

DEVELOPING YOUR OUTCOMES ASSESSMENT PROCESS

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Abstract

In this paper, we describe several issues related to the development of an outcomes assessment process, a key element in an organization's assessment plan. We will present a comparison of several examples of high-profile outcomes assessment processes, explain why an organization should develop its own assessment process instead of adopting one written by another organization, and highlight the difficulties caused by the lack of standard terminology within the ASEE and ABET organizations. We will make suggestions on how to read a published process and how to develop your assessment process and describe implications of the high degree of complexity of outcomes assessment as a process.

1. Introduction

The essential reasons for engaging in outcomes assessment, other than to satisfy ABET's new EC 2000 criteria, are to provide evidence that your students have learned what you think they have learned and to identify areas where improvements are needed. Thus, each organization's assessment plan should include a process for assessing measurable outcomes with which positive changes to an academic program can be made. While the larger plan should include the organizational structure, staffing, financing and resources, time lines, database management, and the like, it is the outcomes assessment process, or cycle, that presents the largest hurdle to faculty buy-in. An acceptable and successful cycle is probably the most difficult part of the full plan to develop. What makes it difficult to develop, in spite of the simplicity of a general description of cycle, is that it can be implemented in so many different ways. The expression, "The devil is in the details" describes the situation well. In this paper, we will discuss why you should develop your own outcomes assessment cycle instead of adopting one from the literature. We will also present examples of several high-visibility processes from the literature, tips on how to interpret them, and the confusion that can exist because of nonstandard terminology. Finally, we give suggestions that may help you as you develop your own outcomes assessment cycle.

2. Why You Should Develop Your Own Assessment Process

There are several reasons why you should develop your own assessment process instead of adopting one from the literature. They include the following:

- You will develop a better understanding of the assessment process, just as students learn more in engineering and technology courses if they do their own work instead of copying the work of others.
- You will be able to modify your process when you run into difficulties if you understand

each of its component parts and the way that they relate to each other.

- Unless your organization hires an assessment specialist or consultant, someone in your organization needs to understand the full scope of the variety of activities that make up outcomes assessment, and writing your own process is one way to acquire this understanding.

2.1. Suggestions for Writing Your Assessment Process

We have several recommendations to make if you plan to develop your own process.

- Study the processes that others have published, being careful of the way that you interpret them and the assumptions you make of their intentions.
- Develop an outcomes assessment plan that falls between the extremes of being too general and too detailed. If your plan is too general, it will lead to faculty reactions that run from a polite, “Outcomes assessment is a little vague, and we will benefit from more details,” to the confrontational, “Outcomes assessment is too vague, and we won’t do anything until someone tells us what to do.” If your plan is too detailed, the enormity of the workload will force a negative reaction from your faculty.
- Develop a plan that is as general as the faculty in your organization will tolerate. This will allow them the flexibility to make choices that suit their needs.
- Do not wait until you have your plan fully conceptualized before you share it with your organization. Keeping them involved early in its development will help promote buy-in, and their input can help you make choices from among the options available to you.
- Rather than developing an assessment process simply to have one, try to develop one that maximizes useful information per unit work. Otherwise, you may end up with a process that requires considerable resources for proper execution.
- You may want to start by assessing a single educational goal or objective to develop a feel for data collecting and interpretation.

Since outcomes assessment is so new to engineering and technology education, it is unlikely that anyone has the “right answer” yet. Thus, we recommend that you study the literature to become familiar with the multiplicity of activities that are available as building blocks for a comprehensive assessment process. You will also have to learn to make choices from among the possible options, and you will be aided with an ability to use your imagination in a problem solving approach to the task.

3. Examples of High-Profile Assessment Processes and How to Read Them

The two most visible assessment processes in the engineering education community are those of Rogers and Sando¹ and McGourty, et al.², and they both provide useful information even though they are written differently. A third description of the assessment process, one that is more commonly seen in the outcomes assessment literature, is reflected by the process written by Banta³. A fourth process was developed by Yokomoto, et al.^{4,5} For comparison and to illustrate the different degrees to which they specify the details of the process, their published processes are presented side-by-side in Table 1 in Appendix I. Notice that there are empty cells

in the grid. This illustrates the different ways that the different authors describe the process, and care that must be taken when you read and interpret a published process.

3.1. How to Read an Assessment Process

When you read a published outcomes assessment process, there are several questions to consider.

- Is it very general? If so, it is for information only, and you must work out the details. Use it to develop a general understanding. The processes of McGourty, et al.² and Banta³ fall into this category.
- Is it very detailed, breaking things down into the littlest detail? If so, it is meant to be a specific plan for a specific program and faculty, and it may not be appropriate for your organization. Do not be intimidated by it, and rue it to learn about specific elements that can go into an assessment process. The processes of Rogers and Sando¹ and Yokomoto, et al.^{4,5} fall into this category.
- Is it very complex with lots of options? If so, it may be a theoretical paper written by an expert who is trying to describe the ideal process, one that can be accomplished only with an abundance of resources. The process of Aldridge and Benefield⁶ falls into this category.
- Is it without data or results? If so, then it may be an untested process.

The process suggested by Banta in column three of Table 1 is the most general of the three processes described in the table. Its strength is in the simplicity of the way that it discloses the major elements of an assessment process. It describes the cycle as follows: (1) set learning goals and objectives, consistent with department's goals and objectives, which must flow from the mission of the school and university, (2) identify learning experiences for each goal/objective, (3) select/develop measures of assessing student learning, (4) analyze and interpret findings, and (5) make appropriate changes in the curriculum. Notice that it tells you what to do without telling you how to do it.

The process by Rogers and Sando in column one of Table 1 is the counterpart to the process by Banta. It is a detailed process as shown by the number of cells that are filled. It is a specific process for a specific organization, and it may not suit your organization. The value of this process is that it is a good tutorial on the elements chosen by the organization for its process.

The process by McGourty, et al., in column two of Table 1 is similar in its generality to the Banta process, and its best use is that of a tutorial of the general process. While it conveys basically the same information as the Banta process, it emphasizes the process in a slightly different way as shown by their side by side comparison.

The process developed by Yokomoto, et al., in column 4 of Table 1 is another example of a detailed process that is meant to illustrate one of the possible ways that outcomes assessment can be accomplished. It is similar to the Rogers and Sando process in its attention to detail, but they differ in the way that the details are laid out.

4. Understanding the Complexity of Outcomes Assessment

There are many ways that an outcomes assessment process can be put together, making it unlikely that a process written for one organization will fit another organization without some modification. There are too many variables, including the nature of the curriculum, the wide variety of alternatives and choices, and the preferences of the faculty. By writing your own assessment process, you will be forced to understand all of the possible ways that outcomes assessment can be carried out, and you will have to weigh the alternatives, involve your faculty in the planning process, and tailor the process to your programs and faculty. Unless the members of your faculty are willing to jump into uncharted waters and adapt each time they confront a hurdle, we recommend that you develop your own process first.

One of the causes of the complex nature of outcomes assessment is the multiplicity of ways that it can be carried out. There is not a single “right answer” that will serve all organizations, but there may be a “best answer” for a particular organization. For example, some may choose to use the capstone design process as their primary focus of their assessment process, while others may use the Fundamentals of Engineering examination, an in-house developed comprehensive examination, a set of core courses, or a portfolio of artifacts. The complexity caused by this range of choices is compounded by the multiplicity of ways of judging the artifacts, which may range from objective scoring schemes to subjective scoring schemes such as rubrics. The development of scoring rubrics can also compound the complexity because of the possibility of using holistic rubrics that contain a single scale or analytic rubrics that contain a set of scales. Of course, the methods of scoring that you select should undergo some degree of testing for reasonable reliability so that any statistics developed from the process will be of some use in curriculum planning.

5. Why You Should Not Adopt an Assessment Process Written for Another Organization

Adopting an assessment process written for another organization can cause you several difficulties. While adhering to an adopted process may get you through the mechanics of the process, you may encounter the following difficulties.

- Your organization may encounter difficulties with terminology if you interpret terms different from the authors’ intended purpose. Sometimes a commonly used word is used several different ways, and sometimes several different words are used to refer to the same thing. This may lead to differences of opinion that are not based on substance. This item is discussed fully in a separate section in this paper.
- If you have to modify your process when you encounter a hurdle, you may have difficulty making good choices if you did not take the time to understand the process. This is similar to the difficulty encountered by a student who memorizes an algorithm without understanding it and thus cannot make modifications to the algorithm when needed.

6. The Problem with Terminology

If you pay close attention when you read papers or listen to presentations on outcomes

assessment, you will see that commonly used words are used in several different ways, and at other time, several commonly used words will be used interchangeably. Here are several examples.

- The term “objectives” is used in at least two different ways, as in the broad goals and objectives or a department or program and in the instructional objectives that are written as part of the syllabus of a course.
- The term “outcomes” is commonly used to refer to the outcomes measures that you will assess, while ABET⁷ uses it to describe more general behaviors and performances (EAC Criterion 3 and TAC Criterion 1.)
- Some who are new to outcomes assessment may interpret the word “outcomes” as the results or findings of a process instead of outcomes measures.
- Some use the word “competencies” as an equivalent of “outcomes.” This word is commonly used in outcomes assessment in medical, nursing, and dental schools where the assessment of competencies in skills is of primary interest.
- While “outcomes” is commonly used to describe behaviors or performances that you will assess, it also is also used to describe, in general terms, what students will gain from your course as in “course outcomes.”
- The term “criteria” is used differently by different people. The common usage of “criteria” is to describe the level of performance that will demonstrate to you that students have achieved the levels of performance on your measurable outcomes. On the other hand, Rogers and Sando² use the terminology “performance criteria” to describe the behaviors that students must demonstrate, which are more commonly referred to as measurable outcomes or competencies.
- The words “process,” “cycle,” “method,” “strategy,” and “plan” are often used interchangeably to describe the outcomes assessment process.
- The term “measure” can also cause difficulties. To some, it refers to the instrument that you will use to assess a behavior or performance, while to others, it refers to the instrument’s scale.

Speakers and writers know what they mean each time they use a term, but the listener or reader cannot be sure of the specific intent if he or she is unfamiliar with the process. Thus, what will appear to be simple to understand at first reading or hearing may be difficult to implement if you use an inappropriate interpretation of one or more of the key words. To minimize difficulties due to terminology, we offer the following suggestions:

- Define your terms clearly and document them.
- Use phrases instead of single words when necessary, such as “measurable learning outcomes” and “general course outcomes” to differentiate between the two uses.

7. Concluding Remarks

In this paper, we presented a discussion on the importance of writing or developing your own outcomes assessment process and a discussion of why you should consider writing your own process instead of adopting a published one, and we gave suggestions on how to read a

published process. We stressed the importance of developing common terms that you use across your organization, and we gave examples of the confusion that can occur if you do not. We described how the complexity of outcomes assessment can lead to difficulties in understanding how best to develop your process and in understanding a process written by someone else, and we presented samples of high-profile assessment processes and described how they are similar and how they differ. We hope that this paper will help you develop your outcomes assessment process and perhaps clear up some of the puzzling questions that may have surfaced in your journey.

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Appendix I

Table 1. Comparison of High-Profile Assessment Cycles

Rogers and Sando ¹	McGourty, et al. ²	Banta ³	Yokomoto, et al. ⁴
			Review the mission statements of the university and the school
Identify goals of the department.			Write the broad goals of the department. These are the broad, philosophical goals of the department.
Identify specific objectives for each broad goal.			Write the objectives of the department, which should include ABET/EAC's Criterion 3 or ABET/TAC's Criterion 1.
Develop performance criteria for each objective (what students must demonstrate).	Define outcomes to be measured.	Set learning goals and objectives, consistent with department's goals and objectives, which must flow from the mission of the school and university.	Write measurable learning outcomes that you can assess to demonstrate that your students have met your departmental objectives.
			Establish levels of performance that students will be expected to demonstrate.
Determine the practices to be used to achieve the goals.		Identify learning experiences for each goal/objective.	Identify the classroom, laboratory, and other learning experiences that promote student achievement.
	Identify measurement strategies.		Determine the primary assessment strategy that you will use as your major assessment activity.
			Determine the supplemental methods that you will use to gather the remaining information

Select assessment methods (data collection methods) for each objective.	Review existing assessment methods and design additional methods and measures.	Select/develop measures of assessing student learning.	Select and develop the assessment elements, such as surveys, exams, project reports, portfolios, etc.
Conduct assessments: (1) collect evidence, (2) analyze evidence, and compare.	Implement and evaluate.	Analyze and interpret findings.	Gather data, analyze, and interpret to produce findings.
Determine feedback channels for continuous improvement of practices.			Evaluate whether or not criteria were met.
Evaluate whether objectives were achieved.			Develop your feedback process to incorporate your findings into the curriculum revision process.
		Make appropriate changes in the curriculum.	Use the evaluation results in curriculum revision process.