

Teaching the right letter pronunciation in reciting the holy Quran using ITS

Alaa N Akkila

Department of Information Technology, Faculty of Engineering & Information Technology, Al-Azhar University, Gaza, Palestine

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 "Tafkhim and Tarqiq in TAJWEED" the Holy Quran, Rewayat: Hafs 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) (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 عبد الله بن مسعود. 175/5 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» (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.

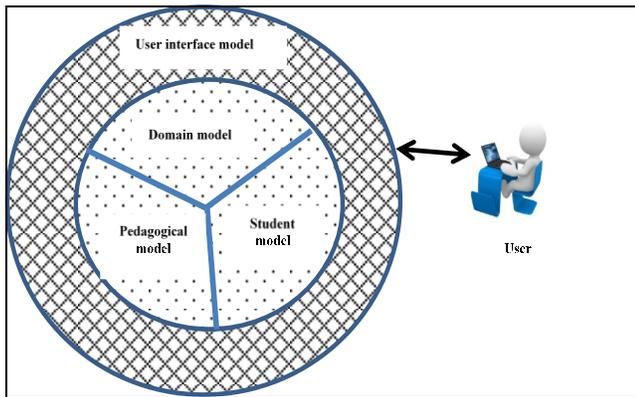


Fig 1: The architecture of the ITS system

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 ضنط قط", and there is levels of tafkhim.

Lesson 3: letters tarqiq always

Lesson 4: letters sometimes tarqiq and sometimes tafkhim

The letters alef "الألف", R "الراء" 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



Fig 3: History of the student



Fig 4: Example of Teaching Material

The screenshot shows the 'Constants Data Entry' window with the 'Students Data' tab selected. The form includes the following fields:

- Enter student ID: 20011234
- Enter student name: [Empty]
- Enter student subject: Computer Science
- Enter student success hours: 0
- Enter student average score: 0
- Enter student question score: 0
- Enter student degree score: 0
- Enter student current score: 24

 Navigation buttons (back, forward, search, etc.) and an 'Exit' button are at the bottom.

Fig 5: Form for adding students' data

The screenshot shows the 'Add New Lesson / Example' window. It includes a dropdown for 'Lesson Name', a dropdown for 'Lesson Type' (with 'Example' selected), and a text area for 'Lesson Content'. There are 'Save' and 'Exit' buttons.

Fig 8: Form for adding the Teaching Material

Item	Font Color	Font Style	Font Color	Font Size
Buttons	cMoneyGreen	Arial	cBlack	12
Labels	Arial	cBlack	11	
Buttons	Arial	cMaroon	9	
Buttons	cInfoBk	Arial	cBlue	9
Buttons	cBlnFace	Arial	cBlue	9
Buttons	cBlnFace	Arial	cBlue	9
Buttons	cInfoBk	Arial	cBlue	9

'Save' and 'Close' buttons are at the bottom.

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

The screenshot shows a teaching material page with the title 'ثانياً قسم مرقق دائماً'. The text discusses the classification of letters based on their position in a word. An illustration shows the human vocal tract with labels for different parts.

Fig 9: Example of Teaching Material

The screenshot shows the 'Constants Data Entry' window with the 'Colors' tab selected. The form includes:

- Enter Title of The ITS System (Arabic): Tajweed al-Quran
- Enter Name of creator of the ITS (English): Alaa Nazir Akkila
- Enter data type: Integer Value
- Enter data type: Float Value
- Enter data type: Boolean value
- Enter data type: Char value
- Enter data type: String value
- Enter data type: Arabic - Arabic

 'Exit' and 'Save' buttons are at the bottom.

Fig 7: Form of entering constants of the ITS

The screenshot shows a user interface with a custom feedback dialog box. The dialog box contains the text: 'إدخال في الخرج الحائس سبب جدا ، لذلك أترج طلب الرجوع إلى درس مفهم أحياناً ويترك أحياناً - حرف الراء - قراءة بتعني تم الرجوع إلى أسئلة الخرج للمعاينة مرة أخرى'. There is an 'OK' button.

Fig 10: Example of customized feedback

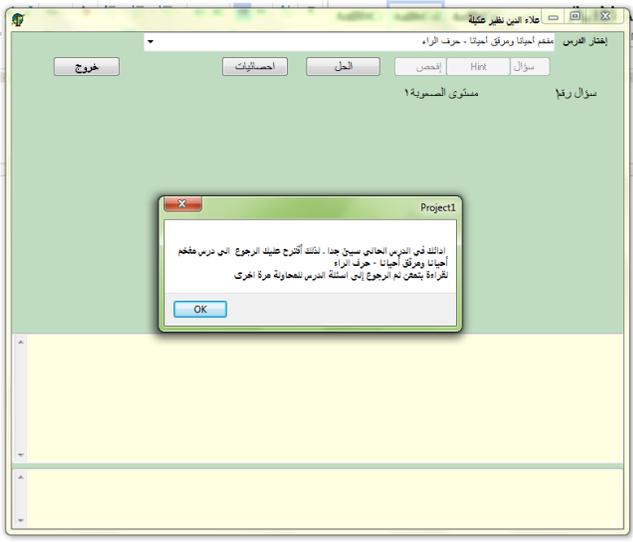


Fig 11: Example of feedback

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.



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.

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