A Conceptual Model of Decision Support System for Continuous Quality Improvement of Engineering Educational Program

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Abstract

The process for continuous quality improvement of engineering educational program can be seen as a decision making process. The process for continuous quality improvement of engineering educational program would be regarded as decision making process for each participant as well as for whole group members. This optimum decision making process enables engineering educational program highly qualitative.

This paper is intended to develop the conceptual model of decision support system in order to support the systemic process for effective implementation of engineering educational program. The decision support system is composed of five parts; data base and its management system, model base and its management system, knowledge base and its management system, collaborative work base its management system, and user interface. Data base retrieves, transforms, and saves the work form supportive data and the work flow supportive information. Model base helps the decision making by linking data base to the model which support each phases of decision making. Knowledge base provides the support needed to the work procedure for each phases of decision making. Collaborative work base helps group work and group decision making for continuous quality improvement of engineering educational program. User interface has communication function between user and system.

Introduction

Recent telecommunication and network technologies have brought a lot of changes, especially in decision pattern in businesses field. Networking revolution makes a user quickly access to virtually any computing machine, database, repository, and facility wherever it locates.

Digitalized ubiquitous, global surrounding and more competitive business environment need faster loop of information feedback, meaning that today's competitive business, timely information delivery is a more than desired attribute(Faught, Green, & Whitten, 2004).

It has been an important agenda to acquire effective decision making procedure for various issues occurred in education area. Recently, educational, medical, and financial industries are looking forwarded the best decision making method integrated with rapidly upgraded modern IT technologies using the various resources and tools which they already possesses. Specially, it is important to make an effective decision making procedure for continuous quality improvement of engineering educational program.

With this subject in mind, in this paper we present a conceptual model of decision support system applying knowledge management agent. The model can be easily adapted to various problems arising in engineering education area.

Engineering Education and DSS

Engineering Education

The conditions of the talented have been change d with needs of the times for globalization and knowledge information, engineering education followed traditional frame and has been troubled in adapting to new circumstances. Veteran engineers recognize that understanding the problem is 90% of the work needed to solving it. There are indeed many voices representing important communities in science and engineering that have pushed the alarm button. One is the American Accreditation Board for Engineering and Technology (ABET)((Bernold, 2007).

Accreditation Board for Engineering Education of Korea(ABEEK) has been established in 1999 to overcome prob-

lems in engineering education and improve international competitiveness, and evaluation of accreditation for engineering education was implemented since 2001. Only few universities participated at the first but interests for accreditation evaluation of engineering education have ignited nationally with Korea being approved as a provisional member of Washington Accord in 2005 and giving additional 10% points to bachelor degree graduates when they got interview test in Samsung Electric Company since Feb. 2006.

The expansion of accreditation evaluation for engineering education contributed to positive changes follows as; operation of systematic basic science and major education, enforcement of design education, systematic management for students, outcome-based education system set-up, and efforts for continuous quality improvement etc.

Nevertheless accreditation evaluation for engineering education has been in trouble because Korea didn't enough preparation process. With this subject in mind, If the implementation of engineering education is decision making process, it is important to make an effective decision making procedure for continuous quality improvement of engineering educational program.

Decision Making Process

The decision making process is a complex task. It is continuous and partially iterative in that the phases may overlap, and the decision maker may loop back to a previous phase.

However, although some steps may be performed concurrently, decision making is fundamentally a sequential process with "design" requiring "intelligence", "choice" needing "design", and "implementation" following "choice". These steps are repeated iteratively with many feedback loops until the final choice has been implemented and lessons learned have been identified and communicated.

Conceptual Model of DSS for CQI in Engineering Education

Conceptual Model for Decision Making in Engineering Education

First, data gathering is observation of reality and collecting of any relevant qualitative and quantitative data. It is done for the general situation of interest.

Second, problem recognition is based on the interpretation of collected data. It is a well-focused problem statement and general objective is defined.

Third, perceiving problem relation is making structure of the problem definitions.

Forth, developing alternatives is using the well-focused problem, a predefined model is instanced with a set of courses of action, outcomes criteria set of uncontrolled events and parameters, and the relationships between these variables. If a predefined model is unavailable, a new model must be developed.

Fifth, selection alternatives is the best course of action is finally suggested, using an optimization, satisfaction criteria, or other approach.

Figure 1. Conceptual Model for Decision Making in Engineering Education
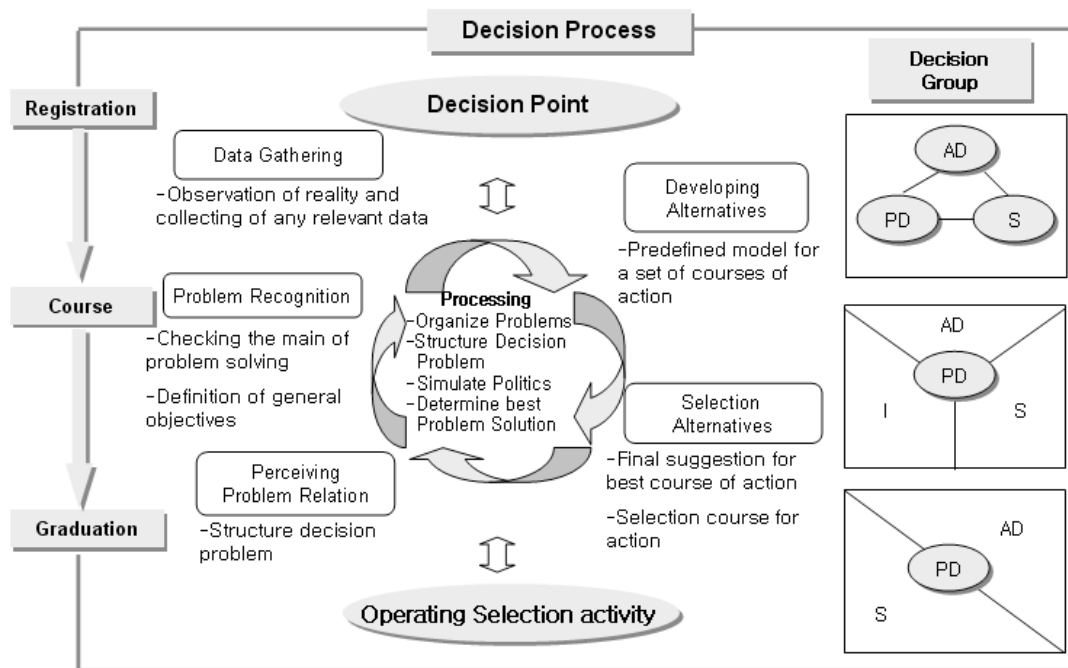
Conceptual Model for Decision Support System in Engineering Education

The decision support system is composed of five parts; data base and its management system, model base and its management system, knowledge base and its management system, collaborative work base its management system, and user interface. Data base retrieves, transforms, and saves the work form supportive data and the work flow supportive information. Model base helps the decision making by linking data base to the model which support each phases of decision making. Knowledge base provides the support needed to the work procedure for each phases of decision making. Collaborative work base helps group work and group decision making for continuous quality improvement of engineering educational program. User interface has communication function between user and system.

Figure 2. DSS Conceptual Model for CQI of Engineering Educational Prog
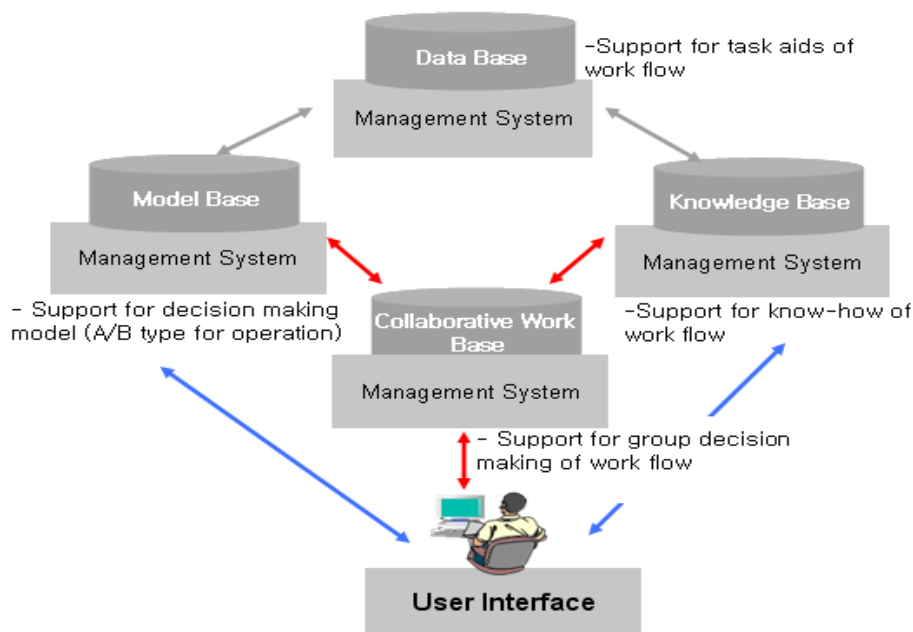
Decision Support System for Continuous Quality Improvement of engineering educational program consists of personal level and group level. The cognitive support tool for personal level is task aids by work flow such as forms, guides, know-how bank in knowledge base. The relationship support tool for group level is task aids by work flow such as operation scheduler and information group decision space, group work output storage for engineering educational program.

Figure 3. Support Tool for Decision Making of Work Flow in Engineering Education

	Registration	Course		Graduation
		regular term	on demand	
Work Flow	−Freshman Orientation −Transfer student Orientation	−Class Timetable −Lesson Plan −Course Enrollment −Enrollment & Alteration of Course −Course Retraction −Submission of Credits −CQI Report −Teaching Portfolio	−Student Portfolio −Questionnaire −Consultation	−Graduation Assessment I −Graduation Assessment II −Program Outcomes Assessment −Application for English Graduation Accreditation −Submission of Degree Application
Personal Support Tool	−Guide for Engineering Educational Program	−Curriculum −Guide for Lesson Plan −Sequence List for Course Completion −Application for Course Retraction −Guide for Course CQI Report −Guide for Consultation & Observation CQI Report −Guide for Program CQI Report −Teaching Portfolio Guide	−Student Portfolio Guide −Questionnaire Guide −Consultation Guide	−Guide of Graduation Assessment −Criterion for Program Outcomes Assessment −Course Completion Table
Group Support Tool	−Operation Scheduler for Engineering Educational Program −Operation Information for Engineering Educational Program −Group Decision Space −Group Work Output Storage			

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