

Teaching the right letter pronunciation in reciting the holy Quran using intelligent tutoring system

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Abstract

An Intelligent Tutoring System (ITS) is a computer system that offers an instant, adapted instruction and customized feedback to students without human teacher interference.

Reciting "Tajweed" the Holy Quran in the appropriate way is very important for all Muslims and is obligatory in Islamic devotions such as prayers.

In this paper, the researchers introduce an intelligent tutoring system for teaching Reciting "Tajweed". Our "Tajweed" tutoring system is limited to "Tafkham and Tarqiq in TAJWEED" the Holy Quran, Rewayat: Hafz from 'Aasem.

The system was evaluated by reciting teachers and students, and the results were auspicious.

Keywords: intelligent tutoring system, expert system, reciting "tajweed" the holy quran, education, problem generation

1. Introduction

Intelligent Tutoring Systems (ITSs) are computer software designed as combined methods from Artificial Intelligence (AI) community to deliver expert tutors which recognize the material to teach, the target students and the technique used [1, 28].

ITS covers the statement "teacher for every student", to put it more simply, ITS takes in account individual needs.

Intelligent Tutors have many features of Artificial Intelligence: generating suitable problems and suggestions depending on student needs, according to inference on the way of student's learning an adjustment of teaching method will be done [1, 2].

ITS was called in the past 'ICAI' an abbreviation of 'Intelligent Computer-Aided Instruction' which was developed from 'Computer-Aided Instruction' (CAI), so ITSs and ICAI are synonymous [3].

At revelation of Holy Quran to Prophet Muhammad (pbuh), an attention began to its recitation as taught by the Prophet Muhammad (pbuh). Then, Muslims learned this recitation from teachers verbally.

When a Moslem believer reads Al Quran even one verse, he/she must read it correctly depending on the rules of 'Ahkam', furthermore, if one reads with some errors he/she commits a sin.

Allah has ordered his Messenger Prophet Mohammed and all Moslems also to recite the Quran as it was revealed, (وَرَتَّلْ) الْقُرْآنَ تَرْتِيلًا [Surat Mozamel-verse 4]

Prophet Mohammed promoted all Moslems to read Al-Quran in order to have great rewards, Ibn Mas'ud (May Allah be pleased with him) reported: The Messenger of Allah (pbuh) said, "Whoever recites a letter from the Book of Allah, he will be credited with a good deed, and a good deed gets a ten-fold reward. I do not say that Alif-Lam-Mim is one letter, but Alif is a letter, Lam is a letter and Mim is a letter." [At- Tirmidhi].

قال رسول الله صلى الله عليه وسلم: "مَنْ قَرَأَ حَرْفًا مِنْ كِتَابِ اللَّهِ فَلَهُ بِهِ حَسَنَةٌ وَالْحَسَنَةُ بِعَشْرِ أَمْثَالِهَا لَا أَقُولُ: (الم) حَرْفٌ وَلَكِنْ أَلِفٌ حَرْفٌ وَلاَمٌ حَرْفٌ وَمِيمٌ حَرْفٌ". رواه الترمذي في سننه عن عَبْدِ اللَّهِ بْنِ مَسْعُودٍ. 5/ 175 رقم 2910 "حَرْفٌ"

This paper introduce the design and development of an Intelligent Tutoring System to teach a subject of Tajweed rules, it is the right pronunciation of letters in Al-Quran using the authoring tool Intelligent Tutoring System Builder (ITSB) which was Developed by Professor Dr. Samy S. Abu Naser in order to help teachers build Intelligent Tutoring System [28].

2. Literature Review

There are a lot of intelligent tutoring systems, some are focused on teaching English language [7, 18], Arabic language [19], teaching Written English to Deaf Learners [16], Programming languages [2, 3, 5, 21, 25, 28], Health [9, 10], testing and debugging [1], evaluation of ITS [4, 11, 20, 27], e-learning [32], database [6, 13, 15, 24], Computer Networks [8], Computer Theory [12], biology [14, 29], information security [17], Linear Programming [23, 26], searching algorithms [31], Big O Notation for Measuring Expert Systems complexity [30].

In fact, one of the researchers has a great experience in computer science especially in Artificial Intelligence, and he created the tools ITSB Intelligent Tutoring System builder [28], the other has an experience in computer science and he studied four courses in Tajweed rules of Al-Quran for more than two years, and he is teaching these courses.

So, both of the researchers decided to combine AI with Tajweed Al-Quran, compliance to Prophet Mohammed's Hadith: "Uthman reported the Prophet (pbuh) as saying: The best among you is he who learns and teaches the Qur'an ". Hadith in Arabic: «خَيْرُكُمْ مَنْ تَعَلَّمَ الْقُرْآنَ وَعَلَّمَهُ» أخرجه البخاري (5027).

3. ITS Architecture

The architecture of ITS system comprises domain model, pedagogical module, student model and user interface model as shown in Figure 1.

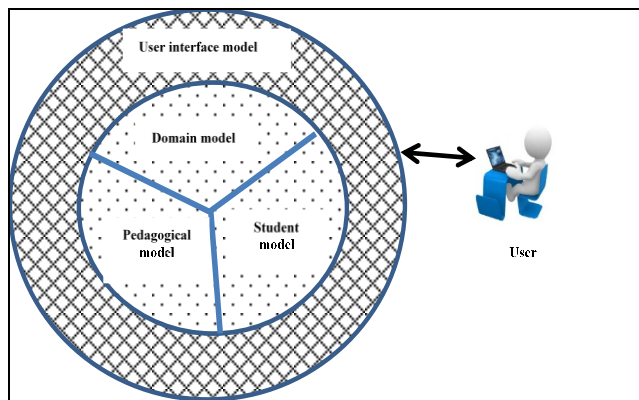


Fig 1: The architecture of the ITS system

3.1 Domain Model Architecture

The arrangement of the material to be taught right letter pronunciation in reciting "TAJWEED" the Holy Quran with Rewaya: Hafs from 'Aasem', called also letter's magnification "tafkhim" and laminating "tarqiq".

The material consists of the following:

Lesson 1: an introduction

The importance of Tajweed, definitions of tafkhim and tarqiq, how to pronounce letters in Al-Quran with tafkhim and tarqiq.

Lesson 2: letters tafkhim always

There are seven letters always tafkhim grouped in the Arabic statement "خص ضغط قظ", and there is levels of tafkhim.

Lesson 3: letters tarqiq always

Lesson 4: letters sometimes tarqiq and sometimes tafkhim

The letters alef "الألف", R "راء" and L "اللام في لفظ الجلالة".

3.2 Student Model Architecture

Each student must have a profile including student's information such as name, number, login date, score and level of difficulty.

3.3 Pedagogical Module Architecture

This module is considered the core of the whole system; it controls all the functions and tasks in system. A student, by answering questions correctly, can precede one step more in the difficulty level if he/she achieves seventy percent score or more, but if less, the system will pose questions from the same level to give more chance, and so on.

3.4 User Interface Model

The used tool ITSB for the system supports teacher who can add lessons, examples and questions (See Fig 5 – Fig8 and Fig 12-Fig 13) and student who can choose the lesson to read, see examples to understand more and answer questions (See Fig 2– Fig4 and Fig 9-Fig 11).

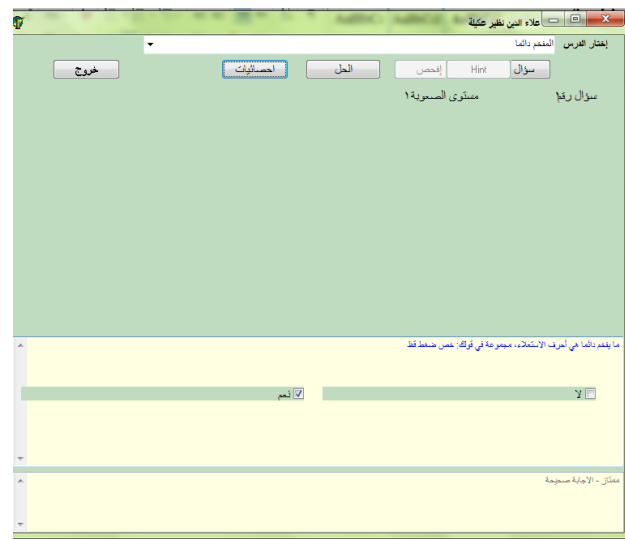


Fig 2: Form for displaying the questions for the student to answer

The screenshot shows the 'Tutor Status' window. It displays a table with columns: studentNo, ProblemNo, difficulty, CurrentScore, OverallScore, SessionDate, and title. The table contains three rows of data.

studentNo	ProblemNo	difficulty	CurrentScore	OverallScore	SessionDate	title
00000000	0	1	0	0	10/01/17 01:38:08	مقدمة في علم التجويد - التفخيم والترياق
00000000	0	1	0	0	11/01/17 07:00:42	المعرفي دائما
00000000	0	1	0	0	11/01/17 07:08:51	المعلم دائما

Fig 3: History of the student



Fig 4: Example of Teaching Material

Constants Data Entry

ITS Basic Data | Students Data | Colors

ادخل رقم الطالب: 20011234

ادخل اسم الطالب: مجد

ادخل تخصص الطالب: Computer Science

ادخل عدد ساعات نجاح الطالب: 0

ادخل المعدل التراكمي الطالب: 0

حسب رقم السؤال للطالب: 0

حسب الدرجة الكلية للطالب: 0

حسب مستوى الصعوبة للطالب: 1

حسب الدرجة النهائية للطالب: 0

حسب رقم الدرس الحالي للطالب: 24

اخرج

Fig 5: Form for adding students' data

[illegible]

Fig 8: From adding the Teaching Material

Constants Data Entry

ITS Basic Data | Students Data | Colors

لون الخلفية	نوع الخط	لون الخط	حجم الخط
cIMoneyGreen	Arial	cIBlack	12
الطلاب	Arial	cIBlack	14
الأوراق	Arial	cIMaroon	0
الصفحات	Arial	cIBlue	0
رئيسية	Arial	cIBlue	0
مستند الوثائق	Arial	cIBlue	0
مربع التحرير	Arial	cIBlue	0
تحرير إدخال	Arial	cIBlue	0

Save Close

Fig 6: Form for changing fonts and colors of the whole system

admin - تتم أحكام تجويد القرآن بملخص من تلاميذ - التتبع والتتبع	البيئات الأساسية	إضافة أسئلة و أجوبة	إهداء
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قائمة الترويض

قائمة في علم التجويد - القواعد والترويض

قائمة الترويض

علم التجويد وعرق التجويد - حرف الألف

علم التجويد وعرق التجويد - حرف الراء

علم التجويد وعرق التجويد - الاء لغة الجلالة

ثانياً قسم مرقق دانماً

وهي الأحرف الباقية من حروف الهجاء وحروف هذا القسم هي : حروف الاستفلال ويستثنى منها ثلاثة : الألف اللبية ، ولام لفظ الجلالة (الله) والراء .

فَرْقٌ بَيْنَ مَرْقَقٍ مِنْ أَلِفٍ

وَحَادِثٌ لَتَعْلِيمِ لَفْظِ أَلِفٍ



المرقق : هو مَرْقَقٌ يَعْتَمِدُ الحرف فلا يَمُشُّ لَفْظُ بَعْدَهُ ، وَلَكِنْ لَعَمْرُكَ تَصْلُحُ الحلق ، وَهَذَا لَعَمْرُكَ صَوْت الحرف إلى لغة الجلالة .

وَالْمَرْقَقُ يَسْتَحِلُّ الاستفلال .

مَرْقَقٌ مِنْ أَلِفٍ

Fig 9: Example of Teaching Material

Constants Data Entry

ITS Basic Data Students Data Colors

Enter Title of The ITS System (Arabic)

Enter Title of The ITS System (English)

Enter Name of creator of the ITS (English)

Enter Name of creator of the ITS (Arabic)

Enter Value of the Constant (Arabic)

Enter Value of the Constant (English)

Enter Value of the Constant (Boolean)

Enter Value of the Constant (Char)

Enter Value of the Constant (String)

Enter Value of the Constant (Arabic)

خروج حفظ

Fig 7: Form of entering constants of the ITS

The screenshot shows the 'Project1' application window. A message box is displayed in the center with the following text:

بالنسبة لأي درس التحاقى سيتم هذا . لذلك ألتخرج تنبيه الرجوع الى درس معلّم
أحياناً ونهتق أحياناً - حرف أراء
لقراءة يتحقق ثم الرجوع إلى أسئلة الدرس لنجاحية مرة أخرى

Below the text is an 'OK' button.

Fig 10: Example of customized feedback

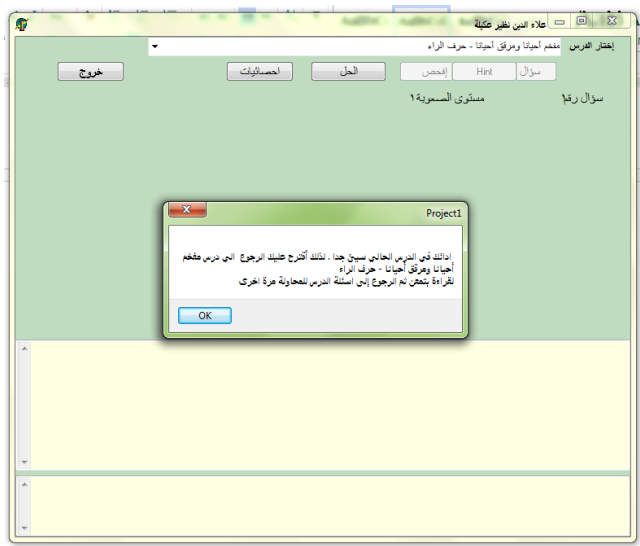


Fig 11: Example of feedback

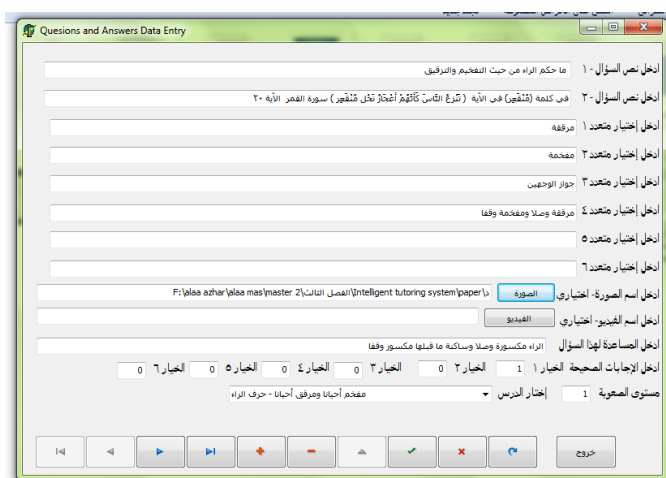


Fig 12: From for adding questions and answers

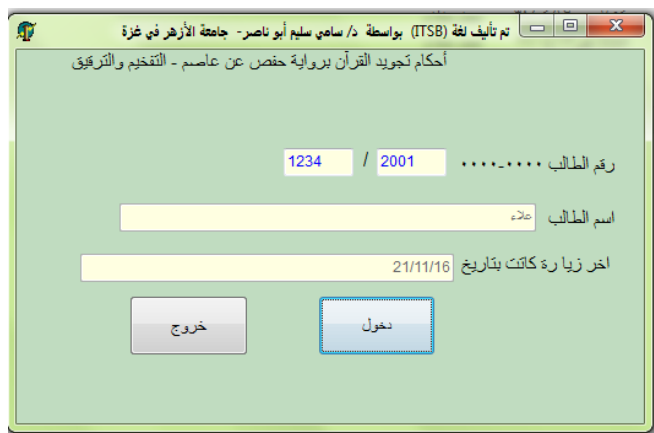


Fig 13: Login Screen

4. Evaluation

The evaluation consists of two stages. The first stage was to present the Tajweed system to a group of student learning Tajweed. The second stage was to present the Tajweed system to a group of teachers in the field. The results of both evaluations were more than expected.

5. Conclusion and future work

We used ITSB to design and develop an Intelligent Tutoring System to teach a specific subject "Tafkhim and Tarqiq" in the rules of Tajweed Al-Quran. The system is planned to smooth the study of "Tafkhim and Tarqiq".

In an initial evaluation of the Tajweed system by a group of Tajweed teachers, the results were more than expected.

For future work, we are going to add more lessons, rules, and exercises of Tajweed to be a complete tutoring system.

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