Results of a National Survey on College Chemistry Faculty Beliefs and Attitudes of Assessment-of-Student-Learning Practices

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Why is assessment of student learning important? The National Science Education Standards chapter on Assessment in Science Education states that assessment is “primary feedback” [1]. Assessment of learning supplies instructors with feedback on how well their students are learning course material, and students are provided information about how well they are meeting teachers’ expectations. Assessment of learning is useful for communicating the expectations of an educational program. Communication helps instructors know what to teach, how to teach, and where to find the material to teach. Assessment of student learning can also be used for program planning and improvement. For example, placement tests can

...if faculty were educated about how to measure outcomes such as group skills, then they might be valued more...
be used as advising tools. Student work, in the form of portfolios, might serve as partial evidence of the quality of an undergraduate chemistry program. In summary, assessment of learning can provide information to:

- Students, about the extent of their learning and possibilities for success in future courses.
- Faculty, about the extent to which their teaching practices are facilitating student learning, and how they might make modifications to those practices.
- Administrators and other stakeholders, about course articulation, program effectiveness, and what students are able to do as they complete a program.

A comprehensive literature review about assessing learning in K–12 science education has examined assessment of learning techniques as well as policy-related issues [2].

**Basic Issues in Assessment of Learning**

Assessment is the collection of data about a learner’s understanding. Evaluation (or grading) is the passing of judgment on the learner’s understanding based on the data collected through assessment. Assessment data may be of a quantitative nature (e.g., test scores, proficiency in carrying out a particular laboratory synthesis) or of a qualitative nature (e.g., interviews with students about their understanding of a particular topic). The accuracy and precision of the data collected through assessment are important issues. When collecting and working with quantitative data sets such as test scores or peer-review responses, the precision of the measurements is estimated through such measures as test–retest reliability or internal consistency estimates (e.g., Cronbach’s alpha). After the precision of the measurements has been established, accuracy of the measurements (also known as validity) can be examined by looking at how well the measurements correlate with other measures (e.g., other sets of students’ scores, or perhaps students’ future performance in other classes). While additional details about reliability and validity can be examined in basic educational psychology or testing and measurements texts [3, 4], the point of assessment is to collect high-quality data about the understanding of an area a student has developed. But these references will not tell us what learning needs to be measured. This is an issue chemistry faculty must address.