
Student Achievements Validation & Interactive Outcomes Rating System: ©SAVIORS

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공학교육인증을 위한 학사지원시스템의 개발과 적용 : ©SAVIORS

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국문요약

공학교육 인증제도를 원활하게 수행하기 위해서는 교수를 비롯한 각 구성원의 노력이 필수적이며, 이는 공학교육 인증제도의 성패를 좌우할 만큼 중요한 요소이다. 이의 성공적인 수행은 수반되는 구성원의 업무를 어떻게 효과적으로 최소화할 수 있느냐에 달려있다고 해도 지나치지 않을 것이다. 본 논문에서는 공학교육인증관련업무의 전전산화와 최소화를 목표로 필자 등이 개발하여 창원대학교에서 운용중인 SAVIORS에 대한 내용과 적용사례를 소개하여 동일한 숙제를 안고 있는 기관들과 유익한 정보를 공유하고자 한다. 특히, 학생에 대한 상담 절차, 각 구성원의 설문조사 및 분석 체계, 강의 및 설계 계획서 작성체계, 학습성과 평가 및 성취도 분석, CQI 작성, 졸업생현황 관리체계, 각종 통계처리 등 공학교육인증의 주요 사항에 대한 총괄관리 및 지원 전산시스템의 구성과 적용사례를 기술하고자 한다.

Abstract

Changwon National University has been developing and using a computerized supporting system named SAVIORS for ABEEK(Accreditation Board for Engineering Education of Korea) related tasks since the year of 2001. The main purpose of the development of SAVIORS is to totally computerize all tasks related to ABEEK so that faculty staff may perform their job as readily and efficiently as possible. In this paper, detailed functions and utilization records of the SAVIORS are introduced for sharing the advantages of the system with other institutes.

주제어 : 공학교육인증, 학사관리 시스템, 학생상담, 학습성과 평가, CQI

Keywords : Accreditation for engineering education, supporting system, student advising, learning outcomes assessment, CQI

I. Introduction

In order to maintain the ABEEK process effectively, constituents who are involved in the close-the-loop-process should perform many related tasks during semester and yearly bases. These tasks would surely be burden to the members involved, the institute has responsibility to reduce their overload caused by the ABEEK related affairs.

Changwon National University has been developing and using a computerized supporting system named SAVIORS for ABEEK related tasks since the year of 2001. The main purpose of the development of SAVIORS is to totally computerize all tasks related to ABEEK so that faculty staff may perform their time consuming job as readily and efficiently as possible.

The SAVIORS can be accessible to faculty, student and secretary, and offers advising records, educational records including credits obtained each semester, requirements of accreditation, accumulated credits and achievement levels for each course, changes in major or schools, desired career path, prize, scholarship, volunteer work, technician certificates and language skill certificates and so on.

In addition to the above mentioned data concerning student' progress, the faculty's basic information, curriculum related information, advising process, CQI (Continuous Quality Improvement) related data and syllabuses, alumni records and survey statistics are also available to all responsible persons. Fig. 1 shows overall diagram of the SAVIORS. In this paper, detailed functions and utilization records of the SAVIORS are introduced for sharing the advantages of the system with other institutes.

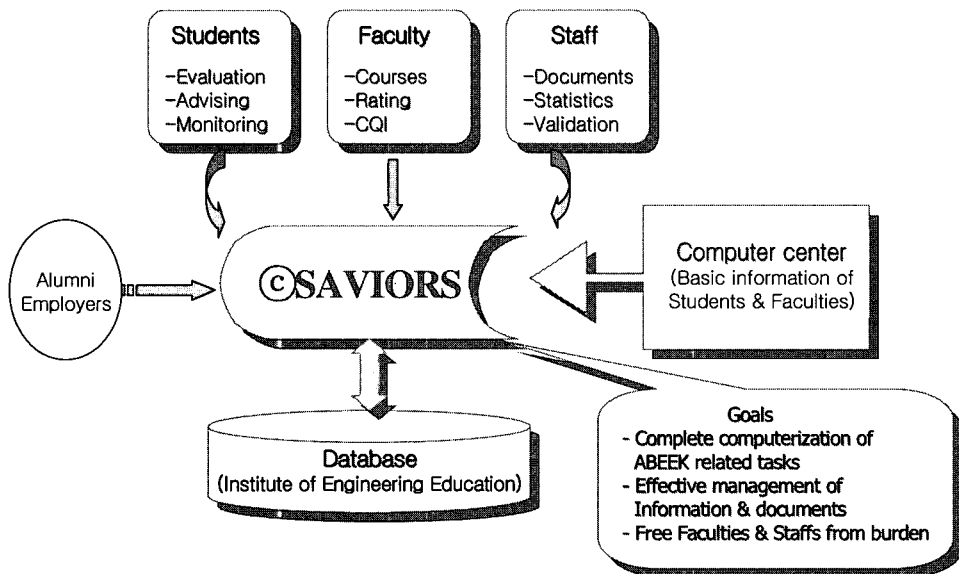


Fig1. Schematic diagram of the SAVIORS

II. Major Functions

1. Student Evaluation

Under the Close-the-loop Education Model, the institution is required to establish the educational objectives and curriculum after analyzing data on students who will take the program, assessing students' academic goals and learning outcomes, verifying the effectiveness of the curriculum and ABEEK accreditation status, and improving the accredited program. The institution carries out the following analysis and assessment on students using the system:

- a) Assess freshman students' learning ability and analyze their knowledge level
- b) Assess transfer students' learning ability
- c) Assess students' academic performance and achievement level during regular semesters
- d) Assess student's academic achievement by the external advisory committee
- e) Conduct questionnaire surveys to collect data from the continuing students, graduates and employers.

2. Student Advising

All Engineering Program designate faculty advisors to assist students in their study, college life and career development. Face to face consultations take place on a regular basis every semester and are also available anytime at either students' or faculty's request.

A faculty advisor is responsible for around 25 students per semester. Upon receiving a request from a student, the faculty advisor is supposed to inform the counseling date to the student through the SAVIORS. After consultation, the professor has to keep counseling records in the computerized student file. The ultimate purpose of this advisory system is to guide students steadily and effectively. The "In-depth consultation" course was newly added to reinforce the student assistance service in 2004. In addition, Capstone Design 1, 2 and 3 are undertaken in the lab of each research unit during the fall semester of the junior year. All seniors are helped by a faculty advisor for their thesis. Since the computerized student file is maintained after every consultation, a change of faculty advisor should not hamper the continuity of interactions between students and professor.

Although a faculty advisor is specified for individual student, students are free to consult with any other professors after making an appointment request online. Consultation takes place either in person or over the web through the system.

3. Student Progress Monitoring

Professors in the program pay constant attention to student academic performance to evaluate whether the program outcomes and accreditation requirements are met. Faculty advisors need to ensure that students are taking all the necessary classes and guide students to fulfill degree requirements by offering consultation. A questionnaire survey is conducted every year to measure student outcomes and achievement levels. Assessment of student outcomes and analysis results serve as inputs to the development of better curriculum and eventually to improvement of the program.

a. Assessment of individual student outcomes

The academic performance and achievement level of individual students are assessed for all engineering topics using the performance criteria and rubrics presented by faculty. The assessment results are used as valuable input to improve lectures and curriculum, student advising and the assessment of program outcomes.

It is not easy, however, to apply the criteria to general education and MSC subjects. Thus an Electronic-portfolio system is presently being developed as an alternative assessment method. Under the new system, students will submit their own portfolio prepared to demonstrate their academic achievement in non-technical areas. Temporarily, the value obtained by multiplying the preset standard rates corresponding to different levels of academic performance and achievement with weighted credits (A+:0.95, A0:0.9, B+:0.85, B0:0.8, C+:0.75, C0:0.7, D+:0.65, D0:0.6, F:0.0) is currently being applied to measure the individual student outcomes and achievement levels in general education and MSC subjects.

b. Student portfolio

Students are required to develop their portfolio in order to ensure student compliance as required by the accredited program. The information in student portfolios is updated throughout the school year until graduation and can be used as a reference for job-seeking students.

c. Student achievements validation & interactive outcomes rating

The main purpose of the development of SAVIORS is to totally computerize all tasks related to ABEEK so that faculty staff can perform their job as efficiently as possible.

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In addition to the above mentioned data concerning student' progress, the faculty's basic information, curriculum related information, advising process, CQI (Continuous Quality Improvement) related data and syllabuses, alumni records and survey statistics are also available to all responsible persons.

d. Questionnaire survey

A questionnaire survey is conducted to collect information from students, graduates and employers. Collected data is used for improving the program. In 2002, the institution started using its web site to distribute the questionnaire online, making participation in the survey easier without time and space constraints. The statistical analysis of previous surveys is also available. Such data can be easily utilized as feedback of education users.

A questionnaire survey of 44 items is conducted with freshman students to identify academic interests

that students have in the program and a counseling service is offered to record any possible discrepancies between students' expectation and curriculum contents of the program. Such an effort can close the gap between students' academic goals and the educational objectives of the program. For instance, in the survey of 2004 freshman students, 78% of the students wanted to have an opportunity to study abroad during their college years. Among them, 27% intended to pursue doctorate study.

4. Conquer the continuous improvement education model using the SAVIORS

The institution adopted a continuous improvement education (close-the-loop) model in which educational objectives and student outcomes are continually evaluated and improved as in Fig. 2.

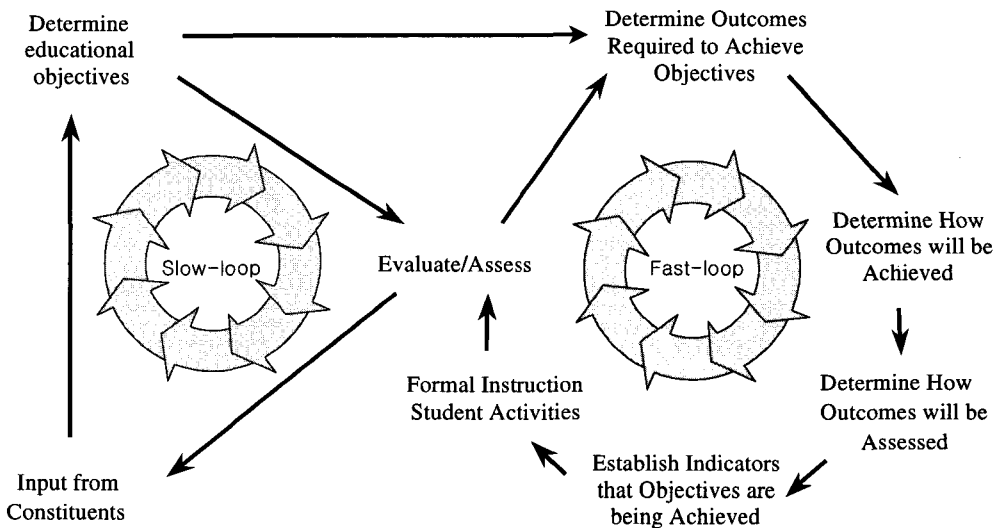


Fig2. Assessment, evaluation, and improvement processes

The opinions of graduates, employers and students are collected through surveys, and meetings of the External Advisory Committee and the Industrial-Academic Coordination Committee. A student questionnaire is conducted in every fall semester to assess the fitness of the educational objectives, student learning outcomes and achievement level. Graduates and employers are also surveyed every three years to evaluate the program educational objectives, and particularly the workplace applications of school knowledge. Thus the opinions of the groups composing the program are crucial for the process to be undertaken every three years to enhance educational objectives, student outcomes and curriculum (slow loop).

Student outcomes are closely associated with the educational objectives of the program. It is therefore an important procedure to evaluate the level of achievement of students in every course and to apply the results to the development of the education system. The results serve as an input into the revision process of student outcomes and curriculum as well (fast loop).

5. Assessment of program outcomes

ABEEK accreditation requires that graduates of the program have both technical and non-technical skills, and that the professors must ensure that their courses are effective to achieve several items among the 13 learning outcomes. It also requires that the curriculum should be well structured to allow students to achieve the 13 learning outcomes as a whole. It is also important to measure the achievement of program outcomes and ensure that the program outcomes are achieved. The method to measure the achievement of learning outcomes and program outcomes and the method to improve the education program are the keys to the success of accredited programs. The continuous improvement education model offers a close-the-loop solution as a means of assessing program outcomes and improving the program in a very structured way as given in Fig. 3 using the SAVIORS.

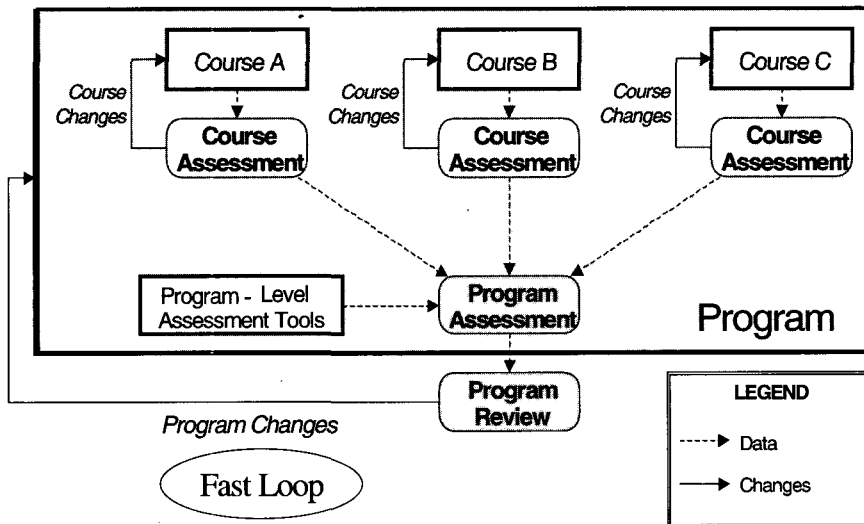


Fig3. Assessment and improvement process for program outcomes

a. Assessment process

By applying performance criteria to the 13 learning outcomes and using assessment methods on a regular basis, the institution measures the program outcomes.

The program outcomes are assessed with respect to the 13 learning outcomes using the following process:

- a) Apply a performance criterion for each item
- b) Draw a curriculum map showing relevant courses linked to a specific learning outcome
- c) Suggest a reasonable assessment method
- d) Assess and evaluate analysis results
- e) Suggest actions needed for improvement

b. Assessment methods

The assessment methods used to assess the learning outcomes vary somewhat from one outcome to another, however, there is a common set of methods in many cases.

a) Student survey in engineering topic courses: the on-line survey of students has been conducted every semester since 2003 through the system.

b) Questionnaire survey of students: A questionnaire survey is conducted to collect information from students, graduates and employers. Collected data is used for improving the program. In 2002, the institution started using its web site to distribute the questionnaire online, making participation in the survey easier without time and space constraints. The statistical analysis of previous surveys is also available. Such data can be easily utilized as feedback of education users.

A questionnaire survey of 44 items is conducted with freshman students to identify academic interests that students have in the program and a counseling service is offered to record any possible discrepancies between students' expectation and curriculum contents of the program. Such an effort can close the gap between students' academic goals and the educational objectives of the program. For instance, in the survey of 2004 freshman students, 78% of the students wanted to have an opportunity to study abroad during their college years. Among them, 27% intended to pursue doctorate study.

c) Course assessment of the achievement level of individual students: The institution plans to issue a certificate describing the level of student achievement to every student who completes the program.

In detail, professors are required to select the most appropriate performance criteria for each engineering topic course from the course performance criteria pool, and submit the course assessment criteria and rubrics along with a syllabus. An electronic portfolio system is under development to measure student achievement of non-technical knowledge and skills.

d) Student portfolio (electronic portfolio): The portfolio file contains the following information.

- List of individual activities (including personal information)
- List of courses completed each semester and academic performance
- Advising records
- Lists of presentations and projects completed
- Individual design portfolio
- Copies of technician certificates or English proficiency certificates (TOEIC or TOEFL)
- Records of education experiences abroad
- Records of industrial training (sandwich) results
- Records of hobby clubs and volunteer work
- Graduation thesis

e) Exit interviews by the external advisory board and the focus group will be performed from 2006.

c. Assessment example for "② an ability to analyze and interpret data"

a) Performance criterion : students will be able to choose the appropriate type of presentation, collect and summarize data, identify a trend from statistical data, explain their importance and draw useful conclusions from the results.

b) Curriculum code map

	Freshman		Sophomore		Junior		Senior	
	Code	credits	Code	credits	Code	credits	Code	credits
1st S/M	GEA7001	1	MKA0015	1	MKA0017	1	GEA1006	2
	GEA7267	1	MKA0005	3	ESA1018	3	MKA0019	1
	MKA0013	1			ESA1041	3	MKA0009,MKA0011	3
							ESA1044	1
							ESA1028	3
2nd S/M	GEA7008	1	MKA0015	1	MKA0018	1	MKA0020	1
	MKA0014	1	ESA1014	3	ESA1007	3	ESA1049	1
							ESA1025	3

c) Assessment and results

- Student survey in engineering topic courses: among the engineering topic courses that were offered in 2003 and 2004, six subjects are closely related to outcome ②. The average achievement level of students who took these subjects was 4.6 out of 5 points in 2003 spring semester, 4.8 in 2003 fall, 4.4 in 2004 spring and 4.5 in 2004 fall.
- Survey of students: according to the survey of students conducted every semester since 2003, the average student achievement of outcome ② was 4.6 out of 5 points.
- Survey of the senior students: the survey result of senior students in 2004 for learning outcome ② was 4.6/5.0 of average achievement.

d) Summary of findings and actions taken for improvement

- Although the achievement level of the outcome ② is fair, the reliance on a single assessment method, namely a questionnaire survey, is too high.
- Professors will assess and quantify student achievement of the outcome in courses, and thus produce a more reliable assessment from 2005.
- Assessment will be expanded to include the information from student portfolios and opinions of the external advisory committee and focus group.

III. Conclusions

In this paper, detailed functions and utilization records of the SAVIORS are introduced for sharing the advantages of the system with other institutes.

In order to maintain the close-the-loop processes effectively and readily, constituents who are involved in the process should perform many related tasks during semester and yearly bases. These tasks would surely be burden to the members involved, and the institute has responsibility to reduce their overload caused by the ABEEK related affairs. Changwon National University and author have been developing a fully computerized supporting system named SAVIORS and efficiently using the system for ABEEK related tasks since the year of 2001. Performance evaluation by the constituents so far is very positive and it has been upgrading through the closed-loop-feed-back system.

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