Ensure Program Quality: Assessment A Necessity

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Abstract—In an effort to achieve high quality programs and courses both formal and informal measures are used the teaching and learning process through direct and indirect methods. Assessment has become even more important since education institutes show great interest in the educational experience outcomes and how they map to institutional goals as well as to the needs of the society. Institutes either develop a formal internal assessment process or through external accreditation try to continuously improve and revamp their programs. It is now perceived that students are more active in building their knowledge rather than simply listening to the lectures. Assessment of student work therefore helps us to determine the effectiveness of programs from student’s point of view. This also gives an opportunity to the students to show us what they have learned and how they can contribute when they graduate. It is therefore all that important, for institutes interested in accreditation, to assess learning outcomes as a component of program review process. The accreditation guidelines in general seek to encourage institutes to think about accreditation as a continuous process and go one step further to data collection, analysis and change in order to ensure good quality program. This paper addresses the necessity of assessment through seeking accreditation and also provides a more structured mechanism for gathering, evaluation and improving the quality of the program. This paper details various assessment tools (AMS, Web-Based, Directory Structure, etc.) used by different institutes, to help in organization and gathering of the related material. The paper also presents a model for sharing responsibilities to monitor and evaluate gathered material and assessment data.

Keywords-component: Accredidation, Assessment, Course Learning Outcome, Program Learning Outcome, Rubrics.

INTRODUCTION

Aiming for good quality programs is on the wish list for almost all the institutes. A collection of good quality courses is thus essential to ensure high quality program. In an effort to achieve high quality programs and courses both formal and informal measures are used the teaching and learning process through direct and indirect methods. Assessment has become even more important since education institutes show great interest in the educational experience outcomes and how they map to institutional goals as well as to the needs of the society. Assessment of student work therefore helps us to determine the effectiveness of programs from student’s point of view. This also gives an opportunity to the students to show us what they have learned and how they can contribute when they graduate. It is therefore all that important, for institutes interested in accreditation, to assess learning outcomes as a component of program review process. The accreditation guidelines in general seek to encourage institutes to think about accreditation as a continuous process and go one step further to data collection, analysis and change in order to ensure good quality program. This paper addresses the necessity of assessment through seeking accreditation and also provides a more structured mechanism for gathering, evaluation and improving the quality of the program. This paper details various assessment tools (AMS, Web-Based, Directory Structure, etc.) used by different institutes, to help in organization and gathering of the related material. The paper also presents a model for sharing responsibilities to monitor and evaluate gathered material and assessment data.

In general, universities support the assessment of student learning as an integral part of their core commitment to graduate students with high value degrees. Institutes in general review their academic programs, to ensure continuous improvement, through a formal automated or manual internal assessment process. As per definition by the U.S. Department of Education, accreditation can be considered as a process by which a third party accrediting agency assures that a program meets quality standards that are established by the respective profession \[4\]. Generally, preparing for an accreditation visit, at regional or national level, is a huge task for everyone involved. The accreditation guidelines in general recommend a one time event rather it is a continuous and progressive process especially when accreditation agencies place lot of emphasis on not only outcomes a nd assessment, but also on continuous improvement, in order to endure good quality program.
The Accreditation Board for Engineering and Technology (ABET) USA criteria for program accreditation require that programs make decisions using assessment data collected from students and other program constituencies thus ensuring a quality program improvement process. This requires development of quantitative measures to make sure that students have satisfied course learning outcomes and consequently the program earns outcomes. Figure #1 shows this cycle of continuous growth and improvement involving activities like revising program learning outcomes (PLOs), course learning outcomes (CLOs), and assessment leading to yet further improvement in program.

![Figure #1 Accreditation and associated activities](image)

We argue that seeking accreditation is a desire that leads to providing a very structured mechanism that helps to assess, evaluate, and eventually improve the quality of the program. Following sections detail various assessment approaches used by various institutes seeking accreditation, emphasizing the fact that computer-assisted assessment would help in organization and gathering of the related material. A brief review of different tools (AMS, Web-Based, Directory Structure, etc.) that can be used for asistance in collecting data for program assessment. The program improvement process requires a model for sharing responsibilities to monitor and evaluate gathered material and other assessment data.

In order to establish clear criteria against which a program needs to be evaluated, one needs program learning outcomes (PLO) that are clearly stated. In addition, course learning outcomes (CLOs), statements of student learning as well as development expectations are essential. All these will help to determine the basis for future program planning. Clearly stated PLOs also serve as a guideline for selecting faculty to teach the course. The PLOs therefore should be relatively stable over time, however, at the same time they must change because of the results from assessment activities. In general, the stated assessment objectives are quite similar to these PLOs. For the sake of not overburdening the faculty with extra tasks, it is recommended to focus on assessment processes.

**PROGRAM LEAD**

The latest trend of getting institutional accreditation, for all academic programs has sparked a greater interest in assessment. However, since the majority of the faculty members are not too keen to get involved in an assessment process, mostly because they are familiar with the assessment process and/or the methods used, we need to explore avenues by which faculty can be engaged actively in the assessment of a program, at college or university level. The new accreditation standards for computing, technology, and engineering disciplines put a lot more emphasis on course and program outcomes, assessment activities, and continuous improvement in their statements of intent [10, 13]. This provides justification for an approach to get the entire faculty involved in the assessment process, while mapping outcomes and other collected data against expectations. Later each faculty member can plan curriculum revisions based on the analysis of this data. These curriculum revisions and developments, from accreditation perspective, can be seen as a part of a continuous assessment process [12].
learning out comes in one given year. It therefore leads to establish a set assessment schedule to make sure that all of the given program learning outcomes are assessed by the end of 4-5 year cycle and before the institute decides to seek accreditation.

In an effort to have faculty involvement and understanding of accreditation and assessment we propose the concept of assigning a faculty to be the program leader with the understanding that this person will be responsible for not only staffing the courses in the program but also for leading and organizing annual assessment of the program. A single person responsible for such an activity would lead to a more focused approach to assessment and more involvement of the faculty in the process of assessment itself. The lead faculty will also ensure PLO and CLO mapping and thus further revisions of CLOs and courses as well as, other asessment related activities. Departments establish their mission statement and the program leads will define their own program goals and determine how they are to be addressed, from an Academic Program Assessment Advisory Board or committee that provides timely feedback to facilitate the assessment process and help revise and improve programs. The emphasis of assessment is on program evaluation to improve student learning, and to further a culture of student learning; assessment measures are employed to help achieve a model of the student's ability to evolve a conceptual knowledge structure keeping in mind the target structure. Assessment provides means to focus our collective attention for examining assumptions that we have made and our efforts in creating a kind of culture that is dedicated to improve the quality of higher education and as associated learning. The assessment exercise requires that all of the expectations and standards, established for the program, be announced and available to public. It also needs that evidence be gathered systematically from time to time to determine how well the standards and expectations are being met. At the same time the analysis and interpretation of the gathered evidence can be used to document the achieved performance, explain any shortcomings and to further improve the performance.

### III. ASSESSMENT

The assessment's role is to determine what a student can gain at various levels of a learning experience in typical educational setting or environment. There are two types of assesssments, formative and summative assessment [3]. Formative asessment, determines the incremental outcomes comes a nd oc curs during the entire learning process. S ummative assessment on the other hand determines more holistic and integrative outcomes at the end of the learning process. Assessment data collected during various stages are subsequently used for multiple purposes, as stated in [3]: (a) Management of instructional part (b) Evaluation and accountability of the program (c) Placement of students in the program. The information gathered from assessment activities is then utilized to develop a model of the student's ability to evolve a conceptual knowledge structure.

### IV. ASSESSMENT: THE PROCESS

As Gloria in [2] states that, it is important that one understand the question before being able to come up with the correct answer. Similarly we should try to think about the questions related to assessment process in connection with accreditation and program effectiveness. This exercise is very important since we may generate lots of random activities for collecting material that we do not need after all. So it is important to understand the question being answered and its implications on the assessment process design. A program or a department should first try to create mission statement in the program and then establish its goals and learning outcomes. These outcomes basically describe what students should be able to do by the time they graduate from this program. In order to verify that the graduate do actually have these
attributes a thorough analysis of the student work (Written as assignment or research paper) can be used as a direct assessment method to access program learning outcomes and goals. In order to quantify program indicators it is always beneficial to develop and use rubrics to measure student performance which ultimately leads to the measure of the program effectiveness. For example, a program outcome can be divided into various components. Later, each of these components can be evaluated using one of the developed rubrics. Finally, merger of all of these individual components will lead to assess a range of program learning outcomes [4].

The assessment process begins when programs identify Program and Course learning goals and outcomes. In most cases goals are formalized based on both faculty expertise and requirement of the professional or accrediting agencies. Once learning goals are established, the departments and programs devise ways of measuring how well students are meeting these learning goals. These assessment methods most often directly measure student learning and are frequently embedded in courses offered in the program, including capstone courses. Appropriate assessments may also include indirect measures like employer surveys, alumni surveys, exit surveys or in terviews and rates of enrollment to advanced degree programs. Appropriate assessments may also include indirect measures like employer surveys, alumni surveys, exit surveys or interviews and rates of enrollment to advanced degree programs. Departments analyze these data, identify strengths and challenges of the program, and make appropriate changes to improve their success at achieving program learning goals. Program also need to evaluate their success in other critical areas, such as, meeting the needs of the general education program, of offering service courses, and other functions that serve the university’s broader mission [9].

Figure #2 shows the activities required to ensure a high quality assessment process that requires direct and indirect measures of the program learning outcomes. All these measures are vital both for credible assessment process and program quality.

University graduate or undergraduate council, at most of the universities, is responsible to oversee assessment of each individual program. This council is also responsible for conducting the Annual and Five-Year Program Reviews to ensure quality and consistency among various programs offered by the university. Among its other assignments the Graduate or Undergraduate Council also examines the main components of aessment plan for each program, particularly student learning and program outcomes. For the purpose of review and asistance in the assessment process of the annual and five year assessment, each graduate or undergraduate degree program is required to provide information on [5]: (a) educational objectives of the program; (b) measures to evaluate success in achieving these objectives; (c) the goals that are being successfully met in addition to those that need attention as determined by the analysis of the gathered data; and (d) how assessment data is used to improve quality of the program.

V. DIRECT AND INDIRECT MEASURES

These measures are considered as the primary source of data in assessment of a program. To ensure consistency as well as equal quality and rigor in all of the courses in the program [7] suggests writing a Program Quality Improvement Report (PQIR) by each faculty member teaching in the program. The report contains (1) Assessment data displayed, (2) a complete analysis of the assessment
data, (3) evaluation of the conclusions regarding course strengths and weaknesses, (4) course modifications as a result of analysis of the assessment data. These modifications may be in goals, objectives, or strategies (5) modifications proposed for course improvement, (6) projected timelines for implementation of all the suggested modifications, (7) a new additional resources requirements for implementing recommended changes, (8) assessment methods evaluations, and (9) a new assessment plan update. In our proposed setup, all of the PQIRs are then analyzed by the program lead for an academic program and approved not only by the program lead but also by the Chair of the department, the Dean of the Academic School or College, and the provost. Collective PQIRs can be used as a basis for initiating any actions aimed at improving the corresponding individual academic program.

The capstone experience becomes a very effective direct measure if it is clearly linked with the identified learning outcomes. This can be achieved when standards are carefully structured and documented, with well-defined rubrics for written and oral communication. A very qualitative internal and external review of senior project can be used to legitimize the tire cap stone experience a nd evaluation. Among other means for direct measure are; student performance on certification or professional exams, for internship or external evaluation, based on stated program objectives. For indirect measures; alumni, employer, and student surveys, exit in terms or survey of graduates, graduate taking higher degree programs, length of time to graduate, job placement can be used as indirect measure for the program quality. Assessment process also include the faculty and staff members input on the pr ocess w hen the next year’s academic plan is prepared. By the department chair in consultation with the faculty and staff outlining realistic budget requests, including both operating and personal costs. Figures #3 outlines different components of the assessment process.

To prepare for an accreditation visit generally involves a lot of preparation work and hence is viewed as a huge task. However, the accreditation guidelines suggest that accreditation should be looked at as a continuous process; an iteration of data collection, analysis, and modifications. The accreditation should not be viewed as a onetime event. Authors in [10] report a prototype system to automatically map ABET-CAC’s outcomes to the department and course learning outcomes for Information Technology P programs. In this system students are required to submit their work through the web, these assignments are mapped to program and course outcomes. Program as a whole or an individual course is then revised using the assessment data. Assessment methods and tools cover the measurement options that can be used for each program learning outcome; which courses are to be considered based on the PLO to be assessed in a particular year; assessment data collection and analysis needs to follow a certain time line; analysis methods used on the collected assessment data; formulate conclusions from the analyses results drawn using a certain rubric or criteria. Rubrics are used in assessment as a good technique to improve communication and feedback between faculty and students. Faculty use rubrics to relate the contents that they want to evaluate with some feedback.
taking into account the possible results of the students in an exam, work or exercise. Learners use rubrics to know which topics they have to improve and why [20]. The assessment model in [7] relates program strengths and weaknesses to conclusions concerning student weaknesses and strengths. Each analysis method and the assessment data collection is evaluated every year using assessment results. Then suitable modifications and updates are included in the program for next year’s assessment cycle.

There are many assessment tools proposed by researchers and practitioners with the aim of facilitating faculty by using good techniques for assessment. A research line of interest in technology-enhanced learning is focused on integrating good assessment techniques in Computer Assisted Assessment (CAA) [17]. It enables the provision of formative feedback to students in a more efficient way than with the traditional asessment. A user-friendly assessment editor helps faculty in the design of eQuestionnaires and rubrics. Brinke et al. [16] propose an educational model for CAA where rubrics are used in the response stage of assessment when reviews of assessment material are evaluating program learning outcomes. [11] proposes a novel more interoperable solution supporting interoperability brought by IMS Test Interoperability specification (QTI) specification [18], by using rubrics more extensively, a nd enhancing user support through an editor implementation. In this paper, they add an editable rubric functionality into previously implemented QTI compliant eQuestionnaires CAA editor [15]. By means of this functionality, faculty can create a rubric using QTI questionsItems ((re)using existing items or creating new ones), and relate them with the assessment activities they want to evaluate and the grades assigned feedback they have to assign depending on the students’ results (which are facilitated by the use of QTI).

The North Carolina A&T State University has been experimenting with standardized exam questions in their chemical engineering program. In this effort a large database of questions has been created. These questions are prearranged by CLOs, difficulty level and type of questions. The questions are made available to students via WebAssign® (a web-based homework system) [1]. The statistical analysis of student performance validates these individual questions in the database. This assessment tool further supports the idea that the assessment should create minimum extra work for the faculty. The tool will quickly and easily provide a assessment data to the individual faculty in the program. It is understood that faculty will adjust both their teaching style and the course material by using this readily available asessment data. This will also help them to meet two objectives; be well informed to advise students who may not be willing to take a course and individual faculty in the program. It is understood that faculty will adjust both their teaching style and the course material by using this readily available assessment data. This will also help them to meet two objectives; be well informed to advise students who may not be willing to take a course.

VII. ASSESSMENT MODEL

It is important that program faculty is involved in every step of the assessment. This is the basis for the design and development of the data collection. The committee level involvement to monitor and control course and program development is also essential. Faculty should be free to make any kind of decision regarding program and course improvement, this also ensures academic freedom. The Accountability Management System (AMS) by TaskStream [21] provides the tools to assist educators for uploading the data required to show institutional effectiveness. AMS is a system that can be modified to help facilitate and manage institution-wide strategic planning and assessment initiatives to strengthen teaching and learning. Institution and program level learning goals can be documented and managed through the use of AMS by universities and colleges. Activities at the program level are planned...
to define essential student skills and for measuring performance outcomes using institutional learning goals. The results of the student achievements, institutional goals and community participation collectively provide new powerful ways for demonstrating effectiveness and improvement over time.

For all of the institution’s initiatives regarding outcomes assessment and continuous improvement, AMS provides a resource and communication center. It also helps in promoting communication and collaboration among campus-wide community. Great communication and collaboration capabilities of AMS allow university management and administration to share with third-party stakeholders’ access to the entire accreditation process. Educational excellence is effectively promoted when both administrators and faculty use real-time activity status reporting facility of AMS during the entire assessment process. Faculty and other administrators do not need to document the entire accreditation process on papers. The system will allow them to effortlessly add their comments, detailed instructions and already agreed templates. Accreditation agencies can utilize online reporting capabilities if given access to this system by the institution. Real-time access to data allows faculty to analyze, recommend or implement changes in a timely manner.

Accreditation as well as reporting processes are facilitated and accelerated because of the instant feedback provided due to the review of the contents and reports provided by the online content and documentation review capability of the system. Program faculty can define their own program learning goals for a specific program using objective and learning outcome definition facility provided in the system. This assessment model helps in building an agreement among the faculty and administration regarding defining PLOs, assessment planning, analyzing results and then implementing the changes based on this analysis. It also allows use of appropriate terminology as well as terminology to customize templates and thus making use of the system even easier. Curriculum mapping, courses (Course Learning Outcomes) versus PLOs, provides a clear indication to all the strengths and weaknesses in the program. Any gaps in the curriculum are also exposed through this mapping.

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Figure #4: Assessment Model

Programs under consideration for accreditation need to participate in all of the program assessment activities. However, in most of the cases the faculty with the responsibility to get the program accredited asks simple questions where do I get started? The response to this question is very simple and straightforward just follow these steps;

**Develop plan:** Start with identifying the program learning objectives or outcomes, criteria and measure for the program.

**Program Input:** Insert all program-related data to the system.
Implement your plan: During each academic year assess your programs based on selected program learning outcomes for that year.

Report your results: All the data from the program assessment should be reported to the system using assessment tool.

Close the Loop: This is the most important step in the accreditation process. Once the assessment results are available examine the data. The analysis of the result will help you determine if changes in curriculum (or instruction) are required. Once these changes have been implemented start your assessment again.

The use of any assessment tool to facilitate assessment activities will still need to follow a certain assessment model. Figure #4 present a assessment model that ensures faculty involvement at every step either as teaching faculty, assessment committee, or at the top as undergraduate or graduate council.

VIII. CONCLUSION AND FUTURE WORK

The work proposed in this paper represents a preliminary approach towards the use of assessment in combination with various tools as a useful method to organize assessment information and to provide a formative feedback, so that assessment activities can be meaningfully embedded in learning flows. Results from this study suggest that although participants in the assessment process generally accepted the responsibilities in the assessment process, they did not necessarily fully appreciate the potential benefits of assessment and reflection activities. Thus, it is apparent that greater effort, further support in the form of tutorial input, extended explanation and revised assessment approaches in relevant courses. The overall aim of such an evaluation reassures participants that formative and effective means of improving courses and programs. This paper presents some of the prominent features for most effective and efficient assessment process. The paper also describes the important step to serve as a guide for the faculty member who wishes to engage in the accreditation and hence assessment of their programs.

REFERENCE


[8] California State University, Long Beach, Division of Academic Affairs, Program Assessment and Review Council.


