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A Comprehensive Plan for the Assessment of Learning Outcomes In Undergraduate Technology Programs

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Abstract

This correspondence describes an assessment model developed in the College of Sciences and Technology at Savannah State University that has been implemented in its engineering technology programs with good results. The assessment Program is derived from the College's guiding principles – to continuously improve its educational delivery system and is as such modeled as an expression of a unified philosophy for all degree programs within the College. It provides room for addressing the differences and variations among the disciplines while affirming the commonage of their core. The assessment plan described in this paper is a dynamic model that accommodates the effects of continuously evolving scientific processes and rapidly changing technologies and workplace on curricula and pedagogy. It is interactive and presumes the instructional delivery system as a closed-loop system which can be self-correcting. The plan provides varied and parallel instruments and methodologies that are exacting and is hence a complete toolbox for the diagnosis of learning experiences in engineering technology. The plan clearly identifies the goals of the College and a performance criterion for each of its specific educational objectives. The beauty of the assessment plan described herein lies in its ability to pin pointedly detect errors (problems) at several break points during the students career.

I. Introduction

The College of Sciences and Technology's assessment program is derived from the College's Guiding Principles – to continually improve its instructional delivery and to unceasingly strive toward total quality in the management of its educational delivery system. Reorganizing the dynamics of the education enterprise, the interdependence of the various disciplines within the College, and the aggregated impact of the knowledge of 'non-science' on the students' ability to study and practice science, an assessment plan consisting of varied and parallel instruments

and methodologies, capable of a complete diagnosis of learning experiences, is devised. The College formulated a dynamic assessment model in order to accommodate the effect of continuously evolving scientific processes, and rapidly changing technologies and workplace on curricula and pedagogy.

The proposed assessment model is an expression of a unified philosophy for all degree programs within the College. It provides room for addressing the differences and variations among the disciplines while affirming the commonage of their core. Assessment instruments with emphasis on specific programs, course sequences, as well as general science and technology education are presented.

The proposed model clearly identifies the goals of the College of Sciences and Technology and its specific educational objectives. For each objective, performance criterions as well as instrument(s) for measuring the attainment of the objective are developed. A schedule for administering each instrument is recommended. The proposed assessment program also includes a data analysis phase and feed back channels with recommendations for corrective measures, where needed.

A chart showing the various attributes as well as key personnel for program implementation is used to describe the proposed assessment model. An algorithm (Figure 1.) for model implementation is also shown. Finally, a block diagram (Figure 2.) depicting the closed loop relationship between the assessment process and instructional process is presented.

II. Goals and Objectives

Pursuant to the mission of the College of Sciences and Technology, which is derived from the mission of Savannah State University, the educational goals of the college are:

- to produce graduates who can successfully complete graduate studies in the Sciences, Engineering Technology, and other closely related fields.
- to produce graduates that are capable of competing in the work place among peers.
- to inculcate in its graduates the attitude of long life learning.

These goals are resonant with the desires and abilities of the college faculty and inform the curriculum development and improvement processes in the college. The attainment of these goals may be realized if the behavioral objectives stated below are met at appropriate levels in the students' careers. College of Sciences and Technology students/graduates will:

A. demonstrate mastery of specific subject matter
B. be able to communicate effectively both in writing and orally
C. have developed a sense of commitment to quality, timeliness and continuous improvement
D. function effectively as a science student
E. have developed basic computational skills
F. have a clear understanding of scientific methods
G. function effectively on teams

H. be able to conduct analyze and interpret scientific experiments
I. be able to apply scientific principles in the work environment
J. be able to identify, analyze and solve technical problems
K. have developed a sense of commitment to life long learning
L. demonstrate readiness for advanced technical courses
M. demonstrate a retention of acquired skills and knowledge, and ability to synthesize knowledge from experiences drawn form various courses.

III. Assessment Instruments

1. Department Examinations
2. Junior College Exit Examination
3. Graduating Senior Exit Examinations
4. Student Survey – Advanced Freshman
5. Student Survey – Beginning Junior
6. Student Survey – Degree Candidates Exit Interview
7. Alumni Survey – Graduate Students
8. Alumni Survey – Industry Employees
9. Employer Survey

MODEL ATTRIBUTES

ENT	DESCRIPTION	TARGET POPULATION	OBJECTIVES ASSESSED	ADMINISTRATOR	SCHEDULE	EVALUATION CRITERION AND METHOD	FE
	A common examination for all students enrolled in a course. Covers the range of materials as described in the course outline	Students in all sections, every semester	A, E	Department heads	Every semester course is offered	At least 80% of students in a class (section) must score 50% or above.	Faculty
	Consists of multiple sections representing the various desciplines with a section (sec. 1) on the common core including English language . A student must answer questions form section one and one other section	Advanced sophomores	B,D,E,F, H, L	Dean	Annually	A student must score 50% or higher in section 1 and in at least one other section	Departm
	Consists of questions integrated from various learning experiences offered to the student in a specific curriculum	Graduating seniors	C,F,H, J, M	Department heads	Every semester	At least 80% o the students must score 50% or higher in the first trial.	Faculty
	Measures freshman's attitude toward Science education, following their initial exposure to the descipline, and factors affecting those attitudes	Second semester freshmen	C,D,F	Dean	Annually	Multivariate Analysis	Dean
	Measures readiness for upper level technical courses, and opinion on the junior college curricula	First semester juniors	B,D,E,F, H,L	Dean	Annually	Multivariate Analysis	Dean
	Examines problems graduates might have had with the curriculum and or pedagogy. Solicits graduates' opinions of the academic program. Measure graduates confidence	Candidates for the BS degree	B,F,G,H, J,K,M	Department head	Every semester	Collects analyse and interpret graduating seniors' comments. Determine aggregate of opinion on issues. Determine percentage approval that objective is met. A least 80% must accept the objectives that are met.	Departm
	Determines the approval rate of graduate students on their preparation for graduate school, and weakness of program with respect to preparation for graduate studies.	Alumni in graduate schools	M,C,G,J,K,L	Department heads	Biannually	At least 80% of graduate students will rate overall preparation satisfactory. No more than 10% of graduate students will rate any objective unmet.	Faculty
	Determines graduates' ability to function effectively in the work place based on academic training	Alumni employed in industry	B,C,E,G,I,J,K,M	Dean	Tri-annually	At least 80% of graduates surveyed will be satisfied with their training for the work place. No more than 10% of graduate surveyed will rate any specific ability (objective) unsatisfactorily met.	Faculty
	Determines employers satisfaction with graduates performance and upward mobility in the work place.	Employers – graduates' supervisors in the work place	B,C,E,G,I,J,K,M	Dean	Tri-annually	At least 80% of employers surveyed will be satisfied with graduates' overall performance. No more that 10% of employers surveyed will be dissatisfied with any stated ability.	Faculty

Figure 1.
A Flow Chart for Model Implementation Algorithm

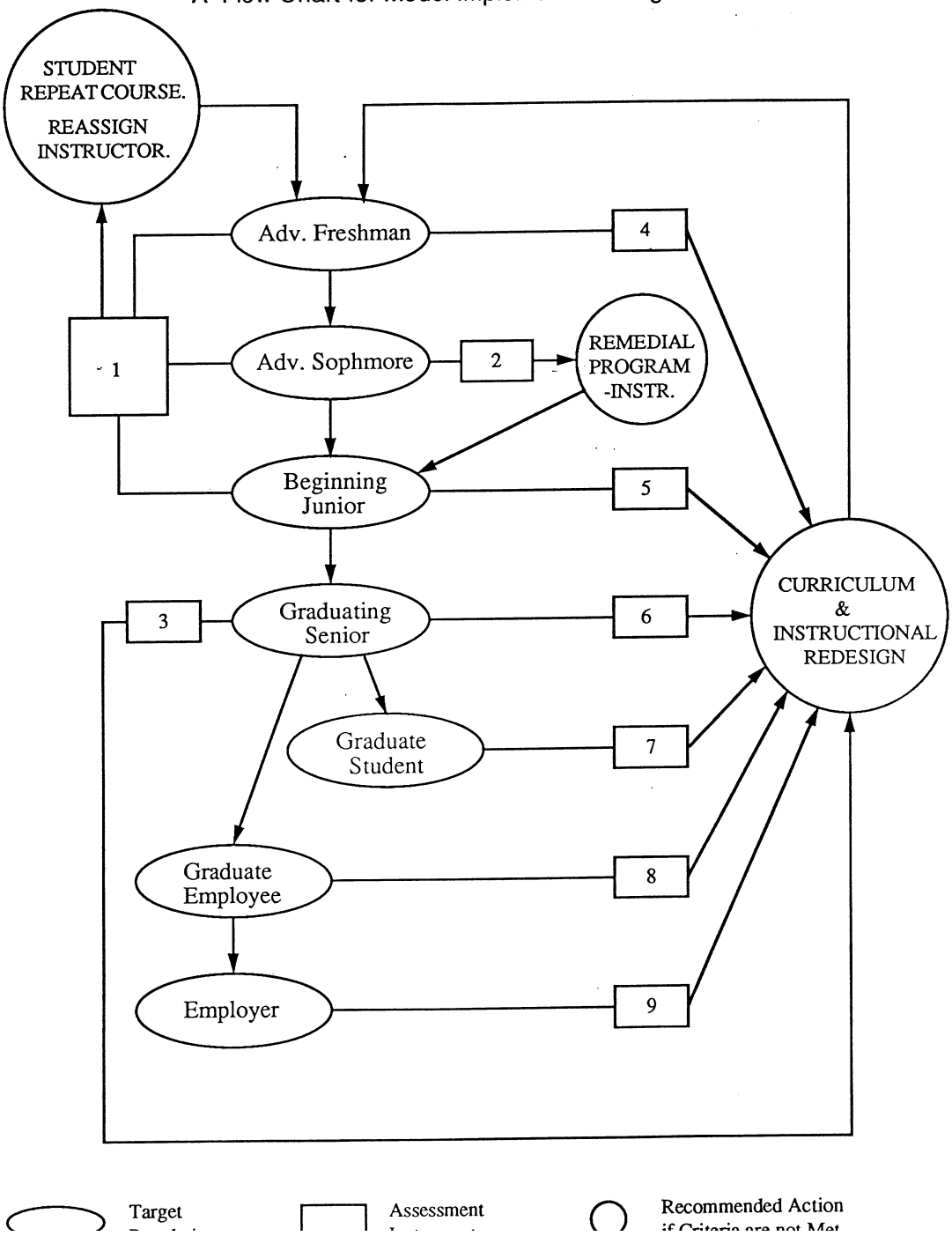
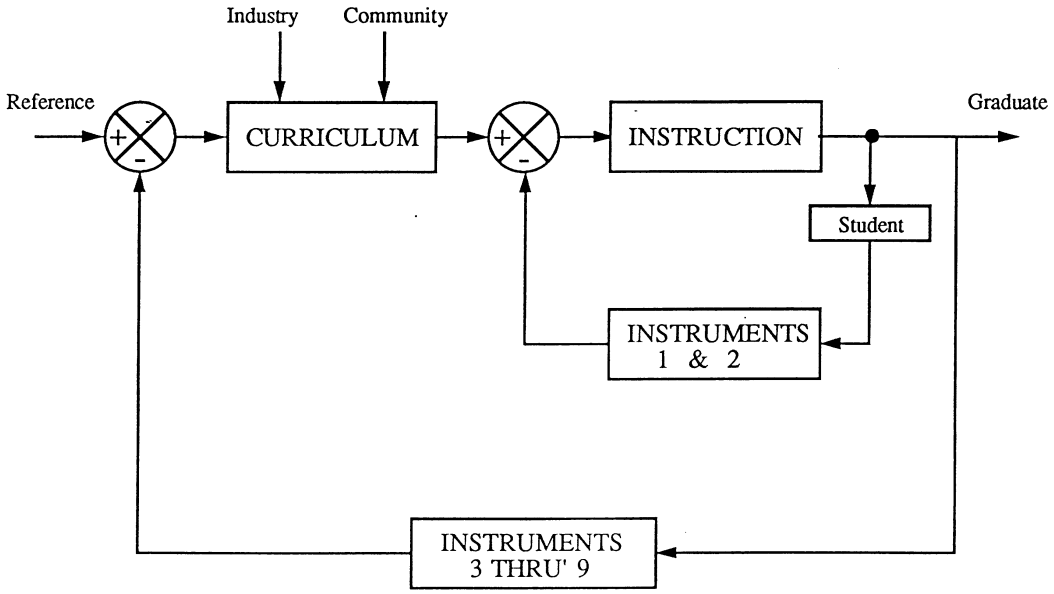


Figure 2.
COST Education Delivery System Block Diagram



V. CONCLUDING REMARKS

The College Total Quality Management (TQM) and Continuous Quality Improvement (CQI) philosophies are intrinsic and fully enforced in the proposed assessment program. The assessment program is intricately interwoven with the instructional process. They are indispensable symbiotic components of the College's educational delivery system. The

comprehensive assessment program reinforce the building – block instructional approach prescribed in the various curricula within the college by tracking students' change in behavior as they emerge form the various courses, and at specific break points in their career. A multiple-input single-output (MISO) closed-loop education system is realized by implementing the proposed model interactively with the instructional process. Such a system is self-correcting and produced excellent output in the long run.

The closed-loop feedback relationship between the proposed assessment model and the instructional process constitutes a CQI program. Similarly, the comprehensiveness of the proposed model would advance the College's TQM philosophy. The model is based on a view of assessment as a mechanism for quality improvement and maintenance. The proposed model will be further validated by comparing its instruments and objective criteria with those set by other institutions and professional organizations.

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