

## Review on an Intelligent Tutoring System for a Virtual E-learning/ E-Teaching

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### Abstract

In the future, intelligent machines will replace or enhance human performance capability in different areas. Artificial intelligence is the intelligence demonstrated by software or machines. This paper contains the review of Intelligent Tutoring System (ITSs) use in Educational system. Intelligent Tutoring Systems (ITSs) play an important role in evaluating student's answers through interaction with them. This review has not attempted to detail all the literature in the area but it can report mainly the most recent work of intelligent tutoring system in virtual E-learning and E-teaching.

**Keywords:** Artificial intelligence, Intelligent Tutoring Systems, Educational system.

### Introduction

Over a last few years the Artificial Intelligence have address several challenges in learning, language processing, reasoning, cognitive modeling and planning. For all of these things AI demonstrate the ITS. The ITS is fill by various programs like how to teach students? What are skills of students? it is also fill by the textbook knowledge. The ITS can simulate the human teacher, all of

things of human teacher are stored on ITS, also it contain different teaching and learning methods. During teaching its can update itself and improve itself by experiences. The ITS are increase in popularity due to : (i) an increased student performance, (ii) a deepened cognitive development, and, (iii) a reduced time for the student to acquire knowledge and skills. Fundamentaly the ITS posses the module domain model, student model, pedagogical model. Domain model where the domain knowledge is gathered, that is to say the knowledge of what has to be taught. Second is a student model represents the knowledge of the student, that is to say knowledge of what the student knows. Finally, there is a pedagogical model it is the knowledge of the instructing strategies, that is to say how to teach the domain knowledge, is described.

1. The Auto tutor domain is kind of tutor which can simulate the course pattern and education techniques. It is an computer tutor. It can behave like human tutor by making dialog with student in natural language so student can understand the tutor. The tutor have been developed increasingly latter it has a 3D interactive interface and has been implemented using visual basic like .NET and C#

programming languages. ITS can do the conversation with students by means of human voice. The computational linguistics algorithms include latent semantic analysis, regular expression matching and speech act classifiers these are uses to handle, the Auto Tutor project.

2. Why2-Atlas is an ITS that can be consist of various physics principles. It can use principle as a domain knowledge. The students give their input work in paragraph form and the ITS program converts their words into a proof by making assumptions of student beliefs that are based on their explanations. By using this method the ITS highlighte the incorrect conceptions and incomplete explanations of the students. The system think about these issues and go through an dialog with the student and asks the student to correct their essay. For these things the system can make number of computation processes.

3. Web-based Intelligent Language Tutoring Systems . It is also known as German Tutor. It is constructed to form the grammar practice fora course in German by using a web-based environment. Intelligence appeared through a parser. That can analyze the German grammar which is the learner's input. The system's student model can provides students with adaptive feedback that is suited to their expertise along with some exercises. The answer can be proceed by intelligent adaptive mechanism were build on a separate server. The system has been evaluated through testing it with 19 students within 1 h class. From thse 84% of the students reported that the system was very vigorous by providing

them the immediate feedback and free grammar practice .

4. Beetle II System: It is a tutorial dialog system designed to accept different kind of languages means which are unrestricted. As an input with two different tutorial planning and dialog strategies. . This system domain is mainly the basics of the electricity and electronics. A natural language dialog parser has been used. It can parse any language input from the student as well as to extract an applicable semantics from each statement and identify paraphrases that could have similar meaning. Beetle II has been implemented to examine whether self-explanation could be handled by computers which can be supported by NLP techniques (Natural-language processing ). This system has been developed to ask the learners that does they want illustrate their answers is yes then it can give them detailed feedback. This system helps to get students into the correct answer to the illustration without referring to the short-answer questions and without referring to the tutor after each tutorial response.

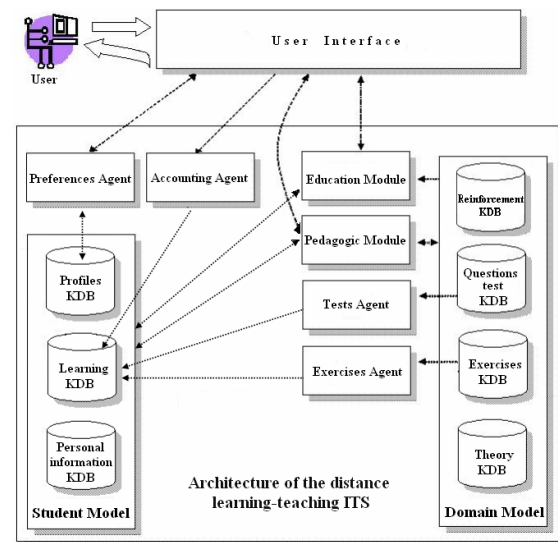
## **LITERATURE SURVEY**

W. Fajardo Contreras et al examined the design and development of an e-learning tutoring system. The E-learning means replacement of the physical location of the real educational establishment for that of the computer. The E-learning technology is an virtual education or online instruction, it is widely used by educational. The virtual education center has been implemented by means of a client/server architecture. The Apache server is used with SSL for securing the protocol and Open SSL certification. The system has been implemented with PHP on a MySQL database. These e-learning tutoring system consisting of two types of components that are : administrative and educational. The administrative component

includes the advancing teaching material such as enrolling students on courses, registering and unregistering teachers and students, and managing academic certification like these. The educational component, on the other hand, aims to simulate the teacher's behaviour and so an intelligent tutoring system has been developed to cover two types of education: distance learning it means the student is not present and individualized instruction means one-on-one guidance for student education.[5]

José M. Gascuena et al Studied the ITS have turned into a technology of increasing interest to complement traditional education so much from showing the students as from that of the teachers. . In distance learning system have been introduced a Student Model, a Domain Model, a Pedagogical Model, and at last the Educational Model. The Student Model consist of knowledge about the student like profile and interaction with the system is represented in this model. This model is composed of three knowledge databases (KDBs). The Domain Model contain the knowledge about the contents to be taught is stored. This model consists of four knowledge databases KDBs. The last is Pedagogic Module provides the necessary mechanisms to efficiently presented matter to the student. This module is carry out three tasks: to provide the learning guidelines for the student, to update statistics in the Domain Model of the exercises and tests presented, to store into the Learning KDB important data as the material prepared to reinforce the student who needs it. In the pedagogical model four agents are included – the Preferences Agent, the Accounting Agent, the Exercises Agent and the Tests Agent - have been added. ITS proposed to get all needed data, obtained fruit of the interaction of the students with the system. It can adapt rhythm of introducing the

contents of the matter to the learning rhythm of each student. the Education Module use in system obtains measures that permit to give suggestions to teacher to enhance the their course of teaching. The ITS proposed in this paper creates an infrastructure for distance learning/teaching of a matter. By this way jointly e-learning and e-teaching are greatly enhanced. In order to obtain good results, we propose to decompose the teaching method into theory, exercises and test questionnaires as shown in figure. The figure is an architecture of the agent-based ITS system for distance learning. In this methods agent plays an important role. The alumni student can read the matter of theory topic first, then making exercises and finally answering to a test which has been given by system. The system will provide help to the students whenever it is necessary by suggesting hint.[1]



**Figure1.** Architecture of the agent-based ITS system

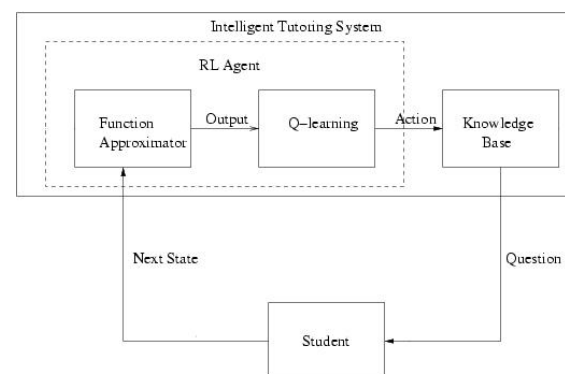
Vladan Devedzic et al described design of the FLUTE system, which is an intelligent tutoring system in the domain of formal languages and automata. it is for making learning formal languages and automata more attractive for the students and make

the abstract material more concrete. This development of an intelligent tutoring system (ITS) called *FLUTE* (Formal Languages and aUTomata Environment) which has been started in ITS. The *FLUTE* the *FLUTE* system is a systematic introduction of students into the system's domain, in accordance with both the logical structure of the domain and background knowledge of individual and the learning capabilities of each student. After that *FLUTE* system developed an ontological analysis and with the help of *GET-BITS* framework. Every concept that a student has to learn during a session with *FLUTE* system, then system can illustrates concept by a number of examples. This makes the tutoring process more progress within the system and facilitates the learning process. The main advantages of this design is to improved lesson presentation and knowledge maintenance and more explicit distinction between different pedagogical features.[2]

B. H. Sreenivasa Sarma et al proposed to use Reinforcement Learning for building an intelligent tutoring system. By this learning we can teach autistic students, who can't communicate well with others. In reinforcement learning, a policy is updated for taking appropriate action to teach the student. Cohen has shown that Artificial Neural Networks (ANN) with back propogation can appropriately model the students' selective attention and generalization abilities, who are suffering with autism. RL is learning what to do, how to map situations to actions, so as to maximize a numerical reward signal. To obtain high reward, an RL agent must prefer actions that it has tried in the past and found to be effective in producing reward. In an ITS, the RL(Rainforest

system design is based on the *GET-BITS* framework and model of GEneric Tools for Building ITS. The idea behind design of

Learning) agent acts as the pedagogical module. The RL agent learns a policy for presenting the examples and the hints to the student. . There is an ITS called *AgentX* which uses RL agent as a tutor which can have RL algorithm for training of the RL agent, a slightly modified version is use for this algorithm. Authors used basic RL algorithms like softmax and  $\epsilon$ -greedy for evaluating the effects of hints on the student. Reinforcement learning method also contain Q-learning . It is an a popular RL algorithm that does not need a model of its environment and can be used on-line. Q-learning algorithm works on guessing the values of state-action pairs by function approximate. The following figure shows block diagram of reinforcement learning with ITS.[3]



**Figure 2.** Block diagram of ITS with RL.

Mona H. Mahmoud et al studied an Intelligent tutoring system (ITS) is presented to replicate the behaviour of the educational process. She can propose the "Arabic Grammar Tutor" that is appreciated as "AG TUTOR". AG TUTOR simulates the behaviour of instructors and students in the educational

environment. These "AG TUTOR modul consist of : the Tutor Module, the Question Selector Module, and the Expert Module. In this domain is use in grammer of the Arabic language of the fourth grade of the elementary schools in Egypt. The knowledge is acquired from the Arabic instructor transcripts. For designing this structure the domain technology of adaptive hypermedia system is used. The domain is already transferred into concepts and fragments in AG TUTOR .AG TUTOR is considered an adaptive learning system which uses computers as an interactive teaching machine. The system adapts the presentation of educational material according to students' learning needs, as indicated by their responses to questions and tasks. ITSs vary in their capabilities according to their components. Systems use NLP tools have the ability to evaluate the student answer and diagnose his/her misconceptions. The structure of the domain of the Arabic grammar of Fig. 1 was designed as concepts and fragments like

Concept	name:	speech
Its fragments:	noun , verb , particle	
Concept	name:	the nominal sentence
Its fragments:	inchoative , enunciate	
Concept	name:	verbal sentence
Its fragments:	verb, subject	

and so on, all the grammar that will be taught was transferred to this form and then to database tables on the computer. AG TUTOR knowledge is represented using the production rules method that consists of: facts and rules.[4]

#### **Literature review of the ITS**

### Conclusion

Research in this field has successfully delivered techniques and systems that provide adaptive support for student problem solving in a variety of domains. Success in these endeavors has the potential to have great impact on our society, and on its ever-increasing need for high quality teaching and training. Research in Intelligent Tutoring Systems favorable advance in Artificial Intelligent, Cognitive Science and Education to increase the ability of computer supported education to autonomously provide learners with effective educational experiences tailored to their specific needs, as good human tutors do.

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Name of Paper	Advantages	Disadvantages
An Agent-based Intelligent Tutoring System for Enhancing E-Learning/E-Teaching	Useful for distance education student and alumni student	There is reading theory, making exercises and answering to the test, student complete all task without critical thinking.
An Intelligent Tutoring System for a Virtual E-learning Center	Use for online study virtually provide information to students like distance education	it is very expensive, some practical knowledge is also important for student understanding
Intelligent Tutoring System Using Reinforcement Learning To Teach Autistic Student”	Due to this we can communicate with Autistic Student	It is difficult to encode Autistic Student behavior, it require deep psychology
An intelligent tutoring system for teaching the grammar of the Arabic language	Due to this student can understand grammer of arebic languade easily	The Arebic language encoding is difficult task because complexity of Arebic grammer

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