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Innovative Engineering Technology Projects: Their Uses As Recruitment, Formative/Summative Evaluation and Outcome Assessment Tools.

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The assessment of student learning and of educational outcome is as old as education itself. However, Society's quest for Quality issues, especially in manufactured products took international and global center stage around the 1950, when Edward Deming's lecture to the Japanese help revolutionize the Japanese manufacturing industry and turned that Country's economy to the most competitive in the World. Suddenly "made in Japan" became equated with high quality. The results an overwhelming demand for made in Japan's automobile, television, VCR and the list goes on.
By the late 1970s and early 1980s, U.S managers were making frequent trips to Japan to learn about the Japanese miracle and how to use the successful Statistical Process Control which had proven successful in Japan to turn around the sagging demand for domestically made products.

Shortly thereafter, accountability in education started to the order of that Century. Concerns for Quality in all areas of life, especially in the Educational arena started to gain momentum. Some portion of the concern for quality in general may be assigned to an intensified national interest in quality, which was in turn partly being driven by increased international economic competition. Other initiatives may also be assigned to those emanating from within the academy. Necessary impetus were from those who are doing what leaders in any organized enterprise should be doing- asking questions of purpose and performance such as: What are we trying to achieve? How good a job are we doing and how do we know? These are simple but penetrating questions appropriate to any sector of our national life and certainly no less important for all Educational institutions including colleges and universities. Contemporary commentary within and outside the academy makes clear that the quality of American schools, colleges and universities continues to come under more intense scrutiny. Evidences are plentiful from the media, be it national news papers, radios, television stations, new accreditation standards, regional and national associations, the demand student teacher evaluation, and outcome assessment all pointed toward an intensified concern for secondary and collegiate educational quality and what students learn.

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The purpose of this paper and the subsequent technical conference presentation is to focus on how engineering class projects and those required in a capstone course can be effectively used in continuous quality program improvements, and also used to document student learning, as well as used as outcome assessment tools. (Formative and Summative Assessment)

Assessing Program Outcomes

Assessment starts from the standpoint of institutional goals, statement of purposes or college mission statements. These statements are generally stated in a broad sense to include such entities as: character and citizenship to be exhibited by graduates.

Departmental, division goals are always a subset of the institutional mission statements and goals. They however should be expressed in discrete quantifiable terms. Program assessment should begin by establishment of program objectives. This helps to establish what to be assessed more than the question of how to assess the objectives. Course objectives must as a rule specify what students are to be taught, what skills the students should be able to do, (behavioral objectives), or what competencies they should be able to demonstrate, also called performance objectives. Performance objectives are generally derived from the skills in the instructional analysis. Generally, one our more objectives are written for each of the skills identified in the instructional analysis. Many times it is advisable to state entry level behaviors (prerequisites) before students enroll in a particular course. Dick and Carey (1996) [1] indicated that it is necessary to have test items to determine if in fact students do have the entry level behavior one assume they have. This will make course outcome as well as program outcome easy do document since it will be easy do show a gain in knowledge, skills and a change in students demonstrated behavior.

Projects as Outcome Assessment Tools

Outcome Assessment can be defined as the test of results. Such as is required in the demand for and documentation of institutional effectiveness. The early standards of accrediting agencies centered primarily on resources- faculty and faculty terminal degrees, that is how many has doctorates, masters and bachelors degrees, library holdings, financial aid resources, equipments used to support required educational laboratories etc. These have more recently shifted in emphasis to institutional effectiveness and student outcomes although some of them are still relevant. Outcome assessment today however is centered on student growth, on changes in knowledge, in skill, in attitudes and values from student college entry to college exit. (Bogue and Sanders, 1992-page 161) [2]

The basic tenet is that educational outcomes such as skills, aptitude and knowledge student graduates gained from various programs should be transferable to businesses and industries. This in turn is believed to contribute to businesses and industries effectiveness, productivity, and to the economic and global competitiveness of those enterprises.

Accrediting agencies and other governmental agencies require that any typical college program have an assessment process with documented results. Most especially, result in student learning, skills and or change in behavior, which document their competencies and readiness for the labor market.

Evidence that can be used to document student outcome assessment include: student portfolios, design projects, nationally administered examinations, alumni surveys, employer satisfactoriness surveys as well as graduated follow-up surveys that give continuous improvement feed back that can be used to revise and improve program.

Dick and Carey (1996) [1] summarize that too often instructors have been blamed for poor teaching and learners for poor learning, when, in, fact the materials used in the instruction were not sufficient to support the instruction effort. Among other excellent outcome assessment documentation in engineering are class projects well as those required in capstone courses. They can be used substantially to improve and document student learning as well as their readiness for advanced concepts or for the labor market. Formative and summative evaluation data can be easily collected for program outcome assessments when class projects and capstone projects are used.

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