CHAPTER ONE

CONCEPTUAL FRAMEWORK

CHAPTER - I

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1.0 INTRODUCTION

The world is changing rapidly and the field of education is being influenced by the changes, as it applies to Media Services. The growth in the use of multimedia within the education sector has accelerated in recent years and looks set for continued expansion in the future. Teachers primarily require access to learning resources, which can support concept development by the learners in a variety of ways to meet their learning needs. The development of multimedia technologies for learning offers new ways in which learning can take place at suitable places. Enabling teachers to have access to multimedia learning resources, which support constructive concept development, allows them to focus more on being facilitators of learning while working with individual students. In fact, the use of multimedia for the teaching and learning of different subjects has become an innovative trend in education, now a day.

Computerization is promoted by the National Policy on Education (1986). It emphasized on the role of computers in enhancing the efficiency of the teaching-learning processes in making children more creative and in providing them with an individualized learning environment.

National Policy on Education (1986) has given way to computers in schools, there is a race in schools for buying computers and providing computer literacy to the children. It is more important to have an empirical study on Computer Assisted Instruction (CAI) in Indian framework of education.

Das (2003) concluded that students have a positive attitude and interest, towards computer education received in their respective schools. Some students had suggested a revamping of the traditional modes of teaching by introducing computers in teaching which they thought would make their education more exciting and interesting.

Computer technology has become an important tool in the teaching and learning process and in students' learning and their achievement in schools today. Bright (1987) believed that teaching and learning are difficult goals to achieve and that the computer opens new ways of working for the achievement of these goals. A computer is an

important tool that provides an educational environment with virtual situations that students can apply to real life.

According to Warschauer and Healey (1998), the use of the computer in and of itself does not constitute a teaching method, but rather the computer forces pedagogy to think with new insight.

Computers have emerged as fascinating technological tools in the educational arena. Their use in classrooms as a tool for teaching holds a great significance for language learning. Using computers in language learning can go a long way in developing study skills in learners of English, as a foreign language.

Jayachandran (2007) stated that computers and language learning were closely interrelated and their judicious integration could enable students to organize and process their knowledge at the touch of a keyboard button. This innovative approach to language learning, which is a variation from the conventional classroom-based instruction, will definitely yield exciting and rewarding results in language teaching.

According to AbuSeileek (2007), the use of computers by non-native speakers became vital in learning English as a Foreign Language (EFL). Investigators and practitioners now realize the important role of computers in learning and teaching English as a second or foreign language and look for effective ways to integrate them into various types of English language courses.

Thus, a computer has become a powerful instrument to successfully achieve a number of educational goals. Computers have a profound effect, not only on the development of children's minds but also on the nature of education itself. A computer also believed to be a versatile technological instrument that can be used in fostering children's thinking and learning. Information Technology provides variety in the presentation of the content, which helps learners for better understanding and long retention of information, which is not possible otherwise.

The contribution of computer-mediated learning exercises to the quality of instruction will be explicitly known only if the observable outcomes are specified, measured and interpreted through empirical researches. It is now high time to begin to explore the capacity of computers for meeting the instructional objectives. The present study is a step in this direction.

The computer has created a revolution in education and the nature of learning process. One mode through which computers can be used in the teaching-learning processes is the Computer Assisted Instruction (CAI) technology (Traynor, 2003). CAI is a set of voice, text, graphics, animation, video and other computer technology in one of the modern teaching methods.

According to Zhiguo (2002), CAI can play a multiplier effect in terms of emphasizing the teaching points, breaking the difficulty of teaching and improving the efficiency of classroom teaching became its clear image, strong sense of dynamic, informative, interactive and flexible advantages.

This visual-spatial learning-based methodology is of great importance to many learners and with relative ease, the education professionals can now create and utilize computer assisted and computer-based learning techniques. In CAI, students interact with the content through instructional software or lessons delivered with the help of the computer.

The method of instruction through CAI includes drill and practice, tutorials, games, simulations, discovery learning, problem solving and multimedia instruction. Presentation software like PowerPoint and Animation software like Flash and others can be of great help to the teachers while delivering information. Computers also help for individualization and self-pacing, immediate feedback, consistent correction procedure, immediate knowledge of correct responses, well-sequenced instruction, motivation etc.

1.1 CONCEPT OF CAI

Investigator drew a list of modes of computer assisted learning, indicating which of them could be considered ‘instruction’, in general. Investigator also identified the differences and the similarity between the terms used in the field viz. Computer Managed Learning and Computer Managed Instruction (CML and CMI), Computer Assisted Learning and Computer Assisted Instruction (CAL and CAI), Computer Based Learning, Computer Based Instruction and Computer Based Training (CBL, CBI and CBT). The meanings of all above are more or less similar to CAL/CAI to most authors but endowed by others with slight shades of special meaning.

Romiszowski (1987) presented a table that shows the 'field' of 'computers in education' divided into 'sectors' (as an aid to the analysis and discussion of the topic):

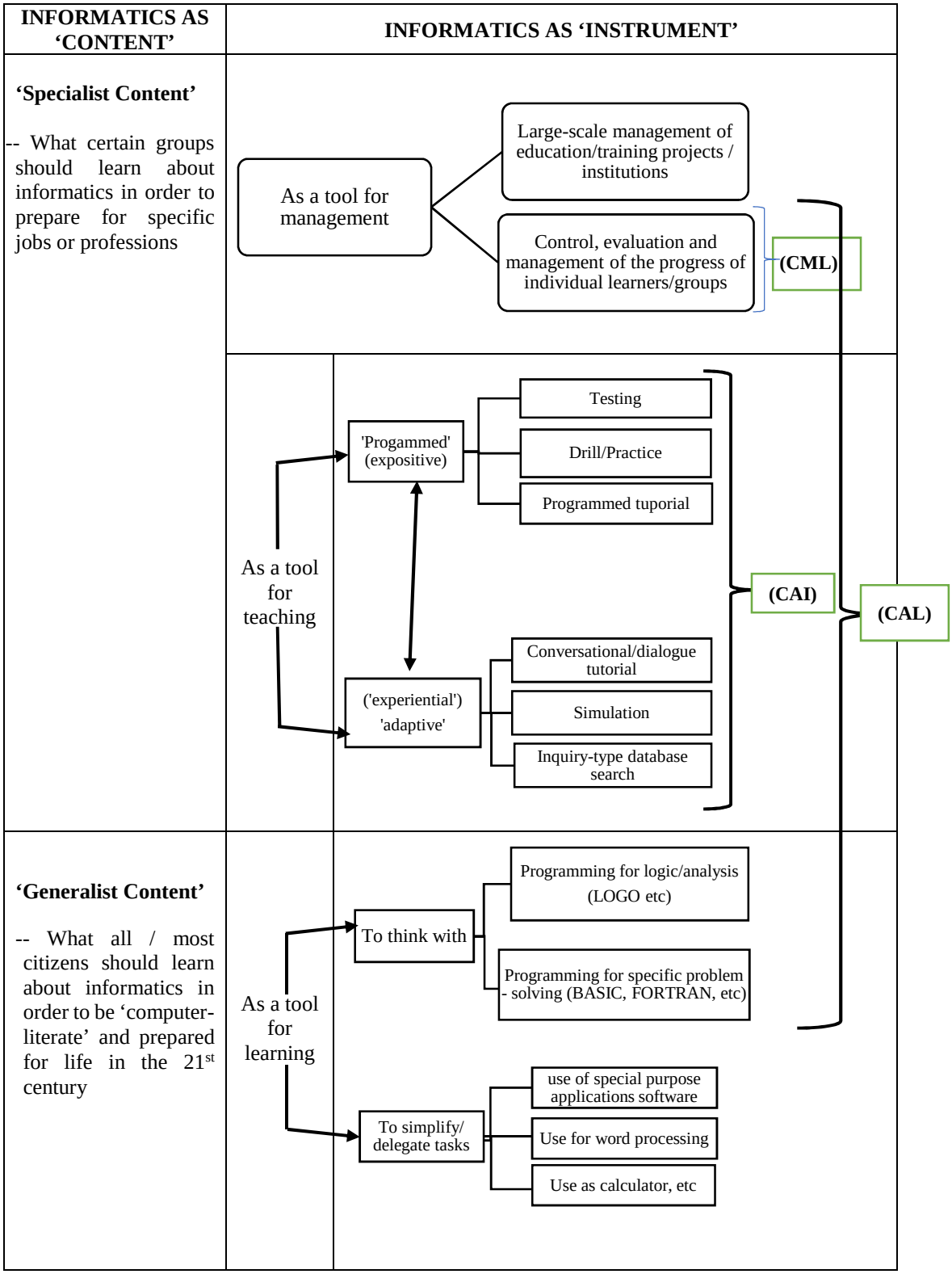

Figure 1.1 Informatics as 'Content' and 'Instrument'

(*Source:* Romiszowski, A. J. (1986). *Developing Auto-Instructional Materials.* Kogan Page: London / Nicholas Publishing: New York.**)**

As shown in Figure 1.1, the computer is divided into two main sectors, which one may call ‘informatics as content of education’ and ‘informatics as an instrument of education’. This distinction separates the problems of designing curricula for computer specialists or for general computer literacy, from the problems of utilizing computers in the educational process. Investigator’s aims here are concerned with the use of computers as an instrument of education.

Romiszowski (1987) has divided this sector of the field into three sub-sectors, dealing respectively with the use of computers as a *tool for management*, as a tool to assist the teacher (*a tool for teaching*) and as a tool to assist the learner i.e. *a tool for learning*. As the Figure 1.1 illustrates, the learner may use the computer to help him/her in learning or to take over routine tasks and thus reduce the labor of the learning process.

Further, Romiszowski (1987) mentioned the three principal technical terms CAL, CAI and CML as the specific of applications of computers in education. In fact, every author seems to have his own definition and classification for the above technical terms. With regard to above, one marked difference is there in the use of the terms ‘instructions' and ‘Learning’. In USA particularly, the term 'Instruction' tends to be used in a more global sense for any type of teacher/learner interchange, whereas in England the term CAI has recently become restricted to ‘programmed instruction’ type of exercises, the preferred generic term being ‘Computer Assisted Learning’ (CAL). It seems that Canada caught between the two influences, cannot make up its mind, although recent publication such as *The Elements of CAL* (Godfrey and Sterling, 1982) suggests that perhaps the British view – that *learning* may be assisted in many diverse ways but only some of them have the characteristics of true *instruction* – seems to be gaining ground. However, detailed differences exist between the usages of CAL / CML / CAI in the work of British authors, even though they do agree that CAI is a subset of CAL.

Computer Assisted Instruction (CAI) is a piece of software that contains lessons on particular subjects. CAI is used with a computer to help in learning these lessons. CAI refers to instruction or remediation presented on a computer. Computer Assisted Instruction is an individualized instructional programme having multimedia inbuilt i.e. a combination of text, graphics, sound, animation and video. A typical CAI programme called courseware which is prepared by the teacher either with a special purpose called

author language (also called authoring system) or a general purpose with high-level language.

CAI has a programme called Computer Assisted Learning (CAL). It can be defined as the use of computers to impart learning i.e. changing student's state of knowledge or skill. CAI stresses on the formative evaluation of students and places stress on highly structured courses while CAL places emphasis on learning and achievement of goals. Computer Aided Instruction (CAI) is defined as the use of a computer and other associated technology with the intention of improving academic performance. In addition to instruction, CAI offers additional benefits such as managing the learning environment by controlling a variety of media and keeping a record of students' responses.

The use of the computer to coordinate instructional activities such as student testing, record keeping, diagnosing students' learning difficulties, giving assignments, and organize students' data and school staff and in reporting all facets of the management component of Education is referred as Computer Managed Instruction (CMI). It can be seen that most of the activities covered under CMI are also part of the CAI.

The role of the computer in CAI is to teach the subject through preferably a dialogue, to evaluate students' response and provide remedial teaching, to generate instructional material depending on the level of the student, to stimulate system of interest and to store students' record. The Computer Assisted Instruction provides the special type of learning environment and teaches successfully the written and visual type of content. The teacher has a peculiar role in this process to play.

1.2 USE OF CAI IN EDUCATION

The different definitions referred by the investigator are given as follows: According to Parker (2003), The use of computers is to present drills, practice, exercises, tutorial sequences to the student and sometimes to engage the student in a dialogue about the substance of the instruction. Abbreviated as CAI also known as Computer Aided Instruction; Computer Assisted Learning (CAL).

Hergenhann (1976) defined that when a computer is used to present programmed or other kinds of instructional material, the process is called CAI.

Bucholtz (1998) defined that Computer-Assisted Instruction (CAI) is an interactive instructional method that uses a computer to present material, track learning and directs the user to additional material which meets the students' needs.

According to Kulik, Bangert, and Williams (1983), Computer-Assisted Instruction (CAI) is among the range of strategies being used to improve students' achievement in school subjects. Programmes for CAI have come a very long way since they were first developed two decades ago. These programs provide drill, diagnose students' problems, keep records of students' progress and present material in print and other manifestations. It is believed that they reflect what good teachers do in the classroom.

Locatis and Atkinson (1984) defined Computer Assisted Instruction as a mode of instruction that involves students' interaction with the computer directly. Typically, students access program presented in segments, with each segment including information and questions or problems for student's response. The correctness of each response is indicated immediately and the remedial or new information is presented. Sometimes students also have the option to requesting help or skipping ahead. Although this tutorial (information-practice-feedback) form of CAI is most typical, there are other forms such as drill and practice exercise, simulations and games.

Computer Assisted Instruction is described and defined by Frenzel (1986) as the process by which written and visual information is presented in a logical sequence to the student by the computer. The computer serves as an audio-visual device. The students learn by reading the material presented or by observing the graphic information displayed. The primary advantage of the computer over other audio-visual devices is the automatic interaction and feedback that the computer can provide.

Steinberg (1991) defines CAI as computer presented instruction that is individualized, interactive and guided. He is of the view that CAI is not a method of instruction. Many methods are implemented in it, including direct and exploratory lessons, drill, games and simulations.

Poole (1995) defines Computer Assisted Instruction as a computer-based system designed to help students learn the subject matter of all kind.

According to Munden (1996), Computer Assisted Instruction is an educational medium in which instructional content or activities are delivered by a computer. Students learn by interaction with the computer and appropriate feedback is provided.

Roblyer and Edwards (2000) defined CAI as a software designed to help to teach information and skills related to a topic, also known as courseware.

All the definitions of computer assisted instruction presented above converge that computer plays a role of tutor and imparts instructions either through tutorials or simulations or any other mode of presentation.

The term CAI refers to the system of providing offline/online direct interactive instruction, testing and prescription in the process of learning. Students can be presented with assignments, problems, exercise, reading materials and references by the computer for learning. After completing the assignments by the students, they can be tested through the computer. If required, remedial exercise can be presented in the next set of assignments. To motivate the students, immediate feedback is an important ingredient of CAI. CAI is a set of programming instructions, which is used in the instructional process to develop certain pre-decided skills for the student's mastery over the subject content. CAI is a type of instruction, which is used to achieve the objectives of the instructions. The computers are the means and have potentials to contribute to the instructional system. As the knowledge is exploding at a very fast rate, and individual teacher cannot handle the enormous amount of information in a limited time period. For this purpose, computerized instructions can very well be used in teaching-learning.

1.3 PRINCIPLES OF CAI

Based on the research conducted, a set of CAI design principles are proposed and described. These principles focus on the instructional design elements important to support and improve learning by supporting the development of learners mental schemas. According to Crews (2004) Principles of CAI are as follows:

Principle 1: Integrate instruction, practice, assessment and feedback.

If the learning objective is to develop new knowledge or skills, it is recommended that the CAI design integrate instruction, practice, assessment, and feedback. Each of

these four components provides a significant contribution to learners' effective development of accurate mental models. However, many existing CAI lack one or more. Many may be surprised, for example, that drill-and-practice CAI programs often lack an instructional component. The key that many do not realize is that drill-and-practice alone does not teach new knowledge; it provides practice and reinforcement of existing knowledge. Instruction is key to imparting knowledge. While the practice is an appropriate and important complement to instruction, it should not be expected to take the place of instruction. Furthermore, even drill-and-practice programs should incorporate assessment and feedback on the practice activities. Assessment is needed to give feedback, and feedback is necessary to help learners test the accuracy and application of their mental models. Moreover, practice, assessment, and feedback are important components for learners to revise, refine and strengthen their mental models of the knowledge provided by instruction.

Principle 2: Instruct

Design CAI to integrate instruction that

- explicitly teaches the knowledge needed to achieve the learning objective
- in small, incremental segments (elements or concepts)
- that are sequenced to accommodate logical dependencies in the information. Furthermore, present the instructional material in a multisensory, multimedia format that actively engages the learners.

First, facilitate expository learning of the required base knowledge by providing explicit instruction of that knowledge. Expository learning is an efficient method for the learners to develop their "prototype" mental models based on knowing, while subsequent practice and review activities provide the opportunity to test and revise those models. In addition, segment the explicit instruction into small incremental elements or chunks of information. In the resultant expository learning, cognitive load is decreased because working memory is allowed to process the elements separately, rather than all at the same time. Connections between the elements can be learned separately from learning the elements; either before (advanced organizer) and/or after (post-structure) the elements are learned. In contrast, discovery learning requires connections to be made between several different elements, while the elements are

being discovered causing a high cognitive load because many different elements must be processed at the same time. This is more difficult and may not be possible for some learners. In addition, although discovery learning can result in effective learning for some, it is prone to mis-discovery (i.e., learning the wrong thing or making the wrong inference) since it is an inductive process.

Thus, explicit instruction is important in CAI design. Segmentation can allow experienced learners to access the specific topics they need in circumstances that require just-in-time learning or a small portion of the instruction covered by the CAI. Furthermore, the segmentation enables the integration and interaction of the instruction with practice, assessment and feedback.

Next, identify the logical dependencies in the knowledge and structure the CAI sequence of the learning experience to accommodate those dependencies. Organize learning materials for the learner in structured, meaningful manner that promotes cumulative and sequential progress to achieving the learning objectives. In designing CAI, designers should not expect learners to be able to choose the best order for developing new knowledge or skills. Ordering of the lessons is important. From a logical perspective, novices do not know enough to know the best order for learning material.

Consequently, determining the most appropriate sequence for learning is the responsibility of the instructional design, and this guidance should be incorporated in the CAI. The instructional analysis should provide a sequence if relevant, based on the learner and the context. Assuming knowledge or skill is cumulative, prerequisite knowledge should be sequenced before it is needed for later lessons. In contrast, a learner experienced in the domain may have specific learning needs and will probably know more about what they need to learn than a novice will. Depending on the characteristics of the learner, the predetermined sequence of lessons may be imposed or suggested; however, ultimately there should be some method of overriding the path.

Finally, present the instructional material in multisensory, multimedia format, Multimedia instruction can be designed to promote multisensory learning, which can facilitate learning by reducing the cognitive load of a learning task and strengthening the development of mental schemas by engaging multiple perceptions.

Principle 3: Practice

Design the CAI to integrate practice with the instruction. Design the practice to:

- activate and test learners' mental schemas from multiple perspectives
- occur infrequent and short practice sessions or activities that are integral to the instructional segments, and
- use multimedia to activate multisensory learning.

Hashway (1998) said that to maintain the learners' active participation in the learning process, design CAI so that learners are frequently required to apply and test their mental schema for the learning objective. Active participation of students may include both overt, visible behaviour, and covert, unseen thinking behaviour by students.

A CAI should be designed to maintain the learners' active participation in the learning process. This necessitates that the learners focus on the learning task. Research has shown that an interactive and multimedia user interface can increase student focus. More importantly, frequent, thought-provoking interactive activities and questions integrated with timely feedback encourages learners to actively process information.

In designing the practice activities, use a variety of approaches (top-down, bottom-up, etc.) and/or learning activities to focus the learner's attention from multiple perceptual modalities (e.g., visual, aural, kinesthetic, etc.) on the knowledge that the learner needs to achieve the learning objective. This will support the development of learners' mental models with multiple forms of practice and review activities Design practice activities into CAI to encourage learners to review, test and strengthen their mental schema of the learning objective. Different forms of practice, examples and review activities should be included for the learner who needs another way of loaming. A learner who is having trouble understanding may need the concepts explained in a different way. For example, in the LBAL reading tutorial, there are several different activities that practice and test different aspects of reading. There are multiple activities to practice encoding (translating from sound to text) words. In one, the on-screen instructor says a word, and the student selects that word from four written on the screen. In another, the student "builds" the word he/she hears by dragging phonemes from a

limited selection. In others, the student spells the word by typing or selects an on-screen illustration of the word from four choices. Each activity activates the learners' attention from a different perspective.

Design the multisensory activities to focus the learners' attention on relevant information but be careful not to split the learners' attention unnecessarily or add extrinsic cognitive load. If designed properly, multisensory instructional activities have the potential to increase the capacity of working memory to process information by engaging multiple senses. However, if the multimedia/multisensory activities split the learners' attention or overload the senses the design can create an extrinsic cognitive load, distracting the learner and reducing the cognitive resources focused on achieving the learning objective. So, multisensory activities should be designed to:

1. Support the learners' unique perceptual preferences,
2. support, and possibly increase, learners' capacity to process instructional information by integrating information in a multisensory format and
3. facilitate the development of their mental models of the learning objective by engaging all of the learner' senses.

Principle 4: Assess

Design CAI to integrate assessment with the instruction and practice activities. Assessment is important because it provides a basis to provide feedback to the learner on their learning. As such, it should be designed as an integral component of the CAI. As with instruction and practice, design CAI to frequently evaluate the learners' learning.

The assessment can be provided directly and explicitly by testing the learners, then recording and evaluating their responses. Or, the CAI design can provide opportunities for learners to assess their own learning by providing analyses and evaluations of practice activities, thereby allowing the learners to assess their own performance in comparison. The former requires separate feedback to be given to learners on their performance, while the latter is a combination of self-assessment and feedback, how to assess learning is a complex issue outside the purview of this study. However, one point will be mentioned. Whatever the method implemented, assessment should measure the learning objectives of the CAI design.

Principle 5: Feedback

Design CAI to integrate feedback with the instruction, practice and assessment components. Preferably, feedback should be timely and performance-specific.

Furthermore, CAI should deliver feedback in structured incremental stages that culminate with explanatory feedback. Feedback should inform the learners regarding their performance in such a way that it promotes the development of the learners' mental models. The presentation and form of feedback should be informative and encourage learners to think and process the information. The goal of feedback is to help learners test and, if necessary, revise, their mental models of the learning objective. Feedback can be varied by time (delay between response and receiving feedback) and content (structure and information provided).

There are many possible levels of feedback content (e.g., KR, KRH, KRC, and KRE). One CAI design strategy is to provide multiple chances to the learner, providing more feedback information immediately after each missed attempt. In this way, learners are encouraged to be cognitively engaged in processing the feedback (i.e., an active participant), receiving additional information after each attempt to help them correct their response and revise/develop their mental model for the problem. In the end, the best practice is to provide KRE feedback that identifies the correct response and provides the explanation of correct response, and maybe why the others are wrong. This provides learners with complete information to prevent misinterpretation in developing their mental models correctly. It should be noted that an individual may ‘know’ something, but their ‘knowledge’ may be incorrect. Explicit instruction and feedback should mitigate the development of misconceptions in mental models. There is a balance between the 'number of tries made and learner frustration. This also relates to the content of the feedback. Consider providing the learner with some control of the number of tries, for example, instituting the option to have from two to five chances with a ‘Try Again’ selection.

Unlike a human teacher, CAI cannot interpret body language to judge whether a student is understanding the instruction or feedback. A CAI must rely on the learner's performance. Normally, if a human teacher interprets a lack of understanding by tile

learner, the human will be expected to adopt the feedback response to try to gain understanding. Another approach or different information will be given. The teacher does not continually repeat himself/herself verbatim if the student makes the same error, and if he/she does, the repetitious feedback would likely become annoying and unconstructive. In the same circumstances, CAI would likely have the same result. Therefore, CAI feedback should be designed in structured, cumulative stages that culminate in feedback that provides knowledge of the correct response combined with an explanation of why the correct response is correct.

Principle 6: Support mastery learning

Design CAI to facilitate sequential and cumulative mastery learning of the knowledge requisite to the learning objective(s). The objective of mastery learning is to ensure that the learner gains the prerequisite skills and knowledge at each stage before preceding to lessons on knowledge dependent on the prerequisite skills. Mastery can be supported by iterations of instruction, practice, assessment, and feedback. A structured sequence of learning based on logical dependencies in the learning task is required to identify the prerequisites for each lesson. In addition, alternate instruction and practice activities can help learners gain understanding. Mastery improves learning, in part, by decreasing the cognitive load on the learners. Because learners develop their mental schema for the prerequisite knowledge, the more cognitive effort can be focused on the more advanced concepts without the need to expend cognitive resources on understanding the prerequisites. Consequently, mastery learning supports the development of mental schemas (learning) and is beneficial to any CAI design.

Principle 7: Focus cognitive effort

Design CAI to focus the learners' cognitive efforts on the learning task while minimizing the cognitive load on the learner. This involves minimizing the intrinsic cognitive load of the instructional design, as well as mitigating extrinsic cognitive load (i.e., distractions). As previously discussed, cognitive load is an important issue for learning since each individual has limited cognitive resources to process information. The cognitive load of the learning task (intrinsic cognitive load) is important, as is the cognitive load caused by distractions (extrinsic cognitive load), Minimizing cognitive load includes consideration of the interface design, presentation of instruction and

materials, timeliness of feedback and the use of multimedia and multisensory activities. Regarding intrinsic cognitive load, the instruction should present the information in small, cumulative bits (elements), if possible, to make the learning task easier. In addition, care must be taken not to add cognitive load extrinsic to the learning process. Cognitive load is extrinsic if the load does not contribute to achieving the learning objective. Sweller (1999) said that this can be achieved by carefully integrating information for the learner in a multisensory format, and avoiding causing the learner to integrate information, especially repetitive information, from disparate sources. Thus, if possible, the CAI design should avoid splitting the learners' attention or distracting attention from the learning objective.

Principle 8: Personalize CAI

According to Bloom (1997) and Newby et (2000), Research shows that personal tutoring improves student achievement. So, design CAI to be the personal tutor for each learner, Personalization has many possible design aspects, these include:

- personalizing the instruction, practice, assessment and feedback activities,
- providing learners some controls of the learning experience and process,
- providing administrative controls for customizing the learning environment, and
- designing an adaptable CAI interface.

Personalize Instruction Practice Assessment and Feedback

Design CAI to personalize instruction, practice, assessment and feedback to focus on individual students' learning needs. To dynamically personalize the CAI for individual learners' will require a combination of pre-assessment and ongoing evaluation of the students' performance. Consider designing the CAI instruction, practice and feedback in modules that can be combined for a personalized learning experience, based on the learners' needs.

To personalize the instruction, the pre-assessment should provide a measure of the individual learner's prior knowledge and skill level, identifying the content (e.g., lessons or learning modules) that a learner needs or has already mastered. In the case of just-in-time training, an alternative to pre-assessment is to provide learners with some control of selecting the content they need, so that they can directly select the

topics of interest. This may also be a strategy for practice and review objectives, allowing learners to select the lessons or topics they need help with.

Personalization of practice and requires some type of assessment to evaluate student progress. Preferably, this assessment would be conducted and tracked by the CAL Alternatively, the assessment can be internally conducted by the learner, but this will increase the cognitive load on the learner to evaluate and manage his or her own progress. In either case, KRE feedback should ultimately be provided, although it may be the final level in a cumulative series, as recommended in Principle 5- If the CAI is conducting the assessment, corrective feedback can be personalized to a greater extent and respond to the specific errors made by the learner.

Provide Learner Controls

Another method of personalization is to provide controls to the learners that allow them to pace their own learning, review instruction and repeat practice as wanted, and focus on topics/lessons that fit their learning needs, Learners should be given some control, in particular, the ability to review or repeat segments when needed, but not necessarily full control of the learning path. For example, if an instructor is involved, the student may not have the privilege to alter the learning path, but the instructor should. Sequence the learning material, but allow learners the control to review and/or repeat the instruction as needed during practice activities, and when receiving feedback. As the learners' practice, they are testing and developing their mental models. There will be times when they experience uncertainty or do not know the correct response. Other times their mental models will be challenged when they think they understand but receive the feedback that they were wrong. At these times, learners are primed 10 alter their mental models and learn. Providing access to the instruction and additional practice activities with feedback will allow learners to strengthen their mental models.

Provide Administrative Controls

Incorporate administrative components to allow customization of the CAI to the needs of particular learners. For example, such controls will enable a learning manager to customize the assigned lessons or courses, learning activities, testing schedules, etc., to specific learners. The 'learning manager' may be a teacher, instructor, administrator

or the learners themselves. The term is used here to refer to whoever is helping to manage the learners' progress to the learning objective. This principle suggests that CAI is designed to help the learning manager with that task by incorporating administrative controls so that the CAI can be further customized for a specific learner or set of learners. For example, LBAL allows the teacher to include some or all of the learning activities, choose the number of questions in each activity, and choose the level of mastery (80 percent or 100 percent) required. And although the LBAL program will recommend an individualized plan of study for a student, the learning manager can adapt the plan of study, if needed. In addition, a CAI would ideally incorporate assessment tools and records to evaluate and track learner progress. There are learning and administrative benefits provided by designing CAI to evaluate and track learner progress. These benefits include:

1. providing feedback to the learners,
2. the ability to adapt instruction and practice to learners' needs based on their progress,
3. informing learners of their accomplishments and progress to the learning objective, thereby removing the cognitive load of self-monitoring progress,
4. informing instructors of learner progress,
5. helping instructors identify problem areas for individual learners, as well as a group of learners, that can be addressed inside or outside of the CAI environment, and
6. providing records for reporting learner progress and achievement to all interested parties.

Principle 9: Learner-centered design .

Overall, keep the CAI system design focused on the needs of the learners. Usability is a critical measure of success for all systems design, including CAI design. It focuses the design on the needs of the users. In summary according to Dumas & Redish (1994), "Usability means that the people who use the product can do so quickly and easily to accomplish their own tasks". Although, a discussion of all of the dimensions of usability is outside the scope of this research, usability is an important characteristic that should be considered in CAI design.

In addition, Dumas & Redish (1994) said that usability testing is crucial to test that the CAI meets the needs of the intended users because in the end, only the users can decide if a system is usable.

A CAI will have multiple users, the primary of which is the learner. Different learners will have different needs and usability is measured individually by each.

Personalization of the learning environment to the learner is one way to address these differences between learners. Other users will include the learning manager(s) and possibly administrators. Even though the needs of the learner should come first, the needs of all users should be considered in CAI design. Consequently, a user-centered approach to CAI design is recommended and existing guidelines for interface and multimedia design should be considered.

1.4 CHARACTERISTICS OF CAI

CAI refers to any use of the computer that interacts with students in any way in the educational process. The major characteristics of CAI are described as under:

- **Practice:**

CAI enables the students to practice as many times as they like, so it will enable them to achieve the required competencies. Students come from different background, so their understanding level differs from student to student. Hence, a teacher only cannot cater to the educational needs of such heterogeneous group. That’s why there is a need for right learning tool and a supportive environment to facilitate them. Practice makes a man perfect. Looking to the usefulness of practice in learning, many psychologists have emphasized the use of the practice in the teaching-learning process.

- **Immediate Feedback:**

CAI enables the students to see the correct answer immediately after giving answers to a particular question so that, they can correct themselves. If the answer is correct then, they will get immense pleasure and develop their confidence level. And if the answer is wrong, they can correct themselves immediately. In traditional classroom teaching, a teacher gives students homework for practice. The student comes to know his/her mistake when the teacher checks the homework and suggest correcting the

mistake. Normally teachers do not provide the correct answer during checking, so the student knows that his answer is wrong but does not know the correct answer. If the teacher provides the correct answer, the student may not pay due attention to the corrected answer instead he would proceed with the next homework.

- **Self-Evaluation:**

CAI enables the students to find their strengths and weaknesses and student can overcome his/her weakness before proceeding further.

- **Reinforcement:**

CAI rewards students immediately, whenever they answer the question correctly. Immediate reinforcement gives immense pleasure as indicated by many psychologists.

- **Immediate Evaluation:**

As soon as each concept is completed, students should answer the questions related to that particular concept. This would further enable for immediate evaluation.

1.5 ADVANTAGES OF CAI IN LEARNING ENGLISH GRAMMAR

In fact, the characteristics of CAI indicate the advantages of the same indirectly, but the major advantages of CAI have been described as under for further clarification in well detail.

- **Helps in achieving mastery learning:**

Mastery is a recent innovation introduced in the sphere of education. Mastery learning implies a systematic approach to the process of teaching or instruction. It is based on the idea that all students are potential learners, and that every child can learn equally well, provided the teacher presents the subject matter in a systematic manner. In mastery learning, instruction or teaching is matched to the learner. The major objective of mastery learning is to promote excellence in learning. This objective is achieved through systematic planning, proper motivation, better methods and materials for learning, self-guided instruction and objective based evaluation.

'Learning for mastery' is a technique of instruction developed by Bloom and his associates in 1968. He developed an instructional plan based on the guiding principle that the learner should achieve mastery of one unit of the subject matter before going to the next unit.

- **Provides the wide range of experiences:**

CAI helps the teacher by providing a wide range of experiences by giving many examples and illustrations to make the concept clear.

- **Provides motivation to the learners:**

CAI sustains the motivation of the students. The topic can be presented systematically, interestingly and immediate feedback can be given by using CAI to motivate the students. Graphics and pictures covered under the CAI can attract and retain students' attention. Students also get reinforcement when they answer the questions correctly.

- **Facilitates individualized instruction:**

CAI is an individualized instruction as it caters to the individual differences. The Indian classroom is a heterogeneous group. Some students need more time to learn while others need less time, so learning speed differs from learner to learner. CAI also provides different learning experiences according to the understanding level of the students. It also provides facilities like selecting the topic of their own interest. It provides individual attention to each and every student and thus enhances the quality of teaching-learning process.

- **Facilitates Interactive learning:**

CAI provides immediate feedback to the students and thus constantly facilitates interactive learning. In CAI students actively take part in the learning process. As it includes examples, diagrams, visuals and interactions; it makes the learning process more interesting.

- **Maintains Continuity in learning:**

When a student remains absent on any day s/he cannot understand the topic afterwards due to the lack of continuity. Afterwards, s/he may feel difficult to comprehend. CAI helps him/her to understand the topic without any difficulty whenever s/he uses it. Thus, CAI maintains the continuity in learning.

- **Enhancing Span of attention**

According to Dandapani (2001), "Attention may be described as the selective activity of the human organism whereby one's consciousness is focused upon a specific, narrow field to the exclusion of everything else in the environment." It shows that the time span for the students to be attentive in a class is different for the different student. Since the CAI used by the students themselves, their span of attention can easily be developed and increased.

Looking to all above the use of CAI for the students is proved to be a self-learning instructional material.

1.6 CAI AND SCHOOL EDUCATION

The increased use of computer technologies to deliver instruction is a trend remarked in research (Ely, 1991; Najjar,1996). Use of Computer in the classrooms has boomed since the 1980's, fueling a debate over whether or not Computer Assisted Instruction (CAI) is an effective means of improving student achievement. CAI generally consists of drill and practice, simulating tasks, instructional games, and tutorials. Instruction can contain new material and can be used alone or as an enhancement to traditional instructional methods. Not many Investigators' dispute the idea that computer technology in the classroom enhances teaching and learning; however, there is a debate as to whether or not a direct link between motivation and academic achievement exists. Advocates of CAI claim that using CAI enhances learning through the overall positive motivational factors associated with technology integration into the curriculum.

The teacher is playing a vital role during teaching-learning process. It is a very difficult task for a teacher to take care of each and every student and impossible for a teacher to teach every individual according to their own pace of learning. With the use of CAI, the teacher can get benefits in many ways like:

- The teacher would thus have more time to interact with students in the capacity of an advisor or a friend.
- The teacher can find out necessary and current information through the computer now very easily, which increases quality of teaching-learning process.
- The teacher is gaining revolutionary change in their thoughts through information technology.
- With the use of internet, teacher can make teaching-learning process live, effective, interactive and interesting.
- It reduces the burden of a teacher.
- It makes teaching an enjoyable experience.

CAI not only helps to manage heavily crowded heterogeneous classrooms to the teacher, but it enhances students' attitudes toward several aspects of schooling. Students like CAI activities and favouring them more than the traditional learning. Some of the studies [Bialo and Sivin (1990), Braun (1990), Lawton and Gerschner (1982), Mokros and Tinker (1987), Robertson, et al. (1987), Rupe (1986), Schmidt (1986), Wepner (1990) Acharya (2005), Badiyani (2008), Das (1998), Patel (2009), Sakhiya (2006), Zyoud (1999)], found that students like to work with computer because it;

- allows students to work privately
- is excellent for drill and practice
- teaches in small augmentation
- makes it possible to experiment with different options
- gives immediate feedback
- helps students improve their spelling
- corrects the answer if needed
- provides reinforcement
- is enjoyable and entertaining
- individualizes the learning
- is self-paced
- builds proficiency in computer use, which will be valuable later in life
- works rapidly - closer to the rate of human thought

Looking to the overall conceptual framework of CAI, it can be revealed that CAI is very much useful to facilitate the teaching-learning processes in all the subjects. Also, many research studies [Acharya (2005), Bhutak (2004), Badiyani (2008), Das (1998), Hirani (2007), Nalayini (1998), Patel (2009), Zyoud (1999), Karia (2001), Khirwadkar (1998), Prabhakar (1995), Sakhiya (2006) and Sharma (2003)] have proved the effectiveness of CAI for the teaching of different school subjects. Looking to this as inspiring research-based support, the investigator has undertaken the present study related to the development of CAI based on English grammar.

The purpose of the present study is to examine the potential of the CAI in helping students in secondary schools to learn English as a second language. The study is intended using the computer as a tool to integrate teaching materials through the use of CAI to encourage students to learn English grammar more effectively. Further, it also focuses on how to learn English grammar more easily and to use it correctly.

1.7 ENGLISH LANGUAGE TEACHING

Teaching-learning of any language is a matter of practice. A learner of English having the first language does not require practice in the classroom as enough scope is there for regular conversation in the school. It is through day to day communication, one acquires knowledge, skills and proficiency in the language. Whereas a learner of English as a second language requires a good amount of practice in the classroom, as there is the little scope of conversation in the classroom. Hence, there is a remarkable difference in the learning of English Language in case of the students with English as their first language and second language.

It is also observed that language teaching is dominated by theories and practice that anticipate the important role of grammar under language learning. This has given two different methods namely: (a) The Grammar-Translation Method and (b) The Audio-lingual Method.

(a) The Grammar-Translation Method:

It was first used in the teaching of English. The major characteristics of the method include explicit teaching of grammatical rules, memorization of vocabulary and translation of passages from one language to another. The Grammar-Translation

Method prepares students with extensive knowledge of grammatical rules but with little communicative ability.

(b) The Audio-lingual Method:

It was developed as a reaction against the Grammar-Translation Method, with a focus on the development of spoken language. Nevertheless, spoken language was still presented in highly structured sequences of forms. Classroom techniques usually include repetition of models and memorization of dialogues. The goal of these teaching techniques is to develop the target language accurately. Learners' errors were viewed as bad habits that would be hard to rectify if they observed as their learning experiences. Therefore, all errors were immediately corrected as they occurred.

Over the past few decades, the focal attention of classroom instruction has been shifted from grammar forms as in the Grammar-Translation Method and Audio-Lingual Method to functional language within the communicative context. It has resulted in the emergence of Communicative Language Teaching. Communicative Language Teaching (CLT), as a language teaching approach arose in the 1970s as a reaction against the view of language as a set of structures. Proponents of CLT claim that the goal of second language acquisition should be communication rather than memorization of a system of rules. In CLT classrooms, students are encouraged to use the language in unrehearsed contexts where learners negotiate meaning through interaction with others. Innovative activities such as information gap, role plays, and games are used to engage learners and sustain learners' motivation. The learner-centered and communication-centered approaches made CLT popular among language teachers.

Then, there is a rise of an approach called, Task-based Language Teaching, which was considered by many as a manifestation of CLT and has emerged as a major focal point of language teaching practice. Skehan (1998) defines a task as an activity in which meaning is primary, there is a problem to solve, there is a relationship to the real world, and where there is an objective that can be assessed in terms of an outcome. In task-based language teaching, the focus is on the completion of the task. A well-designed task with qualities mentioned above has the potential to fulfill the objectives of language teaching.

1.8 PRESENT STATUS OF ENGLISH LANGUAGE TEACHING

The present status shows the importance of English as a language. At the higher level of Education, English as a medium of instruction is more useful than any other language. English enjoys the privilege of an 'Associate Official Language' in India. Not only education but every aspect of Indians' life is affected by English language. For example, television, films, advertisements, food, attire, fashion and so on. English has become a passport to study in foreign universities, now.

Education Commission (1964-1966) and University Grants Commission (UGC) recommended English as the medium of instruction at the higher education level. National Policy on Education (1986) supported English as a scientific language. The UGC has recommended that at least the national level teaching and training institutes should use English as the medium of instruction. In India, English is retained as a medium of instruction at the university level because in professional and technical courses like medicine, law, engineering, agriculture, computers etc. the books are more readily available all over the world in English only.

Crystal (1987) calls English "the world's first genuine global language". It enjoys a dominant position in international politics, banking, news agencies, science and technology, knowledge management and communication. No other language has achieved such a widespread profile or is likely to be in the near future. English has been growing in an Indian socio-cultural and linguistic setting for over two hundred years. It has been a powerful tool to expound Indian culture and philosophy.

The knowledge of English language becomes the need of the hour now. English is not only a language of international communication but also for communication at the inter-state level. India is a country with a vast variety of regional languages. It is for these reasons, English occupies a significant place in our school and college curriculum and continues to be taught as a compulsory course up to the degree level and has also been remained as a medium of instruction.

The teaching of English in the schools of Gujarat has remained a sensitive problem since the inception of Gujarat. Before 1960, Gujarat was the part of the Bombay state and after its existence; Gujarat government formed a new policy on English language teaching with certain modifications and changes. At that time,

English was taught from Std. V. After the formation of Gujarat state, the state government felt that the teaching of English in Gujarati medium schools from Std. V was a great waste. Hence, the state government laid down the policy of introducing English from Std. VIII. But, this policy was not accepted unanimously. People demanded teaching of English from Std. V. The Government of Gujarat in 1975, owing to people's demand and their strong desire to teach English to their children, announced the policy of teaching English from Std. VI on the compulsory basis. Again in 1996, the decision was taken to introduce English from Std. V and it was made compulsory at all the levels of college education. In case of Higher Secondary level, English language was taught as an optional subject while it has to be studied as a compulsory subject at the college level. The students those who have passed their H.S.C. with English are offered 'A' stream English at the college level and those who have passed their H.S.C. without English are offered 'B' stream English.

As a result of the latest development of English language teaching-learning in Gujarat in the last decade of the twentieth century, a large number of English medium schools have been started and English language has been taught as the first language. In Gujarati medium schools, English language is being taught as second language. In some of the self-financed Gujarati medium primary schools, English language is being taught from the First standard whereas in grant-in-aid schools it is being started from Std. V. As per the latest development, the government of Gujarat has initiated the movement of introducing English from the first standard and English has been made compulsory from Std. V to XII. English was first introduced from the Std. VIII and was made an optional in the Std. X state board examination. In later years, the students were given the test of English from the fifth standard onwards but it still retained as an optional subject in the Std. X. For the first-time English as a subject has been made compulsory in the Std. X from the academic year 2006-2007. Hence, under the three-language formula, English has been considered as one of the languages. Gujarat is one of the most developing states in India. So that, SCOPE (Society for Creation of Opportunity through Proficiency in English) has been accepted by the Government of Gujarat to build English language proficiency in the youth of Gujarat and thereby provided better employment opportunities to the youth.

The above all matter shows the status of English language teaching at the state level. But it is a realized fact that one's proficiency in English is obviously based on his/her mastery level in the English language grammar.

1.9 PLACE AND IMPORTANCE OF ENGLISH GRAMMAR

According to Penny (1988), "Grammar may be roughly defined as the way a language manipulates and combines words (or bits of words) in order to form longer units of meaning. There is a set of rules which govern how units of meaning may be constructed in any language." If one is to use the language to express his ideas or thoughts, he has to follow the rules of that language to bring specific meaning. If one commits mistakes in following the rules correctly, the entire meaning will be changed. Therefore, adequate competency is necessarily required in using the rules of grammar to convey desired meaning.

English grammar is divided into two main parts namely; (a) Formal grammar and (b) Functional grammar.

(a) Formal grammar: It is the grammar which is taught in a formal way. In fact, it is theoretical grammar which deals with the definitions and rules of the language. By this, the learner acquires the ability to describe the language. There are set rules in this kind of grammar which are never allowed to be departed from. The students, first of all, learn the rules for the formation of tenses, words, sentence construction, etc.

(b) Functional grammar: It is also called incidental grammar. It is learned by the students quite unconsciously while learning the language. Here language learning is the first concern of the learners and knowing the rules and regulations is the secondary concern. This type of grammar takes into account the fact that language is growing and changing from time to time. Here the rules of the language are set but more emphasized on communicative aspects and less on the structure. It deals with the ability to use the language grammatically i.e. acceptable form of words, the pattern of phrases, sentences, sounds, stress, rhythm, intonation etc.

From the above discussion, it can be inferred that first part is the ability to describe the language whereas the second part is the ability to use the language. The second part can be called better because it helps the learners in the achievement of real

aims of language learning. Hence, it has been recommended for teaching purpose in the schools.

Students learn functional grammar when they are learning to speak their mother tongue. As a result, they get a very high degree of control over functional grammar before they even go to school. Schools are only the place where one finds that formal grammar is taught and used. The fact that students learn mother tongue without learning formal grammar is now being applied to the learning of the second language, too. It is, therefore, Functional (Communicative) Approach has sought the recommendation on the very broad basis to teach English as a second language. It is on these views of second language learning Gujarat government has afforded to begin functional approach-based syllabus in the textbooks of English subject to teach English as a second language at secondary level. But still, the general performance of the students and overall achievement in English is not satisfactory at the secondary level. It further reveals that English grammar should be an essential part to learn English language successfully. It also necessitates strengthening the grammatical knowledge of the students to enable them to speak and to write English correctly.

1.10 OBJECTIVES OF TEACHING ENGLISH AT SECONDARY LEVEL

Linguistics never differentiates between the lower level and higher-level objectives. It perceives that all the four objectives i.e. listening, speaking; reading and writing (LSRW) are to be realized at both the levels. To these linguistics objectives, literature adds two more viz. creativity and appreciation. These two objectives are inter-linked with each other. They are not independent and inseparable from literature.

According to NCF (2005), at the close of school career an average pupil should be able to:

1) To understand and follow talks in English on general topics within the prescribed vocabulary and sentence structures.
2) To talk freely within the range of language items and express suitably.
3) To read books and similar other materials written in simplified English as per the structures and vocabulary, and to follow easy books with detailed notes.
4) To write correctly in English on familiar topics fit to be expressed within the range of the prescribed vocabulary and sentence structure.

5) To write creatively and independently on general topics.
6) To create wider reading interest.
7) To speak in given situation (fluency and accuracy in speaking and writing).
8) To develop study skills and reference skills.

The objectives of English language teaching are broadly classified according to related skills and sub-skills. The language as a skill is to be developed in each segment of sub-skills. Further objectives are classified into two categories; they are general objectives and specific objectives. The general objectives are based on all these sub-skills. So, the general objectives of teaching English for standard – IX as mentioned by Gujarat State Textbook Research and Training Center (1998) with respect to LSRW, are as under:

Skill of Listening: The learner;

- can listen carefully simple, compound and complex sentences having 10 to 15 words.
- can differentiate situations to the purpose of listening (for pleasure, for specific information, for general interest).
- can use some verbal and non-verbal features as clues to interpret the context (keywords, intonation, gestures and back sound noises).
- can listen to and derive information from T.V. telecast, radio broadcast, sports news, railway inquiry etc.
- can listen to talk or conversation and state main points orally.
- can listen to and respond appropriately to directive language (instruction, advice, suggestions).
- can listen to the phrases in context and give their meaning in mother tongue.
- can listen to and comprehend 700 prescribed words.

Skill of Speaking: The learner;

- can speak sentences having words with more syllables, phrases with fluency and clarity.
- can present comments, experiences, incidents, stories listened from radio or watched on T.V. and heard from other sources.
- can express own ideas in about 5 meaningful sentences.

- can use constructions for seeking permission or making proposals.
- can express and respond to personal feeling and opinions.
- can speak story on the basis of the given points.
- can make certain assignment clearly.
- can recite prescribed poems with proper rhythm.
- can pronounce 625 prescribed words correctly.

Skill of Reading: The learner;

- can read the textual material with ease.
- can read and find out the sequence of ideas, facts, details, information and figures.
- can read silently with speed and respond.
- can read and find out in major details from the language material.
- can read and identify the relationships between ideas, events and facts.
- can read and organise the key points and thoughts.
- can read and predict details and events.
- can derive the meaning of unfamiliar words, phrases and idioms in a given context.
- can read the language material and refer to English-Gujarati and English-English Dictionaries to find out the meaning of unfamiliar words and phrases.
- can read the subheadings of different columns in the newspapers, important news headlines, descriptions, stories, magazines, and personal letters.
- can read time-tables, catalogues, broachers and collect information.
- can read and recite poems silently as well as aloud with proper rhythm and intonation.
- can read and translate simple sentences, paragraphs, from English into mother tongue.
- can demonstrate the skill of dramatic reading.
- can read 650 prescribed words.

Skill of Writing: The learner;

- can put down ideas in writing using correct simple sentences with a proper speed.
- can prepare a report of daily activities and events like visits, accidents, birthday celebration and festivals.
- can write a story in about 10 sentences with the help of given points.

- can answer the question in 3 to 4 sentences based on the text.
- can write a paragraph with the help of the words, phrases, pictures and questions.
- can write leave note, formal and informal letters (to parents and friends) for seeking permission, congratulating, inviting etc.
- can note down the points, answer instructions (regarding the announcement of the holiday, examination time-table, tour, etc.).
- can write short compositions in about 75 words with semi or partial guidance.
- can write short compositions and compose a paragraph of about 75 words based on a visual-verbal stimulus like picture-diagram, body, animals, graphs, maps, places, cartoons, photographs, newspaper cuttings, tables showing timing and temperature of the day, notices, suggestions, slogans having simple meaningful sentences, report of the celebrations etc.
- can write the assignment correctly and systematically.
- can write 'thought of the day' on the bulletin board in good handwriting.
- can write quotations, slogans, details of events, news headlines in the diary etc.
- can write answers to the questions based on poems in one to two sentences.
- can use 600 prescribed words in writing.

The above-mentioned statements of the objectives are obviously based on some of the grammatical aspects. Hence, the critical review of above-stated objectives reveals that there is a strong need of having grammatical base or knowledge to achieve mastery level in English.

1.11 IMPORTANCE OF CAI IN ENGLISH TEACHING

According to Kitao (1993), "CAI is good for motivating students to study English. Students are anxious to use computers. Many students are tired of traditional English classes and are interested in a new style of learning. When they use a computer, they feel that they can be master in English. They can study English with their own learning styles and see the results of their own learning. Students think materials are new and fresh if they are presented on computers, and they are often interested in even routine tasks such as learning to type. They seem to be willing to spend more hours and do more exercises on a computer."

CAI has its own importance in the teaching learning process because of the following major reasons:

- CAI can overcome barriers of time and place.
- If a school has a satellite system of computer laboratories, students can study English at various places on campus at any time.
- If the school has a network of computer laboratories, students can use the same materials wherever they are working.
- Students can study at home if they have a computer that can connect to their school's computer. Computers can be connected to schools, and teachers can use them to share materials and information.
- Teachers can get materials from commercial companies, networks, or databases, even from foreign countries.
- Note-type computers are getting cheaper, and some schools are lending them to students so that they can take them home and use them at any time.
- There are computer programs to check spelling and grammar. These allow students to avoid mechanical errors and pay more attention to more substantial matters.

1.12 CONCLUSION

In this chapter, introduction part gave a brief view about how on the one hand considerable changes have occurred in the field of education across the time where the need is felt to help the students to learn English grammar in easy way with the help of CAI package. The Computer Assisted Instruction package for learning English grammar helped the students to learn the various topics like articles, prepositions, kinds of noun, conjunctions, simple present tense, simple past tense, active – passive voice, reported speech, etc. in one package.