesson and pupils' concentration in particular. Some were even apprehensive about being interviewed, but eventually agreed once I promised that the data gathered would be only used for the study. Had I insisted on observing teachers in their respective classrooms I might have lost valuable data.

The next section will discuss the validity and reliability of the qualitative instrument described above:

Validity

Validity and Reliability: In qualitative research, validity and reliability depend greatly on the skills of the researcher (Maykut & Morehouse, 1994; Miles & Huberman, 1994). Silverman (2000: 176) points to the major problem of qualitative researchers who need to show that their findings are based on "critical investigation ...and not on a few well-chosen 'examples'". Lack of validity in qualitative research can be avoided through the insistence on the use of suitable procedures for this type of research (Miles & Huberman, 1994), and an awareness of known methodological problems involved in conducting the process of investigation (Altheide & Johnson, 1994; Denzin & Lincoln, 1994).

A necessary step in validating qualitative data is triangulation (Maykut & Morehouse, 1994; Miles & Huberman, 1994). Triangulation requires that the researcher investigates one source of information, compare it to others and eliminate any alternative interpretations that have not been confirmed. The significance of patterns exposed is determined only after several data sources have been triangulated and found to fit the generalisations and interpretations of the researcher. However, Silverman (2000:99) notes the limitations of triangulation. He states that using multiple methods "in the hope that they will reveal the 'whole picture' ... is an illusion", and he recommends examining a phenomenon in detail even if only through partial data. The first approach, according to which one source of information is explored and then compared with others, was adopted in this study.

Reliability

Ethnographic researchers often have doubts about reliability, since their research instruments are their senses and the understanding they bring to data collection. In order to understand the processes studied and improve reliability, the ethnographic researcher must be skilled, aware of the difficulty and insofar as possible avoid variation that might result from a lack of precision or of understanding the reality exposed. The researcher must also eliminate, as much as possible, the influence of personal views and adhere to a systematic process of investigation. Silverman (2000:185) relates to this danger when he points out that "asking and answering any question can never be separated from mutual interpretations".

In qualitative research, the more experience the researcher has, the higher the reliability of the results. Reliability is achieved by repeated use of instruments. For example, it is possible to increase reliability by conducting more interviews. This adds to the perception of the researcher and exposes him/her to events whose repetition indicates an underlying pattern that might not have been exposed with a smaller number of interviews. Fewer repetitions might not allow for thick description (Geertz, 1973), the condition necessary for constructing a pattern from repeated events.

External validity exists when the data match what is depicted in the literature. Noblit and Hare (1988) and Maxwell (1992) say that external validity relates to what has been found in other research through specific data collection which is generalisable in a theoretical context. The researcher uses the literature to enhance understanding of the situation described.

Integration of quantitative and qualitative data

In this research, the qualitative instrument – the interviews – illuminate and complement the quantitative data. The integration of qualitative and quantitative methods is important to research, as each mode yields information that cannot be produced by the other; interviews can yield rich information which is not obtainable through statistical sampling techniques, which fail to dig deeply enough to provide a true picture of respondents' opinions and feelings. Interview data contribute to the reliability of the study; it is not necessarily reliable in the sense that a questionnaire data can be – but it relates to the feelings, opinions, and views of the participants in a way that coheres and so can be understood more directly than quantitative data, which is more removed and shallow. Several researchers recommend using both methodologies. Goetz and LeCompte (1984) and Scriven (1972, cited in Sabar, 1995) recommend this combination in order to strengthen the internal and external validity of the research. Thus, for example, closed questionnaires are accompanied by interviews, allowing for a better understanding of the essence of the connection between the research variables.

Lawton (1978) believes that the two approaches should not compete. In this research the two approaches were integrated in order to gain better understanding of pupils' perceptions and attitude to English lessons. This integration will be further described in the next section which relates to data analysis.

Data Analysis

Quantitative analysis

The first step in analysing the data was computing descriptive statistics for each of the research groups. These statistics include scores on single variables to measure central tendency (means, median and mode), and to measure variability (frequency, percentage, standard deviation, variance and range).

Manova with repeated measures

The design of the experiment used in this study is referred to by Keppel (1982) as a mixed design (also referred to as split-plot design). Such a design is a mix of within-subjects (or repeated) factors and between-subjects factors. The sources of variance for the mixed design are both between-subjects differences and within-subjects differences, and it is the purpose of an analysis of variance to identify the nature and magnitude of variance that is produced by each factor. In this research the within-subject factor is time of measurement (with two levels "before" and "after") and the between-subjects factor is treatment (with two levels: with treatment – the experimental group, without treatment – the control group). The school - another between-subjects factor, is nested in the treatment factor. It has eight levels (eight different schools), four different schools in each control/experimental group. The main advantage of within subjects designs is the control of subject heterogeneity. Selecting only one group of subjects instead of two different groups strengthens the chances to attribute any differences observed in the treatment conditions to the experimental manipulation. This advantage and an increase in efficiency (in conducting an experiment) have made the repeated-measure design the most common experimental design with which to study such phenomena as learning and practice effects of all sorts (Keppel, 1982).

Analysis of a mixed two factor design

In analysing a mixed two factor design the researcher is usually interested in the analysis of each of the main effects and the interactions between them. That is, the significance of the main effects and the interaction effects are being tested.
When there are two or more factors there might be a significant interaction(s) between them. A significant interaction effect means that the effect of one factor on behaviour changes at different levels of the second factor. Thus, if a significant interaction is found the analysis of main effects is less important and the researcher is interested in discovering which combination of levels, of the two main effects, contributes to the significance of the interaction. If the interaction is not significant the researcher would analyse the two main effects. The statistical procedure to test such models is MANOVA (Multivariate Analysis of Variance) with repeated measure. The significance of effects in MANOVA is tested using Wilks' Lambda (Λ). The evaluation of Wilks' Lambda distribution is not direct. However, it has a very close approximation to F. Practically, all the statistical packages use this approximation for tests of significance in MANOVA (Tabachnik & Fidell 1989).
In this study MANOVA was used to test the different research questions. GLM procedure of the SAS was used to conduct the MANOVA.

When, as a result of conducting MANOVA, an effect is found to be significant, the researcher conducts post-hoc comparisons between treatment means for the different treatment conditions, in order to find out which are the specific levels that their treatment means differ from each other. Obviously this is only needed when the effect in question has more than two levels. The statistical procedure that is used to carry out such comparisons is called simultaneous comparisons. One of the most widely used techniques to carry out the comparisons is the Scheffe test, which is based on the values of the F statistics.

The following are the types of Manova used in this study:

1. The significance of three effects was tested:

1. The within-subjects effect - time (pre, post)
2. The between-subject effect – treatment (control, experimental)
3. The interaction effect – time by treatment

If the interaction effect was found significant it could mean a number of things:

a. The difference between "pre" and "post" is significant for one group and not for the other.

b. The difference between "pre" and "post" is significant for both groups but differs in nature (for example, the mean for "pre" is higher than the mean for "post" for one group and lower for another group).

Since in this study there are only two levels for both main effects these assumptions were tested using t-test.

2. The significance of three effects is tested for each group (control, experimental) separately:

1. The within-subjects effect - time ("pre", "post")
2. The between-subject effect – school (four levels - different schools)
3. The interaction effect – time by school

   If the interaction effect was found significant the difference "post"-"pre" was computed for each school, and Scheffe simultaneous comparisons test was conducted on these.

Cohen and Manion (1994) define three factors to be taken into consideration to obtain statistical significance – to maximise the likelihood of rejecting the null hypothesis:

1. **Sample size:** Statistical significance increases automatically with sample size. The larger the sample, the smaller the difference, relationship or effect needed to reject the null hypothesis. Lipsey (1990) describes the logic and procedure of selection of sample size in a quantitative study of treatment effectiveness. He frames his discussion around the concept of *design sensitivity,* which he defines as follows: "Design sensitivity ... results in data that are likely to yield statistical significance if, in fact, the treatment under investigation is effective" (10). In other words, how big does the sample have to be to obtain statistically significant results, if the treatment is indeed effective? He continues: "Sensitivity refers to the likelihood that an effect, if present, will be detected" (12). Lipsey suggests that a minimal total size of 60-80 subjects in a research involving experimental and control group comparison is adequate to achieve $\alpha = 0.05$. The current research is based on a total sample size of 198 subjects, of which the experiment group includes 99 subjects, and the control group includes 99 subjects.

2. **Level of significance:** Statistical power can be increased by lowering the level of significance needed to reject the null hypothesis. The alpha level used to determine statistical significance is $p < 0.05$, that is, there is less than a 5% chance that a statistically significant difference, relationship or effect which was identified, in fact does not exist. In the current research, all relevant cases, p values are smaller than 0.05.

3. **Effect size:** An estimate of the magnitude of a difference, relationship or other effect, in the population represented by a sample. This statistic is a quantitative way of describing how well the average student who received the intervention performed relative to the average student who did not receive the intervention (or who received less of it). An effect size of 0 means that on average, a student receiving the intervention did no better or worse than a student who did not receive it. Positive effect sizes mean that the average student receiving the intervention did better than the average student not receiving the intervention. The larger the positive effect size, the more powerful the intervention. Researchers consider effect sizes larger than 0.33 to have practical significance; that is, the effect of the intervention is large enough to make a significant difference on the outcome measured. This research adapts Cohen's and Manion's (1994) interpretation of effect size as follows: 0.20 is small; 0.50 is medium; 0.80 is large.

Qualitative analysis

Qualitative data analysis begins when the information starts to clearly indicate the existence of the investigated phenomena, and yields a particular perspective (Maykut & Morehouse, 1994; Yosifon, 1996). According to Miles and Huberman (1994), data analysis is cyclical and takes place in three stages. The first stage involves reducing and eliminating data. This is a process of selecting, focusing and arranging the data so that it can lead to deductions. Tesch (1990, cited in Miles and Huberman, 1994) refers to this as 'data condensation'. The next stage is arranging and displaying the data in order to help the researcher understand the field, and decide if further data collection is needed. This may include ordering the data into sketches or flow charts. The third stage involves drawing conclusions and confirming them with the data. Fetterman (1989) refers to this as 'crystallisation' (101). At this stage, data from different sources are triangulated or compared with quantitative data and the deductions are validated.

Analysis of the qualitative data and the process of writing are intertwined (Miles & Huberman, 1994). The initial analysis and writing occurs when the first phenomena are identified in the observed patterns. Data, which do not fit into the processes observed, are further investigated. Following additional data collection, a kind of 'chain of reasonable evidence' is constructed (Yin, 1984; Miles & Huberman, 1994). This chain is further examined at a later stage of writing for conceptual coherence and its relation to theory. Finally, a synthesis of all the data and impressions collected is made in order to reach an insight to help to define patterns in the activities (Fetterman, 1989). At this stage, backtracking is required. Data must be re-examined to see if they support the generalisations that took shape.

In this study, data were collected on pupils' perceptions, pupils' academic self-efficacy and teaching conditions. The collected data were transcribed leaving them in Hebrew in order to avoid problems such as mistranslation, then they were continually examined for descriptions and patterns which led to the formation of categories (Stake, 1995). Interviewees' responses were categorised against the specific questions asked. I used a system of progressive focusing, attempting to categorise responses by reordering them into groups under categories, putting together elements of a response with those which expressed the same, or similar ideas, grouping and regrouping until the maximum number of phrases or ideas could be fit under the different headings. I could have used a commercial package to analyse the transcripts, but these are not available in Hebrew and so translation, and the consequent loss or distortion of meaning could not have been avoided. There are also distinct advantages to sorting interview data by hand; the researcher becomes more and more familiar with the data, and so gains more insights into connections as, to an extent, analysis results in disconnection.

This chapter has described the design of the study and the methods used to collect and analyse the data. The next chapter will present the findings of the study.

Chapter Seven– Findings

The findings of this study are divided into four major parts, according to the research questions:

- Pupils' perceptions of the concept of learning
- Pupils' academic self-efficacy
- Conditions of English teaching
- Pupils' affective characteristics
- Qualitative findings – teachers and pupils

Research Question One – Pupils' Perceptions of the Concept of Learning

The first research question deals with 10^{th} grade pupils' perceptions of the concept of learning. The findings will describe pupils' scores on the various components of the concept of learning. The findings stem from the quantitative instrument – a questionnaire administered to pupils (N=198.

Pupils' perceptions of the concept of learning were measured by sixteen statements in the questionnaire, which were related to the various dimensions of learning. Pupils were asked to rate their answers on a Likert scale which ranged from one to six: (1) strongly disagree and (6) strongly agree. The numbers between 1 and 6 were for opinions in between.

As a result of factor analysis performed on these sixteen items, and reported previously (chapter six), I decided to focus on eight elements of the perception of learning. Each of these elements consists of 1 to 3 items from the original sixteen statements. The scores for these elements were computed as an arithmetic mean of the responses for the combined items. Three items on the questionnaire related to the **structure of learning**. The reliability of these items is alpha=0.63. Two items related to the **complexity of learning.** The reliability of these items is alpha= 0.34. Two items related to **effort in learning**. The reliability of these items is alpha=0.59. The other six elements of the perception of learning are each measured by one item. Pupils' perceptions of the concept of learning are presented in Table 7.1 as a mean score of their responses to the nine items.

Table 7.1: Pupils' perceptions of the concept of learning (control and experiment groups)

Perceptions of Learning		Control		Experiment		Total		Time	Group	Time by Group
		Pre	Post	Pre	Post	Pre	Post	F	F	F
	N	99	99	99	99	198	198			
Structure of learning: *One can study well only when it is done alone; Good learning is a result of individual hard work; Learning is a personal matter.*	Mean	3.3	3.31	3.32	3.36	3.31	3.34	0.12	0.07	0.04
	Std	1.14	1.06	1.05	1.25	1.09	1.16	(0.73)	(0. 79)	(0.84)
Complexity of learning: *When I learn I make the connection between new things and the things I already know; The trick in learning is to know how to relate topics*	Mean	4.42	4.29	4.42	3.91	4.42	4.1	14.75***	3.3	4.93* [1]
	Std	0.93	0.84	0.97	0.97	0.95	0.93	(0.0002)	(0.069)	(0.027)
Effort in learning: *I don't have to try hard when I study; There's no learning without serious intellectual effort.*	Mean	4.24	3.91	3.97	3.82	4.11	3.87	8.9**	1.55	1.17
	Std	1.06	1.04	1.3	1.16	1.19	1.1	(0.003)	(0.21)	(0.28)
Source of knowledge: *One can study only from the teacher and not from another pupil.*	Mean	2.37	2.25	1.99	2.28	2.18	2.27	0.99	0.96	4.89* [2]
	Std	1.41	1.22	1.28	1.51	1.36	1.37	(0.32)	(0.33)	(0.028)
Learning tasks: *In order to study well you need to use subject matter*	Mean	3.5	3.53	3.61	3.43	3.56	3.48	0.52	0.00	0.79
	Std	1.33	1.33	1.54	1.46	1.44	1.39	(0.47)	(0.999)	(0.38)
Learning aids: *I prefer to study with books and notebooks rather than with a computer.*	Mean	3.92	4.11	3.24	3.54	3.58	3.83	4.14*	11.14***	0.21
	Std	1.57	1.51	1.58	1.62	1.61	1.59	(0.043)	(0.001)	(0.65)
Speed of knowledge acquisition: *When I study it takes me a long time until I feel that I am making progress.*	Mean	2.5	2.61	2.54	2.62	2.52	2.61	0.73	0.03	0.009
	Std	1.29	1.16	1.35	1.32	1.32	1.24	(0.39)	(0.87)	(0.92)
Generality of learning: *In learning one either understands or one doesn't*	Mean	2.55	2.59	2.71	2.57	2.63	2.58	0.37	0.28	0.37
	Std	1.35	1.5	1.53	1.44	1.44	1.46	(0.54)	(0.6)	(0.54)

* p<0.05 ** p<0.01 *** p<0.001 Figures in brackets are probability values

1,2 – No significant difference between pre and post for the control group.

1. Significant difference between pre and post for the experiment group (t=3.95 df=98 p=0.0001)

2- significant difference between pre and post for the experiment group (t=2.05 df=98 p=0.04).

The findings in table 7.1 show that there were no significant differences between the two administrations of the questionnaire (pre and post) with regard to the **structure of learning.**

With regard to the **complexity of learning** table 7.1 shows an overall significant time effect (Wilks' F= 14.75, $p<0.001$) and a significant time by group interaction effect (Wilks' F=4.93, $p<0.05$). Having a significant overall time effect means that across groups the average pretest response (4.42) was higher than the average posttest response (4.1). Having a significant time by group interaction effect means that the time effect is not the same for all groups. The average response, when examined on a scale of one to six, indicates a complex perception of the concept of learning, that is, a belief that learning is a process which involves linking between various topics. T-tests conducted to examine the differences between "pre" and "post" responses for each group, show that the decrease of the average response from 4.42 on the "pre" to 4.29 on the "post" in the control group is not significant (at the 5% level), whereas the decrease from 4.42 on the "pre" to 3.91 on the "post" in the experiment group is significant ($t=3.9$, $df=98$, $p=0.0001$).

Pupils' choice of lower values on the scale indicates a change in their belief of the concept of learning and a shift towards a simpler perception of this dimension of learning; that is a belief that learning and knowledge acquisition entail studying independent isolated pieces of knowledge and that it involves processes of memorisation.

Table 7.1 shows an overall significant time effect (Wilks' F= 8.9, p<0.01) in pupils' responses to **effort in learning.** Having a significant overall time effect means that across groups the average pretest response (4.11) was higher than the average posttest response (3.87). The posttest response indicates that pupils hold a more complex perception of effort in learning. No significant group effect, or time by group effect, was found. The statements for this factor were negatively presented in order to avoid the tendency for agreement, as it is easy to agree with a statement which refers to an ability to do something, but it is more difficult to object to such a statement.

As far as **source of knowledge** is concerned, table 7.1 shows that there was no overall significant time effect. However, there was a significant time by group effect (Wilks' F= 4.89, p<0.05). In order to examine the nature of this effect, t-tests were conducted to test the differences between "pre" and "post" responses for each of the groups. The t-tests indicated that the decrease of the average response from 2.37 on the "pre" to 2.25 on the "post" in the control group is not significant, whereas the increase of the average response from 1.99 on the "pre" to 2.28 on the "post" indicates a significant (t=2.05, df=98, p=0.04) difference in the experiment group. Pupils' choice of lower values on the scale indicates a more complex perception of the concept of learning; in this particular case the teacher is perceived as a tutor or a guide who helps pupils gain knowledge.

With regard to **learning aids** table 7.1 shows an overall significant time effect (Wilks' F=4.14, p<0.05), and a significant group effect (Wilks' F=11.14, p<0.001). Having a significant overall time effect means that across groups the overall average pretest response (3.58) was significantly lower than the average posttest response (3.83). Having a significant group effect means that the average response in the control group (over time) is significantly higher than the average response in the experiment group (over time). Pupils' choice of high values on the scale indicates a simplified perception of this dimension of learning, that is, they prefer learning with books and notebooks rather than with computers.

The group effect indicates a difference in the behaviour of the groups over time, however, it does not necessarily indicate the effectiveness of the treatment, as the sample was not a random sample. It might suggest that the difference between the groups was prevalent from the beginning.

No significant effects were found in the other elements of the perceptions of learning.

Table 7.2 shows the responses of the experiment group to questions concerning perceptions of learning.

Table 7.2: The responses of the experiment group to the perceptions of learning

Perceptions of Learning		Experiment Group A		H		O		R		School	Time by School	Time
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	F	F	F
	N	34	34	32	32	20	20	13	13			
Structure of Learning: *One can study well only when it is done alone; Good learning is a result of individual hard work; Learning is a personal matter*	Mean	3.03	3.1	3.6	3.49	3.14	3.26	3.63	3.75	2.23	0.18	015
	Std	1.14	1.27	0.77	1.2	1.03	0.96	1.11	1.52	(0.89)	(0.9)	(0.69)
Complexity of Learning: *When I learn I make the connection between new things and the things I already know; The trick in learning is to know how to relate topics*	Mean	4.63	3.97	4.65	4.02	4.07	3.87	4.25	3.75	1.7	0.65	14.1***
	Std	0.79	0.87	1.02	1.04	1.08	1.01	0.97	1.06	(0.17)	(0.58)	(0.0003)
Effort in learning: *I don't have to try hard when I study; There is no learning without serious intellectual effort.*	Mean	3.81	3.66	4.23	4.08	3.96	3.65	3.95	3.98	0.77	0.27	1.43
	Std	1.26	1.12	1.49	0.99	1.28	1.38	1.22	1.16	(0.51)	(0.84)	(0.23)
Source of knowledge: *One can study only from the teacher and not from another pupil.*	Mean	1.88	2.5	2.3	2.71	1.41	1.78	2.45	2	2.54	2.3	2.9
	Std	1.24	1.72	1.43	1.55	0.8	1.35	1.39	1.12	(0.06)	(0.08)	(0.89)
Learning tasks: *In order to study well you need to use subject matter.*	Mean	3.09	3.5	4.35	3.17	3.3	3.41	3.95	3.65	1.04	5.1** 1	2.31
	Std	1.44	1.44	1.5	1.34	1.64	1.59	1.32	1.53	(0.38)	(0.003)	(0.13)
Learning aids: *I prefer to study with books and notebooks rather than with a computer*	Mean	2.59	2.84	3.54	4.29	3.39	3.52	3.75	3.79	4.48**3	0.93	3.41
	Std	1.34	1.63	1.69	1.4	1.67	1.56	1.45	1.55	(0.005)	(0.43)	(0.068)
Speed of knowledge acquisition: *When I study it takes me a long time until I feel that I am making progress*	Mean	2.69	2.69	2.21	2.83	2.57	2.35	2.65	2.55	0.23	1.31	0.22
	Std	1.47	1.23	1.22	1.43	1.5	1.23	1.14	1.47	(0.87)	(0.27)	
Generality of learning: *In learning one either understands or one doesn't*	Mean	2.94	2.53	2.71	2.38	2.74	2.17	2.3	3.3	0.38	4.8** 2	0.24
	Std	1.68	1.48	1.55	1.13	1.51	1.19	1.3	1.75	(0.77)	(0.004)	(0.62)

* $p<0.05$ ** $p<0.01$ *** $p<0.001$ The figures in brackets are probability values

By using the procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) we find that

1- **H** behaves differently from **A** and **O**.

2 - **R** behaves differently from **A**, **H** and **O**.

3- The overall mean for **A** is lower than the overall mean of each of the other schools

Table 7.2 shows a significant time by school interaction effect (Wilks' F=5.1, $p<0.01$) in the perception of **learning tasks**. By using the procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) it was found that school ***H*** behaves differently from ***A*** and ***O***. In both ***A*** and ***O*** the average responses on the "pre" were lower than the "post", thus the average in school ***A*** on the "pre" was 3.09 and 3.5 on the "post", and in school ***O*** the average on the "pre" was 3.3 and 3.41 on the "post". In school ***H***, however, the reverse was found – the average pretest responses were 4.35, and 3.17 on the posttest. Pupils' choice of lower values on the scale indicates a simpler perception of the nature of learning tasks; in this case a perception of learning as involving memorising subject matter rather than problem solving.

A significant time by school interaction effect (Wilks' F=4.8, $p<0.01$) was found with regard to the **generality of learning.** By using the procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) it was found that school ***R*** behaves differently from ***A***, ***H*** and ***O***. In schools ***A***, ***H*** and ***O*** the average pretest response was higher than the average posttest response; in school ***A*** the average response decreased from 2.94 on the "pre" to 2.53 on the "post", in school ***H*** the average response decreased from 2.71 on the "pre" to 2.38 on the "post", and in school ***O*** the average response decreased from 2.74 on the "pre" to 2.17 on the "post". In school ***R*** the reverse was found; the average response increased from 2.3 on the "pre" to 3.3 on the "post". Pupils' choice of lower values on the scale indicates a complex perception of this dimension, that is a belief that learning and understanding are a long process, whereas a choice of higher values on the scale indicates a simpler perception where learning and understanding are perceived as all-or-none.

No interaction was found in the responses of the experiment group with regard to the other elements of the perceptions of learning.

Table 7.3 shows the responses of the control group to statements concerning perceptions of learning.

Table 7.3: The responses of the control group to the perceptions of learning

Perceptions of Learning		Control Group: E Pre	E Post	EI Pre	EI Post	KI Pre	KI Post	KS Pre	KS Post	School F	Time by School F	Time F
	N	32	32	24	24	23	23	20	20			
Structure of Learning: *One can study well only when it is done alone; Good learning is a result of individual hard work; Learning is a personal matter*	Mean	3.54	3.45	3.07	3.27	3.45	3.35	2.99	2.97	1.32	0.39	0
	Std	1.01	1.01	1.13	1.22	1.34	0.8	1.14	1.13	(0.27)	(0.76)	(0.99)
Complexity of Learning: *When I learn I make the connection between new things and the things I already know; The trick in learning is to know how to relate topics.*	Mean	4.35	4.24	4.38	4.19	4.6	4.38	4.46	4.54	0.61	0.24	0.9
	Std	0.89	0.83	0.98	0.85	0.68	0.87	1.25	0.85	(0.61)	(0.87)	(0.34)
Effort in learning: *I don't have to try hard when I study; There is no learning without serious intellectual effort.*	Mean	4.43	4.03	3.83	3.7	4.73	4.23	4	3.65	3.4*	0.61	8.8**
	Std	1.05	1.05	1.06	0.89	0.9	1.12	0.98	1.16	0.02	(0.61)	(0.004)
Source of knowledge: *One can study only from the teacher and not from another pupil.*	Mean	2.74	2.47	2.06	2.19	2.05	1.9	2.69	2.38	1.74	0.6	1.21
	Std	1.21	1.26	1.16	1.26	1.57	1.02	1.97	1.33	(0.16)	(0.58)	(0.2742)
Learning tasks: *In order to study well you need to use subject matter.*	Mean	3.74	3.79	3.38	3.47	3.1	3.05	3.83	3.69	2.26	0.08	0.007
	Std	1.14	1.23	1.26	1.16	1.55	1.57	1.53	1.49	(0.087)	(0.97)	(0.93)
Learning aids: *I prefer to study with books and notebooks rather than with a computer*	Mean	3.74	3.88	4.06	4.59	4.05	3.85	3.83	3.92	1.09	0.66	0.46
	Std	1.56	1.65	1.34	1.34	1.85	1.5	1.8	1.44	(0.36)	(0.58)	(0.49)
Speed of knowledge acquisition: *When I study it takes me a long time until I feel that I am making progress*	Mean	2.5	2.62	2.06	2.31	2.55	3.15	3.58	2.46	2.9*	4.8**[1]	0.12
	Std	0.96	1.18	1.05	0.97	1.57	1.14	1.68	1.39	(0.04)	(0.004)	(0.73)
Generality of learning: *In learning one either understands or one doesn't*	Mean	2.45	2.94	2.75	2.56	2.1	2.25	3	2.23	0.9	1.87	0.43
	Std	1.25	1.52	1.52	1.52	1.12	1.48	1.35	1.36	(0.44)	(0.14)	(0.51)

* p<0.05 ** p<0.01 *** p<0.001 Figures in brackets are probability values

1 -By using procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) it was found that KS behaves differently from all other schools.

Table 7.3 shows a significant school effect (Wilks' F=3.4, $p<0.05$) in the **effort in learning.** Having a significant overall school effect indicates that the average responses over time are different for the various schools.

With regard to the **speed of knowledge acquisition** Table 7.3 shows a significant school effect (Wilks' F= 2.9, $p<0.05$), and a significant time by school interaction effect (Wilks' F=4.8, $p<0.01$). By using the procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) it was found that school ***KS*** behaves differently from the other schools. In most schools there was an increase in the average response from the pretest to the posttest, apart from school ***KS*** where a decrease from 3.58 on the "pre" to 2.46 on the "post" was found. Pupils' choice of lower values on the scale indicates a complex perception of the speed of knowledge acquisition, that is, the lower the score the more they see knowledge acquisition as a slow process. A belief in learning as a slow process was found as a predictor of academic success (Schoenfeld, 1983; 1985; Schommer, 1990).

Research Question Two – Pupils' Academic Self-Efficacy

The second research question deals with pupils' academic self-efficacy and will relate to their perceived academic self-efficacy, to the impact of computers on their perceptions of themselves as learners of English, and to their perceptions of themselves as independent learners. The findings are based on an analysis of pupils' questionnaire.

Pupils' academic self-efficacy was measured by eighteen statements in the questionnaire, which were related to the various aspects of self-efficacy. Similar to perceptions of learning, pupils were asked to rate their answers to the statements concerning self-efficacy on a six point likert scale. As a result of factor analysis performed on the eighteen items, I decided to focus on five elements of pupils' perceptions of their academic self-efficacy. Each of these elements consists of 2 to 5 items from the original eighteen statements or all of them. The scores for these elements were computed as an arithmetic mean of the responses for the combined items. Two items on the questionnaire related to the **self-efficacy for individual study versus studying in a group.** The reliability of these items was alpha=0.65. Three items related to **expectation for success.** The reliability of the items was alpha=0.68. Five items related to the self-efficacy for **obtaining information.** The reliability of these items was alpha=0.75. Five items related to the self-efficacy for **coping with problems.** The reliability of these items was alpha=0.70. The reliability of **general** self-efficacy items was alpha=0.83.

Table 7.4 shows pupils' responses to the statements concerning their academic self-efficacy on the pretest and the posttest for both groups.

Table 7.4: Pupils' self-efficacy responses (experiment and control groups)

Self Efficacy		Control		Experiment		Total		Time	Group	Time by group
		Pre	Post	Pre	Post	Pre	Post			
	N	99	99	99	99	198	198			
Individual study versus studying in a group: *I study better on my own more than I study in groups; I enjoy working as part of a group.*	Mean	3.38	3.56	3.31	3.43	3.35	3.49	2.6	0.55	0.09
	Std	1.19	1.19	1.19	1.15	1.19	1.17	(0.11)	(0.46)	(0.76)
Expectation for success: *It is hard for me to do well in exams; Compared with other pupils in my class, I don't always expect to do well in my studies; I'm not sure I'll get a good grade at the end of the school year.*	Mean	2.65	2.84	2.71	3.01	2.68	2.92	1048**	0	0.53
	Std	1.14	1.02	1.06	1.18	1.1	1.1	(0.002)	(0.4)	(0.47)
Obtaining information: *It is hard for me to find material for the papers I have to write; When I study it is hard for me to organise subject matter according to categories or topics; I don't always know where to look for material I need for writing papers; It is very hard for me to connect new topics I study to topics which I studied in the past; When there's a lot of material on a subject I need to write about, I don't always know what is most suitable and what I should select.*	Mean	2.59	2.61	2.72	2.78	2.65	2.7	0.55	2	0.098
	Std	0.88	0.84	0.84	0.85	0.86	0.84	(0.46)	(0.16)	(0.75)
Coping with problems: *It is hard for me to cope with the problems and assignments in school; When I face a difficult learning problem, I worry that I might not be able to solve it; When I try to solve a problem it is hard for me to decide whether I'm doing the right things to solve it; I won't always be able to cope with the problems and the assignments the teacher gives; It is hard for me to decide in advance what I'm going to do in order to cope with a task the teacher assigned, and to check if I'm doing things as I planned.*	Mean	2.95	2.99	3.12	3.05	3.03	3.02	0.05	1.2	0.72
	Std	0.86	0.86	0.95	0.89	0.91	0.87	(0.82)	(0.27)	(0.4)
General self-efficacy (average of all items)	Mean	2.80	2.87	2.90	2.98	2.85	2.93	2.31	1.35	0.005
	Std	0.72	0.66	0.75	0.74	0.74	0.71	(0.13)	(0.25)	(0.95)

* p<0.05 ** p<0.01 *** p<0.001 Figures in brackets are probability values

An analysis of variance with repeated measures of the elements of self-efficacy shows that belonging to either the experiment group or the control group has no significant effects on pupils' perceptions of academic self-efficacy.

Table 7.5 shows the average of pupils' responses to the self-efficacy statements according to schools.

Table 7.5: Pupils' average responses to self-efficacy statements by schools from both groups

		Experiment								Control									
Self Efficacy		A		H		O		R		E		El		Kl		KS		Total	
	N	32	32	24	24	23	23	20	20	34	34	32	32	20	20	13	13	198	198
Individual study versus studying in a group	Mean	2.88	3.22	3.31	3.44	3.48	3.3	3.8	3.9	3.5	3.78	3.34	3.69	3.35	3.15	3.23	3.31	3.35	3.49
	Std	1.02	1.03	1.1	1.26	1.26	1.03	1.31	1.26	0.91	1.1	1.09	1.18	1.35	1.17	1.82	1.36	1.19	1.17
Expectation for success	Mean	2.76	3.04	2.38	2.75	3.1	3.3	2.59	2.91	2.67	2.9	2.14	2.63	2.98	2.95	3.36	3	2.68	2.92
	Std	1.01	1.11	0.89	1.04	1.11	1.22	1.19	1.39	0.85	1.17	0.92	1.02	1.39	0.95	1.44	0.67	1.1	1.1
Obtaining information	Mean	2.57	2.78	2.72	2.58	2.92	2.95	2.71	2.83	2.57	2.54	2.4	2.42	2.77	3.01	2.83	2.66	2.65	2.7
	Std	0.89	0.89	0.85	0.75	0.82	0.75	0.81	0.99	0.69	0.71	0.68	0.7	1.26	1.1	1.01	0.87	0.86	0.84
Coping with problems	Mean	2.87	2.89	3.08	2.84	3.45	3.33	3.19	3.23	2.87	2.98	2.7	2.78	3.08	3.33	3.54	3	3.03	3.02
	Std	0.85	0.88	1.04	0.7	1.02	0.95	0.86	0.99	0.67	0.78	0.77	0.78	1.13	1.04	0.86	0.87	0.91	0.87
General self-efficacy (average of all items)	Mean	2.73	2.91	2.83	2.79	3.17	3.16	2.96	3.09	2.79	2.88	2.55	2.71	2.97	3.11	3.17	2.9	2.85	2.93
	Std	0.7	0.74	0.77	0.60	0.76	0.77	0.77	0.86	0.52	0.56	0.53	0.61	1.03	0.89	0.86	0.60	0.74	0.71

No significant time by school interaction was found for any of the above. The overall time effect for the items in this table is shown in table 7.4.

The findings in Table 7.5 show that no significant time by school interaction was found for any of the schools.

The impact of computers on pupils' perceptions of themselves as learners of English was examined through the statement 'To what extent do you feel that the computer helps you in your study of English?' Pupils were asked to rate their answers on a likert scale which ranged from one to five; not at all (1), a little (2), average (3), much (4), very much (5). Table 7.6 shows the average of pupils' responses in the experiment groups on the pretest and posttest.

Table 7.6: Pupils' average responses regarding the impact of computers (experiment group)

		Experiment Group												
		A		H		O		R		Total		School	Time by School	Time
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	F		
	N	32	32	24	24	23	23	20	20	99	99			
To what extent do you feel that the computer helps you in your study of English?	Mean	3.75	3.22	2.71	2.67	2.87	2.83	3.35	2.75	3.21	2.9	2.81*	1.9	7.6**
	Std	0.92	1.13	1.27	1.43	1.42	1.23	1.18	1.25	1.25	1.26	(0.0439)	(0.14)	(0.007)

* $p<0.05$ ** $p<0.01$ *** $p<0.001$ Figures in brackets are probability values

The findings in Table 7.6 show that there was a significant school effect (Wilks' $F=2.81$, $p<0.05$) in the experiment group for this item. Having a significant school effect means that the average response over time is different for the various schools. Further simultaneous tests (Scheffe) on the differences (post-pre) show that the average response in school **A** (3.5) is higher than the average response in schools **H**

(2.69) and **O** (2.85). Pupils' choice of lower values on the likert scale indicates scepticism as to the effectiveness of computers for learning.

Research Question Three – Conditions of English Teaching

The third research question deals with the conditions of English teaching. The findings will examine pupils' attitude to computers, teachers' attitude to computers, the number of hours allocated to the teaching of English, the number of hours allocated to the teaching of English with the aid of computers, the type of materials and classroom activities used, the type of media preferred by pupils, and the extent of the use of computers outside school hours. The findings stem from an analysis of pupils' questionnaires.

Teachers

The following section provides background data on all English teachers who participated in the experiment.

Teachers' Background: Data on the background and education of the eight teachers were collected by means of interviews which dealt with teachers' background and the teaching process. The background data on the teachers includes gender, teaching experience, training, and position (part-or full-time). All eight English teachers who participated in the study are women who were employed on a full time basis.

Table 7.7: Teachers' and classroom profile

Experimental group	Teachers' Work experience	Courses in methodology	Study hours per week	Books used
School 1 **O**	27 years	Yes. The O.U. course	4	English by All Means
School 2 **R**	30 years	Yes. The O.U. course	4	Tapestry
School 3 **H**	10 years	Yes. The O.U. course	4	Kaleidoscope
School 4 **A**	11 years	Yes. The O.U. course	5	Kaleidoscope
Control group	**Teachers' Work experience**	**Courses in methodology**	**Study hours per week**	**Books used**
School 5 **KS**	10 years	Yes. The O.U. course	4	Kaleidoscope
School 6 **E**	12 years	No	4	Kaleidoscope
School 7 **KL**	20 years	No.	5	Kaleidoscope
School 8 **EL**	27 years	Yes.	4	Kaleidoscope

* All the books used by teachers include reading texts with related reading comprehension exercises, vocabulary exercises and grammar exercises. All books are approved by the Ministry of Education.

Table 7.7 shows that teachers had between 10 and 27 years experience. They are all university graduates who are trained to be teachers of English, and hold a full time teaching position, which is 24 hours per week. All teachers from the experiment group were coordinators, that is, they held an administrative position in addition to teaching. As part of their administrative position they are required to hold departmental staff meetings in which professional issues are discussed, such as the selection of books for the various classes or the administration of tests. Only one teacher from the control group was a coordinator – the others focused primarily on teaching.

The number of hours allocated to the teaching of English for 10^{th} grade pupils is between four to five weekly.

Learning materials and classroom activities: teachers become familiar with learning materials in diverse ways. Some are formal means provided by the Ministry of Education and others are informal, like visits to book- shops or receiving materials from other schools. The interviews revealed that all teachers purchase the materials and have them at home.

The teachers were asked about the teaching materials they used and how they used them. The table shows that teachers use books that contain reading texts on various topics, reading comprehension questions and vocabulary exercises. The following section describes teachers' classroom practice.

The control group – all teachers from the control group use the same book – Kaleidoscope- for the enhancement of reading skills. The book, which is the focus of the lesson, contains reading texts with comprehension questions, grammar exercises, and vocabulary exercises. They all supplement the texts and exercises provided in the book with relevant texts from other sources, for example other books. They believe that what is given in the book is insufficient, because, as one of the teachers said, "*pupils need to get a broader perspective of what they read and enrich their vocabulary*".

In their practice these teachers emphasise the development of reading skills. Of the four weekly hours they have with their classes only one hour is devoted to the teaching of grammar. This is because teachers are bound to follow the curriculum for the teaching of English, which puts an emphasis on developing reading skills. One of the teachers commented that "*grammar is not popular these days. I don't like it either. There is no logic in grammar rules, so it is difficult for them [*pupils*]*".

Teachers use the same techniques for introducing a text – brainstorming, that is eliciting from pupils any background knowledge or associations they have concerning the reading text, presenting the class with a question, and then reading it aloud to the class. This is followed by oral discussion of the text and finally pupils are asked to answer comprehension questions and do a variety of vocabulary exercises. These teachers do not use oral activities, such as role-plays and simulations to enhance speaking skills, because of the noise involved. In addition, some of them are sceptical as to the effectiveness of these activities. One of the teachers in this group was fairly explicit about it:

"*Many teachers, and pupils, who have experienced group work have reservations about this way of teaching and learning. They don't feel that they learn in this way, and I feel the same. Pair work is easier. They can do it with vocabulary exercises or grammar exercises, a question to think about and write notes to themselves*".

The experiment group: These teachers have an integrated lesson-plan, that is, in one lesson they introduce all the four skills; reading, writing, speaking and listening. In their regular lessons- without computers- they teach in a similar manner to the teachers from the control group; they emphasise reading, they introduce a reading text either by asking a question, presenting a picture, guessing the meaning of key words, then the teacher reads the text, and asks pupils to answer comprehension questions, to complete sentences or to write a different ending to a story. The textbooks which they extensively use are similar in structure to the books used by the control group, namely, the book contains reading texts with comprehension questions, grammar exercises, and vocabulary exercises.

It should be pointed out that two teachers from the control group and two from the experiment group do not assign projects to pupils. One of the teachers from the control group explained it as follows: *I don't assign them projects. They have enough work as it is – they have to submit three book reports this year.*

Pupils

The questionnaire that was administered to pupils (Appendix A) contained two items related to pupils' attitude to computers, and the extent to which they make use of computers for homework and projects in English. Pupils were asked to rate their answers on a likert scale which ranged from one to five; not at all (1), a little (2), average (3), much (4), very much (5). The distribution of pupils' responses on these issues is presented below:

Table 7.8: Pupils' average responses regarding their attitude to computers, and the extent of their use (experiment group)

		Experiment Group												
		A		H		O		R		Total		School	Time by School	Time
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	F	F	
	N	32	32	24	24	23	23	20	20	99	99			
To what extent do you feel that the computer helps you in your study of English?	Mean	3.75	3.22	2.71	2.67	2.87	2.83	3.35	2.75	3.21	2.9	2.81*	1.9	7.6**
	Std	0.92	1.13	1.27	1.43	1.42	1.23	1.18	1.25	1.25	1.26	(00439)	(0.14)	(0.007)
To what extent do you use the computer for doing your homework and projects in English?	Mean	3.25	2.91	2	2.71	2.35	2.22	2.5	2.3	2.59	2.58	4.9**	3.79* [1]	0.005
	Std	1.08	1.06	0.98	1.2	1.07	1	1.24	1.08	1.18	1.11	(0.003)	(0.013)	(0.9)

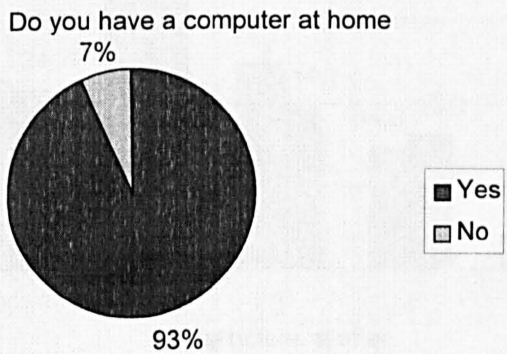
* p<0.05 ** p<0.01 *** p<0.001 Figures in brackets are probability values

[1] -By using procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) we find that H behaves differently from A.

The findings in Table 7.8 show that for the first question there was a significant school effect (Wilks' F=2.81, $p<0.05$) in the experiment group. Having a significant school effect means that the average response, over time is different for the various schools. Further simultaneous tests (Scheffe) on the differences (post-pre) show that the average response in school **A** is higher than in schools **H, O** and **R.**

The extent of the use of computers for homework and projects: Pupils' responses to the second question in Table 7.8 were explored by using one item in the questionnaire. Participants were asked to rate their answers on a five-point likert scale, where (1) never, and (5) most of the time. Table 7.8 shows that there was a significant school effect (Wilks' F=4.9, $p<0.01$) in the experiment group, and a significant time by school interaction effect (Wilks' F=3.79, $p<0.05$). Having a significant school effect means that the average response over time, was different for the various schools. Using a procedure of simultaneous comparisons on the average response for school (over time) reveal that the average response for school **A** (3.1) is significantly higher than the average response in schools **H, O** and **R.** As for the interaction effect, by using a procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) it was found that school ***H*** behaves differently from school *A*. Pupils' responses reflect a change that took place after introducing computers into English lessons. Unlike the other schools, where the average response on the "pre" was higher than the "post", in school ***H*** the average pretest response was lower (2) than the average posttest response (2.71). That is, in school ***H*** there was a significant ($p<0.05$) increase in the use of the computer for homework and projects by pupils, whereas in other schools there was a decrease.

Figure 7.1 The number of pupils from both groups who have computers at home (in percentages)



From the pie chart above it can be seen that 93% of the pupils who participated in the study have computers at home.

Figure7.2 shows in percentages the extent to which pupils from the experiment group use computers for doing homework and projects in English.

Figure 7.2: Pupils' average responses regarding the use of computers for homework and projects in the experiment group (in percentages)

Pupils were asked to rate their answers on a five-point likert scale, where (1) was never and (5) most of the time.

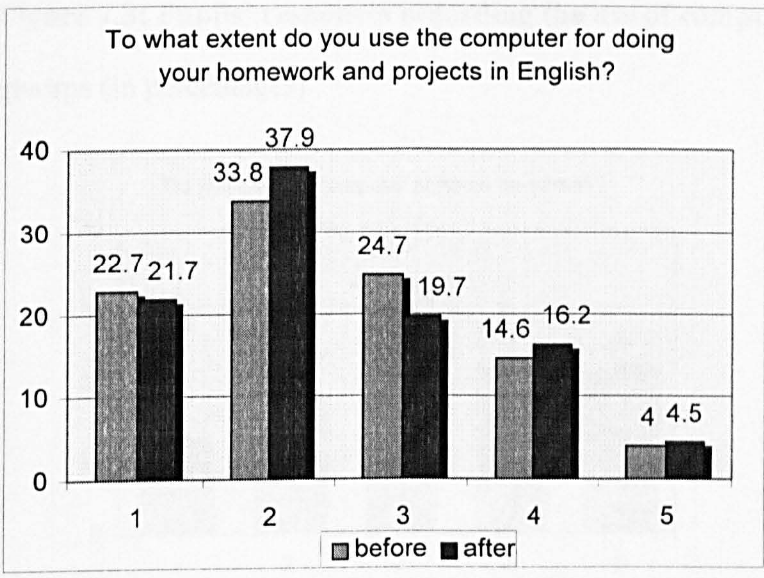


Figure 7.2 shows that approximately 5% of the participants in the experiment group used the computer for homework and projects *most of the time* both at the beginning and the end of the year. Twenty three percent of the pupils said, at the "pre" stage, that they *never* use computers for doing homework, whereas 22% said, at the "post" stage, that they never use computers. This is not at all statistically significant. Thirty four percent responded, at the beginning, that they *sometimes* use the computer for homework, and at the end the figure increased and 38% reported that they sometimes use the computer for homework.

Figure 7.3 shows the extent to which the entire population of the study uses computers at home for games.

Figure 7.3: Pupils' responses regarding the use of computers for games in both groups (in percentages)

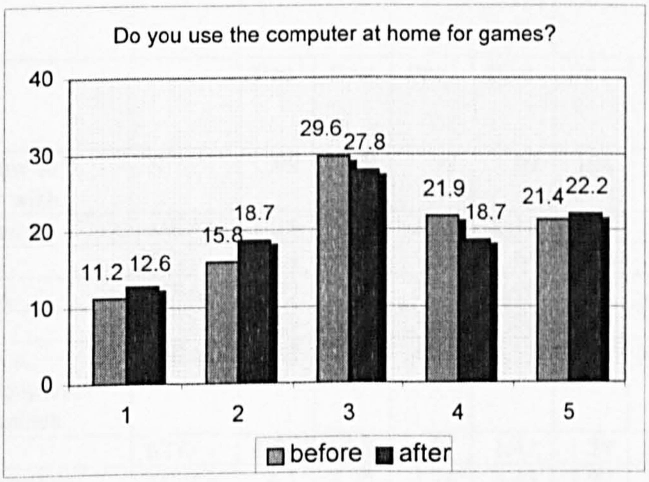


Figure 7.3 shows that approximately 12% of the pupils never use the computer for games, approximately 28% use it frequently for games, and approximately 22% use it most of the time. This distribution of the responses reflects the personal inclinations of the participants in the study; some were very interested in computers, and some either did not have time to play with them or preferred doing other things. Gender issues were beyond the scope of this study and therefore were not explored.

The type of media preferred: Materials used by pupils included textbooks, workbooks and teacher-developed worksheets. Pupils were asked to rank six options according to their personal preferences; one being the most preferred and six the least preferred. An analysis of variance with repeated measures was applied. Pupils' responses as to their preferred mode of studying are presented in Table 7.9 below.

Table 7.9: Pupils' responses regarding their preference in studying (both groups)

		Control		Experiment		Total		Time	Group	Time by Group
		Pre	Post	Pre	Post	Pre	Post	Chi-Square (p)	Chi-Square (p)	Chi-Square (p)
I prefer to study with	N	99	99	99	99	198	198			
teachers	MEAN	1.6	1.6	2.19	2.18	1.89	1.89	0	11.05***	0
	STD	1.24	1.12	1.58	1.64	1.44	1.43	(0.96)	(0.000)	(0.96)
books	MEAN	2.99	2.98	3.04	2.98	3.02	2.98	0.12	0.02	0.06
	STD	1.29	1.32	1.56	1.56	1.43	1.45	(0.73)	(0.88)	(0.8)
articles, newspapers, magazines	MEAN	4.68	4.59	4.59	4.13	4.63	4.36	6.6	3.3	2.9
	STD	1.27	1.2	1.31	1.42	1.29	1.33	(0.01)**	(0.07)	(0.09)
other pupils	MEAN	4.1	3.75	3.74	3.43	3.92	3.59	8.8	4.2*	0.05
	STD	1.4	1.49	1.39	1.33	1.4	1.41	(0.003)	(0.04)	(0.8)
computers	MEAN	3.98	4.3	3.48	3.96	3.73	4.13	12.8***	3.9*	0.51
	STD	1.57	1.59	1.77	1.78	1.69	1.69	(0.0003)	(0.049)	(0.47)
parents	MEAN	3.73	3.78	3.89	4.33	3.81	4.06	4.5*	3.5	2.9
	STD	1.58	1.59	1.62	1.51	1.6	1.57	(0.33)	(0.06)	(0.09)

* $p<0.05$ ** $p<0.01$ *** $p<0.001$

The findings presented in table 7.9 show that pupils prefer to study with teachers. The findings show that there was a significant group effect (Wilks' F=9.76, p<0.01). That is, the average response across "pre" and "post" in the control group was lower (1.6) than the average response across "pre" and "post" in the experiment group. The overall group average response for both the "pre" and the "post" was 1.89.

Pupils' second choice for studying with was books, however, there was no significant effect for this item. Whereas the least preferred means of learning with were articles, newspapers and magazines. The findings show a significant overall time effect (Wilks' F=4.54, p<0.05). Having a significant overall time effect means that across the groups the average pretest response was higher (4.63) than the average posttest response (4.36). That is, at the end of the treatment pupils liked studying with articles better than they did at the beginning.

Computers are not a preferred medium of instruction by pupils. The findings show an overall significant time effect (Wilks'F=8.82, $p<0.01$) for this item. The average response on the "pre" was lower (3.73) than the average response on the "post" (4.13). Pupils' choice of lower values on the scale indicates a preference for studying with computers. Computers must have "lost their popularity" among pupils between the first administration of the questionnaire, at the beginning of the school year, and the second administration, at the end of the school year. Perhaps the novelty of studying with a new medium wore off, or perhaps computers did not meet pupils' expectations.

As for studying with other pupils Table 7.9 shows that there was a significant overall time effect (Wilks' F=8.35, $p<0.01$), and a significant group effect (Wilks' F=4.28, $p<0.05$). Having a significant overall time effect means that the average response on the "pre" was higher (3.92) than the average response on the "post" (3.59). The significant group effect is due to the control group which had, over time, a higher average response (3.97) than the experimental group (3.58).

Twelve items examined pupils' beliefs as to the type of media that is helpful for their study of English. Pupils were asked to rate their answers on a scale which ranged from one to five; not at all (1), a little (2), average (3), much (4), very much (5). Pupils' average responses for both groups are presented in Table 7.10.

Table 7.10: Pupils' responses concerning their preferred media for learning English (control and experiment)

To what extent do you feel that the following helps you in your study of English?		Control		Experimental		Total		Time	Time by Group
		Pre	Post	Pre	Post	Pre	Post	F	F
	N	99	99	99	99	198	198		
The teacher's explanation	MEAN	3.93	3.61	3.6	3.6	3.76	3.6	4.26*	4.26* [1]
	STD	0.99	1.18	0.98	1.02	1	1.1	(0.04)	(0.04)
Peers' explanations	MEAN	3.18	3.09	3.18	3.13	3.18	3.11	1.0	0.09
	STD	0.85	0.98	0.99	0.98	0.92	0.98	(0.32)	(0.77)
Textbooks	MEAN	3.54	3.44	3.48	3.67	3.51	3.55	0.39	3.61
	STD	0.85	0.84	0.94	0.97	0.89	0.91	(0.53)	(0.06)
Worksheets	MEAN	3.31	3.53	3.29	3.37	3.3	3.45	3.55	0.73
	STD	0.85	1.03	0.97	1.04	0.91	1.03	(0.06)	(0.39)
Learning with a computer	MEAN	2.84	2.76	3.21	2.9	3.03	2.83	4.41*	1.96
	STD	1.21	1.2	1.25	1.26	1.24	1.23	(0.037)	(0.16)
Homework	MEAN	3.48	3.24	3.26	3.32	3.37	3.28	1.67	3.92* [2]
	STD	0.96	1.04	1.1	1.06	1.03	1.05	(0.19)	(0.049)
Tests and quizzes	MEAN	3.47	3.48	3.02	3.18	3.25	3.33	0.93	0.73
	STD	1.12	1.2	1.14	1.16	1.15	1.19	(0.33)	(0.39)
Independent study	MEAN	3.57	3.53	3.64	3.57	3.6	3.55	0.45	0.33
	STD	1.01	1.13	1.08	1.01	1.05	1.07	(0.5)	(0.85)
Active participation in classroom discussions	MEAN	3.45	3.25	3.47	3.17	3.46	3.21	7.56**	0.22
	STD	1.06	1.27	1.08	1.13	1.07	1.2	(0.006)	(0.64)
Working in groups	MEAN	3.03	2.77	2.9	2.81	2.96	2.79	4.69*	1.09
	STD	0.86	0.97	1.02	1.03	0.94	1	(0.03)	(0.29)
Doing projects in English	MEAN	3.21	3.35	3.15	2.96	3.18	3.15	0.14	2.8
	STD	1.08	1.09	1.08	1.16	1.08	1.14	(0.71)	(0.1)
The atmosphere in the classroom	MEAN	3.52	3.03	3.48	3.29	3.5	3.16	12.07***	2.26
	STD	1.2	1.38	1.28	1.36	1.24	1.38	(0.0006	(0.13)

* $p<0.05$ ** $p<0.01$ *** $p<0.001$ Figures in brackets are probability values

[1,2] – No significant difference between pre and post for the experiment group,
Significant difference between pre and post for the control group: 1- (t=2.71 df=98 p=0.008); 2 - (t=2.38 df=98 p=0.019).

Table 7.10 shows pupils believe that the teacher's explanation is the most helpful for their study of English. The results for this statement in Table 7.10 show an overall significant time effect (Wilks' F=4.26, p<0.05), and a significant time by group interaction effect (Wilks' F=4.26, p<0.05). Having a significant overall time effect means that across groups the average pretest response (3.76) was significantly (p<0.05) higher than the average posttest response (3.6). As for the interaction effect, further tests of the differences between "pre" and "post" responses for each of the groups showed no significant differences between "pre" and "post" in the experiment group. However, significant differences were found between the "pre" and "post" administrations in the control group (t=2.71df=98 p=0.008).

The findings also reveal that pupils believe that **working in groups** is the least effective for them. The results for this statement in Table 7.10 show that there was an overall significant time effect (Wilks' F=4.69, p<0.05) on this item. Having a significant overall time effect means that across groups the average pretest response was higher (2.96) than the average posttest response (2.79). Thus, the average response for **independent study** was higher than the one for working in groups; on the "pre" it was 3.6 and on the "post" it was 3.55. No significant interaction was found. Pupils seem to prefer to work on their own rather than with peers.

Pupils' average responses to **homework** were higher, 3.37 on the "pre" and 3.28 on the "post", than the average response for **learning with a computer** – 3.03 on the "pre" and 2.83 on the "post". No significant effects were found in tests and quizzes. The lower average response for learning with a computer may suggest that pupils do not perceive it as a learning aid but rather as an instrument which is aimed at breaking the routine of lessons, and one which is supposed to provide them with "fun". However, the results in Table 7.10 show that there was a significant time by group interaction effect (Wilks' F= 3.92, p<0.05) for homework. T-tests conducted to examine the differences between "pre" and "post" responses for each group show that the increase from 3.26 on the "pre" to 3.32 on the "post" in the experiment group was not significant, whereas the decrease from 3.48 on the "pre" to 3.24 on the "post" in the control group is significant (t=2.38 df=98 p=0.019).

As to learning with computers an overall significant time effect (Wilks' F=4.41, p<0.05) was found. There was no significant interaction. An overall significant time effect (Wilks' F=7.56, p<0.01) was found in pupils' perceptions of the effectiveness of **active participation in classroom discussions.** Having a significant overall time effect means that across groups the average pretest response (3.46) was significantly ($p<0.05$) higher than the average posttest response (3.21). It might be that pupils do not perceive participation in lessons as contributing to their learning of English because this activity cannot be measured by them, consequently they cannot evaluate whether this type of an activity is effective for their learning.

Table 7.11 presents the control group's responses regarding the effectiveness of the media used in English lessons.

Table 7.11: Pupils' responses regarding the effectiveness of the media used in English lessons (control group)

		Control Group										
To what extent do you feel that the following helps you in your study of English?		**E**		**EI**		**KI**		**KS**		**School**	**Time by School**	**Time**
		Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**F**	**F**	**F**
	N	34	34	32	32	20	20	13	13			
The teacher's explanation	MEAN	3.97	3.71	4.16	3.66	3.6	3.5	3.77	3.38	0.88	0.5	5.83*
	STD	1.03	1.09	0.81	1.29	1.14	1.1	1.01	1.33	(0.46)	(0.68)	(0.018)
Peers' explanations	MEAN	3.06	3.21	3.03	2.78	3.63	3.1	3.17	3.54	1.86	3.49* [1]	0.36
	STD	0.89	1.01	0.74	0.91	0.9	0.97	0.83	0.97	(0.14)	(0.019)	(0.55)
Textbooks	MEAN	3.79	3.41	3.53	3.48	3.4	3.75	3.08	2.92	2.7*	2.6	0.29
	STD	0.81	0.89	0.8	0.89	0.88	0.64	0.86	0.64	(0.05)	(0.06)	(0.59)
Worksheets	MEAN	3.47	3.36	3.25	3.63	3.2	3.85	3.23	3.23	0.39	2.5	3.65
	STD	0.75	1.06	0.8	1.16	0.89	0.81	1.17	0.83	(0.76)	(0.065)	(0.06)
Learning with a computer	MEAN	2.97	2.85	2.78	2.63	3	3	2.33	2.5	1.03	0.2	0.008
	STD	1.14	1.28	1.18	1.21	1.45	1.15	0.98	1.09	(0.38)	(0.9)	(0.92)
Homework	MEAN	3.74	3.32	3.38	3.25	3.45	3	3.15	3.38	0.67	1.73	3.05
	STD	0.99	1.17	0.98	0.98	0.83	0.97	0.99	0.96	(0.57)	(0.166)	(0.08)
Tests and quizzes	MEAN	3.62	3.29	3.06	3.38	3.6	3.75	3.92	3.85	1.9	1.37	0.01
	STD	1.02	1.17	1.29	1.13	0.94	1.29	0.95	1.28	(0.13)	(0.25)	(0.91)
Independent study	MEAN	3.85	3.68	3.59	3.41	3.7	3.7	2.54	3.15	3.9**	1.61	0.23
	STD	0.86	1.01	0.91	1.19	1.08	1.3	0.97	0.99	(0.1)	(0.19)	(0.63)
Active participation in classroom discussions	MEAN	3.03	3.29	3.5	3.06	3.85	3.5	3.85	3.23	1.38	2.49	4.37*
	STD	1	1.24	0.98	1.32	0.99	1.19	1.21	1.42	(0.25)	(0.065)	(0.04)
Working in groups	MEAN	2.97	3	3	2.44	3.25	2.95	2.92	2.69	1.55	1.38	4.3*
	STD	0.76	0.95	0.84	0.8	0.97	1	1.04	1.18	(0.21)	(0.25)	(0.041)
Doing projects in English	MEAN	3.35	3.36	2.94	3.34	3.45	3.65	3.15	2.85	1.65	1.05	0.21
	STD	0.95	1.17	0.91	1	1.39	1.23	1.21	0.69	(0.18)	(0.37)	(0.65)
The atmosphere in the classroom	MEAN	3.26	2.59	3.34	3.19	4.2	3.35	3.54	3.31	2.9*	1.31	9.3**
	STD	1.14	1.28	1.18	1.31	1.11	1.46	1.27	1.55	(0.039)	(0.27)	(0.002)

Figures in brackets are probability values

* $p<0.05$ ** $p<0.01$ *** $p<0.001$

1 -By using procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) we find that **KS** behaves differently from **KI**.

An inspection of the findings presented in table 7.11 reveals that in the control group there was a significant time by school interaction effect (Wilks' F=3.49, p<0.05) in **peers' explanations,** that is asking friends to explain subject matter which is not understood. By using a procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) it was found that school ***KS*** behaves differently from school ***KI*** with regard to this item. In school **KS** there was an increase in pupils' response to this item, from 3.17 on the "pre" to 3.54 on the "post".

There were no significant interactions with regard to the rest of the responses of the control group.

The responses of the participants from the experiment group with regard to the effectiveness of the media used in English lessons are presented in table 7.12.

Table 7.12: Pupils' responses concerning the effectiveness of the media used in English lessons (experiment group)

		Experiment Group										
To what extent do you feel that the following helps you in your study of English?		**A**		**H**		**O**		**R**		**School Effect**	**Time by School Effect**	**Time**
		Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**F**	**F**	**F**
	N	32	32	24	24	23	23	20	20			
The teacher's explanation	MEAN	3.81	3.47	4.08	4.25	3.22	3.7	3.1	2.9	8.51***	3.7* [1]	0.06
	STD	0.93	1.11	0.72	0.79	0.8	0.82	1.17	0.85	(0.0001)	(0.014)	(0.79)
Peers' explanations	MEAN	3.13	3.22	3.21	3.33	3.3	3	3.1	2.9	0.36	1.18	0.52
	STD	0.98	0.94	1.1	1.09	0.97	0.9	0.97	0.97	(0.78)	(0.32)	(0.47)
Textbooks	MEAN	3.44	3.63	3.46	3.71	3.65	3.78	3.4	3.55	0.38	0.057	2.7
	STD	1.05	1.16	0.78	0.95	0.98	0.8	0.94	0.89	(0.77)	(0.98)	(0.103)
Worksheets	MEAN	3.41	3.38	3.08	3.46	3.3	3.43	3.35	3.2	0.13	1.02	0.54
	STD	0.91	1.07	1.1	1.02	0.97	1.2	0.93	0.83	(0.94)	(0.39)	(0.46)
Learning with a computer	MEAN	3.75	3.22	2.71	2.67	2.87	2.83	3.35	2.75	2.81*	1.89	7.63**
	STD	0.92	1.13	1.27	1.43	1.42	1.23	1.18	1.25	(0.044)	(0.136)	(0.007)
Homework	MEAN	3.66	3.44	3.04	3.33	2.86	3.22	3.3	3.25	1.65	1.48	0.4615
	STD	1.04	0.98	1.04	1.01	0.94	1.13	1.26	1.21	(0.18)	(0.22)	(0.49)
Tests and quizzes	MEAN	2.91	3.06	3	3.33	2.7	3.04	3.6	3.35	1.57	1.21	1.53
	STD	0.86	1.11	1.22	1.05	1.29	1.4	1.14	1.14	(0.20)	(0.31)	(0.22)
Independent study	MEAN	3.69	3.34	3.5	3.5	3.83	3.61	3.5	3.95	0.45	2.38	0.06
	STD	1.12	1.1	1.29	0.88	1.03	1.12	0.83	0.83	(0.71)	(0.075)	(0.8)
Active participation in classroom discussions	MEAN	3.81	3.13	3.46	3.42	3.43	3.13	3	3	1.26	1.67	4.15*
	STD	0.98	1.04	1.22	1.02	1.04	1.25	0.97	1.3	(0.29)	(0.18)	(0.04)
Working in groups	MEAN	2.97	2.91	3.04	2.96	2.74	2.5	2.8	2.8	0.92	0.16	0.67
	STD	0.97	0.93	1.12	1.12	0.86	1.01	1.15	1.11	(0.44)	(0.92)	(0.42)
Doing projects in English	MEAN	3.41	3.16	2.83	3.21	3.09	2.52	3.2	2.85	1.23	2.47	2.41
	STD	1.1	1.22	1.09	1.25	1.04	0.99	1.06	1.04	(0.3)	(0.07)	(0.12)
The atmosphere in the classroom	MEAN	3.84	3.59	3.71	3.67	2.78	2.43	3.45	3.35	5.57**	0.27	1.95
	STD	1.17	1.29	0.95	1.2	1.59	1.31	1.15	1.39	(0.0015)	(0.84)	(0.166)

* $p<0.05$ ** $p<0.01$ *** $p<0.001$ Figures in brackets are probability values

1 -By using procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) we find that **A** behaves differently from **O**.

Table 7.12 shows that there was an overall significant school effect (Wilks' F=8.51, p<0.001), and a significant time by school interaction effect (Wilks' F=3.7, p<0.05) for **teacher's explanation** in the experiment group. By using a procedure of simultaneous comparisons (Scheffe) on the differences (post-pre) it was found that school ***A*** behaves differently from school ***O***. In school ***A*** the average response on the "pre" was higher (3.81) than the "post" (3.47), whereas in school ***O*** the findings show an increase from 3.22 on the "pre" to 3.7 on the "post". That is, pupils in school ***O*** attributed more importance to the teacher's explanation at the end of the year than they did at the beginning. However, in school ***A*** pupils seem to attribute less importance to the teacher's explanation.

Research Question Four – Affective Characteristics

The fourth research question deals with pupils' attitude to English lessons. It relates to the following aspects: the comparison of different types of instruction, pupils' attitude to the study of English, their attitude to classroom activities, and their preferred mode of learning English. The findings are based on an analysis of pupils' questionnaire.

Affective characteristics

Acquiring knowledge is not the only goal of teaching and should not be used as the single measure of success of teaching and learning. Affective characteristics need to be taken into account in the process of assessment and evaluation of the introduction of a change. The attitude questionnaire administered to pupils was designed to discern pupils' satisfaction with the teaching process, the materials and activities used and the discipline itself, and their preferred mode of learning.

Satisfaction with the teaching process: Table 7.13 shows pupils' average responses to questions concerning their satisfaction with English lessons.

Table 7.13: Pupils' attitudes to their English lessons (both groups)

		Control		Experiment		Total Pre		Time	
		Pre	Post	Pre	post		Post	F	P
	N	99	99	99	99	198	198		
English lessons are interesting	MEAN	3.27	3.01	3.3	3.16	3.29	3.09	6.9**	0.009
	STD	1.09	1.09	1.13	1.19	1.11	1.14		
English lessons are fun	MEAN	2.63	2.58	2.69	2.86	2.66	2.71	1.1	0.29
	STD	1	1.2	1.06	1.21	1.03	1.21		

* p<0.05 ** p<0.01 *** p<0.001

No significant Group or Time by Group interaction effect for any of the above items.

The findings in table 7.13 show that even though pupils are quite pleased with their English lessons, there was a decrease in their satisfaction with lessons between the first administration of the test (3.29) and the second (3.09). No significant group or time by group interaction effect was found.

Pupils' average responses on the "pre" to the item **English lessons are fun** was 2.66 and 2.71 on the "post". There was no significant group by time interaction on this item. There was no change in pupils' perceptions of English lessons between the beginning of the year and the end.

Satisfaction with the materials and activities used: Pupils were asked to rate their answers on a scale which ranged from one to five; not at all (1), a little (2), average (3), much (4), very much (5). Table 7.14 shows pupils' responses to the items concerning their attitude to the materials and activities used in class, at the beginning of the treatment and at the end of it.

Table 7.14: Pupils' average responses regarding materials and activities used in the classroom (control and experiment)

To what extent do you feel that the following helps you in your study of English?		Control		Experiment		Total		Time	Time by Group
		Pre	Post	Pre	Post	Pre	Post	F	F
	N	99	99	99	99	198	198		
The teacher's explanation	MEAN	3.93	3.61	3.6	3.6	3.76	3.6	4.26*	4.26* [1]
	STD	0.99	1.18	0.98	1.02	1	1.1	(0.04)	(0.04)
Peers' explanations	MEAN	3.18	3.09	3.18	3.13	3.18	3.11	1.0	0.09
	STD	0.85	0.98	0.99	0.98	0.92	0.98	(0.32)	(0.77)
Textbooks	MEAN	3.54	3.44	3.48	3.67	3.51	3.55	0.39	3.61
	STD	0.85	0.84	0.94	0.97	0.89	0.91	(0.53)	(0.06)
Worksheets	MEAN	3.31	3.53	3.29	3.37	3.3	3.45	3.55	0.73
	STD	0.85	1.03	0.97	1.04	0.91	1.03	(0.06)	(0.39)
Learning with a computer	MEAN	2.84	2.76	3.21	2.9	3.03	2.83	4.41*	1.96
	STD	1.21	1.2	1.25	1.26	1.24	1.23	(0.037)	(0.16)
Homework	MEAN	3.48	3.24	3.26	3.32	3.37	3.28	1.67	3.92* [2]
	STD	0.96	1.04	1.1	1.06	1.03	1.05	(0.19)	(0.049)
Tests and quizzes	MEAN	3.47	3.48	3.02	3.18	3.25	3.33	0.93	0.73
	STD	1.12	1.2	1.14	1.16	1.15	1.19	(0.33)	(0.39)
Independent study	MEAN	3.57	3.53	3.64	3.57	3.6	3.55	0.45	0.33
	STD	1.01	1.13	1.08	1.01	1.05	1.07	(0.5)	(0.85)
Active participation in classroom discussions	MEAN	3.45	3.25	3.47	3.17	3.46	3.21	7.56**	0.22
	STD	1.06	1.27	1.08	1.13	1.07	1.2	(0.006)	(0.64)
Working in groups	MEAN	3.03	2.77	2.9	2.81	2.96	2.79	4.69*	1.09
	STD	0.86	0.97	1.02	1.03	0.94	1	(0.03)	(0.29)
Doing projects in English	MEAN	3.21	3.35	3.15	2.96	3.18	3.15	0.14	2.8
	STD	1.08	1.09	1.08	1.16	1.08	1.14	(0.71)	(0.1)
The atmosphere in the classroom	MEAN	3.52	3.03	3.48	3.29	3.5	3.16	12.07***	2.26
	STD	1.2	1.38	1.28	1.36	1.24	1.38	(0.0006	(0.13)

* $p<0.05$ ** $p<0.01$ *** $p<0.001$ Figures in brackets are probability values

[1,2] – No significant difference between pre and post in the experiment group,
Significant difference between pre and post in the control group: 1- ($t=2.71$ $df=98$ $p=0.008$); 2 - ($t=2.38$ $df=98$ $p=0.019$).

The findings in Table 7.14 show that the average response to **textbooks** on the "pre" was 3.51 and 3.55 on the "post". A similar rating was given by pupils to the item **worksheets** – 3.3 on the "pre" and 3.45 on the "post". There was no significant group or time by group interaction effect for these items.

Table 7.14 also shows pupils' responses to **classroom activities**. The findings show that the average response to **homework, tests and quizzes** was rated higher than other items related to classroom activities. Thus, pupils rated homework 3.37 on the "pre" and 3.28 on the "post", and tests and quizzes were rated 3.25 on the pretest and

3.33 on the posttest. There was no significant interaction effect for this item, however, there was a significant time by group interaction effect (Wilks' F=3.92, p<0.05) in the item homework. The source of this interaction effect is not due to a significant difference between the "pre" and the "post" in the experiment group, but rather from a significant difference between the two administrations in the control group (t=2.38, df=98, p=0.019). Pupils in the control group seem to have less "faith" in the effectiveness of homework for their progress in English.

Pupils' attitude to **doing projects** is positive; the overall average response on the "pre" was 3.18 and on the "post" it was 3.15. No significant time effect, or time by group interaction was found. Pupils believe that doing projects in English contributes to their learning of the subject. A similar attitude was shown towards **learning with a computer** even though it was rated lower than doing projects. The average response was 3.03 on the "pre" and it decreased to 2.83 on the "post". No significant interaction effect was found for this item, but the table shows an overall significant overall time effect (Wilks' F=4.41, p<0.05). Having a significant overall time effect means that the average response on the "pre" was higher (3.03) than the average response on the "post" (2.83).

The findings about pupils' responses to **working in groups** show that pupils do not have much confidence in this classroom activity as contributing to their learning. The average response was 2.96 on the "pre" and it decreased to 2.79 on the "post". Table 7.14 shows that there was an overall significant time effect (Wilks' F=4.69, p<0.05).

Importance of studying English: Pupils' attitude to learning English was examined by the following two items: "How important is it for you to know English?", and "Do you like to study English?" Pupils were asked to rate their answers on a scale which ranged from one to five; not at all (1), a little (2), average (3), much (4), very much (5). Table 7.15 shows pupils' average responses to these items.

Table 7.15: Pupils' attitude to English lessons (control and experiment groups)

		Control		Experiment		Total		Time
		Pre	Post	Pre	Post	Pre	Post	F
	N	99	99	99	99	198	198	
How important is it for you to know English?	MEAN	4.78	4.76	4.85	4.86	4.81	4.81	0.02
	STD	0.51	0.57	0.46	0.43	0.48	0.51	(0.89)
Do you like to study English?	MEAN	3.79	3.7	3.88	3.67	3.83	3.68	4.12*
	STD	0.85	1.07	0.84	1.01	0.84	1.04	(0.044)

* $p<0.05$ ** $p<0.01$ *** $p<0.001$ Figures in brackets are probability values
No significant Group or Interaction effects. (P-values for these effects are larger than 0.1)

The findings in Table 7.15 show that pupils consider learning English very important; the average response on the "pre" and the "post" was 4.81. No significant group or interaction effects were found for this item. However, their responses to the item concerning their liking of lessons were lower. Table 7.15 shows that there was an overall significant time effect (Wilks' F= 4.12, $p<0.05$) for this item. That is, across groups the average pretest response was higher (3.83) than the average posttest response (3.68). These findings illustrate the discrepancy between pupils' beliefs that they need to know English, and between the classroom reality, which might not contribute to pupils' liking of a subject they consider very important.

Pupils' preferred mode of learning: In order to respond to this aspect, pupils were asked to rank four options where choice number one was the most preferred and four the least preferred. An analysis with repeated measures was performed on each of the four items. Table 7.16 shows the average responses to pupils' preferred mode of learning.

Table 7.16: Pupils' preferred mode of learning (both groups)

		Control		Experiment		Total		Time	Group	Time by Group
I prefer to study		Pre	Post	Pre	Post	Pre	Post	Chi-Square (p)	Chi-Square (p)	Chi-Square (p)
	N	99	99	99	99	198	198			
in groups of 2-4 pupils	MEAN	1.9	2.16	1.85	1.73	1.87	1.94	0.86	6.37*	6.34*
	STD	0.87	0.93	0.87	0.78	0.87	0.89	(0.35)	(0.012)	(0.012)
in groups of 6-8 pupils	MEAN	2.93	2.98	2.69	2.86	2.81	2.92	1.91	3.25	0.57
	STD	0.94	0.89	0.94	0.87	0.95	0.88	(0.17)	(0.07)	(0.45)
with the whole class	MEAN	2.91	2.85	3.12	3.35	3.02	3.1	0.76	8.17**	2.2
	STD	1.2	1.23	1.14	0.92	1.17	1.11	(0.38)	(0.004)	(0.14)
alone	MEAN	2.27	2.06	2.39	2.06	2.33	2.06	8.9**	0.22	0.44
	STD	1.11	1.1	1.15	1.09	1.13	1.09	(0.003)	(0.64)	(0.5)

* $p<0.05$ ** $p<0.01$ *** $p<0.001$

[1] No significant difference between pre and post for the experimental group,
Significant difference between pre and post for the control group (t=2.35 df=98 p=0.02)

Table 7.16 shows an overall significant group effect (Wilks' F=6.9, p<0.01), and a significant time by group interaction effect (Wilks' F=6.1, p<0.05) for **studying in groups of 2-4 pupils**. As for the interaction effect, t-tests conducted to examine the differences between "pre" and "post" responses for each of the groups show that the decrease from 1.85 on the "pre" to 1.73 on the "post" in the experiment group was not significant, whereas the increase from 1.9 on the "pre" to 2.16 on the "post" in the control group was significant (t=2.35, df=98, p=0.02). Pupils in the control group seem to prefer to study in groups of 2-4 more than pupils in the experiment group. The least preferred mode of learning by pupils was **studying with the whole class.** The average response on the "pre" was 3.02 and on the "post" it was 3.1.

The findings reported in this chapter pertain to the four research questions explored in the study. In general, the findings show that computers had a limited impact on pupils' perceptions of learning, their academic self-efficacy and attitude to English lessons. Despite the use of computers in schools pupils still prefer to study with teachers. Both the quantitative and qualitative data reveal that pupils consider having knowledge of English as important for their future, academic or otherwise. But, they do not like to study English in their respective classrooms.

Teachers' attitude to the use of computers in the experiment group was positive, whereas teachers in the control group were more sceptical about the effectiveness of computers in the EFL classroom for pupils' progress.

Qualitative findings

This chapter describes themes and issues which emerged in the process of interviewing teachers and pupils from both the experimental and control group. The interviews with the 18 pupils took place at school, after school hours, and interviews with teachers (eight all together) took place either at school or in their homes. The themes which emerged in teachers' accounts relate to the following areas:

- Attitude to a new technology
- Perceived changes and personal development
- Teachers' role in the classroom

Teachers

Attitude to a new technology

Two groups of eight teachers, four from the experiment group and four from the control group, were interviewed in order to gain insights into their views and experiences of teaching English to tenth grade pupils during the previous school year and in so doing to gain insights into the learning experiences offered to the pupils, a sample of whom was also interviewed. The two groups of teachers were broadly matched for experience and school type (see chapter six - methodology), however, the experimental group had all undertaken a course in teaching English through computers with the Israeli Open University, while the other teachers had not. Interviews were transcribed and subject to analysis as described in chapter six. The intention was, by a process of progressive focusing, to categorise their comments in order to compare the two groups and to look for differences and similarities within the groups. The following tables summarise teachers' responses to the first part of the interviews in which they were asked what they thought about using computers in their classroom. It must be pointed out that, in response to this question the experimental group were much fuller in their answers, touching on a number of different issues, such as the advantages and disadvantages of computers, while the control group gave very general responses. This is an example of a response given by a teacher from the experimental group who answered the question with *They use authentic English. They do not know it but they learn English from the Internet, from finding information, summarising it, answering questions. English comes in a natural way for them. They can find lyrics of their favourite songs on the Internet. They love it. It motivates them. People do things better if they enjoy doing them.*

While a control group teacher responded, *I like computers. I use the computer for my personal professional needs, such as crosswords, worksheets and tests.* In consequence, in presenting tables in which responses have been categorised it will be seen that there are a number of categories which present responses from the experimental group only.

Table 7.17 - Question: *What do you think about using computers in your classes?*

	Category of response	Experimental group	Control group
General view of computers in class	**In favour – non specific** * *"I am very much in favour".*	2	3
	Computers are fun *"Computers help pupils. They love it"*	1	0
	Computers not proven *"Scientifically it has to be explored; to check whether pupils, who study with computers, know English more than those who do not use."*	0	1
Advantages of computers for pupils	**Technical** *"They also learn how to use power point".*	7	0
	Coping with information * *"They learn how to find information, what to do with this information."*	3	0
	Computer as a private teacher *"They are like private teachers".*	10	0
	Aesthetical * *"It is more interesting to read from the screen than from a piece of paper".*	5	0
	Computer as a learning tool *"Computers help pupils not only with reading, but also with listening".*	11	0
Advantages of computers for teachers	**Computers as a means of control** * *"I can see them reading".*	4	0
	Personal * *"It is the variety of information which I can't give".*	4	0

Apart from the one considered negative response asking for proof of their value, the control group seems to have given little thought to the ways in which computers can be used in the classroom. The experimental has clear views of the value of computers to aid learning, and perhaps, are not threatened by the possibility that the computer can be a 'teacher' and might even provide more than the teachers themselves can.

Actual Use of Computers

Table 7.18 - Question: ***What kind of activities do pupils do with computers? Can you describe a typical lesson?***

	Category of response	Experimental group	Control group
Approaches to use in classrooms	**Personal use** *"I also take from the Internet, because it is a source of data".*	**0**	**4**
	The computer as a supplement * *"We use the Internet to find more news all over the world".*	**2**	**0**
	Use of the computer as a word processor **"They use "word" for writing their projects*	**2**	**0**
	Paper based substitute for 'them' **"They are using the computer as a substitute for a textbook."*	**3**	**0**
	Use: pupils' interests * *"They can find lyrics of their favourite songs on the Internet".*	**2**	**0**
Reasons for not using the computer	**Class size** *The class is big*	**0**	**2**
	Technical aspects *"We don't use computers because of technical problems in the school".*	**0**	**4**
	Inadequate software *"...because of problems with the program".*	**0**	**3**
	Personal *"It is a load we do not think we can cope with at the moment".*	**0**	**2**
	Pupils' limitations *"I imagine some of them will be afraid to use the computers".*	**0**	**4**
	Limited time available *"...a very short time available".*	**0**	**2**

What is startling here is that teachers from the control group mentioned the use of computers for themselves, as a means to gather teaching resources; all their comments began with 'I'. Whilst the experimental group talked about 'We' or 'They', meaning their pupils. The control group simply take information from the computer for use in classroom whilst pupils in the experimental group teacher's classrooms make use of the computer for themselves. Having said this three of the four teachers in the experimental group described uses of computers which were essentially a substitute for paper, for example a cloze procedure presented on screen rather than on paper. On the other hand, it was only the control group teachers who expanded, not on their use of computers in class, but on reasons for not using them.

Discussion

Teachers from the control group perceived computers as a convenient source of data, which they all used extensively to supplement subject matter introduced in class. It is convenient for them because of its accessibility and the ease with which information on various topics can be obtained; teachers found computers useful for their own needs. They expressed a positive attitude to computers, but showed reluctance to use them in their respective classrooms. Interestingly, none of these teachers referred to the advantages computers offer learners, rather, when asked about their views concerning the use of computers at school, the teachers said they were all for it, and only one was sceptical as to the usefulness of computers: *Scientifically it has to be explored, to check whether pupils who study with computers know English more than those who do not use. This is my opinion. Personally, I do not think that anybody up to date has an answer. This is a new thing. I read articles even in the English Teachers' Journal, written by teachers, that after all the revolutions in the teaching of English the traditional way has proven itself.*

This teacher was the only one who openly expressed her reservations concerning the effectiveness of computers, and expected some kind of scientific proof as to their pedagogic advantage. Nevertheless, they all justified their reluctance to use computers mostly in technical aspects; lack of technical support, the limited time they have - only four hours of English a week, *the class is big* [thirty eight pupils] *and* *there are only twenty computers, we have to book the room in advance and many teachers want the computer room.* Some of them referred to the human factor as interfering in the use of computers; pupils do not know how to use computers and teachers will have to teach them the mechanics of computers, and one teacher even referred to pupils' fear of computers: *...you have to work on them not to be afraid of it* [the computer]. *It is funny because they are young and I am older, and I should be afraid of using computers.*

It seems that these teachers were protesting too much in their efforts to justify their avoidance of the use of computers. They were all for computers but not in their classrooms. They did not come up with strong, professional arguments against using computers, but rather held to the "objective" technical difficulties they encounter daily at school. It did not occur to them, it seems, that technical problems could be solved by technical arrangements with the help of the administration.

Teachers from the experiment group were enthusiastic about the use of computers in the classrooms and, unlike teachers from the control group, were fairly eloquent about the advantages computers offer for both learners and teachers. These teachers believed that computers offer numerous advantages for learners, which can be described as technical, pedagogical, and aesthetical.

The technical advantages teachers mentioned referred to pupils' ability to locate sites, to sift through data sources and decide what information is relevant for them, and to learn how to use the computer as a word processor. They believed that possession of such skills is an integral and important part of the learning process.

The pedagogical advantages for learners refer to pupils' ability to progress at their own pace, pupils get immediate feedback on their performance, and they are offered a variety of texts on a similar topic. They are also able to develop each of the four skills they need to progress in English: reading, writing, listening and speaking. Thus, these teachers, unlike those from the control group, perceive the computer as a learning device, which can help pupils progress in their learning, rather than a resource instrument, which is merely used to supplement classroom activities.

The aesthetic advantages derive from the variety of pictures and graphics available on the computer. All these features contribute, teachers maintain, to pupils' motivation to study English, because they make the learning process more interesting and enjoyable.

The advantage of computers for **teachers** was that they served as a means of control in the classroom; teachers could see whether pupils were doing the tasks assigned. One of the teachers explained that *when they work with computers I can see them reading*. In addition, computers contribute, teachers believe, to their performance in the classrooms as they offer a variety of features, which may make the learning process more interesting and attractive for learners; the computer as a rich resource centre, and the visual advantages it offers.

It seems, then, that even though both groups, the experimental group and the control group, had similar teaching conditions, they were all experienced, had the same number of pupils, and had access to computers, the teachers from the experimental group were more prepared to try the innovation computers offered. In their reports they did not mention any of the technical difficulties teachers from the control group mentioned as interfering in their attempts to use the new technology. Nor did they find pupils unable to use computers; on the contrary, one of the teachers explained that *most of the students are good at using the computer.* Those who are not so proficient at using the computer pair with friends and together they work on their assignments, each contributes either with his/her technical knowledge or knowledge of subject matter

Perceived Changes and Personal Development

The following describes teachers' experience with and impressions of the course of incorporating technology into English lessons they attended. The table below shows the impact of the course on their pedagogy, and on their attitude to learners in their respective classrooms. The table summarises their responses concerning the impact of the course on their daily practice.

Pedagogical changes

Table 7.19: Question: ***What do you think of the Open University course for incorporating technology into English lessons?***

	Category of response	Experimental group
Pedagogical changes	**Traditional, teacher centred pedagogy** *"...be afraid of these [*group and pair work*] kind of activities".*	5
	General *"I make better use of time-students share the activities. It's less boring for the pupils"*	8
	Integrative methodology *"My lessons are integrative now".*	4
Change in attitude to learners	**Awareness of pupils' needs** *"I am more aware of the needs of the students".*	7

Teachers' responses concerning the impact of the computer course they participated in reflected pedagogical changes and a change in attitude to learners. Their answers reflect a process in which teachers changed their pedagogy from being teacher centred to pupil centred, in addition to learning new teaching strategies. Andrea described the impact of the course as follows: *My approaches to teaching have changed a lot. I am more open than I used to be. I used to be very traditional and very strict. It* [the course] *enlarged my views.*

They all emphasised the insight they gained from the possibilities integrative lessons offered to classroom atmosphere. They realised that using integrative methodology would reduce discipline problems, on the one hand, and make lessons more interesting, on the other. In addition to the fact that such methodology enhances learning and understanding on the part of pupils. Teachers also gained more self-confidence in using techniques which in the past they refrained from using, for example doing pair work and using jigsaws. Elana explained that *I have strength in some of the techniques I was too lazy to use. Like jigsaws*

As far as teachers' attitude to learners is concerned, the course made them more tuned to pupils' needs, for instance, they realised that they should not spend a whole lesson teaching only one aspect of language learning such as grammar. This is because it is boring for pupils. In more general terms, teachers understood that they should be more aware of learners' various needs, and therefore, they design classroom activities around pupils' personalities and learning styles. Irena said that *I understand pupils more. I know what they like.* Finally, pupils have become more active participants in the learning/teaching process. Rather than expecting them to sit passively in the classroom and do the exercises assigned, teachers made pupils more involved in their own learning. This was done by asking pupils to bring songs of their choice to lessons, in addition to allowing pupils have a say in the type of exercises and homework assigned to them. Thus, part of the learning process became negotiable for learners. In this sense teachers gave up some of the control they had on the learning process and transferred it to learners.

Veronica summed teachers' responses with regard to the change they underwent by saying that *the course let me understand that the focus should be on the pupils and not on the teacher.*

Teachers' role in the classroom

The following table describes how teachers perceive their role in the classroom, and the strategies they use in order to achieve their goals. Teachers' responses show that both groups understand that lessons have to be interesting for learners, but the means they use for obtaining this goal are different. When teachers from the control group were asked to explain why they use those particular strategies they came with a general explanation that 'it helps pupils', whereas others, in fact an equal number of respondents from both groups, referred to the pedagogic importance of the strategies they use in their classrooms. Interestingly, compared with the general 'It helps pupils' response, the majority of teachers from the experimental group explicitly mentioned 'motivation' as a reason for selecting some of the strategies, whereas only one teacher from the control group referred to it. Does it have to do with the course they took, which made them more tuned to pupils' needs? Teachers, mostly from the control group, also explained why they refrain from introducing some activities; they are concerned about difficulties pupils may encounter in their attempt at coping with such activities.

Table 7.20: Question: ***How can we help pupils progress in English?***

	Category of response	Experimental group	Control group
Duties and obligations	**Interesting lessons** **I try and make lessons interesting.*	5	4
Strategies selected by teachers	**Humour** ** When I teach grammar I try to use a lot of sense of humour.*	0	1
	Intonation ** I change my tone of reading and intonation.*	0	2
	Involving pupils **Usually the pupils bring the songs.*	3	3
	Pupils' working with peers *Pupils work in pairs.*	3	2
	Reading texts **I read the text for pupils.*	1	5
	Vary activities in a lesson ** I try to integrate all skills and not to focus on one skill.*	4	2
	Selection of authentic texts **We use authentic English.*	1	4
Justification of strategies selected	**Helps pupils** ** It helps them remember the teaching point.*	3	5
	Improves attitude **It improves pupils' attitude to English.*	0	2
	Motivation ** They are part of the motivation process.*	6	1
	Pupils' concentration *...because they lose their concentration.	0	3
	Pedagogical *Everything is important.*	4	4
	Technical *...because it is a very big class	0	2
	General ** The preparation of pupils to life situations.*	1	0
Teachers' avoidance of certain strategies	**Oral activities** ** Oral activities are not done much.*	0	2
	Reading **In literature lessons I don't let the pupils read the text out loud.*	0	1
	Group work **I know that group work may help, but I haven't tried it with this class yet.*	0	1
	Providing the site **I provide the site. They don't do the surfing.*	2	0
	Projects **I don't fancy assigning big assignments*	1	0
Teachers' justification of avoidance	**Noise** ** ...because of the noise. Some of the pupils who really want to listen can't because of the noise.*	0	2
	Difficult for pupils **Because it is difficult for them.*	2	1
	Unsure about effectiveness **I know how to do group work, but even with this class I have my own doubts*	0	1
	Laziness **I don't fancy assessing big assignments because we have to decide about assessment procedures*	1	0

When teachers, from both groups, provide an account of their responses they are heard to attend to their duties and obligations towards their pupils. These duties involve the use of strategies the purpose of which is to achieve what they perceive as pupils' cognitive and affective needs in the process of learning. Thus, a major element in their reports is the need to provide pupils with an **interesting** learning environment. They believe that such an environment is necessary to enhancing pupils' involvement in the learning process; they become more interested and motivated. In order to reach this end, in the process of preparing their lessons, teachers, especially those from the control group, select authentic texts which they perceive to appeal to the particular age group they are teaching, for example, texts on the body language of the first date. By authentic, teachers refer to texts which they download from the Internet, rather than the texts they have in the textbooks, and which are especially written for pupils. Or, they introduce texts which are related to current issues. They believe that these types of texts, because of their relevance, enhance pupils' motivation to study English.

Another element, which was more emphasised by teachers from the experiment group, and which is involved in maintaining an interesting learning environment is teachers' awareness of the need to vary the activities in a single lesson; the justifications they provide for such a need are mostly pedagogical, that is, pupils need to have a command of all the four skills necessary for the acquisition of a foreign language. Therefore, teachers' responsibility is to introduce activities which involve reading, writing, listening and speaking in a single lesson. Nevertheless, one of the teachers (control group) explained the need to vary the activities in technical terms; the size of the class: *A frontal lesson can take maximum ten minutes. Then you have* *to make them work.* What is also implied here is the need to take into account pupils' concentration span. Pupils cannot sit and only listen to the teacher for fourty five minutes; they need to be engaged in other activities.

Subject matter has to be introduced in different and interesting ways, for example, some of the teachers resort to entertainment strategies in order to draw and maintain pupils' attention in the process of learning. Therefore, a teacher from the control group resorts to humour in order to explain a grammatical point, because she believes it helps pupils remember what is taught. Other teachers from the control group try and make an effective use of their voice when they read a text to pupils; they believe that such a strategy contributes to making the lessons more interesting and entertaining for pupils. Irena (experiment) summed it as follows: *Activities should be fun, interesting, and challenging because they are part of the motivation process.* Thus, teachers are aware of the link between the activities they use in the classrooms and their impact on pupils' motivation to learn.

In general, teachers seem to be tuned to pupils' needs in the process of teaching; therefore, they all allow pupils to bring into the classrooms the lyrics of their favourite songs. In this way, there is a sort of a division of work in the classroom; pupils are in charge of the fun aspect of the lesson, and teachers of the more pedagogic part, such as the selection of texts. In addition, such "symbiosis" may cause pupils to have a sense of influencing and contributing to the teaching/learning process. However, throughout the interviews, and most interestingly, teachers justified their selection of some of the classroom strategies by saying that 'the pupils like it'. For instance, Eris (control) maintained that *they like to read and I let them read,* or, Andrea (experiment), who explained that pupils work in pairs by the computers *because they prefer it. Because it is fun.* Teachers' concern, it seems, is whether pupils like the activities they get in the classroom. If they do, as in working with peers, then teachers perceive it as an activity which should be used; pupils' needs and preferences dictate the choice of classroom activities. Teachers try and adapt themselves to pupils' affective and cognitive needs. Thus, teachers maintain, some of the pupils like to work with peers because it is more fun; they feel more comfortable because their partner knows how to use the computer better. On the other hand, there are those who prefer to work with peers because it gives them an opportunity to discuss subject matter with them, or to make use of their academic strengths. For instance, a pupil may be good at writing, whereas his/her partner may be good at another area, by working together each pupil makes the best use of his/her strengths, which ultimately might cause pupils to be more confident about school work.

It should be pointed out that some of these strategies, as in the first example where the teacher lets pupils read, are in contrast to the Inspectorate's regulations, but the justification teachers provide has a moral and professional value. They are concerned about pupils' needs, which are no less important than the formal regulations. They are aware of the regulations, Hanah (control) said that *once we were told by the Inspectorate that letting pupils read aloud is a mistake, because it is not what we want to teach. If pupils need to improve their reading it should not be done in this way* [reading aloud], *they should improve it elsewhere.* Nevertheless, teachers do what they believe is best for pupils.

In a similar manner, they justified their **avoidance** of some pedagogic strategies with the explanation that pupils do not like it or do not benefit from it. Therefore, some of them do not use group or pair work because of the noise involved which interferes with some pupils' learning. Hanah's (control) explanation illustrates this: *Many teachers, and pupils, who have experienced group - work have reservations about this way of teaching/learning. They* [pupils] *don't feel they learn in this way, and I feel the same.*

A somewhat different justification of classroom practice was provided by Elana (experiment): *I provide the sites* [on the net]. *They do not do the surfing. Because it is the beginning now, at their present level, I don't think that their English is good enough to do the surfing on their own. If they do, I'm afraid that many of them will be put off by the amount of English, where they will have to assess and judge which site answers their needs.* ***I took a whole year course for that purpose.*** *If I put the key words on the blackboard for them to find the sites I know it will take them a long time.* ***I know how long it takes me to do it at home.*** This teacher justifies her "spoon feeding" of learners by attributing to them the difficulties and insecurities she encounters in the process of preparing her computer assisted lessons. It seems that it does not occur to her that pupils might not need the same time to learn the intricacies of computers as she needed. Furthermore, they might be proficient at the use of computers, but she never put it to the test; she did not find out from pupils about their knowledge of computers. This strategy also has a moral and professional value, as the teacher takes into account what she perceives as pupils' difficulties, and attempts at reducing them or dealing with them. This is similar to control group teachers who do not use computers at all because pupils are not proficient at using them or do not feel comfortable with them.

Teachers understand the pedagogical value involves in varying classroom activities; that learning English effectively does not entail a focus on one skill per lesson. Rather, pupils need to be exposed to all four skills in a unit of time in order to maximise learning outcomes. However, this understanding of their professional responsibility towards pupils does not interfere with another understanding they have, and that is an awareness of their professional limitations.

The following table describes the limitations teachers perceive as interfering with their practice.

Table 7.21: Teachers' perceived limitations

	Category of response	Experimental group	Control group
Limitations in helping pupils	**Pupils do not cooperate** **I tell them they can come to me on my free periods, but they never come.*	0	2
	Pupils need private teachers ** Sometimes they need private lessons*	0	2
	Teachers cannot cater for pupils' needs **I try and make lessons interesting, but I can't dance every lesson.*	0	2
	Computers as private teachers **...computers...are like private teachers*	4	0

It is interesting to note that only teachers from the control group referred to their limitations in the teaching/learning process, and their inability to cater to pupils' needs. Teachers from the experiment group, on the other hand, explicitly said that if pupils encounter problems in computer lessons 'they are there to help them'.

Discussion

Despite teachers' attempts at being tuned to pupils' affective and cognitive needs, they are aware that they are quite **limited** in their abilities to reach their pedagogic goals with the majority of learners. One of teachers, from the control group, admitted that they *can't help these pupils* – those who encounter difficulties in the process of learning English, and that *sometimes they need private lessons. This has to be said.* Teachers, from both groups, are also aware that they are limited in their ability to provide a variety of texts, and therefore they find computers very effective for this purpose. Computers are also beneficial for meeting other limitations teachers have; they provide immediate feedback to learners, whereas teachers because of class size are unable to do this. The same is with tests – teachers need a considerable time to return pupils' tests, whereas computers provide the feedback on the spot. Computers are like private teachers, who monitor pupils' learning according to their current level of knowledge.

Finally, teachers admit that despite their attempts at providing pupils with interesting lessons, they cannot always do it. A teacher from the control group described it vividly: *I try and make lessons interesting, but I can't dance every lesson.*

To summarise, teachers describe their relationship to pupils as primarily grounded in professionalism, and therefore leading to actions embodying more pedagogical dimensions of responsibility and knowledge. Nevertheless, they realise that they cannot always carry out their professional responsibilities.

Pupils

The findings in the following chapter describe tenth grade pupils' experiences in learning English in Israel. These experiences were gleaned from semi - structured interviews with learners from both the experimental and control group. The areas which emerged in analysing the interviews are as follows:

- Pupils' perceptions of subject matter
- The role of teachers
- Pupils' preferred mode of learning
- Perceptions of computers in the learning process
- Pupils' coping with problems

Pupils' perceptions of subject matter

The pupils who participated in the interviews were stratified according to their attitude to computers and their academic self-efficacy. The stratification was based on calculating the average of all items related to computers and pupils' self-efficacy. From the fifty-four pupils who were approached, eighteen pupils with both high self-efficacy and low self-efficacy and positive or negative attitude to computers agreed to be interviewed.

The qualitative findings reported below are a summary of themes which emerged from the data; these themes relate to the areas of pupils' perceptions of subject matter, and their attitude to computers, their perceptions of the role of teachers in the classroom, their perceptions regarding working with peers, and finally, the strategies pupils use for coping with academic problems.

The following table describes pupils' perceptions of English as a subject taught at school, and their attitude to their own English lessons.

Attitude to English as a subject taught at school

Table 7.22: Question: ***Is it important for you to study English? Why?***

	Category of response	Experimental group	Control group
Attitude to English language	**I don't like it** **I don't like to study English because it is imposed on me.*	2	2
	Important for the Matriculation Examination **It is important for my future, to university, for passing the Matriculation Examination.*	1	1
	Like any other subject ** There are interesting subjects and there are others which are less interesting.*	0	1
	Important **I think it is very important to know English, so I try.*	3	3
	It is fun **It is fun to speak another language.*	5	7
	International language **It's a big universal language.*	2	4

Clearly the importance pupils attribute to English derives from its being an international language, and less as a language which is important for the Matriculation Examination. In addition, the affective factor of 'fun' – the experience of using a foreign language - plays an important role. Pupils, from both groups, also describe the acquisition of English in general terms as important.

Pupils' attitude to their own English lessons

Table 7.23: Question: ***Do you like to study English? Why?***

	Category of response	Experimental group	Control group
Attitude to English lessons	**Generally positive** **Our English lessons are fun.*	4	2
	I don't like it ** I don't like the way she teaches.*	4	6
Sources of dissatisfaction	**Lessons are not interesting** **The topics she presents us with are not interesting*	4	5
	We should study something else **We should be taught how to speak English.*	5	2
	It's difficult **Perhaps because I find it difficult*	3	1
	I don't understand grammar **Sometimes it's boring. The rules are not clear.*	0	3

Compared with the experimental group, pupils from the control group are less satisfied with their English lessons. Participants from both groups agree that lessons are not interesting, even though pupils from the experimental group had stronger views as to what should be taught in the classroom.

Discussion

Pupils' attitude to English lessons is ambivalent; on the one hand, they have a positive instrumental approach to learning English. They believe that it is important to study English *because it is important for life*. The importance derives from the fact that English is an international language and a good command of it will help them when they go abroad, it will help them when they go to university, and in the workplace. Those with a negative approach to learning English explain their attitude by saying that they either don't like to study, or they don't like the fact that English is imposed on them. On the other hand, and in sharp contrast to the overwhelming positive attitude to English as a subject taught at school, pupils' perceptions of **their** English lessons were fairly negative; they did not like their lessons. Ortal (control) explained it as follows: *I don't like the way we are taught. I want the lesson to be more interesting, more challenging. There are worksheets in class I can work with at home. There should be interesting things in class, which will attract pupils' attention.* Elan (experiment), on the other hand, is not so concerned with the type of activities, as he is concerned with the topics presented: *The topics she presents us with are not interesting. Who is interested in such topics? They are old and tiresome. I'm interested in computers, music, motorcycles, a lot of motorcycles, news. I'm not the only one who is not interested in the topics she introduces. Really.*

Their dissatisfaction can be related to **objective factors** and **subjective factors**. The first refers to uninteresting topics presented by the teacher; unclear instructions given by the teacher, who causes pupils to feel intimidated, and therefore they refrain from asking questions to clarify subject matter; discipline problems in computer lessons, as pupils did not follow teachers' instructions and entered other sites instead. Consequently, pupils did not feel that there was an atmosphere of learning, but rather an atmosphere of games and wasted time.

Subjective factors relate to the clash between pupils' areas of interest and the kind of activities teachers chose to introduce in the classroom. They did not find the activities, topics and texts introduced by teachers as interesting. Pupils also had their own perceptions as to *what* should be taught in English lessons. They believed that the emphasis should be on acquiring oral skills, that is communication, rather than on the teaching of reading texts or grammar. Finally, some of them referred to affective reasons, such as boring and unchallenging lessons, their reluctance to speak English in class because of lack of self-confidence, and their dislike of reading texts.

The following tables describe what pupils believe they need in order to study well, and how they perceive the nature of the role of teachers in the classroom, and their expectations from them.

The role of teachers

Table 7.24: Question: ***What conditions are necessary for you to study well?***

	Category of response	Experimental group	Control group
Conditions needed to study well	**The need for quiet** **I need quiet, a pleasant atmosphere.*	5	4
	A good teacher ** A serious teacher.*	3	3
	Personal **To do everything the teacher says.*	3	3

It is interesting to note that interviewees pointed out that what they mostly need for effective learning to take place is quiet. Are classes unbearably noisy so much so that pupils cannot learn?

Table 7.25: Expectations from teachers

	Category of response	Experimental group	Control group
Expectations from teachers: pedagogic knowledge	**Interesting lessons** **The activities in the classroom are not interesting.*	6	6
	General **The teacher should give us more tests.*	3	2
	Help pupils **She doesn't help me read a text in the book*	0	1
	Interesting texts ** The stories are not interesting.*	2	3
	Variety **How much can one read articles and answer questions?*	1	1
	Explain subject matter **I need somebody to teach me, that I will understand.*	5	5
	Pay attention **If I ask a question, she does not always answer my question. She ignores it.*	0	1
Disciplinarians	**The teacher as "watch dog"** ** She sees you* [if you're not working]	7	1

The two most important pedagogic expectations pupils have from their teachers are to provide them with interesting lessons and to be able to explain subject matter to them. In addition, many pupils, mostly from the experiment group, expect teachers to be good disciplinarians so that effective learning will take place.

Discussion

Pupils' accounts reflect the central role teachers have in the learning process; teachers are expected to use their pedagogic knowledge in order to introduce interesting lessons, and scaffold pupils' learning so that they will be equipped with the necessary skills for learning English, and finally for passing the Matriculation Examination. In addition to maintaining a classroom atmosphere, which will be conducive for effective learning. Pupils expect teachers to both have the pedagogic knowledge to teach English, and to be capable disciplinarians, that is, to be able to control the class and deal with discipline problems.

The expectation from teachers to possess pedagogic knowledge is manifested in pupils' hope that lessons will be **interesting.** They expect teachers to vary the activities they introduce in the classroom; Deena (control) complained that *it is irritating to sit and listen only to the teacher for a whole lesson.* They also expect that teachers assign interesting and challenging projects, and to *explain the difficult things in English,* such as grammar rules, which they find extremely difficult to comprehend.

As reading is the focus of the English curriculum, pupils' demand to have interesting reading texts is even more pronounced, as they spend quite a lot of time tackling these texts. They expect the terminology in the texts introduced to them not to be beyond their level: *This year I don't listen because it is not interesting. The activities in the classroom are not interesting neither is the book. The texts and exercises are boring. She doesn't help me read a text in the book. She doesn't help me with the words which are difficult to read* (Elana - control).

The need for help in the process of learning English is a recurrent theme in pupils' accounts. They need somebody to explain subject matter to them, somebody to correct their mistakes and answer questions. Pupils perceive teachers as guides who are supposed to lead them in the process of learning a much desired, and at the same time very difficult, language. Therefore, projects and assignments not only are expected to be interesting, but also to be explained by teachers. Teachers are expected to explain to pupils what is required from them in the homework and projects they assign. They are expected to scaffold pupils' learning and serve as a go between subject matter and pupils. Once pupils understand what is expected from them they can do their work, and have a sense of learning and making progress. The consequences of lack of comprehension on the part of pupils is frustration, which causes them to "switch off" during lessons, to become noisy, and in some cases even to leave the classroom. Assaf (experiment) summarised it as follows: *I don't like to study. How do I suffer less when I study? If you do it* [studying] *in an enjoyable way, in a varied way, to have interesting projects, such as creating a newspaper. I am a good pupil in subjects which I find interesting. If I'm not interested, then I don't study, and I don't have good grades.*

Pupils pointed out that, not only pedagogic issues affect their learning, but also environmental ones. They mentioned noise in the classroom as one of the elements that interferes with their ability to learn; they need quiet in order to be able to concentrate on the tasks at hand, and to understand what the teacher explains. This view of the need for quiet in classroom setting is also held by teachers, who explained that they refrain from introducing group work because of the noise involved. Thus, the teacher's role is to maintain quiet in the classroom so that those who are negatively affected by it will be able to study. The role of the teacher in the classroom, as perceived by pupils, is the role of a "watch dog"; *The teacher can see whether the pupil is working or not.* [When you work with peers] *You are tempted to do other things, because nobody sees you. The teacher sets the limits and framework of our learning* (Tali - experiment). The teacher, then, is expected not only to possess pedagogic professional knowledge, but also to possess disciplinarian skills so that effective learning will take place. Teachers who do not possess good disciplinarian skills are not considered to be good teachers, despite the pedagogic knowledge they may possess. Eran (experiment) put it as follows: [In order to study well] *I need a good teacher; An experienced teacher who knows how to teach and deal with problematic pupils. She may be wonderful but you don't know that because she can't teach* [discipline problems].

Considering pupils' expressed need for quiet in the process of learning it will be interesting to find out about their attitude to studying with peers. The following table describes pupils' responses concerning studying with peers.

Pupils' preferred mode of learning

Table 7.26: Question: ***How do you like to study?***

	Category of response	Experimental group	Control group
Preferred mode of learning	**Pairs** **I prefer to study in pairs or on my own.*	2	1
	Groups * *I prefer to study in groups.*	0	3
	Individual **I don't think it is right to study alone.*	2	1
	Other **I like to study with my father.*	2	1
	With the teacher **I like to study with the teacher.*	1	5
Explanation of preferences	**Peers don't know** * *She*[the peer] *doesn't know subject matter*	2	1
	In groups you study less * *Because you study less from four*	1	3
	It's easier * *It's simply easier for me.*	4	1
	General *...*because she* [the teacher] *explains.*	2	3

What is striking here is the large number of interviewees, from the control group, who prefer to study with a teacher. Pupils from this group expressed dissatisfaction with their teachers. Is it because it is the only devil they know? They were not exposed to other ways of teaching. Or, is it, that despite their dissatisfaction with **their teachers of English** they believe that teachers, in general, are best for teaching?

Discussion

In contrast to their clear preference for studying with teachers, pupils were sceptical as to the effectiveness of studying with peers, either in pairs or in groups. They do not believe that learning with other pupils will contribute to their progress in English, because the atmosphere is not serious enough to allow for proper learning, and because they do not think that peers can teach them, or explain subject matter to them. Thus, Rivka (control) believes that *If I study with a group I don't always study. You can't expect a group to be serious for a whole hour and to study, sometimes there is laughter.*

Tal (experiment), on the other hand, is more concerned with the academic disadvantage of working with peers. Her experience of working together with other pupils taught her that often they do not know or understand subject matter, and consequently the task she and her friends are asked to carry out does not become a learning experience: *I don't like to study in pairs; if it is with somebody who understands subject matter then you study. Most of the time I pair with my friends who do not exactly understand subject matter and then I do not study.*

Pupils' preference for studying with teachers is linked to their perceptions of teachers (discussed previously) as possessing the pedagogic knowledge to explain subject matter to them. They prefer to study with somebody 'who knows', that is a person whose knowledge of English is greater than theirs. They do not perceive their peers as possessing either the knowledge or skills to explain difficult aspects of subject matter to them.

Perceptions of computers in the learning process

In order to gain better insight of pupils' preferred mode of learning, they were asked about the impact of computers on their learning. The explanations they provided to justify their answers were varied. In addition, not only the area of effectiveness was explored, but also the element of enjoyment; whether pupils liked studying English with computers. The following table describes experiment group pupils' responses to the use of computers in their English lessons.

Contribution of computers to progress in English

Table 7.27: Question: ***Do you feel that the computer helps you progress in English lessons?***

	Category of response	Experimental group
Contribution of computers to progress	**It doesn't help me** * *It doesn't help me in any way.*	**8**
	It helps **The computer helps in learning English.*	**1**
Pupils' explanations	**You study less** * *You study less when you are in front of the computer*	**2**
	Boring exercises * *It's only reading and answering* [assignments given].	**3**
	I'm not interested * *I personally don't quite like computers.*	**3**
	Disappointment **It doesn't enrich my vocabulary like she said it would.*	**1**
	Computers help * *...because you are exposed to a lot of material which is written in English.*	**1**
Enjoyment of computers	**It's fun** * *This is a fun activity.*	**5**
	It's not fun * *Not really*	**3**
Pupils' explanations	**It's more interesting** * *It is more varied. It is more interesting.*	**2**
	It's too much * *... it's already too much to have it every week.*	**1**
	A substitute for books * *We use it instead of using books.*	**1**

The majority of learners interviewed from the experiment group believes that studying with computers did not help them progress in English. Yet, they believe that it is fun to study with it.

Discussion

Considering pupils' reservations concerning learning with peers, and their clear views as to how lessons should be conducted, it might have been expected that they would find computers more conducive for learning English. Computers offer individualised instruction, which is also catered to the academic level and pace of individual learners. Thus, potentially computers may be the answer to the problems pupils encounter in the process of learning English.

The interviews revealed that there is a consensus in pupils' perceptions concerning studying with computers. Generally, pupils agree that it is more fun to study English with the aid of computers, because of the medium and the possibilities it offers, but as far as the effectiveness of the medium for their learning is concerned, they agree that the use of computers in English lessons did not contribute to their progress in this subject. Aviva explained that *we normally read texts or articles* [on the computer] *and then answer questions which we have on a worksheet. Sometimes she has innovations such as filling in a cloze on the computer...You don't learn from this.*

The consensus regarding the limited impact of computers has to do with the classroom activities teachers assigned pupils. These activities were "more of the same"; *The use of computers did not change ... because what you do in computer lessons is practicing what you studied in class* (Ruti). It seems that the exercises pupils were given by their teachers were mechanical ones, that is, they merely used the computers for practice rather than for creating something; teachers would provide pupils with worksheets with questions about a certain topic, and the latter were expected to answer these questions based on a text they read on the computer. From pupils' perspective there was no difference between the activities they did in the classroom and the activities they did with computers, as they did not use the computer as a learning tool.

Neither did the use of computers change their attitude to English as a subject studied at school: *If it had been written in Hebrew I wouldn't have started to like Hebrew* (Oded). Nor did they find computers helpful in understanding grammar, as *there are no rules of the Present Perfect on the computer* (Oded). And Eli complained that the computer *does not enrich my vocabulary like she said it would.*

Perhaps computers did not meet pupils' expectations. Elana, one of the teachers, seemed to have been aware of pupils' dissatisfaction with computer lessons: *Pupils like computer lessons, the work sheets they get, they don't always find the topics we choose interesting. They don't try to get away from computer lessons, but they don't see the benefit of it.*

Pupils' coping with problems

If pupils do not find computer helpful in the process of learning a difficult subject such as English, how do they cope with their academic problems? What strategies do they use? The following table describes the strategies pupils use for coping with difficulties they encounter in the process of learning.

Table 7.28: Question: ***How do you overcome problems?***

	Category of response	Experimental group	Control group
Pupils' coping with problems	**By studying more** * *I try to study well and a lot.*	5	2
	I need somebody to tell me *Before I read a story in English I need somebody to tell me briefly what the story is about.*	1	1
	I don't do anything * *I don't do anything practical to overcome my problems.*	2	1
	I think a lot * *I try to concentrate more and to think more.*	0	5
	I use * *I use the quicktionary [electronic dictionary] when I have problems*	0	1

Most pupils from the experimental group attempt to deal with their problems by studying more, whereas pupils from the control group try to think more.

Discussion

Not surprising pupils did not feel that the use of computers in English lessons provided them with tools, which would enable them to overcome difficulties in the learning process. In order to deal with difficulties they encounter, pupils from both groups either use active strategies to deal with problems, or they remain passive – not attempting to take measures at coping with problems. Thus, those who are active resort to the use of strategies which involve closer interaction with subject matter, either by spending more time studying, or thoroughly revising subject matter, but still without consulting the computer. Whereas those who are passive either do not do anything or they seek the help of others to help them cope with their difficulties. Elanit (experiment), for example, admitted that when she encounters problems *I give* *up too easily because I don't do well in a quiz or a test, and it causes me to lose my motivation. I think I should study and work harder than I have done so far. If I get a good grade it increases my motivation because I see that I can do it. I don't do anything practical to overcome my problems. I think it has to do with my parents; if they cared a little bit, then surely I would have done something about it.* Similarly, Oren (experiment) said that when he encounters problems: *Either I don't do anything, or I ask friends, or the teacher and that's it.*

The change of the learning environment did not contribute to a change in pupils' selection of their strategies for coping with problems. They all held to their familiar strategies, which they found useful for dealing with difficulties. In general, the use of computers did not make pupils more independent in the process of learning. They are still dependent on the teacher as a source of knowledge to solving their academic problems and guiding them in the process of learning.

Conclusion

The objective in interviewing teachers was to gain insight into their perceptions and experiences of teaching English to tenth grade learners. Four of the teachers taught English with the aid of computers, the experimental group, and the other four, the control group, did not use computers in their lessons. The interviews revealed a fundamental difference in teachers' perceptions regarding computers. Teachers from the control group perceived the computer as a device which they use for obtaining information and supplementing class work based on textbooks. Teachers from the experimental group, on the other hand, perceived it as learning tool, which can help pupils progress in their learning of English, and provide them with an interesting learning environment, which teachers believe is one of their responsibilities in the classroom. Teachers use various strategies in order to have interesting lessons; some of them vary the activities in the lessons, whereas others believe that if they use theatrical strategies, such as reading texts dramatically for learners, lessons will be more interesting. Yet, teachers are aware that, for various reasons, they are quite limited at meeting pupils' needs in the process of learning.

Similar to teachers' views concerning lessons, pupils also expect their teachers to provide them with interesting lessons, and to help them in the process of learning a foreign language. In addition, teachers are expected to maintain classroom discipline in order to enable pupils to study properly. Pupils do not believe that effective learning can take place if they study with peers, therefore, they need quiet in the classroom so that they can hear the teacher's explanations. Furthermore, pupils from the experimental group prefer to study with the teacher rather than with the computer, as they do not believe it contributed to their progress in English.

It seems that there is a clash between teachers' views (experimental) concerning the professional change they underwent as a result of the Open University course for integrating technology in English lessons, and their pupils' perceptions concerning their professional performance in the classroom. The interviews revealed that teachers were progressing in the direction from being traditional teachers to adopting more constructivist methodology as a result of the course they participated in; their lessons were more integrative, they tried to find more interesting materials on the Internet, they increasingly negotiate with learners about the content of lessons. Yet, pupils did not like their lessons, nor did they perceive them as interesting. This suggests little fundamental change in teachers' practice. Perhaps the course teachers took should have been followed by actual support and guidance on the part of its orgnisers to the teachers, as teachers, following the completion of the course, did not feel they were in full command as far as using computers for professional purposes are concerned. In addition, the fact that the study was conducted shortly after the course was completed, might suggest that teachers needed more time to familiarise themselves and adapt their methodology to the new possibilities computers offer. The fact that teachers have the imperative to cover a lot of material because of the Matriculation Examination is likely to slow them down in this process because they will probably be cautious. The impact of the course on pupils will probably be more evident in a number of years time - after teachers have some time to allow for professional development.

Chapter Eight – Major Findings

This study examined the impact of a new learning environment in English lessons on high-school pupils' perceptions of learning, their academic self-efficacy, and the extent to which innovative technology affected pupils' attitude towards the discipline. The rationale for the use of computers in education derives from new pedagogic psychological approaches concerning the nature of knowledge and learning, as was presented in the theoretical part of this study. According to these approaches, learning processes should be modified in light of the technological changes our society is undergoing, and which affect the classroom as well. Indeed, it may be thought that experiencing this kind of learning would present pupils with a completely different learning process than they have previously encountered, and would introduce to them new learning possibilities. However, the findings of this study indicate that this is not the case.

The basic assumption in this study was that one of the factors considered in an evaluation of an innovative learning environment, intended to change teaching and learning processes, is the examination of a change in the perceptions of learning and pupils' ability to learn. If pupils do not change their perceptions regarding learning processes, the change of the learning environment will not affect the way they learn. For instance, their selection of learning strategies, effort in learning and ways for solving problems will not be affected by the introduction of a change. The examination of these perceptions was based on the premise that a change in perception indicates a different understanding of the processes involved in the learning environment.

It was the assumption of the researcher that studying in a new learning environment, which offers different learning experiences for pupils, and which enhances their interest and motivation to study, would change the perceptions of learning and the academic self-efficacy of those involved in it.

Pupils' Perceptions of the Concept of Learning

The data concerning pupils' perceptions of the concept of learning were collected from a questionnaire administered at the beginning and at the end of the year. Major findings concerning pupils' perceptions of the learning process relate to the following dimensions: the complexity of learning; effort in learning; source of knowledge; learning aids.

Complexity of learning: At the beginning of the treatment pupils held a more complex perception of the process of learning than they did at the end of the treatment. That is, believing that learning is based on processes in which they have to be able to connect between different topics, and that it involves working collaboratively with their peers rather than doing assignments on their own. An example which might illustrate this point was given by a pupil who said that she found writing compositions very hard because she had to be able to know the tenses she had learnt and use them correctly. In order to overcome this difficulty, she worked with a partner who explained to her areas she found too difficult. Unlike her, others avoided dealing with their academic problems; for instance, a pupil said that she avoids speaking in the classroom because she had to connect words in her mind. However, the decrease in the response of pupils from the experiment group for this dimension indicates a shift towards a simpler perception of the concept of learning.

That is, at the end of the treatment, pupils believed that learning is a process which entails the study of independent isolated pieces of knowledge, and that it involves memorising subject matter. This may be due to the fact that pupils have to study a lot of material in English which gives them the impression that learning is disjointed, and therefore seemingly less complex. The interviews indicated that, for most interviewees learning involved understanding subject matter taught in class. Thus, it can be concluded that the teaching process in the experiment group had a modest effect on pupils' perceptions of this dimension of the concept of learning.

Effort in learning: At the beginning of the year pupils, from both groups, believed that in the process of learning they did not have to struggle in order to answer questions correctly, however, at the end of the year their perceptions changed and they held a more complex view of learning, that is, understanding that learning involves an intellectual effort. No differences were found between the groups. Interviews with pupils from the experiment group indicated that pupils believed they had to study subject matter both in class and outside, for example doing their homework, in order to succeed in their studies. This might suggest that these pupils were more equipped with strategies for coping with academic problems; they believed they had to spend more time and practice what they study, whereas pupils from the control group focused on use of more mental effort. Yet, for some of the interviewees making an effort in the process of learning was an indication that they did not understand subject matter. In addition, they did not consider themselves good in subjects where they had to put in a lot of mental energy and time.

Source of knowledge: Pupils do not perceive teachers as the only source for obtaining knowledge; they are perceived as tutors who may guide pupils in the process of learning. Their responses indicate a more complex perception of the concept of learning. Interviews with pupils revealed that some pupils believed that they needed teachers as a go between, to explain subject matter to them which they could not cope with on their own. Even though one of the pupils in the control group said that she would have preferred to study with a computer rather than with a teacher because the computer has '*more intelligence*'.

Learning aids: Despite the introduction of new technology into English lessons, pupils still prefer to study with books and notebooks. Teachers thought they were making more and better use of the computer as a learning aid – but pupils were of the opinion that much of what they were given was simply on a screen instead of on paper. This fact indicates that they are conservative in their approach to learning, or perhaps the possibilities computers offer for learners were not optimally pointed out to them in the process of learning.

Generality of learning: Pupils studying in schools ***A***, ***H*** and ***O*** – the experiment group - hold a complex perception of this dimension; they believe that learning and understanding are a long process, rather than perceiving it as all-or-none.

Generally, pupils from the experiment group did not see any added academic value to learning with computers, though they appreciated the fun they provided. Indeed, some of the teachers used computers mostly for the introduction of fun activities, such as filling in questionnaires or learning about pupils' horoscopes. These activities may have a pedagogic value, however, pupils did not perceive them as such. Had more cognitively demanding tasks been assigned to pupils, they might have perceived the computer as educationally beneficial for them, and not merely as tool for entertainment.

Interestingly, in the control group, unlike the experiment one, pupils hold a "mythical" view of computers; in the interviews they all expressed their wish to study with computers, as they believed they would help them progress and improve their knowledge of English. This might suggest that pupils are willing to take on new learning modes, which in turn implies that pupils in the experiment group were let down.

Pupils' Academic Self-Efficacy

Major findings in this section relate to learners' general academic self-efficacy; the impact of computers on pupils' perceptions of themselves as learners of English; learners' perceptions of themselves being independent learners. The findings were gleaned from the questionnaire administered to pupils and interviews with them.

General academic self-efficacy: The introduction of new technology into English lessons seems not to have affected pupils' general academic self-efficacy for learning. No differences were found between the two administrations of the questionnaire on the various items relating to self-efficacy. This might be related to the fact that teachers' instruction and methodology did not undergo a change; the reason for this might be that teachers should have gone through a process in which they would have developed awareness of teaching methodology, which would have been followed by reflection on their own practice, rather than merely responding to questions concerned with the evaluation of the activities presented in the course.

And finally, the Open University course should have offered individual feedback to the participants in their respective classrooms (Cambell *et al.*, 1995). The absence of reflection resulted in teachers teaching and introducing the same type of activities for working with and without computers. For various reasons - the noise involved, too much preparation - they did not introduce group work or projects into lessons, consequently, pupils were faced with unchallenging classroom situations, which prevented them from encountering new learning assignments. Thus, because the perceived tasks were not considered challenging there was no change in pupils' academic self-efficacy. This fits with Zimmermman (1990) who stated that self-efficacy would change when people experience different situations and that it is dependent on the effort required for performing the new task.

Impact of computers: At the beginning of the treatment pupils rated computers high, an average of three on a scale of one to five, whereas at the end of it the average score dropped to just below two. In general, it can be said that pupils are quite satisfied with the computer as a learning aid in English lessons. However, the decrease observed in pupils' scores at the end of the year might suggest that initially pupils had great hopes and expectations from a new medium for learning, but at the end they were disillusioned due to unsatisfactory computer material introduced by teachers. Their dissatisfaction may be related to a failure on the part of teachers to *actively* change, which in turn may have to do with the fact that their beliefs about learning had not changed. One of the conditions necessary for teachers to undergo a professional change is the need for reflection on their practice. Teachers in Israel are under a great deal of pressure to prepare their pupils for the Matriculation Examination, therefore, many of them are mostly preoccupied with covering the requirements of the curriculum and do not have the time to stop and think about their practice.

Perceptions of being independent learners: Interviews with learners indicated that computers did not contribute to pupils' sense of independence and ability to deal with academic problems. The reasons for this may be the same as the ones mentioned for general academic self-efficacy. However, the interviews revealed that pupils' ability to cope with academic problems is dependent to a great extent on the perceived challenge at hand; some would just avoid dealing with the assignment they face, whereas others would perceive it as challenging, and would either consult the computer or persist in their efforts to deal with it with other means. This confirms Bandura's (1997) description of self-efficacy as being task and situation specific.

Conditions of English Instruction: Teachers

Teachers' willingness to try a new mode of instruction, which required the participation in training courses and the preparation of teaching materials attests to their professionalism. All teachers emphasised that they entered their respective classrooms with a clear understanding of what they wanted to achieve: the general objective was to provide pupils with the skills necessary to pass the Matriculation Examination at the end of twelfth grade.

The findings concerning teachers and their background were gathered from interviews with them. All teachers of English were female, and had between 10 and 27 years of experience. They all had academic credentials for teaching English.

Teachers from the experiment group held an administrative position – they were coordinators – whereas only one teacher from the control group held such a position.

Learning materials and classroom activities: All teachers use books geared to equip pupils with the necessary skills for passing the Matriculation Examination. Thus, they contain reading comprehension passages with questions to answer, and grammar and vocabulary exercises.

Basically teachers from both groups use the same techniques for introducing subject matter, for instance before reading a text they introduce it to pupils using a variety of techniques, then the text is read and pupils answer comprehension questions. The difference between the two groups, however, is that teachers from the experiment group use an integrative approach in their lessons, that is, all four skills are taught in a period of teaching. Teachers in the control group, on the other hand, divide the four weekly hours to teaching each of the skills separately. Thus, on certain days pupils learn grammar and on others they focus on the development of reading skills. Yet, the different approach adhered to by teachers from the experiment group, seems to make little difference as far as pupils are concerned; they were dissatisfied with their English lessons.

Attitude to computers and classroom activities used: Generally all teachers had a positive attitude to the use of computers for teaching and learning English. They all seemed to be aware of the potential of computers for education and for scaffolding pupils' learning; they pointed out the fact that learners can progress at their own pace and according to their academic level, they referred to the authentic language computers offer, and to the vast number of texts and libraries. However, an examination of the classroom activities they introduced reveals that they used the same type of assignments for working with computers as they did with books and worksheets. Thus, for instance, when teachers want to develop pupils' reading skills they provide them with a worksheet with questions to answer while reading online articles. In addition, pupils were asked to write letters while using e-mail, or to create birthday cards with greetings.

Conditions of English Instruction: Pupils

Pupils' attitude to computers: Pupils had a positive attitude to using computers in their English lessons. At the beginning of the year they rated their satisfaction 3.21on a scale of one to five, however towards the end of the year there was a change in their attitude, and the score for this item was lower. The change in attitude suggests pupils' dissatisfaction with the medium for the purpose of learning English. Interviews with pupils indicated that materials used in the classroom did not meet their needs; they were either too difficult with unclear instructions, or the topics selected were found to be boring by pupils. In addition, the activities were not unique to learning with computers, because they did not take advantage of the possibilities computers offer. Thus, pupils perceived them as additional exercises which are meant to enhance what they learn with traditional textbooks.

Extent of use of computers for homework and projects: The findings indicate that approximately 36% of the pupils in the experiment group *sometimes* used the computer for homework, whereas approximately 22% said that they *never* use computers for doing homework. Thus, computers are partially used for homework assignment, even though the findings show that 93% of the pupils have computers at home. Some of the teachers argued that they had no information as to how many pupils had computers at home, and did not wish to put pupils in unpleasant situations where they would have to tell their teachers they could not do their homework assignments because they did not have computers. Others showed a similar sympathetic attitude towards pupils when they said that the workload on them is already too much, and they felt they could not add to it.

It seems that the limited use of computers outside the classroom for educational purposes prevented pupils from exploring and familiarising themselves with the options they offer learners of a foreign language. This might explain the less favourable attitude to computers pupils showed at the end of the year. In addition, interviews with teachers revealed that they knew it was necessary for them to spend a great deal of time to familiarise themselves with the new technology and to learn how to use it. Perhaps they did not have the time to devote for such an enterprise. Had they provided pupils with homework which required the use of computers, pupils might have gained more practice with the medium, their appreciation of it would have increased rather than decreased, and their knowledge of the target language would have improved. It seems that the limited use - one lesson a week and no homework - is responsible for the modest and unenthusiastic responses concerning the effectiveness of computers for learning English. Teachers need to be aware of the importance of homework, which is aimed at giving learners extra-practice with subject matter, for their progress in learning a foreign language.

Preference for studying English: Pupils preferred to study English with teachers. The second choice for studying with was books, and the least preferred item for learning English was articles, newspapers and magazines. Computers, which were rated just above articles, newspapers and magazines, are not a preferred medium for instruction on the part of pupils.

The findings suggest that pupils need the interpersonal interaction for learning a foreign language. Pupils find learning English difficult, especially grammar and writing compositions, therefore, they feel they need a person they can turn to when they encounter difficulties with subject matter. One of the interviewees summed it up *"I need somebody to teach me, that I will understand, good books which I will find interesting; somebody to help me if I don't understand"*. This is in contrast with scholars' (Warschauer, 1996; Walker, 1999) assertion that computers could be more effective in scaffolding pupils' learning. These findings suggest that the benefits involved in the use of computers for learning English were not demonstrated to pupils. They did not have any evidence of their effectiveness, because teachers themselves had not internalised the merits of the use of computers.

Type of media preferred: Pupils used learning materials such as textbooks and workbooks as well as teacher developed materials. Pupils believed that the teacher's explanation is the most effective means for studying English. This indicates that they perceive teachers as professionals who have the skills and know-how to explain subject matter to them. This is in contrast to their attitude to working in groups; the findings indicate that working in groups is the least effective for them, and that independent study was rated higher than working in groups. The findings suggest that pupils perceive learning in groups as a waste of time, and an activity which does not contribute to their understanding, because of its social nature. They like being together, but they know that they learn less because pupils do not do the assignment, or because of the noise involved. That is why independent study was rated higher; pupils believe that if they want to learn properly the best way to do it is to sit on their own and concentrate on subject matter they have to study.

An agreement was found with regard to the ineffectiveness of group work between pupils' perceptions and their teachers'. This coincides with Galton *et al.* (1980) findings that the provision of material on the part of teachers is insufficient for effective group work. Teachers need to ensure that learners possess both the social and cognitive skills necessary for working collaboratively; these include the ability to express an opinion, to show disagreement or to ask questions.

The findings also indicate that pupils rated homework, tests and quizzes higher than they rated learning with a computer. This might suggest that pupils are conservative in their attitude to new media. However, in light of the findings regarding the extent of the use of computers for homework, it would be reasonable to assume that pupils rated computers lower than homework and tests because of the limited experience they had with the medium. They did not have sufficient time to be exposed to the technology they offer.

Affective characteristics

Transmitting knowledge and teaching cognitive skills should not be the only objectives for assessing the success of teaching and learning. Pupils' attitude to the study of English is of central importance, and therefore needs to be considered in evaluating the learning process. The affective characteristics examined in this research focused on the importance of the study subject in the eyes of the pupils (or their attitude towards the subject), drawn from a series of questions in the questionnaire and from interviews held individually. In general, pupils' attitude to studying English was positive in both the interviews and in their responses on the written questionnaires.

General agreement was found among pupils as to the importance of the subject: the average response on both the "pre" and the "post" for both groups was 4.81 on a scale of one to five. Pupils thought that it is very important to study English. In interviews, pupils indicated that English is an international language, and as such a good command of it is important both for the work force and for academia. This fits with what was found by Spolsky (1992). Thus, pupils believe it is important to know English for pragmatic reasons, that is, they have instrumental motivation to learn English – to travel, to communicate with English speakers, and to be able to read academic texts. Compared to the high percentage of pupils who attributed importance to English studies, pupils' responses to their liking of lessons were rated lower; the total average response on the "pre" was 3.83 and on the "post" it was 3.68. The average response for the control group remained more or less stable (3.7) on the two administrations of the questionnaire. However, pupils' response on the experiment group indicated a decrease, from 3.88 to 3.67, between the beginning of the year and the end.

To sum, pupils' responses on the questionnaire indicate an instrumental approach to the learning of English. Their responses indicated that they made a distinction between recognising the value of knowing a foreign language, and therefore it is very important for them to know English, and the difficulty involved in the process of acquiring it. Because they find subject matter difficult, they feel they have to work hard and struggle in order to understand it. They do not like to work hard, and therefore their responses showed a decrease in the item which examined liking to study English.

Chapter Nine – Conclusions

A major finding of this study, emerging from both the interviews, the purpose of which was to gain more insight into participants' views and experiences, and the more quantitative data, is that computers are a tool, and that teachers - the tool users - are the key, consequently their beliefs about teaching are central to the way they use computers.

Before I discuss the conclusions of this study I would like to point out that in the initial stages of the research I saw the qualitative data as providing additional 'colour' for the study, by merely supporting the quantitative findings. But as the complexity of the data and the issues of interpretation grew, the qualitative element of the study grew in importance and indeed came to be seen as an essential element in the construction of the complexity that emerged.

My assumption at the beginning of the study was that the introduction of computers would be accompanied by a change in teachers' pedagogy. Yet, a change in pedagogy requires, in this case, a shift in the beliefs of teachers from a behaviourist view of their practice, to a constructivist one. The teachers in this study, like the physics teacher in the Elby (1999) study were guided by their beliefs as to what is considered good learning or teaching. But, unlike that teacher, who was interested in a change, the teachers in this study did not undergo a change in their pedagogy. The reasons for that, the data show, are both **personal** and **objective**.

Personal reasons - interviews with teachers revealed that they had not realised that a fundamental change in their pedagogy was expected from them following their participation in the Open University course for the integration of technology in English language lessons. Their responses revealed that they perceived the course as a means for the acquisition of *techniques* for the teaching of English. It seems that they did not understand that having integrative lessons is insufficient if pupils are not actively involved in the lessons. Despite their claims that they try to involve pupils in the learning process, this 'involvement' is fairly superficial and with no pedagogical value, as it entails bringing songs to lessons. Even when pupils work with peers they are not expected to be engaged in problem solving activities, which are more cognitively demanding than checking homework together or bringing their favourite songs to the classroom. Teachers' responses reflect a shallow perception of teaching, as teachers did not seem to realise that certain techniques are guided by certain pedagogy.

Furthermore, it was revealed that there was a big gap between their existing knowledge of pedagogy and the constructivist principles, as well as the application of computer technology, which the course organisers attempted to instill in them. They needed to familiarise themselves with principles of group work, teaching with learners as the focus of the learning process, rather than the teacher, in addition to internalising what they studied about the integration of computer technology. Following the completion of the course they did not perceive themselves as experts in the use of computers; they felt they still had a lot to learn about computers and the possibilities they offer to learners and teachers of English. Teachers found the bridging of that gap overwhelming and time consuming and therefore rejected the proposed change. This fits with Mercer's (1993) findings in a study where he explored teachers' rejection of proposed changes. He found that when teachers are faced with a new innovation which they find difficult to acquire they tend to reject it.

In addition, this educational innovation, the integration of computers into classroom practice, could have made part of their current practice and experience, such as knowledge of contents of textbooks irrelevant and perhaps obsolete. This is in accordance with Arielli (1995) who found that educational innovations negatively affect teachers as they may make part of their professional knowledge irrelevant.

Finally there is the issue of accountability - teachers have to follow the requirements of the curriculum (Driver, 1983). Teachers of English in Israel are under constant pressure to prepare their pupils for the Matriculation Examination, which they take at the end of twelfth grade. In this sense not only are pupils tested about their knowledge of subject matter, but also teachers and their professionalism. Therefore, teachers, as early as tenth grade, focus in their lessons on preparing pupils for the final test. That is, they provide pupils with the skills they believe are necessary for getting a good grade in the final examination. This professional behaviour is similar to the one described by Bolon (2000) who maintained that teachers know that their professionalism is tested when pupils take national tests, and thus they focus on preparing them for the test. Furthermore, in their daily practice teachers avoid risky situations, such as using computers extensively, which might bring about criticism about their performance as professionals. Shilling (1992) explained this avoidance of risky situations on the part of teachers as an effort at maintaining their psychological confidence.

Objective reasons - the Open University course the teachers attended was too short - twelve weeks - to allow for the optimum assimilation of its pedagogic and technological principles on the part of teachers. Teachers found the content of the course too crammed and sessions were conducted too quickly, consequently, they felt they needed time to absorb the flood of information before they attempted to apply it. They needed some kind of "incubation" period, which could have been obtained through a process of reflection. Indeed a reflection was part of the course, but it only related to the activities presented by the organisers, who used it for evaluation purposes. Teachers, unlike the teachers in the Cambell *et al.* (1995) study, were not asked to reflect on their classroom practice and compare it with the constructivist pedagogy the course was advocating. A critical reflection might have resulted in a change of professional beliefs.

Furthermore, the course did not provide any follow-up for teachers; they did not get guidance, peer or group support, which might have helped them in the application of the educational innovation, rather, at the completion of the course, they went back to their respective classrooms and their isolation. Had teachers had some kind of support - peer support - for instance, like Arielli (1995) suggests, they might have been able to share the time consuming lesson planning, which would have saved time, and allow them to contextualise their teaching with the new innovation. This form of a support might have enabled teachers to encourage one another in their experiments with changing pedagogy. If teachers had some sort of mentor to contact for help, or to visit and observe their lessons, they might have been more confident in implementing the new approaches, as they might have been provided with examples of best practice. Because teachers were left to their own devises, and with their professional isolation, they did not try out any classroom activities except for the ones they were introduced to in the course.

Finally, had teachers been encouraged to conduct school based research the purpose of which was to explore the new approaches they had been exposed to during the course, and to reflect on their observations and findings, they might have done some of the obvious things like asking pupils if they thought the activities were interesting. There was a considerable gap between teachers' perceptions of what contributes to having interesting lessons and pupils' perceptions; teachers seemed to think that encouraging pupils to bring the lyrics of their favourite songs to the classroom would make lessons more interesting, whereas, in fact, pupils were interested in other areas, such as computers and motorcycles.

The major conclusion of the research is that the learning environment as a whole should be changed in order to get the optimum effect of incorporating computers into English lessons. The difficulties involved in learning this discipline have been described above. Therefore, in order to effectively obtain better results of this educational innovation, the content of the lessons has to be changed; topics introduced should match pupils' areas of interest, pupils need to be more actively involved in the process of learning, for instance by teachers expecting them to be creative, and consulting with them as to the topics to be presented in lessons. Teaching English through the use of computers showed that they did not contribute to a change in pupils' self-efficacy; however, a change was observed in the dimension *complexity of learning* in the experiment group. Pupils moved towards a more complex perception of the concept. The finding that studying in an innovative learning environment can affect the change in perceptions of learning contributed to the understanding about the impact of the learning environment on pupils' perceptions. Indeed, the changes found in the present study are not considerable, but the results of the research support the opinion that experiencing different kinds of processes can change perceptions related to such processes (Schommer, 1994). Therefore, educators should take into account the fact that the learning processes they are "orchestrating" can have a long term impact, beyond the immediate product of the experience (for example, success in tests), and that they may shape pupils' future ability to cope with learning assignments.

The limited impact on pupils' perceptions may be related to the fact that teachers, despite their positive attitude to the use of computers, still adhered to traditional methodology. They, and some of the pupils, perceived computers as electronic books and therefore the exercises pupils were engaged in were supposed to have supplemented what they did not get in their textbooks. The activities they did with computers were identical to the activities they did without them. Thus, learners did not appreciate the use of computers in their lessons and could not see any educational benefit for studying with them. For pupils the learning environment remained the same.

The rationale for introducing computers into the classroom was to adapt the classroom to the changes taking place outside school. However, in the process of the application of the theoretical concepts underlying the use of computers, there are many factors involved, such as pedagogy, the teachers, and the pupils. Some of these factors may have interfered in the process of application, and therefore it was difficult to evaluate whether the theoretical basis for the introduction of the use of computers brings a change in pupils' perceptions.

In addition, the changes in pupils' perceptions were examined on a small part of their general experience at school. The duration of the experiment (an hour a week for a whole school year) was short considering the time necessary for the assimilation of such changes. The assimilation of such a change was not the main objective of the study, but in order to examine "side effects", such as perceptions, it is still a short time. In examining the impact of learning experiences on perceptions it is important to base them on a comprehensive experience, over a long period of time. It is important to examine the impact of the change of the learning environment over a long-term in order to see whether the changes are stable over time.

In critically examining the results of the study another aspect should be taken into account; in the theoretical part I referred to two main routes for the change of perceptions – a change in the central route, which is stable over time, and a change in the peripheral route, which derives from the attractiveness of the experience and is not stable over time (Petty & Cacioppo, 1986; Chaiken, 1987). Naturally, I would have liked to assume that the changes observed in the experiment group are changes in the central route, however, in order to support this argument it will be necessary to retrace the population and re-examine its perceptions. A re-examination is technically impossible since the majority of pupils involved in the study are studying in different classes, and also it will be impossible to control variables, which might affect the validity of the conclusions, such as a new learning environment or a social environment.

Another aspect, which should be taken into account, is the extent to which pupils were influenced by the environment – school, home, friends – in their answers. It was not possible to isolate the influences, which derive only from a change in perceptions from those which derive from environmental influences to which learners are normally exposed. For instance, there may be a situation where pupils will change their perceptions with regard to the computer as a major learning aid due to the support of the environment, for instance parents and siblings, and not as a result of a genuine change in pupils' perceptions. That is, pupils expressed an opinion which was accepted by their milieu at the time of answering the questionnaire. For this reason interviews were used in this study to illuminate quantitative findings and to get a better perspective. However, I might have obtained more illuminating data had I observed teachers in their classrooms in order to see what approaches were actually adopted by them, or interviewed more pupils a number of times over the year.

It should be pointed out that in designing the study I thought that there would be a change in pupils' perceptions of learning and their academic self-efficacy. The focus of the study was on the quantitative instrument with the qualitative there only to illuminate. The possible influence of the environment on pupils' perceptions is an indication of the complexity of the situation, the extent of which I could not foresee. In light of the above I need to reconceptualise the study as more to do with evaluating the implementation of an innovation in which an exploration of the attitudes and beliefs of the participants is more firmly the focus of the study.

The rationale for the use of computers was presented in the theoretical review, and the disadvantages of the traditional approach to teaching were also discussed.

Nevertheless, no teaching approach should be discredited as long as it is appropriately used and adapted to the needs of pupils. Indeed, current technology offers opportunities to bring about significant changes in the educational process. For instance, changing the learning process from a passive one in which subject matter is transmitted to pupils, to an active one where pupils are expected to cope with authentic inter-disciplinary problems, and a change from individual study to studying in groups. This type of pedagogy has a psychological justification and basis, which was presented in previous chapters of the study; however, its application requires, on the one hand, a proper use of computer technology and that it should be used knowledgably, and on the other, an adaptation to the population of teachers and pupils who use it. No one method of teaching is suitable for all pupils, nor should all teachers be treated as robots and be expected "to do as they are told", rather, all facets and the various combinations of different educational theories should be taken into account, and should not be discredited. Therefore, the terms right or wrong with regard to learning theories are irrelevant as they serve the interests of theoreticians more than they do those of pupils' (Sfard, 1998).

Finally, the findings of this study may point out to policy makers that teaching cannot be improved by merely spending money on computers for classrooms. Nor, does it seem, that sending people on short courses is cost effective.

Contribution of the Research

The above analysis of the findings clarifies how teachers used computers in their respective classrooms. The findings provide information on pupils' perceptions in

both modes of instruction, and also illuminated the condition of English studies in the various schools through attitude questionnaire and interviews.
The contribution of the research lies in the fact that it is the first attempt to examine tenth grade pupils' perceptions, and attitude to English, quantitatively and qualitatively. Pupils' perceptions and attitudes were examined twice: at the beginning of the year before the process began and the change was implemented, and at the end of the year after pupils had the opportunity to experience learning English with computers. The findings were analysed to examine the implementation of computers and compare the results with classes where computers were not used. The research followed the instruction in both types of classrooms by means of interviews, which documented the change processes. To the best of my knowledge, this research constitutes the first attempt at such an analysis.

Despite the importance pupils and teachers attribute to learning English, English studies are recognised as a 'problematic' subject due to the difficulties – language, grammar and coping with the various skills required – pupils encounter. While schools support the implementation of innovative technology, thought was not given to adapting modes of instruction to the use of computers in English studies. This is surprising considering the consensus surrounding its importance, and the difficulties involved in teaching and learning this subject. In this research, English was taught with the aid of computers in the hope that this might change pupils' perceptions regarding learning and their academic self-efficacy.

The findings of this study indicate that there was a small change in pupils' perceptions of learning, and no change in their academic self-efficacy. The quantitative findings indicate that in general pupils were displeased with the materials teachers used in the classrooms. These findings justify the recognition of the teacher as a dominant component of the change process, and present another contribution of the research.

Appendix I

QUESTIONNAIRE

Name: ______________

Class: _____

School: __________

Male/Female - please circle.

Do you have a computer at home? YES NO (Please circle)

Dear pupil,

The following are statements about learning in class and at school. Please circle the number which best represents your opinion regarding each of the statements: 1= strongly disagrees with the statement, and 6= strongly agrees with the statement. The numbers between 1 and 6 are for opinions in between. There are no right or wrong answers to the questions, so it is important that your answer will reflect your belief.

Your answers will be used only for the purposes of the present study.

Thank you for your cooperation.

	Strongly Disagree					Strongly Agree
1. When I learn I make the connection between new things and the things I already know.	1	2	3	4	5	6
2. I study better on my own more than when I study in groups.	1	2	3	4	5	6
3. Good learning means acquiring a great deal of knowledge on a particular subject.	1	2	3	4	5	6
4. It is hard for me to cope with the problems and assignments in school.	1	2	3	4	5	6

5. In order to study well I should memorise subject matter.	1	2	3	4	5	6
6. It is hard for me to find material for the papers I have to write.	1	2	3	4	5	6
7. One can study well only when it is done alone, because group work may interfere with my own progress.	1	2	3	4	5	6
8. I prefer to study with books and notebooks rather than with a computer.	1	2	3	4	5	6
9. When I study it is hard for me to organise subject matter according to categories or topics.	1	2	3	4	5	6
10. Pupils will study well only if they get a grade for their learning.	1	2	3	4	5	6
11. I don't have to try hard when I study.	1	2	3	4	5	6
12. When I do my homework or solve problems, I simply try to do what I can and if I don't manage I try again.	1	2	3	4	5	6
13. It is hard for me to do well in exams.	1	2	3	4	5	6
14. Compared with other pupils in my class I don't always expect to do well in my studies.	1	2	3	4	5	6
15. Good learning is a result of individual hard work and not a result of group work.	1	2	3	4	5	6
16. One can study only from the teacher and not from another pupil.	1	2	3	4	5	6

17. I don't always know where to look for material I need for writing papers.	1 2 3 4 5 6
18. In order to study well you need to use subject matter.	1 2 3 4 5 6
19. There's no learning without serious intellectual effort.	1 2 3 4 5 6
20. When I face a difficult learning problem, I worry that I might not be able to solve it.	1 2 3 4 5 6
21. I'm not sure I'll get a good grade at the end of the school year.	1 2 3 4 5 6
22. It is very hard for me to connect new topics I study to topics which I studied in the past.	1 2 3 4 5 6
23. When I try to solve a problem it is hard for me to decide whether I'm doing the right things to solve it.	1 2 3 4 5 6
24. Learning is a personal matter and has nothing to do with a group.	1 2 3 4 5 6
25. Good learning involves problem solving.	1 2 3 4 5 6
26. I won't always be able to cope with the problems and the assignments the teacher gives.	1 2 3 4 5 6
27. When there's a lot of material on a subject I need to write about, I don't always know what is most suitable and what I should select.	1 2 3 4 5 6
28. I enjoy working as part of a group	1 2 3 4 5 6

29. In learning one either understands or one doesn't.	1	2	3	4	5	6
30. I don't always use the most suitable material for the papers I write.	1	2	3	4	5	6
31. When I study it takes me a long time until I feel that I am making progress.	1	2	3	4	5	6
32. Planning my learning is a difficult process which I find hard to cope with.	1	2	3	4	5	6
33. The trick in learning is to know how to relate topics.	1	2	3	4	5	6
34. It is hard for me to decide in advance what I'm going to do in order to cope with a task the teacher assigned, and to check if I'm doing things as I planned.	1	2	3	4	5	6

Rank the following in order of importance: 1= the most important

35. Learning involves

( ) acquisition of knowledge
( ) reading new material
( ) memorising
( ) relating new topics to old ones.

36. I prefer to study with

( ) teachers
( ) books
( ) articles, newspapers, magazines
( ) other pupils
( ) computers
( ) parents

37. I prefer to study

( ) in groups of 2-4 pupils
( ) in groups of 6-8 pupils
( ) with the whole class
( ) alone

PART TWO

To what extent do you feel that the following helps you in your study of English?

	Not at all 1	a little 2	average 3	much 4	very much 5
The teacher's explanation					
Peers' explanations					
Textbooks					
Worksheets					
Learning with a computer					
Homework					
Tests and quizzes					
Independent study					
Active participation in classroom discussions					
Working in groups					
Doing projects in English					
The atmosphere in the classroom					

The following statements are concerned with your attitude to English lessons. Please circle the number which best represents your opinion.

English lessons are	not interesting	1	2	3	4	5	interesting
English lessons are	not suitable to my academic level	1	2	3	4	5	suitable to my academic level
English lessons are	not fun	1	2	3	4	5	fun
The atmosphere in the classroom is	not pleasant	1	2	3	4	5	pleasant
Teaching methods are	not varied	1	2	3	4	5	varied
Tests and quizzes are	not suitable to my academic level	1	2	3	4	5	suitable to my academic level
The worksheets are	not interesting	1	2	3	4	5	interesting
The activities in the classroom	do not promote my knowledge of English	1	2	3	4	5	promote my knowledge of English

Please circle the number which best represents your opinion in the following questions:

1. To what extent do you use the computer for doing your homework and projects in English?

Never **1**	**2**	**3**	**4**	**most of the time** **5**

2. To what extent do you do your classroom assignments in English on your own?

Always with peers **1**	**2**	**3**	**4**	**always alone** **5**

3. How important is it for you to know English?

Not important **1**	**2**	**3**	**4**	**very important** **5**

4. Do you like to study English?

I do not like it at all				**I like it very much**
1	**2**	**3**	**4**	**5**

5. Do you feel that your grades reflect your knowledge in English?

They do not reflect it at all				**they accurately reflect my knowledge**
1	**2**	**3**	**4**	**5**

6. Do you feel that you are taught according to your level in English?

The teaching level is not suitable at all				**the teaching level is suitable to my own**
1	**2**	**3**	**4**	**5**

7. To what extent do you like to study English in each of the following ways?

With the whole class	I do not like it at all **1**	**2**	**3**	**4**	I like it very much **5**
In groups	I do not like it at all **1**	**2**	**3**	**4**	I like it very much **5**
In pairs	I do not like it at all **1**	**2**	**3**	**4**	I like it very much **5**

Alone	I do not like it at all **1**	**2**	**3**	**4**	I like it very much **5**

8. Do you use the computer at home for games?

Never **1**	**2**	**3**	**4**	most of the time **5**

Appendix II

Interview questions to pupils who study with computers

1. Have you used computers before using them in English lessons? If yes, how often and for what purposes do/did you use them?
2. How often do you use computers in your English lessons? Which of the activities you do with the computer do you like most? Why? What do you need to make you progress in English?
2. Do you like having computers in your English lessons? Why? Do you feel that the computer helps you progress in your English lessons? Can you explain how? Do you feel that the use of computers in the classroom helped you become more independent in your study of English?
3. What can you do now, in your English lessons that you could not do before?
4. Do you like to study English? Why? Now that you are using computers in your English lessons do you like to study English better than before?
5. Is it important for you to study English? Why?
6. How do you like to study (in a group, with books)? When do you feel that you study well? What conditions are necessary for you to study well?
7. What kinds of activities/assignments are easy for you when you study English? In other subjects? What are difficult? Does the use of computers help you in overcoming the difficulties or improve your work in any way? How do you overcome problems?
8. What do you think of your English lessons? Are they interesting? Do you find them helpful for your progress in English?

Interview questions to pupils from the control group

1. Do you like studying English? Why? What don't you like about studying English? Why? Is it important for you to study English? Why?
2. Do you feel that you have made any progress in English this year? What do you think will help you improve your grades in English? What do you think has contributed to your progress in English? Explain. What kinds of activities/assignments are easy for you when you study English? What are difficult? How do you overcome the difficulties?
3. How do you like to study (in a group, with books)? When do you feel that you study well? What conditions are necessary for you to study well? You do not use computers in your classroom. Would you have liked to study English with the aid of computers? Why?

Interview questions to teachers from the experiment group (with computers)

- Can you tell me about your work experience? How long have you been teaching for? Do you have a teaching certificate? Have you taken any courses in the methodology of teaching English recently? What books do you use for this particular class?

1. How many computers do you have in your English Room? The computer lab?
2. How many hours of English does your class have per week? How often does your class have computer lessons? Does the whole class have computer lessons at the same time? How long is each computer session?
3. What kind of activities do pupils do with computers?
4. How do they work with the computer- in pairs or individually? Any other way?
5. What do you think the emphasis in the teaching of English should be?
6. What do you think of the Open University course for incorporating technology into English lessons? Do you apply the principles you studied in the course in your lessons? Can you give an example of something you apply? Do you consider yourself computer literate/a computer resource person?
7. What do you think about using computers in your classes? Do pupils like using computers in the classroom? Do computers help pupils in their study of English? What do they offer that you can't offer?
8. What do you think is needed to improve pupils' performance in the classroom or their attitude to English lessons?
9. Have your approaches to the teaching of English changed as a result of taking the Open University computer course? Did the course affect you in other ways? Explain.

Interview questions to teachers from the control group

Can you tell me about your work experience? How long have you been teaching for? Do you have a teaching certificate? Have you taken any courses in the methodology of teaching English recently? If yes, what courses? If not, why? What books do you use for this particular class?

1. How many hours of English does your class have per week? What kind of activities do your pupils do in their English lessons? Can you describe a typical lesson? Why do you assign these particular activities?
2. What is needed to help pupils progress in English?
3. What do you think about the use of computers in the English language classroom? Explain.
4. What do you think the emphasis in the teaching of English should be?

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