CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents the related literature and research in the use of computers in language teaching. It addresses both the advantages and disadvantages of using computers in teaching and learning as to determine the effectiveness of CALL in language learning. This chapter covers some important aspects of CALL. First, we will be looking at the pioneers in CAI and how CALL was introduced and implemented in language teaching and learning. Then, the theories related to CALL will be explored to give us further understanding on how CALL works based on certain principles and how they are applied in teaching a language. A six component framework for CALL as proposed by Steinberg (1991) will then be discussed and examined to see how these domains- learning theories, instructional models, practical experience and technology- tie into this framework. Lastly, we will look at CALL environment, learners' motivation in CALL and other researcher's views on the effectiveness of CALL. The researcher hopes that this chapter can enlighten readers on what CALL is and explore the effectiveness of CALL in the researches done.

2.1 The Early Years of CALL

Computer- assisted language learning or CALL is a process in which learners use computers and as a result improve their language proficiency.

(Beatty, 2003)

Computer as we know is a wonder of modern technology which has helped human in many ways and many fields. It has become so important that we cannot imagine a world without computers. Thus, in other words, computer has become a part of our life and it is a boon to many. Not only are computers required in industries like banking, manufacturing and processing, but they are also massively used in education where they help students acquire certain skills.

As Heines (1988) reflected on the history of the development of learning tools, he suggested that the theoretical stage for mechanized learning devices was set by Thorndike in 1912, who wrote "if by a miracle of ingenuity, a book could so be arranged so that only to him who had done page one would page two become visible, and so on, much that now requires personal instruction could be accomplished by print." This resulted in invention of a machine by Sidney L. Pressey, just a few years later. This machine presented multiple choice questions on a rotating cylindrical drum. Students were then asked to choose an answer by pressing one of four keys, each of which represented one of the answer choices. Thus, this opened way to the use of computers in education in order to mechanize the learning process.

2.2 Pioneers in CAI / CALL

CALL means learners learning language in any context with, through, and around computer technologies. (Egbert, 2005, p.4)

Computer Assisted Language Learning or also known as CALL may not be something new for people today but it certainly was totally a new approach to education in the late 1950s and early 1960s. CALL is a new approach to learning a language. Levy (1997, p.1) defined CALL as "the search for and study of applications of the computer in language teaching and learning". Looking back at the pioneering days of CALL, only higher learning institutions which had access to large mainstream computers were using computers for language instruction. (Ahmad et al 1985, Jung 1991). The experiments in CALL were funded by major corporations like IBM, Control Data Corporation, National Science Foundation (NSF), Carnegie Foundation and major universities like Dartmouth, Stanford and University of Illinois. The development of CALL can be traced to the 1960s when two projects on large computers led the way in the evolution of CALL. The two of the best known systems continue to have an impact on education are PLATO and TICCIT. (Merril, Hammons, Vincent, Reynolds, Christensen and Tolman, 1995)

2.2.1 PLATO

PLATO was designed by a group of engineers, physicists, psychologists and educators in 1959 and it evolved into a powerful CBE system. The PLATO system is probably the best known CALL project in the world. PLATO researchers were the ones who pioneered the use of colour graphics, touch sensitive screens, simulations and a higher level of computer- user interaction and user control. PLATO then became a platform for other computer based education systems such as TICCIT, WICAT, MECC and CONDUIT. Though the PLATO project, significant improvement is made to the field in terms of hardware capability but left unanswered the questions of effectiveness of CALL to learning. (Chambers and Sprecher 1983, p.10)

During the 1970s the PLATO system made considerable progress (Ahmed, Corbett, Rogers and Sussex, 1985). PLATO covered a wide range of languages besides English. PLATO also offered teachings of other languages besides English which include Chinese, Esperanto, French, German, Hindi, Latin, Modern Hebrew, Modern Greek, Norwegian, Russian and Swedish. The focus was still on drill and practice application. The exercises include tackling phonemic and graphemic problems in Hindi, logographic problems in Chinese and playing the game 'Hangman' in Modern Hebrew. According to Ahmed, Corbett, Rogers and Sussex, the PLATO system talks to the student: it can give dictation, for instance. More importantly the motivation behind the production of PLATO language materials has been practical; the aim was not "to investigate abstract theories of lesson and curriculum design" (Harb, 1981) In the 1970s, when most student input to the computer system was still via a keyboard, the PLATO offered touch sensitive screen. This removes the possibility of typing mistakes which is a common problem among beginners and less dexterous users. Although PLATO system is extremely expensive, it offers a high degree of technological sophistication, an aspect that may attract more learners.

2.2.2 TICCIT

TICCIT is another best known system to have an impact on education. TICCIT (Time shared, Interactive, Computer –Controlled Information Television) system began in 1971 with the combined efforts of the engineers from MITRE Corporation in McLean, Virginia and the educators at the CAI laboratory at the University of Texas. They were later joined by the Institute for Computer Uses in Education at Brigham Young University. TICCIT was funded by the National Science Foundation. TICCIT developed complete courses in Math and English at the college freshman level. A major

objective of TICCIT system was to help students become independent learners. This project was the first of its kind to emphasize the “use of innovative approaches to hardware as well in depth consideration of learning theory and instructional strategies in the design of the course materials” (Chambers and Sprecher, 1983, p.11). Anastasio and Wilder (1984), further added that “the results of using TICCIT indicated significant improvement of both student achievement and attitudes on part of students using CAI” (p.16)Jones (1978, cited in Steinberg, 1991) also points out that the English courses carried out using TICCIT showed that “TICCIT students performed significantly better than lecture students” (p.66). Thus, the evaluation gained from the TICCIT project provided some evidence in regard to the effectiveness of CALL as an instructional and learning tool.

2.2.3 WICAT

World Institute for Computer Assisted Teaching Inc (WICAT), trailed behind these mega projects. Dustin H. Heuston, its principal founder, formed this non-profit organization in 1977 when he became heavily involved in research in and implementation of CAI applications to education. Other founders of WICAT included educators, instructional designers and computer scientists who were dedicated to finding ways in which technology could be used to improve training and education. (Burn, 1989). WICAT aimed to develop exemplary software, particularly in basic skill areas such as English, mathematics and reading and conducting research in learning and teaching through use of capabilities generated by the new technologies.

With all these mega projects, computers have made their way through our education system with various ways to enhance learning.

2.3 Learning Theories and CALL

The development of CALL can be explicitly seen in three different phases; the behaviourist CALL, the communicative CALL and cognitive CALL. The two major learning theories – behavioural and cognitive – that are related to CALL and their principal proponents as presented by Huntington (1979) are further elaborated below;

2.3.1 Behavioural Theories in CALL

- Connectionism (Thorndike)
- Contiguity Theory (Guthrie)
- Drive Reduction Theory (Hull)
- Operant Conditioning (Skinner)

The first phase of CALL, conceived in the 1950s and implemented in the 1960s and 70s was based on the then-dominant behaviourist theories of learning. Lee (2000) defines the behaviourist CALL as follows:

"In the 1960's and 1970's the first form of Computer Assisted Language Learning featured repetitive language drills, the so-called drill-and-practice method. It was based on the behaviourist learning model and as such the computer was viewed as little more than a mechanical tutor that never grew tired. Behaviourist CALL was first designed and implemented in the era of the mainframe and the best-known tutorial system, PLATO, ran on its own special hardware. It was mainly used for extensive drills, explicit grammar instruction, and translation tests (Ahmad, et al., 1985)."

The theory of behaviourism concentrates on the study of overt behaviours that can be observed and measured (Good & Bropy, 1990). It views the mind as a "black box" in the sense that response to stimulus can be observed quantitatively, totally

ignoring the possibility of thought processes occurring in the mind. Some key players in the development of behaviourist theory are Thorndike, Guthrie, Hull and Skinner.

Thorndike's Theory of Connectionism.

Edward Thorndike's theory states that learning is the formation of a connection between stimulus and response. Hence, connectionism is also known as S – R (Stimulus – Response) bond theory. This theory views learning as a trial and error process which involves stamping in a connection between a stimulus and response. This connection or bond comes in forms of rewards for correct responses. Callender (1969) claims that such rewards received by the learner is used to reinforce the intended behavior. These rewards are called reinforcements. Thorndike developed the law of effect, emphasizing the importance of reward in learning. The law of effect states that when a connection between a stimulus and response is positively rewarded, it will be strengthened and when it is negatively rewarded, it will be weakened. The principles behind connectionism are:

- Learning requires both practice and rewards.
- A series of S- R connections can be linked if they belong to the same action sequence.
- Transfer of learning occurs because of previously encountered situations.
- Intelligence is a function of the number of connections learned.

Based on the principles of connectionism, Huntington (1979) states that the implications of connectionism for CALL applications are threefold. Firstly, behaviours that are acceptable should be reinforced and this can be accomplished by incorporating verbal praise or displaying pleasant graphic on the computer screen after receiving a response that can be classified as appropriate. Secondly, lessons of similar concepts can

be used to foster transfer. Thirdly, feedback from students through non- directive measures can be used to help the transfer of learning process.

Guthrie's Theory of Contiguity

Guthrie (1946) states that all learning is a consequence of association between a particular stimulus (S) and response (R). The contiguity theory specifies that this association between S-R is not the result of positive or negative reinforcements but of time factors. Therefore, this theory maintains that "coupling of stimuli with responses occurring close together in time will cause them to be associated in such a way that future presentation of the stimuli will elicit the same responses" (Huntington, 1979, p.116).

The classic experimental paradigm for contiguity theory is cats learning to escape from puzzle box (Guthrie and Horton, 1946). The puzzle box which was made of glass allowed Guthrie to photograph the exact movements of the cats. The photographs revealed that the cats learned to repeat the same sequence of movements associated with the preceding escape from the box. Improvement is seen when irrelevant movements are unlearned or removed in successive associations.

The contiguity theory posits that the more immediate the feedback or reinforcement, the more learning is facilitated. How fast the rewards are received is based on whether the S-R is well paired or not. Placing the importance on timing of reinforcements and giving careful concern for appropriate learning so as to prevent the unlearning of undesirable responses are useful implications of CALL.

Hull's Drive Reduction Theory

Hull's theory is a version of behaviourism in which the stimulus (S) affects the organism (O) and the resulting response (R) depends upon the characteristics of both O and S. Drive reduction theory focuses on what goes on within the learner and infers that there is a set on intervening variables which is not directly observable. Huntington (1979) proposes that the surest way of observing the effects of these variables is "to investigate responding and need reduction" (p.117). Huntington (1979) further postulates that

"Motivation is viewed as need reduction, and it is believed that drives must be reduced, though not necessarily eliminated, before learning can occur. Learning is seen as an iterative sequencing of stimulus conditions coupled with responding, reinforcement and drive reduction (p.117)."

Like other forms of behaviour theory, reinforcement is the primary factor that determines learning. Miller and Dollard (1941) attempt to apply the drive reduction theory in the following situation:

A six year old girl who is hungry wants a candy. She is told that there is candy hidden under one of the books in a bookcase. The girl then begins to pull out books in the bookcase at random until she finds the book with the candy. Her first attempt took her 210 seconds. She is sent out of the room and new piece of candy is hidden under the same book. Her next search is more directed. Her second attempt took her 86 seconds. After the ninth repetition, the girl only took 2 seconds to find the candy.

The experiment shows that the girl's drive for the candy caused her to look under books to reduce the drive. She was rewarded (with a candy) when she eventually found the book. Because this particular response was rewarded each time, it was habit forming. On subsequent trials, the strength of this habit was increased until it became a single stimulus response connection.

The implications for CALL are elements that motivate the students to want to learn must be incorporated in each lesson. Moreover, the learning must satisfy the students' needs. Huntington (1979) maintains that *"requiring responses that are low on the hierarchy of needs and reinforcing them in a sequence that maintains the student's interest is a desirable practice" (p.117)*

Skinner's Operant Conditioning Theory

Skinner's views grew out of observations of the performance of animals in a device known as a Skinner Box. The Skinner box is a small box with a lever on one side. When a hungry pigeon depressed the lever, a food pellet was delivered. This is a form of positive reinforcement. His early experiments are concerned with shaping the behaviour of pigeons – low level behaviours of animals – and how simple behaviours are learned and weakened. His study concluded that a hungry bird that is reinforced by food when a desired behaviour is elicited is more likely to continue to respond to the given stimulus. However, if reinforcement is withdrawn, the behaviour will in time be extinguished. Skinner's learning theory is very simple. His theory basically tells us that response will result in reinforcement.

Reinforcement is the key concept to operant conditioning. Reinforcement may be positive or negative. Positive reinforcement occurs when feelings of satisfaction are engendered in the learning as a result of responding successfully to a given stimulus.

Skinner in later years tested his theories on complex behaviours by studying the learning processes of human subjects. He developed teaching machines and programmed learning based on his response / reinforcement model. Programmed learning developed contiguously with operant conditioning. Since CALL is a form of programmed learning, it relates significantly to operant conditioning.

2.3.2 Cognitive Theories in CALL

Cognitive theories are concerned with how individuals gain knowledge through cognitive processes and how they use it to make decisions and perform effective actions. They try to understand how the mind works. According to Chambers and Sprecher (1983), a cognitive learning theory is concerned with the following:

1. The effect of stimuli on the organism's receptors.
2. Storage of information in the short term memory
3. Storage of information in the long term.
4. Processes involved in encoding and decoding information
5. Retrieval of the stored information, its possible combination with other information and its effect in behavior on the organism,

(Source: Chambers J.A and Sprecher J.W 1983, pg. 79)

Cognitive learning theories are most applicable to tutorial CALL. This approach of applying cognitive leaning theories to CAI was pioneered by Robert M.Gagne (1970) emphasized the importance of identifying the goals of learning task followed by the development of the specific instructional objectives to meet these goals. Gagne (1974) identified 5 categories of learning outcomes which he believes to represent all types of learning. These include:

1. Intellectual skills (how to do something of an intellectual sort)
2. Cognitive strategies (capabilities that govern the individual's own learning, remembering and thinking behaviour)
3. Verbal information
4. Motor skills
5. Attitudes

Some key players in the development of cognitive theory are Tolman, Weithermer and Piaget.

Tolman (Sign Learning Theory)

The sign (purposive) theory includes the element of purpose and learning which is believed to be acquired through the acting out of meaningful behaviors. Behaviors are goal directed and the goals of the instructional system must be compatible with those of the learner in order for learning to take place at a reasonable rate. Learners possess reward expectancies which they build up as a result of experiencing and setting goals. They assign values to the things that they are asked to do. The aspect of this theory that is applicable to CALL is the providence of appropriate universal rewards besides timing rewards that match the rewards to individual expectations.

Wertheimer (Gestalt Theory)

This theory deals with issues of perception, organizing perceptions and recalling the effects of past experiences. These processes are applied to problem solving situations through the use of insight. The essence of successful problem solving behaviour according to Wertheimer is being able to see the overall structure of the problem. Gestalt theory emphasizes the higher order cognitive processes in the midst of behaviourism. The major implication of Gestalt theory for CALL is the perception based orientation and the element of prior experience. Thus, while using a CALL program, learners are expected to solve the problem on their own and also use their prior knowledge to answer the questions.

Piaget (Development Theory)

The core of this theory is cognitive growth. Mental structures are either inherent or a product of the interaction between a learner and the environment. In carefully observing the child's intellectual development, Piaget offered a useful description of the stages of development and learning. To Piaget, the environment was the curriculum. The micro worlds of the computers makes available and provide a new environment for learning. Central to his theory is the idea that there are definite stages of development and these stages occur universally in a fixed order. In a nutshell, environment plays an important role in order for learning to take place. Through this study, we will be able to see whether students prefer the computer lab to classroom.

2.3.3 Communicative CALL

The next phase is the "communicative CALL," introduced in the 1970s and '80s was the result of a communicative approach, which was one of the mainstream methods in second/foreign language teaching at that time. Since this approach emphasized the process of communication and highlighted the use of the target language in real settings, the programs that appeared in this period featured practice in a non-drill format. Software that had not been specifically designed for CALL was also employed for writing practice. One of the main advocates of this new approach was John Underwood, who in 1984 proposed a series of "Premises for Communicative CALL" which are as follows:

- focuses more on using forms rather than on the forms themselves;
- teaches grammar implicitly rather than explicitly;

- allows and encourages students to generate original utterances rather than just manipulate prefabricated language;
- does not judge and evaluate everything the students nor reward them with congratulatory messages, lights, or bells;
- avoids telling students they are wrong and is flexible to a variety of student responses;
- uses the target language exclusively and creates an environment in which using the target language feels natural, both on and off the screen; and
- will never try to do anything that a book can do just as well.

The implications for CALL are to keep the learning increment small to insure success, to reinforce every time a correct behaviour occurs, and to build a set of discriminated operant to ensure a progression of learning from simple to complex. Computers in communicative CALL involves the *computer as tool* (Brierley & Kemble 1991; Taylor 1980) or, as sometimes called, the *computer as workhorse* (Taylor & Perez 1989). In this role, the programs do not necessarily provide any language material at all, but rather empower the learner to use or understand language. Examples of computer as tool include word processors, spelling and grammar checkers, desk-top publishing programs, and concordances.

Of course the distinction between these models is not absolute. A skill practice program can be used as a conversational stimulus, as can a paragraph written by a student on a word processor. Likewise, there are a number of drill and practice programs which could be used in a more communicative fashion; for example, students were assigned to work in pairs or small groups and then compare and discuss their answers (or as Higgins 1988, students can even discuss what inadequacies they found in the computer program) In other words, the dividing line between behaviouristic and

communicative CALL does involves not only which software is used, but also how the software is put to use by the teacher and students.

On the face of things communicative CALL seems like a significant advance over its predecessor. But by the end of the 1980s, many educators felt that CALL was still failing to live up to its potential (Kenning & Kenning 1990; Pusack & Otto 1990; Rüschoff 1993). Critics pointed out that the computer was being used in an ad hoc and disconnected fashion and thus "finds itself making a greater contribution to marginal rather than to central elements" of the language teaching process (Kenning & Kenning 1990: 90).

The challenge for advocates of CALL was to develop models which could help integrate the various aspects of the language learning process. Fortunately, advances in computer technology were providing the opportunities to do just that.

2. 4 Theoretical Framework for CALL

“CAI draws on learning theories, instructional models, practical experience and technology” (Steinberg, 1991, p.2) Steinberg proposes a six component framework as presented in Figure 2.2. Six components have been identified as essential in a CALL framework. They are:

1. Target population
2. Goals
3. Task- skills and materials involved
4. Instruction – the externally planned activities
5. Computer application – the way computers are used as the vehicle of instruction

6. Environment implementation (the way CALL lessons are implemented in instructional environments)

Each of these components is necessary and the interaction of these components is crucial for learning to take place. The first four components- target population, goals, task and instruction – are derived from learning theories and instructional models while the other two components- computer application and environment implementation – mirror the research and experience with CALL.

2.5 Applications of CALL

The use of CALL in the teaching and learning process falls under four broad categories. They are drill and practice, tutorials, simulations and games. The examination of some of the major learning theories will serve to present an idea of the scope of applying these learning theories into practice in each of these four categories of CALL.

2.5.1 Drill and Practice

Drill and practice courseware is based on the model of computer as tutor (Taylor, 1980). In other words the computer serves as a vehicle for delivering instructional materials to the student. Drill and practice is the classic mode of CAI and it is also the easiest type to write. According to Price (1990), from a learning theory point of view, the purpose of drill and practice in general is to transfer knowledge from short term to long term memory and to aid learner in retrieving knowledge at suitable time. Briefly put, the rationale is as follows:

- Repeated exposure to the same material is beneficial or even essential to learning
- A computer is ideal for carrying out repeated drills, since the machine does not get bored with presenting the same material and since it can provide immediate non-judgmental feedback
- A computer can present such material on an individualized basis, allowing students to proceed at their own pace and freeing up class time for other activities

Based on these notions, a number of CALL tutoring systems were developed for the mainframe computers which were used at that time. In these programs, like the drill and practice programs mentioned above, the computer remains the "knower-of-the-right-answer" (Taylor & Perez 1989:3). The basic operation of a typical drill and practice program is clearly illustrated below;

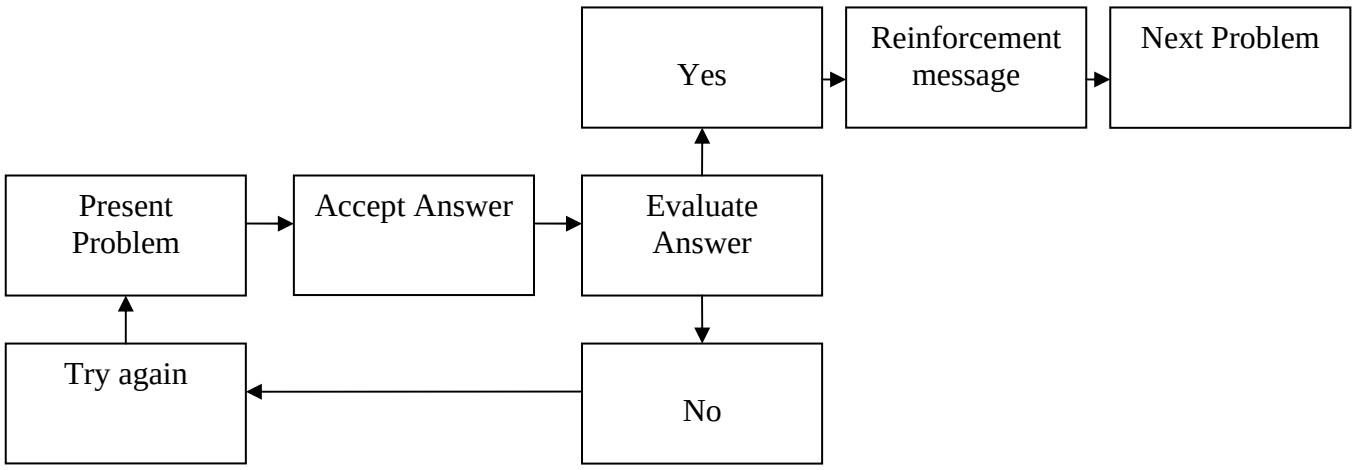

Chart 2.1 : A Typical Drill and Practice Program

(Source: Computer- Aided Instruction (A Guide for Authors), Price (1990), pg. 86)

One of the most sophisticated of these was the PLATO system, which ran on its own special PLATO hardware, including central computers and terminals. The PLATO system included vocabulary drills, brief grammar explanations and drills, and translations tests at various intervals (Ahmad, Corbett, Rogers, & Sussex 1985).

2.5.2 Tutorials

The application of behavioural theories to tutorials in CALL includes:

1. Obtaining a clear, detailed objective specification of what it means to know the given subject matter.
2. Writing a series of information, question and answer frames that expose students to the material in graded steps of increasing difficulty and frequently retest the same facts from many different angles.
3. Requiring the learner to be active because the learner is expected to give a response within a given time frame.
4. Providing immediate feedback for each answer.

5. Permitting students to proceed at their own pace.
6. Giving ample reinforcement for correct responses.

In tutor applications, the computer acts as a tutor by performing a teaching role. In effect, the student is tutored by the computer. The general process is as follows;

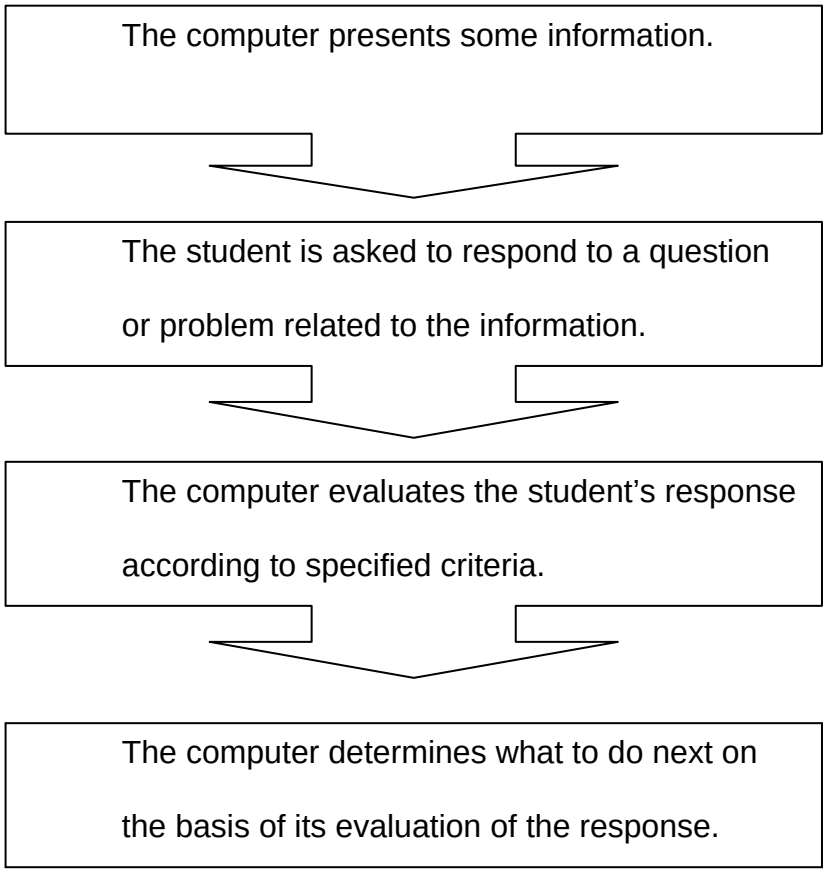

Chart 2.2 : Process of tutoring by computer

*(*Source: The Computer in the School: Tutor, Tool, Tutee, New York: Teachers College Press, Taylor (1980) pp.1-10.)

2.5.3 Simulation

In addition to computer as tutor, another CALL model used for communicative activities involves the computer as stimulus (Taylor & Perez 1989:63). In this case, the purpose of the CALL activity is not so much to have students discover the right answer, but rather to stimulate students' discussion, writing, or critical thinking. Software used for these purposes include a wide variety of programs which may not have been specifically designed for language learners, programs such as *SimCity*, *Sleuth*, or *Where in the World is San Diego?* (Healey & Johnson 1995b).

Steinberg (1984) defines simulation as a model of an event; a process or an abstract idea. The event may be physically observable or not; it may have occurred in the past or reflect an estimate of future occurrence; it may represent reality in every detail or only in a subset of features. Simulations constitute one of most powerful and potentially valuable applications of CAI. The learner makes decisions and sees the consequences of those decisions through use of CAI simulations.

There are variety of examples of these programs which include airplane flight simulators, replications of business environments, survival in foreign or imaginary lands and medical simulations. A good simulation program motivates students because, like a good teacher, it inspires. (Price, 1990)

2.5.4 Games

Games are known as an effective method to enhance learning, however, not many are perceptive of the idea of using games in classroom. The word ‘games’ is very closely related to ‘play’. Thus, for some teachers and parents, ‘play’ in classroom setting may not seem a good idea to enhance learning and often has negative connotation. On the contrary, in reality, games can be highly motivating experiences in a wide variety of situations. These games may teach some valuable skills and concepts. “A game is an educational activity presented in game format” (Steinberg E. R, 1984). Success in a game may require only rote knowledge or it may involve the application and extension of knowledge. Inappropriate games may have no effect on learning or motivation; they may even have negative effects. Therefore, in order to achieve the effectiveness of CAI, one must make sure that games that are used in the software are both motivating and educationally effective. The two main aspects of usage of games in CAI are extrinsically instructional games and intrinsically instructional games.

2. 5.4.1Extrinsically Instructional

In this type of games, the games are entirely independent. The game is instructional and the game context itself does not contribute to learning. The purpose of the game is motivation and the game is extrinsic to the actual learning. One example is a very popular arithmetic drill in game format called Speedway, developed for the PLATO CAI system by Seiler. The context is an automobile race, where the student is the driver of a car that races against another car, driven by computer, with the goal of being the first to cross the finish line. Arithmetic problems are presented one at a time and the student has to answer as quickly as possible. The faster the answer, the further

the car travels, provided the answer is correct. If the answer is incorrect, not only does his car not move, but the student also loses time entering the correct answer. The student must recall rote knowledge in order to succeed in this game; he does not have to know how to race a car in order to win; he only has to know arithmetic fact. The computer tells him if the answer is right or wrong. Moreover, the fact that the car did not move because the answer was wrong does not help the student learn the correct answer. Although the lesson provides remedial assistance when the student needs it, this remediation is entirely outside the context of the speedway. The function of this game is to motivate the student and to improve speed in using existing knowledge.

2.5.4.2 Intrinsically Instructional

Unlike extrinsically instructional games, this type of games provides instruction as well as motivation in the game context itself. The student can see for himself how well he is doing without having to depend on the computer to tell him if the answer is right or wrong. To win the game, the student must make new applications of available knowledge or gain new knowledge, such as generating a problem solving strategy. An example of intrinsically instructional game is by Seiler (1982) on the PLATO system entitled “How the West Was Won.” The goal is to be the first one to each a town at the end of the trail on the board. In order to win, students must do more than recall facts; they must synthesize many aspects of their knowledge. The results are self- evident from the context of the game. The distance the students moves is neither right nor wrong; it depends on the expression she generates. If the computer, which acts as spinner, shows the numbers 2,3 and 4, for example, the student will move 14 spaces if she enters the expression 3 X 4 + 2. However, she has a chance to move 18 spaces if she enters the expression 3 X (4+2) or 20 spaces if the expression is 4 X (3 + 2). The

student's chances of winning depend on the context of the game as well as on her own skills. This creates a unique opportunity for new learning, in which students can acquire new strategies by modelling their opponent or making inferences.

2.6 **CALL and learning environment**

A computer changes any environment in which it is used.

(Burke, 1982)

According to Oxford (1989), environment can be defined as the circumstances or conditions that surround one; surroundings. It is a norm that human beings react differently when put in different environments because of the presence / absence of certain elements. Similarly, in education, different environment produces different outcomes in terms of students' performance, attitude, understanding and many more. It is undeniable that there is an obvious difference between a CALL environment and a non CALL environment. Second language acquisition research has shown the eight "Conditions for Optimal Language Learning Environments" which is summarized below.

1. Learners have opportunities to interact and negotiate meaning.
2. Learners interact in the target language with an authentic audience.
3. Learners are involved in authentic tasks.
4. Learners are exposed to and encouraged to produce varied and creative language.
5. Learners have enough time and feedback.
6. Learners are guided to attend mindfully to the learning process.
7. Learners work in an atmosphere with an ideal stress/anxiety level.

8. Learner autonomy is supported.

(Egbert, Chao, and Hanson-Smith,1999, p. 4)

Although both CALL and non CALL are similar in purpose, differences between these two environments can be seen in these aspects.

I. Interaction

In a traditional classroom, students interact with their teacher and peers. Therefore, there is an opportunity to have ample practice of the language. However, in CALL environment, this 'lively' interaction is absent. Students interact with computers. The advantage of this kind of environment as said in Using Computers In Classroom by Callison (1985), is that the students who lack confidence or have low self esteem and underachievers gain more benefits. They are able to perform without fear of being laughed at when they are in CALL. This is because the only 'audience' who is present at that moment would be the computer. Thus, learning in CALL environment can be helpful for students who feel intimidated with the presence of others.

II. Tasks

Although the tasks assigned in CALL and non CALL environment may be the same, they may differ in ways student perform in the tasks given. When given a task, students need to concentrate and work on it. In a traditional setting, students are more vulnerable. They are easily distracted by peers, teachers or other factors. In contrast, student in a computer lab would work just as if they were in a library. When in a CALL environment, students do not passively listen and watch the teacher while their attention wanders, as they might in a traditional classroom (Price, 1990). As the tasks are individually assigned, they can concentrate better and perform well. This is evident in

many studies done over the years where students have performed better and enhanced their skills after using CALL.

Not only that, CALL is also well known for its capacity to provide personalized and self paced learning. (Ahmad, Corbett, Rogers and Sussex, 1991). In other words, students are able to take their own time in finishing the task given according to their ability. Slow learners may take longer time in finishing the task but they are given a chance to perform at their own pace. In contrast, slow learners in a traditional classroom may be pressurized to finish the task as soon as other learners have finished. They tend to be more careless in order not to be left behind.

According to Ahmad, Corbett, Rogers and Sussex (1991), the computer's flexibility of time allows the student the choice of when to study particular topics and how long to spend.

III. Learning process

CALL is designed expressly to foster active student involvement in the learning process and requires frequent responses from the learner as information is presented. Once a student makes a response, the computer can immediately indicate whether the response in correct or incorrect. (Price, 1990). This allows learning to take place. Lochtman (2002) supported this statement by telling that giving feedback to students regarding the language students used during the interaction while doing English language activities gave students opportunity to learn and use the language. Therefore in some researches , students in a CALL environment performed better than those in a non CALL environment.

Futrell, M.K and Geisert, P.G (1995) also added that computers can promote learning. Computer driven devices present the user with sights, sounds, smells and

feeling that make one perceive a different environment from reality. Thus students will be stimulated to learn and pay more attention to what is presented in a CALL lesson.

Not only that; it is also proven that CALL helps to improve students' attention spans. Based on research done with two groups of learners in a CALL environment and non CALL environment, Ahmad, Corbett, Rogers and Sussex (1991) have come up with the conclusions that while using CALL, students' attention spans are longer; the material is usually better learnt and learnt more quickly.

IV. Teachers

Although in both CALL environment and non CALL environment, teachers are present, they play totally different roles in respective environments. A teacher in a CALL environment or a computer lab facilitates learning. In other words, teachers observe students learning independently and offer help whenever necessary. Bailey (1993) suggested that teachers in a CALL environment work with the students as helpers rather than authorities.

Therefore, environment plays an important role for learning to take place. Egbert and Jessup(1996) postulated that computer supported learning environment to be one of the ways to give students an authentic learning environment and this condition helps the students to learn English better than the daily classroom context. Mickan (2003) also had positive views on learning in a computer environment. He said that although a task could have been done without computers, the physical use of the equipment appears to have created a learning environment.

2. 7 Review of CALL

Researchers have done a great number of studies on CALL to see if the learners' can benefit in language learning through CALL. Those studies were also done to see the role of computer as a tool and tutor.

2.7.1 Learner Motivation

'Motivation is, without question, the most complex and challenging issue facing teachers today'

(Scheidecker and Freeman, 1991, p.116)

With regards to CALL and learning motivation, there was a research conducted by Robinson, Underwood, Hernandez, Rudesill and Ensinat(1985). They studied a group of first year students studying Spanish in a high school in Oakland,California. They participated exclusively in CALL activities each day during the two week of field study. An inventory on pre-research and post- research attitudes of students toward CALL revealed that CALL activities challenged and encouraged students to develop their own learning strategies. Besides that, they could proceed at their own pace and they commented that the computer was a very 'forgiving' and 'patient' tutor (Robinson,1991).

Warschauer (1996) in a more recent study on the relationship between CALL and motivational aspects of learners researched the effects on student motivation of using computers for writing and communication in the language classroom. He reported that the subjects overall had a positive attitude toward using computers and that this attitude was consistent across a number of variables which included gender, typing skills, and access to a computer at home. In addition, he identified that self-reported

knowledge of computers and amount of experience using e-mail correlated positively with student motivation.

Bradley (1982) also noted that learners are especially enthusiastic and motivated while working on CALL programs;

"Children seemed to be highly motivated by seeing their spoken language appear on the screen and were eager to contribute ideas and to read the sentences a they were displayed….Aside from the novelty of using the microcomputer, a significant factor in the children's enjoyment…seemed to be the speed at which their dictation could be transcribed. Writing sentences on a wall chart takes so much time that the children often get restless and bored before the story is finished…Once children realized how easily changes could be made, they suggested revisions voluntarily and freely….Getting the printed copy of the story immediately stimulated great excitement. (p. 736- 7)"

According to Kim Thomas (2005), in his article "Putting computers in school is a really dumb move", computers, if used correctly, can also help children work at their own pace. Since computer is a patient tutor, it gives an opportunity for students to reread the notes presented numerous times and students have the time to slowly comprehend whatever that is presented. This is highly impossible in a typical classroom because a teacher may lose his/her patience and other students who are smarter may feel restless if the same points are being repeated over and over again. Thus, while using CALL, students will feel more confident and this will increase their motivation in learning. With an increased motivation level, students get to perform better in their lessons. Therefore, high motivation level influences the effectiveness of CALL by helping the learners learn successfully.

The role that computers play in motivating students cannot be overstated. Traditional, tightly structured, teacher-centered labs may make teachers feel good, but they make students sleepy (Szendeffy, 1997). Szendeffy claims that in a CALL lab,

students are in control of their learning and the teacher ensures that they are on the right path. He also added that when students are interested and entertained, then they are conscious, focused, and thinking about and in English. Therefore, CALL has proven to be a motivating tool for language learners which influences the effectiveness of CALL softwares in the classrooms.

T. Ravindran (2000 p.82 – 89)) also has positive reviews on CALL and according to him CALL has been a great teacher in maintaining the students' interest. He said that it is often necessary, in a language learning classroom, to provide repeated practice to meet important objectives. Because this can be boring, painful, and frustrating, many students lose interest and motivation to learn foreign languages. CALL programs present the learner with a novelty. They teach the language in different and more interesting, attractive ways and present language through games, animated graphics and problem-solving techniques. As a result even tedious drills become more interesting. In fact, CALL motivates the students to go beyond the point of initial mastery and practice activity until they become automatic.

In another study conducted by Pawling (1999), CALL software has once again prove its effectiveness by enhancing learners' motivation. Pawling postulated that; *"CD-ROM is potentially a liberating instrument for teachers and learners alike in that it has the special facility of incorporating practice in all four language skills mentioned above in a multimedia package using video, text, photograph and sound. There is much evidence; not least teachers' own experience, to suggest that computer-based learning is very motivating for children (p. 164)."*

Gillespie and McKee (1999) conducted a study with group of undergraduates and graduate learners. The findings of this study showed that CALL enhanced student performance and skills considerably in their studies. Similarly, Garcia and Arias (2000) compared the performance of sixty students of Land Surveying at the Extremadura

University in Spain. They found out that students made use of the references provided by the computer more extensively than they did of the printed references. Also, the results showed that students' motivation to access computer-supported information was higher than accessing similar information in print-oriented references.

The findings from a study conducted by Navaporn Sanpraset (2005) in ARECLS E-journal also show that with graphics and sounds computer-based materials are more motivating and be able to encourage more learner autonomy than paper-based materials.

Although the findings from the studies above suggest that CALL has been effective in the classrooms by motivating the learners, some people might argue that self learning can be frustrating at times and thus learners may not feel enthusiastic to keep on trying on their own. My study seeks an answer to this question on whether or not NETPLUS motivates learners to learn a language on their own just like the other CALL softwares mentioned above.

2.7.2 Learners' attitude towards CALL

Finkbeiner (2001) administered a questionnaire to 100 undergraduate EFL learners and collected data from 82 learners to learn about the learners' attitude and interest in CALL and cooperative learning. His results showed that undergraduate learners had positive attitudes towards CALL and suggested that a successful implementation of CALL required it to be put into everyday study life.

In a similar study conducted by Ayres (2002), 157 non-native undergraduates from certificate and diploma courses at the school of English and Applied Linguistics were studied in a CALL environment to gather some empirical data to assess how much learners valued the use of CALL in their course. It was found that university learners

appreciated and valued learning through CALL. Also in another study carried by Mitra (1997), learners' attitudes towards computers were discovered to be very important since it would affect the learners' view of CALL. Allum (2002) argued that students had positive feelings about CALL and suggested that CALL should be mixed with the regular classes. Similarly, Dewhurst et al. (2000) discussed that students became more positive after they had experienced using CALL.

Ayres (2002) had participants of 157 non-native speaker undergraduates who were enrolled in various certificate and diploma courses at the School of English and Applied Linguistics. The results indicated that learners favoured classroom-based teaching over using a computer. They did not see it as a worthwhile replacement for classroom-based learning but, it had high face validity with learners. Stricker and Rock (2004) studied the attitudes of the test takers who took the computer-based TOEFL in the spring and summer of 1999; a total of 689 test takers. Results revealed that positive attitudes towards computer-based testing but negative towards admission tests. Shaw and Marlow (1999) stated that in their study, the participants of 99 sports science and nutrition undergraduates were uncomfortable with computers, were unhappy about the lack of personal contact and preferred to learn in a more traditional way. Holmes (1998) studied the influence of CALL in 100 Japanese first-year students' language classroom. Agreement as regards the benefits of CALL in language education was stated, but the students' real reason was to communicate internationally.

Debski (2000) discussed project-oriented CALL innovation at the University of Melbourne, based on the principles of socio-collaborative language learning with computers. Language teachers and students participated in his study. The results indicated that the participants appreciated learning situations which were not available in traditional classes. Therefore, we can conclude that positive attitude of learners has a huge impact on the effectiveness of language acquisition through CALL.

According to Higgins (1983), the attitude with which a person faces a learning process is determinant for that learning process to be successful. In this sense, the motivating power that computers have for students guarantees that they are going to face English with a positive attitude; and this increases the possibility of the learning/acquisition process to be a successful one.

2.7.3 Implications of CALL

CAI has made dramatic change in methods of teaching and learning over the decades. Although the question on the effectiveness of CALL is still unanswered, studies and researches have proven some significantly positive outcomes when CALL is used. Many authors, researchers and teachers have commented on the effectiveness of CALL based on their experience. In a review of evaluation studies of CALL in general, Kulik, Kulik & Cohen (1980) claimed that 'computer based or computer supplemented' instruction has educational advantages at elementary and secondary school levels. The main advantage claimed seems to be 'performance gains of 1-8 months over children who received only traditional instruction' (1980, p.526). Overall, Kulik purported that the fifty- nine evaluation studies they considered show the following results for computer – based instruction:

a. It raised examination scores by about three percentage points
b. It had small positive effects on attitudes of college students towards instruction and subject matter.

Although there isn't a concrete answer on how effective CALL is, typical surveys reveal positive student reactions for motivation and continued enrolment, the quantity of learning, the pace of learning, and the type of language skills learnt.(McEwen 1977; Taylor 1979).In learning essential grammar skills such as grammar,

Seymour Papert (1980) sees the computer as a powerful learning tool which modifies the learning environment by stressing the following:

"I believe that the computer's presence will enable us to so modify the learning environment outside the classroom that much if not all the knowledge schools presently try to teach with so much pain and expense and such limited success(p.9)."

In stressing how CAI has been successful in teaching grammar, Holmes and Kidd (1982) say:

"It is often when applied to the grammar learning situation that the analytical and interactive capabilities (of the computer) have been used to good advantage. There are no grammatical constructions that do lend themselves readily to effective treatment by the computer via multiple choices, constructed formats (p.508)."

Stonier and Conlin further suggest that:

"Grammatical rules need to be systematically taught and frequent reminders need to be given. These formal (grammatical) rules can be taught most effectively by a proper use of computer programs. By using the computer as a 'fun tool' for learning these rules the children begin to play at grammar. They no longer find the task arduous or boring. (p. 68)"

The computer can also support various types of exercise pertaining to vocabulary – building skills. A variety of programmes such as Spelling Bee and Reading Primer (Edu-Ware), Magic Spells (Apple Computer), My Spelling Easel (Atari) and other spelling related programs help to build up students' vocabulary and word- recognition. Citing Micro Primer case study, Chandler (1982) states that a primary school teacher attempting to teach word- recognition declared " I can tell them (the pupils) once or twice, and that computer can tell them another ninety eight times (p.2). The computer's ability to use different approaches to teach vocabulary which ranges from games to the use of animated images expands the range of instructional

tools available to the teacher. Slone, Gordon, Gunn and Mickelsen (1989) postulate the following;

CALL has several advantages over lecture or paper and pencil lessons. It offers interactive responses, immediate feedback, infinite patience, animation, motivation and the ability to maintain accurate records of student progress. Good CALL can also individualize, enrich, correct and remediate for each student (p.2)

Hope, Taylor and Pusack (1984) believe that computers can increase the effectiveness of grammar teaching efforts when they state the following:

"Even the most experienced and patient teachers become frustrated at times because much of their available classroom time has to be spent drilling grammar points, a task that takes away valuable time…Computerized instruction offers a solution to this problem, relieving teachers of certain necessary but mechanical efforts. (pp. 34 -35)"

Porcaro (2004) in his article in Modern English Teacher journal conducted a CALL lesson to teach a group of Japanese students about Africa. The aim of his lesson was to integrate language and content instruction with the utilization of computer. At the end of his study, the students highly rated the course and agreed that computers help them to acquire meaningful and interesting new knowledge through the language medium of English.

Hope, Taylor and Pusack (1984) state that computer technology has made available a powerful language teaching resource and the teaching of all language skills can to some extent benefit from computer technology. They also stress that the computer can be a "useful, challenging, creative tool and resource in and around the foreign (second) language classroom" (p.2). To further justify their stand, they say that "the positive feelings CALL frequently engenders can be traced to a single factor: the computer's liveliness and language study is particularly well suited to a dynamic context like this" (p.3)

Chandler (1984) stresses that the ability "to read and write is a powerful advantage for abstract, logical thinking, and extends our capabilities for systematic learning" (p.27). Frank Smith (1982, cited in Chandler, 1984) supports this statement but emphasizes "the importance of an environment whereby the children see that reading and writing are clearly both personally useful and enjoyable" (p.27) the computer is believed to be able to create these profound effects of making writing more enjoyable and personal. Carman (2003), Gulcan (2003), Hagood (2003) and Mackay (2003) hold the view that the interplay of multimedia elements through CALL improves learning to read a second language.

Clements (1982) purports that computers can provide a powerful approach to meaningful writing and reading by lending support and structured guidance in a way that helps children fully comprehend written language (p.194). Graves (1979, 1983) through intensive researches also has shown that children's writing at each composing prewriting, writing and revision can be supported by using computers.

Based on the studies done on CALL, Fisher (1983) draws four conclusions;

a. Student performance is highest in science and foreign language, followed by mathematics, and last in reading and language arts.
b. CAI appears effective when aimed at specific student body groups, such as high or low achieving students and students with learning difficulties.
c. CAI is most effective when it is fully integrated into the curriculum.
d. Positive effects increase when the proper settings and scheduling are established.

Suppes & Morningstar (1969) report a 72% continuing enrolment rate for CAI students versus 32% for non –CAI students in elementary Russian classes at Stanford University. This study shows that more students are keen in incorporating technology in language learning and are motivated to learn due to this factor.

In another study, on the efficacy of CALL over a whole range of learning activities, Atkinson(1968), Morrison & Adams(1968), and Rosenbaum (1968) all report significantly improved performance from CAI students in almost all areas of learning tasks. The CAI students not only performed better; they had covered more of the learning material, in a shorter time, and with greater retention and improved learning strategies. Merril, Hammons, Vincent, Reynolds, Christensen and Tolman (1986) have this to say on the effectiveness of CALL:

The use of computer based instruction, when compared to conventional instruction, has a moderate positive effect on student achievement and attitudes toward computers and instruction, and it substantially reduces instructional time. These results indicate that computer based instruction can have positive benefits, although certainly it is not a panacea.

In Ying's study (2002) on effectiveness of CALL, the participants were thirty-two junior students majoring in Foreign Trade English at the school of Foreign Languages of Suzhou University. The results indicated that network-assisted environments provided learners with autonomous training and learning. In another study of fifty-five participants, second-year students in an applied linguistics program, Yang (2001) discussed that students benefited from maximizing the language and learning link in computer-mediated environments, particularly web-based instruction. Thus, a conclusion can be drawn that students perform better in CALL environments due to learner autonomy.

As we can see, many researchers agree that CALL has helped in improving motivation and has created a conducive environment for learning to take place. However, the effectiveness of CALL is still a controversial issue. Reviews on CALL have been both positive and negative. Though CALL is perceived as an effective tool to

further enhance language learning, there are some limitations that should be taken into consideration.

According to Price (1990), some educators and trainers have decided, after a brief experience with CALL, that computers cannot teach. Jones (2001, p.361) pointed out that CALL 'cannot be regarded as a self- access operation '; teachers are needed to drive the process and teachers' involvement and commitment are essential. Zhao (2003) stated that it is not the technology per se that is effective or ineffective but the particular ways in which the technology is used. This explains why the answer for effectiveness of CALL is sometimes yes, often no, sometimes yes for some learners but not for others. (Kern, 2006).

Some of the results have been equivocal or inconclusive or the results themselves have not shown any appreciable difference with students using CALL. Curtin, Dawson , Provenzano & Cooper (1976), for instance, used the PLATO system to teach a reading translation course in Russian, and found that there was no significant difference in the performance of PLATO and non- PLATO students. Russel (1999) compared the paper and the computer versions of reading tests. He found out that paper versus computer administration did not significantly affect the test taker's performance. Dewhurst, Macleod and Norris (2000) compared the difference between the computer-assisted instruction and traditional instruction. The results revealed that sixty-two students of undergraduate Physiotherapy studying on Human Physiology did equally well.

According to Price (1990), CALL does not always make learning fun and easy. This is probably due to the lack of interaction and communication which exist more in traditional method of learning a language. In a computer lab, students interact with passive partner which is the computer which is not as exciting as having a homogenous partner. In a recent publication *Beyond Babel,* Felix (2001) points out that web based

learning needs to be treated with caution.

"...it takes a very special person to learn and, especially, speak a language without face-to-face communication." (Felix 2001:8)

This has become a fear among CALL users as whether they will be able to learn a language effectively without the presence of face to face communication.

2.8 Conclusion

So, where is CALL heading? Undoubtedly, there will be an expansion of online learning, but it is more likely to supplement conventional modes of learning rather than replacing them. As discussed earlier in this chapter, a traditional classroom is rather essential for learning to take place. However, using technology or incorporating technology in traditional classroom will only be a great help to create a better learning environment. There are some skills that cannot be taught by CALL solely but practice can be done using CALL to further enhance the skill. Language learners cannot acquire certain skills, for example conversational skills, without face-to-face contact with an experienced teacher, but software tools such as Wimba now facilitate synchronous and asynchronous oral communication and are already being used in distance-learning CALL environments (Graham Davies, 2003*)*. Although some people strongly believe that learning can only take place in a traditional classroom, this belief has to change considering the fact that there are many people out there who are not able to get a traditional classroom teaching. Thus, for these people, CALL is the next best option to continue learning.

Not only that, computer is now indispensable especially in education field. The era when students walk around with pile of books in their hand is long gone because what you see nowadays are students walking around with their laptops. This shows that

technology has become so vital in education filed that it is a waste if we do not use computers in learning effectively when it is readily available almost everywhere. Computers are not only used for learning, but is has become increasingly popular for testing. Online exams, IBT courses and online degrees were not a norm few decades ago but it is now a common scenario. When CALL was first introduced, people were sceptical about it but they still gave it a try. By trying, they are able to identify the strengths and weaknesses and further improvise it to make it a better tool for learning. Now, you can see that CALL has become a household name because in some ways it has proven to be effective and efficient. More and more sophisticated CALL software are available in the market these days and more and more researches are being done to find out how one can fully utilize CALL to achieve optimum results.

For a CALL software to be effective, it needs to be user friendly and interactive as to increase the motivation level of the learners. By doing this, it can help a learner acquire a language while having a great experience using CALL. Not only that, a successful CALL software should also have audio and visual features to enhance learning by giving the learners good feelings and positive attitude towards learning. The content of the software should match students' needs and level of proficiency to avoid frustration so that they are driven towards learning a new language.

This study is one of the many studies on CALL to find out the efficacy of the software used in order to see if students learn better with NETPLUS or with pencil and paper. Based on the findings, the researcher hopes to share ideas on how CALL can be improvised and used in all learning centres extensively.