E-Advisor in Egyptian Educational Institutions

Lamiaa Mostafa[1], Giles Oately[2], Nermin Khalifa[3],Walid Rabie [4]

Abstract—**Educational Services is important since it affects all students practical life. The manual academic advising suffers from many drawbacks as knowledge of advisors, awareness of course contents and how to capture the student preference. Academic advising is a process for helping to define the proposed subjects to be registered. Academic advising also includes student guidance and transfer cases. Case based Reasoning (CBR) is one of the automated techniques that can be used for converting the manual process of academic advising into automated one.**

This paper proposes an automated technique that proposed the student with the most suitable major in his case. The user feed the system with a group of cases in each available department. The mechanism converts the individual course into a group of concepts and enables matching of similarities between concepts of different courses. The proposed technique will be beneficial for transfer cases between major. Based on the system recommendation, the student can take decision on the best major based on the achieving level.

Keywords- Academic advising; Case based Reasoning; Concept; Major Transfer ;Major Decision

[1] *Lamiaa Mostafa*

Business Information System Department, Arab Academy for Science and Technology and Maritime Transport
Alexandria, Egypt

[2] *Giles Oately*
School of Management, Cardiff Metropolitan University,
UK

[3] *Nermin Khalifa,*

Business Information System Department, Arab Academy for Science and Technology and Maritime Transport
Alexandria, Egypt

[4] *Walid Rabie*

Business Information System Department, Arab Academy for Science and Technology and Maritime Transport
Alexandria, Egypt

I. Introduction

Academic advising is one of the significant processes in the educational institutions. The influence of academic advising is so effective on the two sides: the student life career and the development of the university [1].

Universities variety degrees programs' make the academic advising a complicated task. Academic advisors needs to improve the quality of the advising process [1],[12].

The main problems of the advising process is the higher numbers of students and not enough advisors, additional paperwork, and long lines; inexperienced academic advisors and no full understanding of all the universities degrees and programs. Academic advising is a process for guiding students to select courses to register in each semester and fulfill the degree requirement. This process enables the academic advising to the student.

The purpose of this paper is to propose an CBR advising system\ which is an automated tool that helps the academic advisor and the student to select the suitable major .Questionnaire was filled by CBR advising system users which are a group of academic advisors to understand their perception towards the system and to validate the results of the proposed system.

The paper is organized as follows. The first section is the introduction. Second section is the literature review of the academic advising process and information and communication technology. The third section is the proposed system which includes: CBR framework and proposed research model.the fourth section is the discussion of the results and the last section includes the conclusion and the directions for future work.

II. Literature Review

A. *Academic Advising*

Academic advising is a process in student' educational life. Each semester, there should be a face-to-face meeting between the academic advisor and the student to guide student for registration and courses selection process [2],[12].

Example of the drawbacks of the manual academic advising : labor intensive, time consumption, human advisors

limited knowledge and the large number of students compared to the number of advisors [3],[12].

Many researchers recommended automated systems for advising. MASACAD is a multi-agent system that is used in e-learning environment, MASACAD advises students using data mining techniques [4]. He discusses as well, the manual advising process and its problems such as limited number of advisors , advisors availability, new advisors who do not have enough knowledge/experience with advising and finally the serious consequences may occur if mistakes are made, for example, graduation delay, major or college drop out [4],[5].

Case-based Reasoning System (CBR) is used in academic advising. CBR are used to explain the reason of choosing the solution to the new case by comparing the case with another old cases [15].

The benefit of using CBR defined in the following points: solves new problems by adapting solutions that were used to solve similar old problems, increases the decision confidence and reliability and CBR can be used as a training system for the new advisors or students execute sample advising cases [15].

B. *Information and Communication Technology*

Information and communications technologies (ICT) are" resources used to communicate, and to create, disseminate, store, and manage information [6].

ICT advantages were divided into: psychological advantages, educational advantages ,sociological advantages; and economic advantages [14]. Psychological advantage represented in the effect on the students' motivation, attitudes, interest, thought processes, attention, problem-solving, and decision-making. Educational advantage produce students judge in a reasonable way, there actions are reflection and they understand their place on the practical life. Sociological advantage of the ICT is shown when enhancing the communication tool between teachers and students. The economic advantage of ICT is increasing the competition which leads to effective educational level.

Communication and information are used widely in private and public educational institutions. The impact of computer is increasing, ICT should be used in teaching and tutoring. Different studies were defined to show the impact of computers when use in learning. The connection between increasing learning efficiency and using computer technology in the learning process is stated in different researches [7,8]

A case study was made in Makerere University-Kampala (MUK) to understand how ICT is integrated in instruction of the university. In the study the role of ICTs in instruction are highlighted and the extent students and lecturers at (MUK) use them in their academic work [13].

III. **Research Methodology**

Research methodology is defined as a strategy that links the theoretical approach and the research method [9]. Research strategies in research approach are: experiment, survey, case study, action research, grounded theory, ethnography and archival research [10].

Based on the drawbacks of the manual academic advising , CBR advising system was proposed. The framework and the research model are discussed in this section.

A. *Proposed Framework*

CBR framework is composed of two main phases: adding archival cases, testing the new case.

The proposed approach adds the archival cases to a database called advising database. The courses taken by each student is stored in the form of nodes and arcs. Each course is divided into concepts with weights to represent its importance.

Testing the new case module uses the similarity process to compare the student taken concepts and the concept of each major stored in the advising database.

CBR system proposes the suitable major to the taken concepts, the major of highest achievement level is the chosen major unless the students indicate other requirements. The following figure shows CBR framework [12].
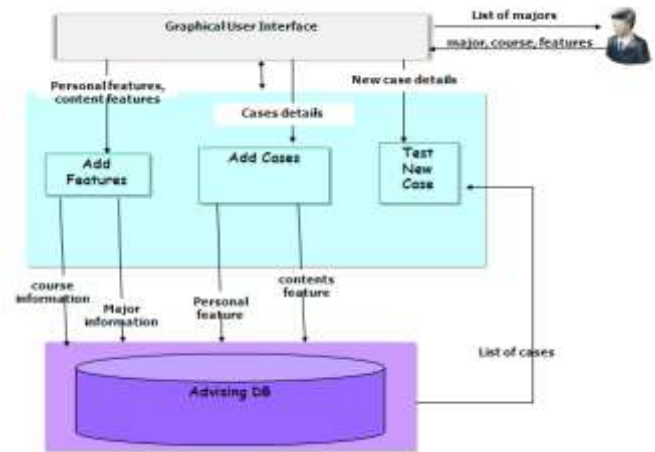

Figure 1.   CBR System Framework

B. *Research Model*

The research in this paper uses the deductive approach; it is defined as "strategy in which theory informs research at the outset and hypothesis dictate what evidence the researcher looks for" [11].

Deductive approach depends on building research hypothesises and test them and answering the research questions. Existing literature review, theories were compared with the empirical findings before conclusion are made, and this is why deductive approach was chosen. A hypothesis is

conducted within the framework of the research's model. The dependent variable, proposed in this study is CBR system quality.

The research focuses on the variables that affect the quality of the CBR system which are: efficiency, reliability, usability, time consumption and accuracy [12].
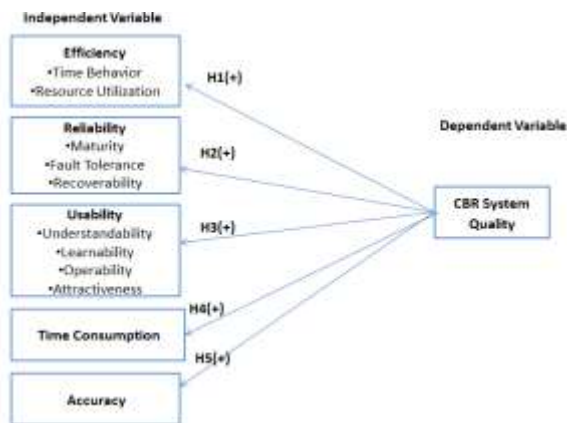

Figure 2.   CBR Research Model

IV. **Discussion of Results**

The statistical package of social sciences (SPSS) was used to analyze the collected data. Several techniques were used to reach the results and the findings of this paper.

First, a reliability analysis was conducted to ensure the consistency of the various items in each instrument used in the questionnaire. Second a correlation was undertaken to measure the strength and the direction of the relationship between the variable and to approve or reject the proposed hypothesis. Finally the regression analysis has taken place to measure the significance of the research model.

Cronback's alpha coefficient is used for measuring the reliability of the scales used in the questionnaire. It tends to increase the inter correlation between the items of the scale increase and also it can indicate the degree to which a group of items measure a certain construct. [11] stated that an alpha coefficient between 0.5 and 0.7 is acceptable for social sciences.

Based on the results of questionnaire, the cronback's alphas of the scales are ranged between 0.5-0.8 which shows a moderate internal consistency among the items measuring the constructs in the study. The following table shows the reliability coefficients of each variable.

Table 1: Reliability Results

Variables	Number of Items	Cronbach's Alpha Sample N=30
Efficiency	2	0.663
Reliability	3	0.501
Usability	4	0.640
Time Consumption	2	-0.166
Accuracy	2	0.612

The second test is the correlation analysis. Pearson correlation analysis was used to measure the relationship between the variables under investigation. Pearson correlation analysis indicates the strength, direction, and significance of the relationship between only two variables at a time, then it is used to test the research hypotheses [11]. Results had shown that there is a positive relationship between the independent variables: efficiency, reliability, usability and accuracy and the CBR system quality, however there is a negative relationship between time consumption and CBR system quality.

The third test is the regression test. Multiple regression analysis is the process that defines the effect of each independent variable on the dependent variable. The highest effect on the dependent variable is represented in the beat value. The beta is measured in units of standard deviation [11]. It was found that the most influential variable on the dependent variable CBR system quality is the efficiency variable with a beta value 0. 537. The results of the regression analysis will be shown in the following table.

Table 2: Regression Analysis

Unstandardized Coefficients		Standardized Coefficients	
B	Std. Error	Beta	
(Constant)	2.146	.186	
Efficiency	.198	.030	.537
Reliability	-.011	.023	-.032
Usability	.238	.049	.238
time consumption	-.074	.032	-.104
Accuracy	.087	.023	.252

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v. **Conclusion and Future work**

The problem of the manual advising motivates this research. The researchers designed and implemented a CBR system for academic advising in university system. A designed questionnaire was filled in by academic advisors to validate the systems' results and compares it with the traditional manual system. The research model of the CBR system was examined by the quality attributes: efficiency, reliability, usability, time consumption and accuracy. Results had shown that the CBR system enhance the academic advising process.

The proposed system focuses on specific majors and it is only used in private universities. The CBR system could be extended to include different public and private colleges. The CBR system could include student personal information and also his preference, these information can be used for better recommendation of the proposed major.

References

[1] Howell,N.(2010).Appreciative Advising from the Academic Advisor's Viewpoint: A Qualitative Study.PhD Thesis,Educational Administration, Department of Educational Administration,University of Nebraska – Lincoln.

[2] Ahmar, M.(2011). A Prototype Student Advising Expert System Supported with an Object-Oriented Database. International Journal of Advanced Computer Science and Applications,Special Issue on Artificial Intelligence,(IJACSA)

[3] Grupe, F.(2002). An Internet-based expert system for selecting an academic major.Internet and Higher Education,pergamon.

[4] Henning M. (2007).Students' Motivation to Learn, Academic Achievement, and Academic Advising.AUT University.

[5] Golubski,W.(2008).The genesez approach to model driven software development.International Conference on Systems. Computing Sciences and Software Engineering (SCS208).

[6] UNICEF (1998). State of the world's children 1999 [On-Line]. URL

http://www.unicef.org/sowc99/sowc99f.pdf

[7] Hall,E. and Higgins,S.(2002). Embedding computers technology in developmentally appropriate practice: engaging with early years professionals' beliefs and values. Information technology in childhood education annual 2002 pp 293-312

[8] Higgins,S.(2002).Does ICT improve learning and teaching in schools.Newcastle university. Master Thesis.

[9] Crotty, M. (1998).The Foundations of Social Research: Meaning and perspective in the research process. Sage Publications. London.

[10] Saunders, M., Lewis, P. and Thornhill, A. (2007). Research Methods for business students. 2nd Edition. Financial Times Pitman Publishing.

[11] Sekaran,U.(2003).Research methods for business:A skill building approach.6th Edition.John Wiley and Sons, Inc.

[12] Mostafa,L., Oately,G., Khalifa,N., and Rabie,W. (2014).A Case based Reasoning System for Academic Advising in Egyptian Educational Institutions. 2nd International Conference on Research in Science, Engineering and Technology (ICRSET'2014) March 21-22, 2014 Dubai (UAE).

[13] Opati,O (2013). The use of ICT in Teaching and Learning at Makerere University.UNIVERSITY OF OSLO.

[14] Bekele (2004), ICT Integration at Addis Ababa University; a Masters Thesis submitted for the award of Masters in Comparative and International Education.

[15] Santoso, P.(2010). The development of a case-based reasoning system in relational model using group technology for academic advising. International Journal of Academic Research.