An Intelligent Tutoring System for Teaching Grammar English Tenses

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Abstract:

The evolution of Intelligent Tutoring System (ITS) is the result of the amount of research in the field of education and artificial intelligence in recent years. English is the third most common languages in the world and also is the internationally dominant in the telecommunications, science and trade, aviation, entertainment, radio and diplomatic language as most of the areas of work now taught in English. Therefore, the demand for learning English has increased. In this paper, we describe the design of an Intelligent Tutoring System for teaching English language grammar to help students learn English grammar easily and smoothly. The system provides all topics of English grammar and generates a series of questions automatically for each topic for the students to solve. The system adapts with all the individual differences of students and begins gradually with students from easier to harder level. The intelligent tutoring system was given to a group of students of

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all age groups to try it and to see the impact of the system on students. The results showed a good satisfaction of the students toward the system.

INTRODUCTION

Artificial intelligence technologies were incorporated into the education and teaching as early as 1970 in multiple frameworks such as Intelligent Tutoring System (ITS). The recruitment of artificial intelligence came in the field of education by computer in response to the growing demand for individual learning, widening individual differences among the educated and the need for pedagogical advice during the learning. So that the available system is able to analyze the level of student and weaknesses and strength and the use of accumulated knowledge about this student to give him advice that will support learning. Intelligent Tutoring System is a computer system designed to simulate a human teacher, provides dedicated instruction for learners without human teacher intervention. In other words, the possibility of learning in a smooth and efficient manner through the use of computing technology is often using intelligence. Intelligent Tutoring System that focus on dialogue with the learner, interact with the learner and the interpretation and response to reactions of the learner.[10,31] In the last years, research which specializes in the field of Intelligent Tutoring System with the student modeling are developed and it became a great interest by a researchers because it is one of the most appropriate and promising method for providing individualized instructions, adaptability and personalization in computer system education [12]. A typical architecture for ITS system consists of knowledge base, student model, pedagogical module and user

interface model [8]. The knowledge base, also called domain model, is the knowledge that relate to the subject which will the student be taught, asked questions to answer or given problems solve. It is the source of knowledge for students. Student model is a model that represents the processes that run on the knowledge such as problem solving, information retrieval, learning from mistakes, the level of student learning and learning pattern. The pedagogical module also called tutoring model is knowledge about how to teach students and knowledge relating to rules of teaching a particular subject. The user interface model is student interaction with ITS, to interpret the dialogues and student communication with ITS. Fig.1 shows the ITS architecture.
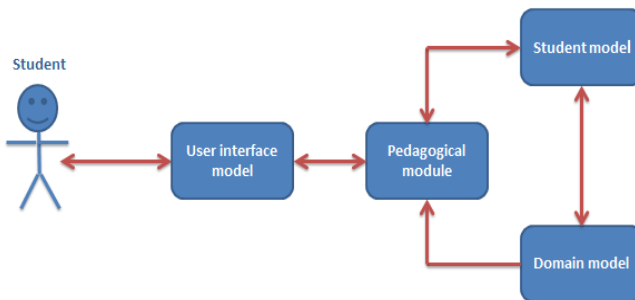

Figure 1: ITS architecture

The aim of this paper is the design an intelligent tutoring system to teach the English Grammar tenses using Intelligent Tutoring System Builder (ITSB). ITSB is a tool designed and developed to assist teachers in building intelligent tutoring systems in multidisciplinary areas [5].

LITERATURE REVIEW

In recent years we have a huge development of Intelligent Tutoring System, ITS has attracted much attention of the researchers. There are many intelligent tutoring systems, such as Knowledge-based program debugging (PROUST) designed by

Johnson and Littman Soloway to examine non syntactic bugs for students in the Pascal programs [11]. SQL-Tutor, developed by Mitrovic and Ohlsson, teaches and explains to students the way of writing queries in relational database through several lessons in the basics of writing query, and also the student enters the query to the system then the system analyzes the query to find errors and defects. Depending on the errors, the system gives a set of notes and hints by showing a short text describing the error and how to fix it [14-16]. Dance Learning from Bottom-Up Structure (DL-BUS) based on automated lesson generation systems, teaches beginners basic dance movements through analyzing and dividing dance into lessons. The first: divided the dance to small movements then display them to the student. The second: teach students combined dance movements during a period of time [32]. Affective tutoring systems (ATS) based on embedded devices is a system that relies on embedded devices for detecting the feelings, emotion, psychology student and also adapt to the student's mood such as angry, frustrated and fatigued etc. Based on the mood and feelings of the student, the student will learn [24, 25]. An ITS teach students English dialogues through interaction with students and it takes into account the individual differences of students through levels [13]. The Andes physics tutoring system is a system that teaches students ways to solve physics problems [29]. PIXIE Design by Sleeman in 1987 is based on Leeds Modeling System (LMS) to examine errors in algebra [27]. MYCIN [26] is expert system for diagnosing diseases such as cancers, based on MYCIN, Designed GUIDON to display the lessons of the disease and symptoms, showing rules in the knowledge base of the student [30]. A comparative study between Animated Intelligent Tutoring Systems (AITS) and Video-based Intelligent Tutoring Systems (VITS) [1], Parameter Passing In Java Programming[2], Java Expression Evaluation [4], Java Objects[6], Linear Programming[3,19], effectiveness of e-learning[7], computer aided instruction[17],

effectiveness of the CPP-Tutor[18], teaching AI searching algorithms[20], teaching database to sophomore students in Gaza[21], Predicting learners performance using NT and ITS [22], learning to program in C++ [23].

GRAMMAR ENGLISH TENSES TUTOR ARCHITECTURE

In this paper we used the Intelligent Tutoring System Builder (ITSB) tool in building intelligent tutoring system for learning grammar English tenses. ITSB authoring tool is developed using Delphi Embarcadero XE8, 2015; ITSB authoring tool consists of two systems. The former is the teacher is a system through which add materials and questions and answers etc. and the latter is the students a system through which learn the course material and answer the exercises [5].

DOMAIN MODEL ARCHITECTURE

The domain model contains information relating to the English grammar tenses or number of strategies to represent information. Intelligent tutoring system uses its domain model to solve problems, or problem solving strategies. The domain model displays materials and lessons in a simple, and it generates a set of problems for each lesson taking into account individual differences. When a student answers the problems, determines whether the answer is correct or incorrect and also evaluate student.

STUDENT MODEL ARCHITECTURE

The student model forms the frame which determines the current state of the student in understanding English grammar tenses. The student knows status through the creation of profile. Profile containing information about the student, such as name and student number in addition to the student's major,

dates of login, knowing the result for each level based on questions such as present, past and future tenses that are divided into several levels beginner and intermediate and advanced, moving from one level to another level, showing the student Grade Point Average (GPA) for each level and the number of hours a student's success.

PEDAGOGICAL MODULE ARCHITECTURE

English one of the most common languages in the world and it became necessary to learn. Therefore, the students had encountered many difficulties in distinguishing between the times of the English grammar tenses because of the great similarity between them and the problems in writing the sentences in the English language whether past, present or future. Intelligent tutoring system for learning grammar English tenses have been designed to students in all stages of their studies, especially high school and also to students applying for the TOEFL test. The system displays the English Grammar tenses sequentially in terms of structure, use, tenses keyword and negation sentence, problems generates automatically to be solved by students. The torturing materials are divided into several main parts: [9, 28]:

1. **Present Tense:**
   - Simple Present Tense
     I do
   - Present Continuous Tense
     I am doing, I am doing tomorrow
   - Present Perfect Tense
     I have done
   - Present Perfect Continuous Tense
     I have been doing

2. **Past Tense:**
   - Simple Past Tense
     I did do, I did
   - Past Continuous Tense

    I was doing
- Past Perfect Tense
    I had done
- Past Perfect Continuous Tense
    I had been doing

3. **Future Tense**
   - Simple Future Tense
       I will do
   - Will or Going To?
   - Future Continuous Tense

USER INTERFACE MODEL

The interface can be used in the presentation of the tutorial system materials. Intelligent Tutoring System Builder (ITSB) [5] that has been used in the design of the intelligent tutoring system to teach the English Grammar tenses that contains two users are teachers and students. In other words, each user is composed of different interfaces for the other user both separately. The student Interfaces has been designed for the student to interacts with the system through which displays tests for each lesson. The student chooses a lesson from the list of lessons; the system displays the first difficulty level of the test questions randomly. If the student answered on all questions of the first level, the system moves the student to the next level of difficulty automatically. The interface and responses are essential to the process of adaptation of the system with the student. So, the increase in the of the adaptation process depend on it. Fig2, fig3, fig4 and fig5 show the student interfaces.
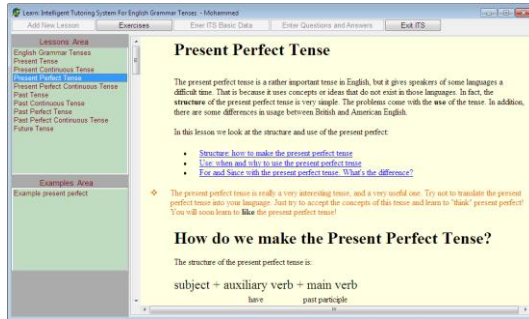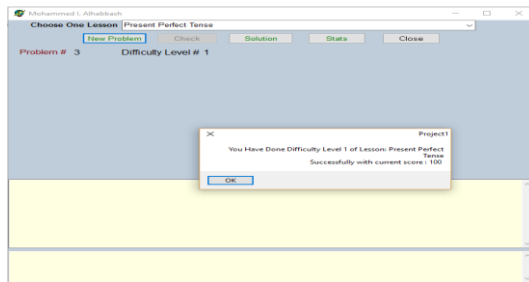
Fig. 2: Student lessons and examples interface.

Fig. 3: Student Exercises Difficulty Level Score Interface.
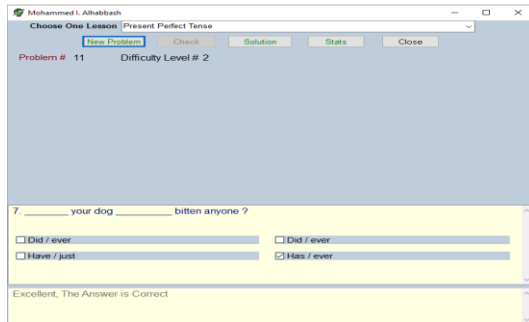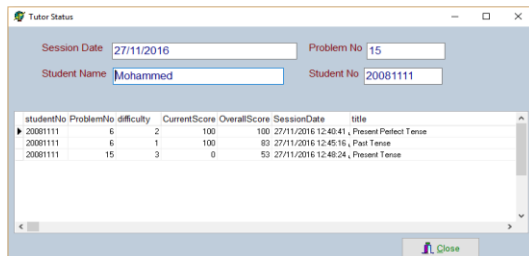

Fig. 4: Student Exercises interface.

Fig. 5: Student statistics Interface.

The teacher interfaces consists of three basic parts to construct of the student model and domain model. The first interface is to add examples and lessons with the ability to add video and pictures with lessons to help and facilitate the learning of students. The second interface is to add questions and answers with the ability to add video, photos and hints to facilitate the answer to the question and add a level of difficulty for each question. The third interface to modify the background color and font name and font size and font color for all forms, list boxes, combo boxes, labels, buttons, page sheet and rich edit, also construct basic data about the student and system. Fig6, fig7, fig8, fig9 and fig10 show the teacher interfaces.
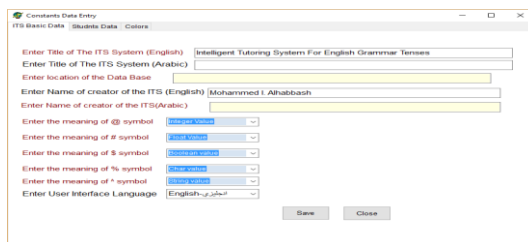

Fig. 6: Interface for adding Lessons and Examples
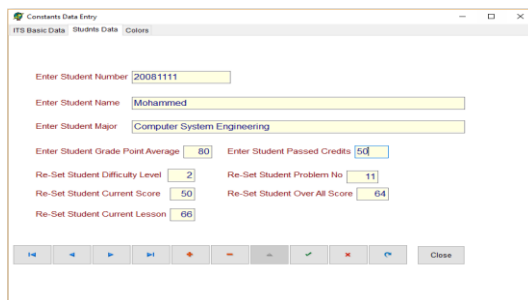

Fig. 7: Interface for adding constants of the system

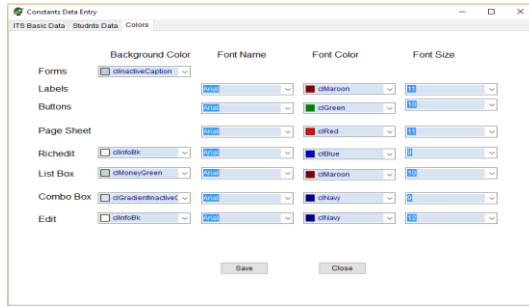**Fig. 8: Interface for adding initial student data.**

Figure 9: Interface for modifying Fonts of all screens of the system.
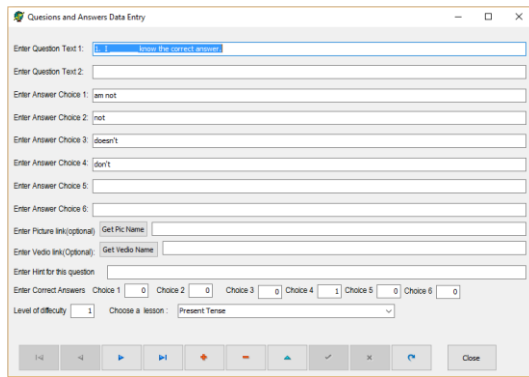

Fig. 10: Interface for adding questions and answers

The login interface through which the student login to the system by student number and also it shows the student name and the last session on the system. Fig.11 shows the login interfaces.
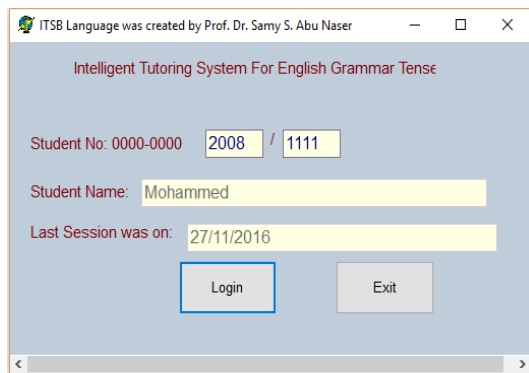

Fig. 11: Logging Interface.

EVALUATION

We evaluated the Intelligent Tutoring System for English Grammar tenses by presenting the system on a group of teachers who specialize in teaching English language and a group of students at the high school and university. Then we introduced a number of questions for each teacher and each student in terms of benefit, comprehensiveness of material, quality of system design and quality of material. The result of the evaluation by teachers and students are pleasing as shown in Fig. 12.
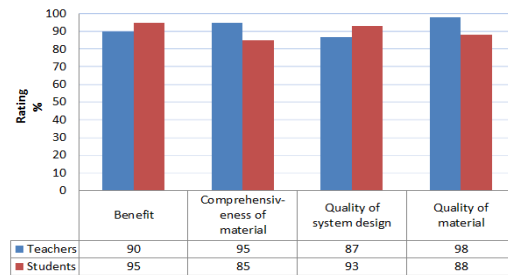
	Benefit	Comprehensiveness of material	Quality of system design	Quality of material
Teachers	90	95	87	98
Students	95	85	93	88

Fig12: The results of the evaluation.

CONCLUSION AND FUTURE WORK

In this paper, we have designed an intelligent tutoring system for English grammar using ITSB tool. The system is designed to facilitate the study of English grammar to students and overcome the difficulties they face with ease and smoothness. System architecture and requirements of each part in the system has been explained. We conducted an evaluation of system by teachers and students, the results were wonderful.
In the future, we will suggest an intelligent system to teaching the skills of listening, spelling, writing and conversation in the English language.

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