1. Introduction

The use of computers to support and enhance learning dates back many decades. The tremendous increase in usage of internet over the past few years and the ease of availability of resources across the globe has contributed much to the advancement of e-learning. Online learning or e-learning is no more a new paradigm of learning. It has been an active field of research over the last couple of decades, covering various aspects such as content design and delivery, assessment, feedback and collaboration.

From its birth, e-learning has evolved in different ways in various domains. We can categorise the domains in different ways, depending on the level of learner (school, college, special streams), depending on the nature of learning (formal, non-formal, job training, etc), depending on the nature of the subject (mathematics, sciences, language, etc), and so on. Among the various domains, language learning is an important area with high potential for e-learning. The various reasons include –

- If you are a visitor or a tourist, knowing the native language is a significant advantage.
- The rich culture embedded in most languages is a strong motivation for many students to study them.
- For people who have migrated for various reasons, learning the native language will help them to communicate and gel with locals better.

The use of technology in language teaching and learning started in the 80’s. Initially, the application of technology in language classrooms included the use of film, radio, television, language labs with audio/video tapes, computers, and interactive video [Cunningham, 1998]. The majority of Computer Aided Language Learning (CALL) uses were limited in form, to drill and practice exercises. As the technology advanced, we began to see more interactive uses of CALL as well as an increase in the integration of various media into the computer system [Pusack and Otto, 1990]. Despite such technological advancements, e-learning systems has not taken off as expected; e-learning for language learning is no exception. There are many reasons. One primary reason is inadequate attention given to the many differences between a traditional learning scenario and an e-learning scenario. In particular, use of pedagogical models appropriate to an e-learning context is important. There is also a
misconception that e-learning is mainly about technology, whereas technology is only an enabler for e-learning. Refocusing e-learning addressing such issues may help e-learning to play a more dominant role in education.

1.1 Language Learning Methods and Approaches

Many methods and approaches for the learning and teaching of languages have been proposed till date. These methods and approaches are influenced by growth in the fields of linguistics and psychology. Methods for language teaching include grammar translation method, direct method, and audio-lingual method, etc.

Grammar-Translation Method is based on translation from and into the target language in teaching of the second language grammar. The student’s native language is maintained as the reference system in the acquisition of the second language. In practice, reading and writing are the major focus. Student has to memorise endless list of grammar rules and vocabulary. Students are passive in language learning process.

The direct method is a major change from Grammar-Translation Method with respect to instruction strategy, communication in the classroom, and by the avoidance of the use of the first language and of translation as a technique. In this method, the learning of languages is viewed as analogous to the first language acquisition.

The audio-lingual method interprets language learning in terms of stimulus and response, and reinforcement with an emphasis on successful error-free learning. It uses dialogues as the means of teaching the language. Tape recordings, and language laboratory drills were offered in practice.

Some teachers prefer to use a single method in classroom, whereas others prefer a blend of two or more. Many researchers and teachers feel that a single right method to teach language does not exist. Also no research study has proved that one method is better over the others for the teachers, as well as for the students in all kinds of situations.

The language teaching methods mentioned above can also be broadly categorized into grammar based approach and non-grammar based approach. The grammar based approach uses grammar as the base, the starting point and foundation, for the development of all language skills - speaking, listening, writing, and reading.
Language teachers focus on grammar as a set of forms and rules. They teach grammar by explaining the forms and rules accompanied with numerous practice opportunities for learners, which ranges from simple manipulation of form to open communicative interaction. Learner applies the rules to form constructs in target language, and to validate them for correctness. During teaching, much of the emphasis is usually on the syntactic structure of the language. This often results in bored, uninterested learners who can produce correct forms on exercises and tests, but consistently make errors when they try to use the language in context.

In non-grammar based approach, language is taught through meaningful interaction and iterative practice, during which, the focus is on meaning rather than form. Audio or text is used for interaction. Language constructs are taught implicitly. In the whole teaching process, grammar rules are not used explicitly but they are imbibed by the learner from examples.

The non-grammar based approach is more similar to the way children learn their first language. In first language learning, the learning starts with the utterance of words children hear and repeat them randomly till improvement occurs in the speech. As they build mastery over utterance of words, they try to combine and modify words in their own way, for example – ‘Daddy comed’. ‘Comed’ may not be word children have heard from parent’s utterance. Though wrong grammatically, such errors are interesting: the verb, in a sense has the ‘correct’ ending on it for past tense. In other words, the only explanation for a child who is learning language making such an error is that he is learning a rule that derives past tense from verb stem. What the child hasn’t mastered at this point are the various exceptions to the rule. It shows that children look for and learn grammatical rules primarily from the utterances they hear.

It is very difficult for anyone to recall when he or she has started constructing sentences in mother tongue. Also, to construct a sentence, has he ever learned any grammar rules? The answer is ‘no’. During first language learning, grammar rules are never taught explicitly; instead they are learned implicitly by the child. As soon as child starts putting two words together, parents carefully introduce the appropriate variants of sentence by changing the constituent of sentence selectively. Here, parents repeat and expand on what is uttered by the young child. It also usually includes an exploration of ‘what’ is repeated for the better understanding of the child. Repetitions
help the child to make associations. In this process, the child learns different types of words from the language, how to put these words in correct order, and form their own grammatical rules and apply them to form new phrases and sentences. Here, the learning happens through continuous trials with appropriate advice and intervention by the parent(s).

1.2 Motivation

The work done in the area of Language Tutoring System (LTS) using non-grammar based approach is not much. The work done in India in the area of language learning is also very little despite the large number of languages we have. The current LTS in Indian languages have features like vocabulary, audio for pronunciation, script of the target language, basic grammatical constructs, etc. These LTS are not addressing the actual requirement of language learning through computer. The major aspects of any LTS are content, instruction, interaction, assessment and feedback.

Instruction, in turn, has multiple facets like design, presentation, delivery, pedagogy, etc. Most of the LTS in Indian languages and also those from abroad lack pedagogical principles of language learning. No learning sequence is suggested for course material so learner tends to get lost. In many cases, entire material is presented to the learner and he may get confused as to where to start.

As [Sims, 1999] said, interaction serves various functions which includes allowing for learner control, facilitating program adaptation based on learner input, and allowing various form of participation and communication. A teacher can do all these activities very well. He can change the learning pace from learner to learner. As per student’s current state of knowledge and need, he plans various exercises for him. During this whole process he also keeps in mind student’s learning ability, interest, and frame of mind. Most of the LTS in Indian languages does not have a teaching component that guides the student in overall learning process.

Assessment component plays a significant role in maintaining learner control, motivation and providing feedback. Various assessment mechanisms are useful to check the student’s depth of the knowledge in a particular topic. Except a few LTS in Indian languages, others do not have any significant assessment component. Those
who have, do not provide appropriate feedback which is useful for learner to correct his mistakes and also useful to motivate him to carry on.

From the above discussion, we can say that most of the LTS in Indian languages lack in pedagogy, meaningful interactions, analysis of student’s response, and suggesting appropriate measures in case of mistake, etc. When we review literature in detail in chapter 2, we will elaborate on these issues.

Considering the reasons of language learning and current scenario of LTS for Indian languages, we decided to explore this domain of LTS for Indian languages, trying to address the problems mentioned above. To develop an effective LTS for Indian languages, it is proposed to follow the model of children learning their first language where no direct attempt is placed on teaching grammar rules. Grammar rules are to be learned through continuous experience, right time intervention and appropriate feedback. The focus will be on the development of LTS on Marathi language. It is intended to keep the framework for the system sufficiently language independent, so that the same framework can be extended to other languages.

1.3 Major Challenges

In realising an LTS for Indian language with the first-language learning approach, the major issues and challenges are as follows.

1. The most common structure of the sentence (for Indian languages) is subject + object + verb. Teaching a sentence requires system to generate syntactically correct as well as meaningful sentences. Ideally speaking, one can generate all types of sentences using grammar rules only. But, for generated sentences, adherence to grammar rules is not the only requirement; the generated sentences are required to be meaningful also. To ensure both these aspects, a schema to store the structure of Marathi sentences is needed.

A powerful domain model of language constructs and grammar rules also play a larger role in selection of right language construct and in generation of correct form of it. In short, to generate legal and meaningful sentences, system’s domain model requires understanding of full grammar model of the language. Designing such a rich domain model is highly challenging task.
2. If the student makes a mistake, an intervention is required. But there are many concerns in doing this effectively, such as when to intervene, and how to tell the student that he has committed a mistake, etc. Intervention can be carried out by asking him question so that he can realize the mistake or by telling him that his answer is wrong and providing him some clues to correct the mistake. The selection of intervention may depend on the type of student, kind of the problem being solved, etc. Deciding the time and type of intervention, particularly in an e-learning scenario, is another major issue.

3. Identifying if there is any mistake in student’s response is, often, itself a difficult task and recognising the type of mistake is even more challenging. A human teacher can do this, relatively effortlessly. From LTS point of view, these issues are important in providing appropriate feedback at right time. A powerful domain model having language constructs, syntax and semantics along with effective analysis tools such as parser would be needed, in general, for this.

Consider a scenario where LTS has asked a question to the student. A response from student is expected in the form of a sentence. Since the student is a learner, the sentence may not be grammatically correct. The usual way to analyse any natural language input, is to parse it to identify its structure, and then analyse the structure. To parse a sentence, grammar is required which describes the structure of a sentence in particular language. Using grammar, a parser can assign structure to each grammatical sentence. This structure is called a parse tree. Thus parsing process determines which sentences are accepted as syntactically well formed and which are not. For syntactically well-formed sentences, it assigns a structure. Since the student response may be grammatically wrong, parser is not always in a position to generate a parse tree. Also, general language parsers are very difficult to design and normally not available for Indian languages. These make a parser based analysis of student response difficult to implement in practice.

To overcome this issue, one can use scaffolding where student’s response can be in the form of a few words. This also makes it easy for the system to compare the student’s response with expected answer. Designing effective scaffolding model is another challenging task.
4. For any e-learning system, there are also typical challenges like content design, assessment and delivery, which also apply to our task.

All these issues can be considered as research challenges in the realisation of LTS for Indian language, in the approach we have adopted.

1.4 Thesis Overview

The rest of the thesis is organized as follows. Chapter two covers the literature survey where important aspects of language teaching and learning are discussed briefly. Also it throws light on the various language tutoring systems available in Indian as well as in foreign languages. The chapter ends with a comparative study and analysis of these existing systems. Chapter three outlines our approach of teaching language, briefly including the pedagogical model used to teach the language. It also introduces Marathi language and its important characteristics. Chapter four presents the implementation details. Chapter five presents evaluation and results. Finally the thesis ends with conclusion and some direction for future work.