One Size Can't Fit All: A Multi-Layered Assessment Approach to Identifying Skill and Competency Levels

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Introduction

Identifying skill and competency levels of freshman college students can be challenging. Where they are and what they know regarding finding, using, evaluating, and synthesizing information influences what we teach via tutorials, online subject guides, and in-class teaching. Assessment research indicates that various types of assessments that focus on what students learn and how they learned content, skills, and competencies can enhance students' engagement of academic integrity (avoiding cheating and plagiarism). This can also improve a program's or institution's ability to determine where improvement is needed in both teaching and learning efforts. Additionally, standardized testing can often overlook "hidden skills" such as the ability to analyze, create, and practically apply knowledge. Newer pedagogical approaches like active learning, group work, and online learning objects call for different types of assessment rather than just the traditional written exam, 20-page research paper, or one-time only course evaluation. Assessments such as self-reflection and peer-to-peer analysis are increasingly more important to determine how students are learning as well as what students are learning.

Importance of Using Multiple Types of Assessment

In an assessment program, using multiple types of assessment reveals a variety of skills and competencies possessed by students, as well as the effectiveness of the overall program. This is valuable because no sole assessment type or tool can fulfill all assessment goals or address student variations in different areas such as learning content, attitudes, etc. Different types of assessment retrieve different data and there are disadvantages and advantages to every tool. Additionally, students possess varying learning styles and test taking skills. Deciding what the assessment should accomplish before beginning the process will most often lead to choosing multiple types of assessment.

The first step in determining what type of assessment to use is to identify the scope of the assessment. Classroom assessment takes place within a class and gathered data is used to change that particular class. Programmatic assessment takes place within a program, department, or institution and gathered data can be used to make changes at any of those levels. Determining this scope influences what type of assessment tool(s) to use as well as when and where.

Next, it is important to clarify how the assessment data will be used. Typically assessment functions are considered summative or formative. Summative is typically used to provide proof of achievement and is completed at the end of a learning process. Formative assessment is completed to facilitate learning as well as inform teaching, and is typically done while teaching is occurring. A less common assessment function is using it to facilitate life-long learning (Boud & Falchikov, 2006). Boud and Falchikov (2006) state that "preparing students for lifelong learning necessarily involves preparing them for the tasks of making complex judgments about their own work" (p. 402) and that "traditional assessment practices can, as we have seen, undermine students' capacity to judge their own work" (p. 403). It quickly becomes apparent that it is important to include multiple layers of assessment to accomplish multiple tasks.

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After determining how the assessment data will be used, it is then important to decide what type of data should be gathered. Sobel and Wolf (2011), in an article about redesigning assessments in the library, uses Bloom's Taxonomy Learning Domains to break down learning into three dimensions: knowledge, skills, and attitudes. For example, to learn if students can define a database, a multiple choice test would work fine but to know if a student can find an appropriate database on their own topic, using a more authentic in-class activity is the better choice. Knowing which type of data to collect will lead towards appropriate assessment activities and/or tools and quite often towards more than one.

It is also important to remember that students think and learn in various ways. Library instructors tend to take this into account while teaching but tend to forget the importance of this when it comes to assessment. Sternberg, Grigorenko, and Zhang (2008) studied ability-based and personality-based styles of learning and thinking in students. They also studied the results of various types of assessments. The studies concluded that for students to get the most out of instruction and assessment "at least some of each of instruction and assessment should match their styles of thinking" (p. 504). Keeping this in mind gives yet another reason to have multiple layers of assessment.

Once the scope, function, and goals of the assessment are decided, the tool(s) that will work best to accomplish these objectives can be chosen. As researchers Sobel and Wolf (2011) predicted during their study of various assessment types used in library instruction, not one instrument was clearly the best, but instead they found that there were strengths and weaknesses of each tool.

Specific Types of Assessments

The variety of assessment options today is at the same time inspiring and overwhelming. Not only does the appropriate assessment method need to be aligned with what is being learned and taught, but it also ensures the methodology is sound and gathers the desired data. While traditional forms of evaluating student learning like a standardized test, research paper, or course evaluation are still valid, assessments such as self-reflection and peer-to-peer analysis are increasingly important to determine how and what students are learning (Edwards & Bruce, 2004). Not only do these types of assessments capture data in a way other forms cannot, but they also, if done well, encourage students to use higher order thinking as it relates to what they have learned.

Selecting tools for assessment is important because there needs to be a link between the assessment and the established learning outcomes and domains (Astin et al., n.d.; Avery, 2003). Additionally, the assessment instrument needs to be designed within the context of what will be measured, such as demonstration of skills or self-reflection on a research process (Radcliff, Jensen, Salem Jr, Burhanna, & Gedeon, 2007). The types of assessment tools selected also relates to the type of research being conducted, qualitative or quantitative, and therefore the type of data gathered. Quantitative inquiry gathers statistical data via instruments such as surveys. Qualitative inquiry methodologies examine information gathered from interviews, self-evaluations, or focus groups. Using a combination of both qualitative and quantitative methods (known as mixed method) is often a good choice when trying to determine both a generalized picture of a population as well as gathering more individualized data (Creswell, 2009).

Another key component of tool selection is ensuring the validity of the questions and the tool. Several factors play into validity and are influenced by the type of data being gathered as well as the method of gathering the data. For instance, when creating multiple choice questions for a knowledge test there are certain types of answer options, such as "all" and "none of the above", that should not be used (Radcliff et al., 2007). No matter how much data is gathered, an invalid tool will not yield the necessary data and information to deduce strengths of teaching or gaps in student learning. Another related consideration is the plausibility of administration of the assessment and the needed time for analysis. For example, if there are 200 subjects in a sample population, consider the time needed to transcribe data written on paper as opposed to captured via a web form.

While creating, validating, and determining vehicles for administration of tools is key to successful implementation, it is also important to be in conversation with key stakeholders that can assist with connecting with a sample population and generating buy-in. For instance, if a target population is students enrolled in an introductory composition class, it is important to have had conversations with the composition program coordinator as well as the program's faculty and teaching assistants to ensure they understand the importance of the assessment and that it does not conflict with the established curriculum.

Methods of Data Analysis

Before beginning data analysis, the nature of the data must first be identified. Important questions to ask are: Is the data qualitative or quantitative? What is the data format? Whether or not the methodology is qualitative or quantitative, both the conceptualization and quantification must be considered. Smith and Glass (1987) define conceptualization as "the definition and theoretical analysis of the construct to be measured and the selection of an indicator for that construct" (p. 84). So, while information literacy cannot be observed, observable traits of information literacy can be identified. Once these traits have been identified, how they will be quantified can be decided. Regardless of whether data originates in qualitative or quantitative form, it is necessary to consider quantification. The weight and significance of variables will need to be taken into account in assigning values to either form of data.

Once the data has been collected and quantified using valid methods, the next step is to analyze the data. According to Levine and Roos (1997) there is a circle of three rules in data analysis:

Step 1: Determine what can be drawn from the data.

If looking for patterns, identify what some of those patterns might be.

Step 2: Estimate the central tendency of the data. This is also known as the distribution of a variable and will help determine which method of analysis is most appropriate. This is the stage at which patterns will start to emerge.

Step 3: Look at exceptions to the central tendency. This could also be referred to as outliers from the pattern.

Example of an exception: In the overall data, 50-75% of students are able to find a book; this indicates the central tendency. If, however, 100% of students in the sample are able to find a book, this indicates an exception. The exception could be caused by a variable not controlled for, such as all students in the sample are honors students or a fool-proof method of teaching first-year students how to understand the process of finding books was used in the sample courses but not used in all of the courses.

The number of variables to be examined will determine the type of data analysis used. If multiple variables are examined, the next step is to look at the relationships between these variables. This is essentially finding patterns in the data that indicate a correlation between two or more variables. When comparing data from two groups, it is often best to determine the mean for each group and then look at the difference (General Accounting Office, 1992). In the case of library instruction sessions, it is of little statistical use to compare the highest scores of two different groups of students, but the mean of the scores of two classes provides input from all participants. Comparing medians, proportions, and distributions can also be effective when comparing two groups.

Before determining a cause and effect, it must be determined what, if any, relationship exists among variables. If the conditional variable distribution between two groups is similar, there may be no relation between the variables. When sampling is involved, it's best to use a histogram to examine the distribution of responses. If, for instance, 1,000 students are given a library quiz, but only 100 are analyzed, it's necessary to use a histogram, which is a chart or graphic showing the distribution of data, of a different sample of 100 students to determine whether any major aberrations exist. If the distribution of responses is similar, it is likely a statistically significant sample.

Future Steps

Determining impact on student learning and fulfillment of stated outcomes and objectives is always a challenge. Utilizing multiple types of assessment provides the best opportunities for examining effectiveness at the classroom, program, and institution levels. Additionally, no one assessment type or tool can achieve all of the different types of analysis needed for a comprehensive review. When deciding what types of assessment to use, consider the following: determine the scope of the assessment, clarify how the assessment data will be used, and identify what type of data should be gathered. While the selected assessments need to be aligned with learning outcomes, the methodology needs to be sound to ensure the desired data is gathered. Doing data analysis is just as important as selecting the tools. Prior to the actual analysis, it is important to do a general review of the data, thinking about the format of the data and what steps need to be taken to do an extensive examination. Using the circle of three rules in data analysis helps determine patterns, norms, relationships, and anomalies of the data. This then helps to draw conclusions that can spark modifications and changes to classroom teaching, programmatic efforts, and conversations at the institutional level.

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