



## 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.

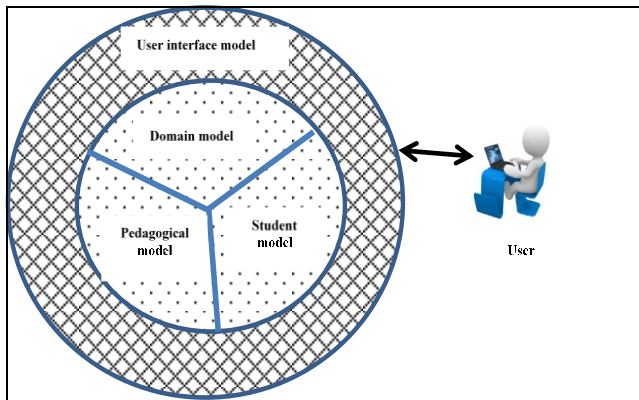


Fig 1: The architecture of the ITS system

**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).

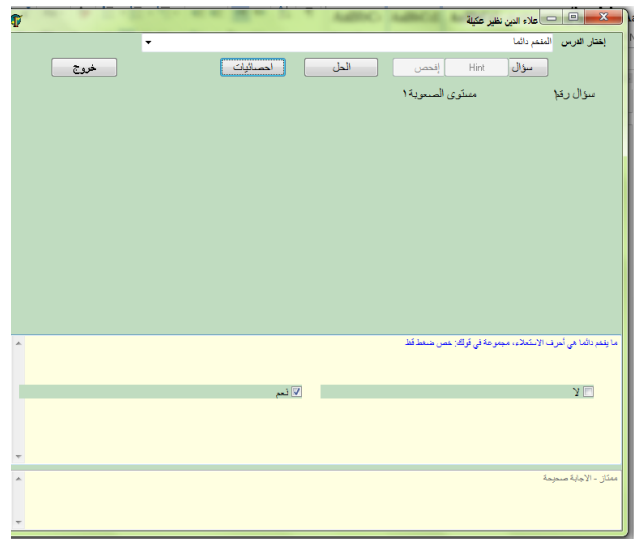


Fig 2: Form for displaying the questions for the student to answer



Fig 3: History of the student

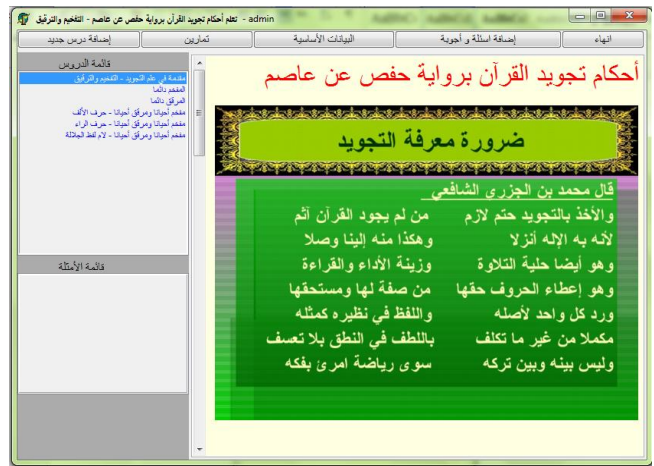


Fig 4: Example of Teaching Material

Fig 5: Form for adding students' data

Fig 8: Form for adding the Teaching Material

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

Fig 9: Example of Teaching Material

Fig 7: Form of entering constants of the ITS

Fig 10: Example of customized feedback

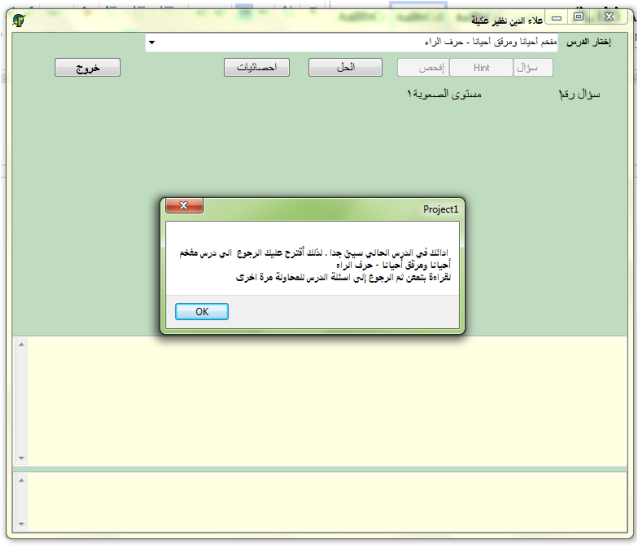


Fig 11: Example of feedback

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.

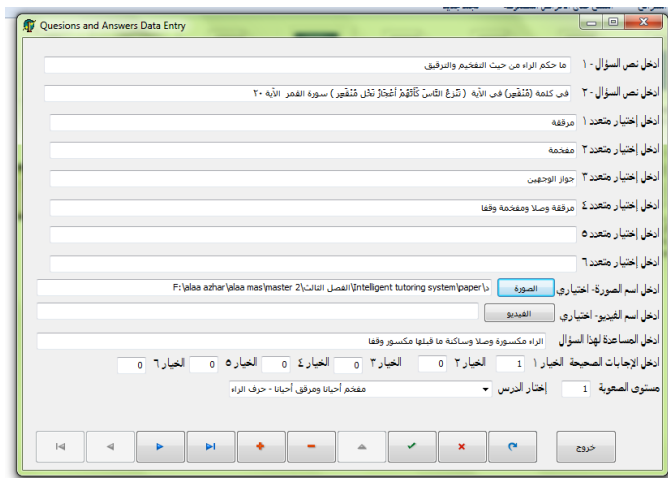


Fig 12: Form for adding questions and answers



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.

## References

1. Akkila, A. N. and S. S. Abu Naser (2017). "Teaching the right letter pronunciation in reciting the holy Quran using intelligent tutoring system." *International Journal of Advanced Research and Development* 2(1): 64-68.
2. Abu Hasanein, H. A. and S. S. Abu Naser (2017). "An intelligent tutoring system for cloud computing."
3. Abu Naser, S. (2008). "An Agent Based Intelligent Tutoring System For Parameter Passing In Java Programming." *Journal of Theoretical & Applied Information Technology* 4(7).
4. Abu Naser, S. S. (1999). "Big O Notation for Measuring Expert Systems complexity." *Islamic University Journal Gaza* 7(1): 57-70.
5. Abu Naser, S. S. (2001). "A comparative study between animated intelligent tutoring systems AITS and video-based intelligent tutoring systems VITS." *Al-Aqsa Univ. J* 5(1): 72-96.
6. Abu Naser, S. S. (2006). "Intelligent tutoring system for teaching database to sophomore students in Gaza and its effect on their performance." *Information Technology Journal* 5(5): 916-922.
7. Abu Naser, S. S. (2008). "Developing an intelligent tutoring system for students learning to program in C++." *Information Technology Journal* 7(7).
8. Abu Naser, S. S. (2008). "Developing visualization tool for teaching AI searching algorithms." *Information Technology Journal, Scialert* 7(2): 350-355.
9. Abu Naser, S. S. (2012). "A Qualitative Study of LP-ITS: Linear Programming Intelligent Tutoring System." *International Journal of Computer Science & Information Technology* 4(1): 209.
10. Abu Naser, S. S. and I. S. Zaqout (2016). "Knowledge-based systems that determine the appropriate students major: In the faculty of engineering and information technology." *World Wide Journal of Multidisciplinary Research and Development* 2(10): 26-34.
11. Abu Naser, S. S. and S. H. AlMursheidi (2016). "A Knowledge Based System for Neck Pain Diagnosis." *World Wide Journal of Multidisciplinary Research and Development (WWJMRD)* 2(4): 12-18.
12. Abu Naser, S. S., et al. (2008). "A Proposed Expert System For Guiding Freshman Students In Selecting A Major In Al-Azhar University, Gaza." *Journal of Theoretical & Applied Information Technology* 4(9).
13. Abu Naser, S., et al. (2011). "Human Computer Interaction Design of the LP-ITS: Linear Programming Intelligent Tutoring Systems." *International Journal of Artificial Intelligence & Applications (IJAIA)* 2(3).
14. AbuEloun, N. N. and S. S. Abu Naser (2017). "Mathematics intelligent tutoring system." *International Journal of Advanced Scientific Research* 2(1).
15. AbuEl-Reesh, J. Y. and S. S. Abu-Naser (2018). "An Intelligent Tutoring System for Learning Classical Cryptography Algorithms (CCAITS)." *International Journal of Academic and Applied Research (IJAAR)*.
16. Abu-Naser, S. S. (2008). "JEE-Tutor: An Intelligent Tutoring System for Java Expression Evaluation."
17. Abu-Naser, S. S. (2016). "ITSB: An Intelligent Tutoring System Authoring Tool." *Journal of Scientific and Engineering Research* 3(5): 63-71.
18. Abu-Naser, S., et al. (1995). "& Beattie, GA (2000)." *Expert system methodologies and applications-a decade review from: 9-26.*
19. Abu-Naser, S., et al. (2011). "An intelligent tutoring system for learning java objects." *International Journal of Artificial Intelligence and Applications.*
20. Alawar, M. W. and S. S. Abu Naser (2017). "CSS-Tutor: An intelligent tutoring system for CSS and HTML." *International Journal of Academic Research and Development* 2(1): 94-98.
21. Al-Bastami, B. G. and S. S. Abu Naser (2017). "Design and Development of an Intelligent Tutoring System for C# Language." *EUROPEAN ACADEMIC RESEARCH* 6(10): 8795.
22. Albatish, I., et al. (2018). "ARDUINO Tutor: An Intelligent Tutoring System for Training on ARDUINO." *International Journal of Engineering and Information Systems (IJEAIS)* 2(1): 236-245.
23. Al-Bayed, M. H. and S. S. Abu Naser (2017). "An intelligent tutoring system for health problems related to addiction of video game playing." *International Journal of Advanced Scientific Research* 2(1): 4-10.
24. Al-Bayed, M. H. and S. S. Abu-Naser (2018). "Intelligent Multi-Language Plagiarism Detection System." *International Journal of Academic Information Systems Research (IJAISR)* 2(3): 19-34.
25. Aldahdooh, R. and S. S. Abu Naser (2017). "Development and Evaluation of the Oracle Intelligent Tutoring System (OITS)." *EUROPEAN ACADEMIC RESEARCH* 6(10): 8711-8721.
26. Alhabbash, M. I., et al. (2016). "An Intelligent Tutoring System for Teaching Grammar English Tenses." *EUROPEAN ACADEMIC RESEARCH* 6(9): 7743-7757.
27. Al-Hanjori, M. M., et al. (2017). "Learning computer networks using intelligent tutoring system." *International Journal of Advanced Research and Development*(2): 1.
28. Almurshidi, S. H. and S. S. Abu Naser (2017). "Design and Development of Diabetes Intelligent Tutoring System." *EUROPEAN ACADEMIC RESEARCH* 6(9): 8117-8128.
29. Almurshidi, S. H. and S. S. Abu Naser (2017). "Stomach disease intelligent tutoring system." *International Journal of Advanced Research and Development* 2(1): 26-30.
30. Al-Nakhal, M. A. and S. S. Abu Naser (2017). "Adaptive Intelligent Tutoring System for learning Computer Theory." *EUROPEAN ACADEMIC RESEARCH* 6(10): 8770-8782.
31. Anderson, J., et al. (2005). "Adaptation of Problem Presentation and Feedback in an Intelligent Mathematics Tutor." *Information Technology Journal.*
32. Azaab, S., et al. (2000). "A proposed expert system for selecting exploratory factor analysis procedures." *Journal of the College of Education* 4(2): 9-26.
33. Baker, J., et al. "& Heller, R.(1996)." *Information Visualization. Information Technology Journal* 7(2).
34. Baker, J., et al. (1996). "Information Visualization."

- Information Technology Journal 7(2): pp: 403-404.
35. Buhisi, N. I. and S. S. Abu Naser (2009). "Dynamic programming as a tool of decision supporting." *Journal of Applied Sciences Research*.
  36. Chen, R.-S., et al. (2008). "Evaluating structural equation models with unobservable variables and measurement error." *Information Technology Journal*.
  37. El Agha, M. I., et al. (2018). "SQL Tutor for Novice Students." *International Journal of Academic Information Systems Research (IJAIRS)* 2(2): 1-7.
  38. El Haddad, I. A. and S. S. Abu Naser (2017). "ADO-Tutor: Intelligent Tutoring System for leaning ADO. NET." *EUROPEAN ACADEMIC RESEARCH* 6(10): 8810-8821.
  39. Elnajjar, A. E. A. and S. S. Abu Naser (2017). "DES-Tutor: An Intelligent Tutoring System for Teaching DES Information Security Algorithm." *International Journal of Advanced Research and Development* 2(1): 69-73.
  40. Hamed, M. A. and S. S. Abu Naser (2017). "An intelligent tutoring system for teaching the 7 characteristics for living things." *International Journal of Advanced Research and Development* 2(1): 31-45.
  41. Hilles, M. M. and S. S. Abu Naser (2017). "Knowledge-based Intelligent Tutoring System for Teaching Mongo Database." *EUROPEAN ACADEMIC RESEARCH* 6(10): 8783-8794.
  42. Hissi, H. E.-., et al. (2008). "Medical Informatics: Computer Applications in Health Care and Biomedicine." *Journal of Artificial Intelligence* 3(4).
  43. Li, L., et al. (2011). "Hybrid Quantum-inspired genetic algorithm for extracting association rule in data mining." *Information Technology Journal* 12(4).
  44. Mahdi, A. O., et al. (2016). "An intelligent tutoring system for teaching advanced topics in information security." *World Wide Journal of Multidisciplinary Research and Development* 2(12): 1-9.
  45. Naser, S. (2009). "Evaluating the effectiveness of the CPP-Tutor an intelligent tutoring system for students learning to program in C++." *Journal of Applied Sciences Research* 5(1): 109-114.
  46. Ng, S., et al. (2010). "Ad hoc networks based on rough set distance learning method." *Information Technology Journal* 10(9).
  47. Owaied, H. H., et al. (2009). "Using rules to support case-based reasoning for harmonizing melodies." *Journal of Applied Sciences* 11(14): pp: 31-41.
  48. Shaath, M. Z., et al. (2017). "Photoshop (CS6) intelligent tutoring system." *International Journal of Academic Research and Development* 2(1): 81-87.
  49. Sulisel, O., et al. (2005). "Growth and Maturity of Intelligent Tutoring Systems." *Information Technology Journal* 7(7): 9-37.
  50. Khella, R. A. and S. S. Abu-Naser (2018). "An Intelligent Tutoring System for Teaching French." *International Journal of Academic Multidisciplinary Research (IJAMR)* 2(2): 9-13.
  51. Marouf, A., et al. (2018). "An Intelligent Tutoring System for Learning Introduction to Computer Science." *International Journal of Academic Multidisciplinary Research (IJAMR)* 2(2): 1-8.
  52. Mosa, M. J., et al. (2018). "ASP. NET-Tutor: Intelligent Tutoring System for leaning ASP. NET." *International Journal of Academic Pedagogical Research (IJAPR)* 2(2): 1-8.
  53. Qwaider, S. R. and S. S. Abu-Naser (2018). "Excel Intelligent Tutoring System." *International Journal of Academic Information Systems Research (IJAIRS)* 2(2): 8-18.
  54. Akkila, A. E.-D. N. and S. S. Abu Naser (2018). ITS-Tutor for Teaching Rules of Tajweed the Holy Quran, Al-Azhar University, Gaza, Palestine.
  55. Akkila, A. N. and S. S. Abu-Naser (2018). "Rules of Tajweed the Holy Quran Intelligent Tutoring System." *International Journal of Academic Pedagogical Research (IJAPR)* 2(3): 7-20.
  56. Abu Ghali, M. J., et al. (2018). "An Intelligent Tutoring System for Teaching English Grammar."