

Development and Evaluation of the Oracle Intelligent Tutoring System (OITS)

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Abstract:

This paper presents the design and development of intelligent tutoring system for teaching Oracle. The Oracle Intelligent Tutoring System (OITS) examined the power of a new methodology to supporting students in Oracle programming.

The system presents the topic of Introduction to Oracle with automatically generated problems for the students to solve. The system is dynamically adapted at run time to the student's individual progress. An initial evaluation study was done to investigate the effect of using the intelligent tutoring system on the performance of students.

Key words: Intelligent Tutoring System, Oracle, Authoring Tool, ITSB

INTRODUCTION

A computer program that offers instant and individualized feedback to students, generally without involvement from a human instructor is called an Intelligent Tutoring

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System (ITS). ITSs have the mutual objective of facilitating learning in a meaningful and operational way through using a variation of computing skills [1,2].

Intelligent Tutoring Systems denote the cognitive skills that use intelligence in innovative forms. Similar to human tutors, they are convenient in reducing the time necessary by students to gain knowledge and expert abilities [10,12]. The Oracle Intelligent Tutoring System (OITS) dedicated on determining the effectiveness of an Intelligent Tutoring System for Oracle students at Introduction level. OITS teaching material and exercises are used from OCA Oracle Database 12c: SQL Fundamentals I, Exam Guide. So, it's an effective and flexible system for students who want to practice for the OCA Exam.

The Oracle Intelligent Tutoring System was designed and developed using the ITSB authoring tool which was developed by Delphi Embarcadero XE 8 [20].

LITERATURE REVIEW

There are many intelligent tutoring systems designed and developed for the education purposes. A few of these ITS devoted to teaching computer science like [6, 12,16, 21, 27], Mathematics such as [19,22] and English language such as [15]. ITS for helping students who are 8-to12-year-olds to learn Primary Mathematics[15], A comparative study between Animated Intelligent Tutoring Systems (AITS) and Video-based Intelligent Tutoring Systems (VITS) [11], An agent based ITS for Parameter Passing In Java Programming[27], Java Expression Evaluation [9], Teaching Java objects Programming language[21], ITS for helping Computer Science students to learn debugging skills [18], ITS which called CPP-Tutor for helping Computer Science students to learn C++ Programming Language [6], ITS for helping English Language students to teach the Passive Voice of English Language and given

exercises to students [22], Linear Programming[12,16], effectiveness of e-learning[24], computer aided instruction[5], effectiveness of the CPP-Tutor[25], teaching AI searching algorithms[8], teaching database to sophomore students in Gaza[14], Predicting learners performance using NT and ITS [17], and intelligent tutoring system for teaching advanced topics in information security[13], an Intelligent Tutoring System for Teaching Grammar English Tenses[19], design and development of diabetes intelligent tutoring system[7,26], an Intelligent SQL Tutor on the Web[10], an intelligent tutoring system for teaching FOL equivalence[23].

ITS ARCHITECTURE

OITS has the following four basic components [1]. The section below lists them with their functionality, individually and then by way of their integration.

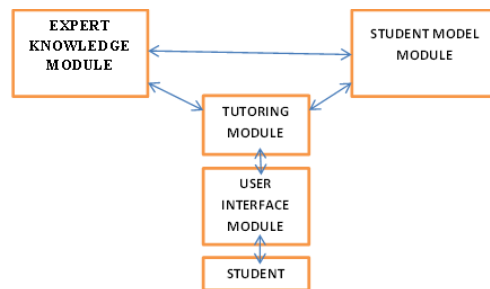


Fig 1: OITS Architecture

EXPERT KNOWLEDGE MODULE

The expert knowledge module is also called domain module and cognitive module. It contains the material, rules, facts, and problem -solving policies of the domain at hand. It works as a source of expert knowledge, a standard for appraisal of the student's performance and identification of errors. The material of the OITS includes:

- Introduction to Databases
- Getting familiar with SQL
- Creating and Modifying Database Tables
- Using SQL Queries to Insert, Update, Delete and View Data
- Retrieving Data From A Single Database Table
- Retrieving Data From Multiple Database Tables
- Introduction to PL/SQL
- Intro. to Forms Builder
- Custom Forms
- System Messages, Triggers
- Creating an Integrated Database Application
- Advanced Topics in Database Administration

STUDENT MODULE

The student module is intersecting with the domain module. It highlights cognitive and affecting states of the student relative to his evolution as the learning progression advances. As the student progress step-by-step through the problem-solving process, the intelligent tutoring system involves itself in module tracing process. Anytime there is any deviation from the predefined module, the intelligent tutoring system stamps it as an error.

TUTORING MODULE

The tutoring module is also called pedagogic module or teaching module which accepts information from the student, domain, and tutoring modules. This module controls instructional interactions with the student. It is connected to the student module, makes use of knowledge related to the student and its own tutorial targeted structure, to develop the pedagogic activity to be offered. It keeps record of the student's progress,

constructs a profile of strong point and flaws relative to the production.

USER INTERFACE MODULE

This is the interacting front-end of the OITS. It integrates all types of information needed to interact with student, through graphics, text, multi-media, key-board, mouse-driven menus, etc. [2]. Main factors for user-acceptance are user-friendliness and presentation. Figure 2 presents login screen for OITS.

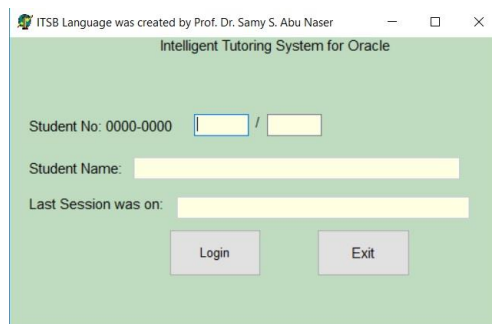


Fig 2. In the following interface student Login Screen

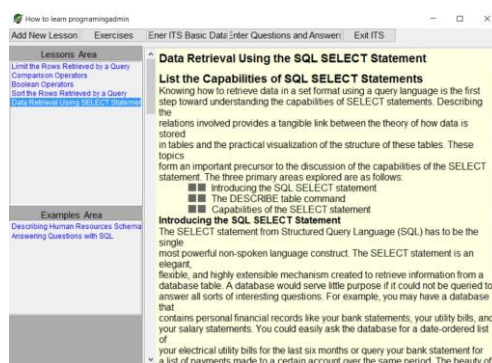


Fig. 3: In this interface student chooses the desired lesson to learn

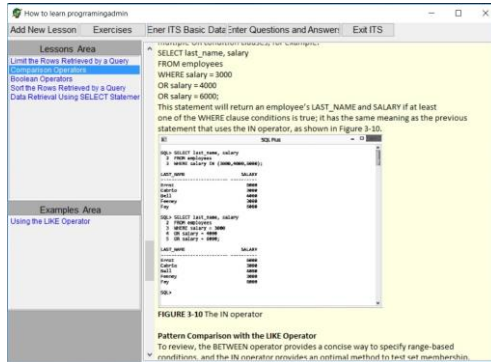


Fig. 4: In this interfaces student chooses examples required to take advantage of

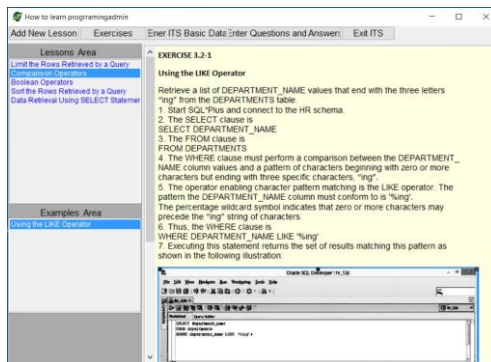


Fig. 5: In this interfaces student chooses examples required to take advantage of



Fig. 6: In this interface, student chooses to meet the required questions to answer and gets feedback from OITS

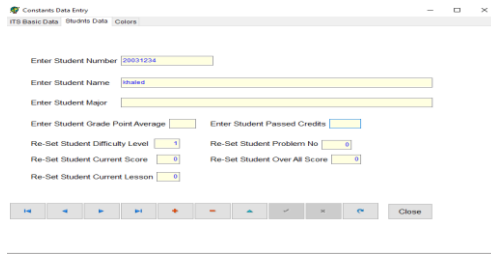


Fig.7: In this interface, new basic student data is added or updated

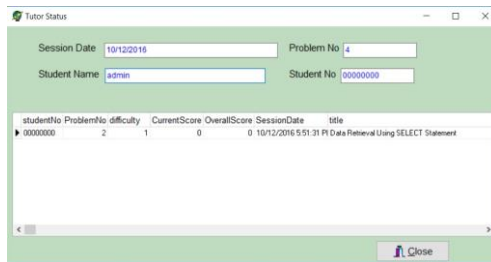


Fig. 8: Shows current assessment of the student performance

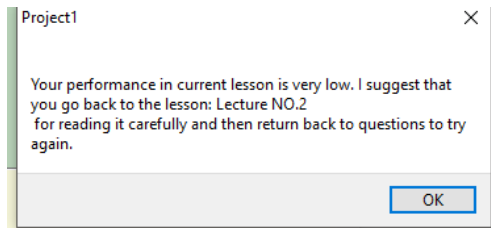


Fig. 9: Shows a notification of the performance of the student in a specific lesson

EVALUATION

The evaluation was carried out to test the OITS Oracle intelligent tutoring system. The evaluation was to let a group of students examine the materials: lessons, examples, exercises, answers, student information, and system constants etc. for Oracle individually. Then we gathered the opinion of each student in team of how easy, efficient, and friendly was the OITS tool. The outcome of the evaluation was positive and

suggested that other intelligent tutoring systems be designed for other courses.

CONCLUSION

The design of an Intelligent Tutoring System called OITS was described in this paper. OITS was designed developed using ITSB authoring tool for teaching OCA Oracle Database 12c: SQL Fundamentals I, Exam Guide to students to overcome their difficulties. OITS is dynamically adapted at run time to the student's individual progress. The outcome of the evaluation was positive and suggested that other intelligent tutoring systems be designed for other courses. We recommend a comprehensive evaluation of the system to be carried out next time the course is offered.

REFERENCES

1. Conati C., Gertner A., VanLehn K. (2002). Using Bayesian Networks to Manage Uncertainty in Student Moduleing. User Moduleing and User-Adapted Interaction. 12(4) p. 371-417
2. VanLehn, K. (1996). Cognitive skill acquisition. Annual Review of Psychology, 47, 513-539.
3. Date C. J., An Introduction to Database Systems, 8th Edition, Pearson. (2003).
4. Ramakrishnan, R. & Gehrke J., Database Management Systems, 3rd Edition, McGraw-Hill, 2002.
5. Naser, S.S A., & Sulisel, O. (2000). The effect of using computer aided instruction on performance of 10th grade biology in Gaza.
6. Naser, S.S. A. (2008). Developing an intelligent tutoring system for students learning to program in C++,Information Technology Journal, Scialert,7,7,1055-1060.

7. Almurshidi, S. H., & Abu Naser, S. S. (2016). Design and Development of Diabetes Intelligent Tutoring System, *European Academic Research*, 4(9).
8. Naser, S.S.A. (2008). Developing visualization tool for teaching AI searching algorithms, *Information Technology Journal*, Scialert,7(2), 350-355.
9. Abu Naser, S. (2008). JEE-Tutor: An Intelligent Tutoring System for Java Expression Evaluation, *Information Technology Journal*, Scialert , 7(3),528-532.
10. Mitrovic, A. (2003). An Intelligent SQL Tutor on the Web. *International Journal of Artificial Intelligence in Education* 13. 171-195 IOS Press. University of Canterbury, Private Bag 4800, Christchurch, New Zealand.
11. Abu Naser, S.S. (2001). A comparative study between Animated Intelligent Tutoring Systems (AITS) and Video-based Intelligent Tutoring Systems (VITS), *Al-Aqsa University Journal*,5(1) Part,1.
12. Naser, S. A., Ahmed, A., Al-Masri, N., & Abu Sultan, Y. (2011). Human Computer Interaction Design of the LP-ITS: Linear Programming Intelligent Tutoring Systems, *International Journal of Artificial Intelligence & Applications (IJAIA)*, 2(3),60-70.
13. Mahdi, A.O., Alhabbash, M.I., & Abu Naser, S. S. (2016). An Intelligent Tutoring System for Teaching Advanced Topics in Information Security, *wwjmr* 2(12) 1-9.
14. Naser, S. S. A. (2006). Intelligent tutoring system for teaching database to sophomore students in Gaza and its effect on their performance, *Information Technology Journal*, Scialert,5(5),916-922,2006
15. Hennessy, Sara, Tim O'Shea, Rick Evertsz, and Ann Floyd. (1989). "An Intelligent Tutoring System Approach to Teaching Primary Mathematics." *Educational Studies in Mathematics* 20, no. 3 273-92. <http://www.jstor.org/stable/3482472>

16. Naser, S. S. A. (2012). A Qualitative Study of LP-ITS: Linear Programming Intelligent Tutoring System, *International Journal of Computer Science & Information Technology*, 4,1,209-220, Academy & Industry Research Collaboration Center (AIRCC).
17. Naser, S. S. A. (2012). Predicting learners performance using artificial neural networks in linear programming intelligent tutoring system, *International Journal of Artificial Intelligence & Applications*, 3,2, 65-73, 2012,Academy & Industry Research Collaboration Center (AIRCC).
18. Carter, Elizabeth and Blank, Glenn D. (2013). "An Intelligent Tutoring System to Teach Debugging", *Artificial Intelligence in Education: 16th International Conference, AIED 2013, Memphis, TN, USA, July 9-13*.
19. Alhabbash, M.I., Mahdi, A.O., & Abu Naser, S. S. (2016). An Intelligent Tutoring System for Teaching Grammar English Tenses, *European Academic Research*, 4(9).
20. Naser, S. S. A. (2016). ITSB: An Intelligent Tutoring System Authoring Tool. *Journal of Scientific and Engineering Research*, 3(5), 63-71.
21. Abu-Naser, S., Ahmed, A., Al-Masri, N., Deeb, A., Moshtaha, E., & AbuLamdy, M. (2011). An Intelligent Tutoring System for Learning Java Objects, *International Journal of Artificial Intelligence and Applications (IJAlA)*, 2(2).
22. Maria Virvou, Dimitris Maras, Victoria Tsiriga. (2000). 'Student Modeling in an Intelligent Tutoring System for the Passive Voice of English Language", *Educational Technology & Society*, 3(4).
23. Grivokostopoulou, Foteini, Isidoros Perikos, and Ioannis Hatzilygeroudis. (2013). "An intelligent tutoring system for teaching FOL equivalence." *The First Workshop on AI-supported Education for Computer Science (AIEDCS 2013)*.

24. Abu-Naser, S., Al-Masri, A., Abu Sultan, Y., & Zaqout, I. (2011). A prototype decision support system for optimizing the effectiveness of e-learning in educational institutions, *International Journal of Data Mining & Knowledge Management Process (IJDKP)*,1,1-13.
25. 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, <http://www.aensiweb.com/JASR/>.
26. Gujarathi, M. V., & Manojkumar, S. S. (2012). "Intelligent Tutoring System: A case study of mobile mentoring for diabetes." *Diabetes* 3(8).
27. Naser, S. A. (2008). An Agent Based Intelligent Tutoring System For Parameter Passing In Java Programming, *Journal of Theoretical & Applied Information Technology*,4(7).
28. Alnajjar, M., & Naser S.S.A. (2015). Improving Quality Of Feedback Mechanism In Un By Using Data Mining Techniques, *International Journal of Soft Computing, Mathematics and Control*, 4(2).