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Assessing Learning Outcomes in Students of Differing Abilities

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ABSTRACT

Instructors are routinely faced with the problem of differing skills, potential and motivation of students in their classrooms. Public universities admit students graduating from elite private schools as well as students from inner-city public schools. In addition to a range of abilities, the typical class often includes significant differences in engagement: from some students a complete disinterest, from others a reticence to put themselves forward, while others have an overassertive need to interject themselves. Although some argue that an extremely diverse (in terms of ability) student body has its advantages (Chang 1999; Terenzini et. al. 2001), the typical range of ability and engagement presents challenges both for instruction and assessment. This article suggests an approach using four procedures that can aid in meeting both of these challenges.

Integrating Assessment Through Learning Objectives

Instructors sometimes approach assessment as an afterthought: determining which topics they wish to cover in a course, offering instruction on these topics, then testing to see if their students remember, understand, or can apply the material. A more strategic and integrative approach to teaching involves the instructor determining in the first step of course design what level of knowledge or skills students should achieve. One method to accomplish this involves the creation of learning objectives prior to the delivery of material.

Learning objectives are statements of observable actions or behaviors that demonstrate students' knowledge, understanding, skills or other performance outcome (Felder and Brent 2004; Bonner 1999). These objectives are goals students are expected to accomplish by the time exams are administered. Learning objectives should be specific, relevant to the material presented in class, focused on the level of knowledge desired and phrased as outcomes for the student. Moreover, learning objectives should be given to students well before an exam to help guide their preparation. Careful selection of learning objectives can be considered the most important step in course design, since they serve as a pedagogical map of the course, influencing all other course design decisions (Whetten 2007).

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Learning objectives can be oriented from the lowest level of knowledge through the very highest levels. These levels of learning, based originally on Bloom's taxonomy (1956), are organized by White (2007) as follows:

1. **Knowledge.** At the lowest level of learning is the ability to recite information. This type of learning demonstrates exposure to the material but does not necessarily mean the student truly understands the underlying concepts.
2. **Comprehension.** Comprehension requires true understanding. At this level, students are able to describe the topic in their own words rather than the words of the instructor. Students know the "why" as well as the "what."
3. **Application.** Application of knowledge requires a student to be able to take concepts and theories and put them to use. This type of knowledge is especially important for technical training.
4. **Analysis.** This is the ability to take something apart. At the analysis stage, students are able to use knowledge to diagnose problems. In business education, this is typically achieved through case analysis. Analysis is a higher learning level than application because the problem to be solved is not specified for the student.
5. **Synthesis.** Whereas taking something apart is the process of analysis, putting the pieces back together is the process of synthesis. Synthesis is the ability to create something new using the knowledge one has acquired. Synthesis involves creating new theory and tends to be the domain of upper level and graduate courses.
6. **Evaluation.** At this level of knowledge, the individual must be able to evaluate competing ideas or positions. At this knowledge level, students are able to deal with an unstructured problem, such as a case. Such unstructured tasks typically have multiple acceptable solutions, so the student demonstrates the ability reach and justify a decision.

Thus at the lowest levels of knowledge, students should be able to recall information whereas at higher levels of knowledge, students should be able to create, extend or evaluate new theory. By determining learning objectives as part of course design, the instructor also has a guide in the creation of learning assessments.

Integrating Assessment and Course Content

While learning objectives provide a roadmap for a course, they do not inherently increase student engagement. Moreover, student engagement—involvement in educationally meaningful activities, both in and out of the classroom—is linked to higher levels of academic effectiveness, with enhanced learning outcomes as well as improved retention rates (Kuh 1996; Tinto1998; Carini, Kuh & Klein 2006). Engagement is essential for reaching the higher

levels of knowledge. One means of enhancing engagement is to involve students more directly in the process of assessment. Such a procedure can be implemented in the following manner: after course material is covered, each student is assigned a learning objective and asked to develop an exam question for that objective. This becomes an elaboration activity: linking their newly acquired content knowledge to the stated learning objective. Because the assignment requires the question to be linked directly to the learning objective, the student must examine the learning objective for its level of difficulty within the learning taxonomy. This constraint prevents students from developing trivial questions. Each question is then critiqued by another student, both for content accuracy and appropriateness to the level of the learning objective.

At this point, the test questions are read and evaluated by the instructor. If students have failed to develop appropriate test questions, the instructor is able to identify whether the problem is lack of course content understanding or of the stated learning objective. This feedback allows for learning "gaps" to be addressed prior to the actual assessment. The elaboration involved as students develop exam questions linked to specific learning outcomes provides students with an additional context for considering newly acquired content. When students elaborate by thinking about how the information they have learned relates to other information, or by explaining the concept to someone else, a deeper and more active cognitive processing occurs (Bonner 1999; McKeachie & Svinicki 2006). This practice of bringing students into the process of assessment development also serves as an experiential activity. Use of such experiential activities can be key in achieving increased student engagement (Batra, Wolvoord & Krishman 1997).

The Assessment Dilemma

Yet, even as students are actively involved in the development of test questions, the instructor is faced with the challenge of matching the rigor of an exam to the differing capabilities of students in a course. Testing only at the highest level of knowledge may cause a significant portion of the class to perform poorly, while limiting questions to only lower levels of knowledge may cause more advanced students to lose motivation. Testing only at low level knowledge has a limited value, since factual comprehension is not well retained unless used and practiced regularly (Eriksen 1983). Instructors may feel they are forced to decide either to assess all students at higher knowledge levels or to protect lower ability students by limiting assessment items to lower knowledge levels.

Given the ability range typical of most classes, Felder and Brent (2004) suggest presenting students with tasks that reflect a range of learning levels and that provide choices that do not force students to work at levels too high or too low for their current ability. Permitting students to opt-in to questions that test at differing knowledge levels allows students to work at a level that may push their ability, yet not be beyond their capability of performance. Higher

ability students, by choosing the higher knowledge level question can also be pushed to an appropriate level of performance. Presenting only higher level questions to all students, rather than stimulating cognitive responses, may actually result in some students experiencing frustration and a sense of helplessness (Bandura 1997). Moreover, when students are given a choice option, research suggests they are often more motivated to push themselves to a higher learning level (Entwistle 1988; Ramsden 1992).

The process of developing and critiquing potential test questions as part of the course should increase students' ability to correctly answer the higher level question. However, level of preparation as well as individual differences can be meaningful constraints. A solution to this dilemma lies in offering assessment instruments that are more customized to student abilities. Building on the questions developed by students for the course learning objectives, the instructor can create an assessment instrument that offers the option of questions at differing knowledge levels for each topic covered on the test. Brent and Felder (2004) suggest in implementing such an approach that a greater point value should be given for high-level questions. For each topic, a question would incorporate a higher knowledge level and, if correctly answered, earn maximum points. The other question on each topic would assess a lower knowledge level and be worth a more limited number of points if correctly answered.

The student is given the ability to "opt-in" to the level of difficulty for each topic area, while encouraged through the point differential to answer the higher level question. Use of choice as a part of the testing process, as well as increased points for higher level items, has been found to increase student motivation (Entwistle 1988; Felder & Brent 2004).

Students who push themselves to correctly answer the higher level question are rewarded with a higher number of points. Those students who do not feel confident in answering the higher knowledge level question have the option of answering the lower level question. In this procedure, while students may not omit a particular topic area, the "opt-in" approach allows the student to select their assessment level. When students are presented with learning tasks at a level that pushes too far above their ability, part of the difficulty is often a lack of understanding of what they are being asked to do (Felder & Brent 2004). This barrier is lessened by the use of learning objectives linked explicitly to targeted levels of knowledge. One advantage to the "opt-in" procedure is that students can be tested to a higher knowledge level, while not failing significant portions of the class. The approach also signals those students selecting the lower knowledge level question that their understanding on a particular topic is not yet at the level of learning required for a top grade.

McKeachie and Svinicki (2006) note that:

> "…beginning courses in a discipline will emphasize lower-level thinking skills but should not be devoid of higher-level challenges…Advanced courses that only develop and test lower levels of

thinking simply shortchange students by limiting their conceptual development and thinking practices."

Consequently, the use of the opt-in approach in assessment design is applicable across the range of courses required for business majors. For example, within introductory level classes, the learning objectives can begin with recitation-level competencies and can end with application level competencies. For the more advanced courses in a curriculum, the use of recitation questions would be below the lowest expectation of accomplishment. Instead, opt-in testing would include questions of comprehension and application at the lower levels of learning whereas the upper levels would ask questions regarding analysis and synthesis.

Integrating Experiential Activities and Assessment: the Team Exam

Numerous studies suggest the use of student teams can facilitate a more active, engaged learning process (e.g. Johnson et al. 1981; Slavin 1983; Watson & Michaelsen 1988; Williams, Beard & Rymer 1991; Ashraf 2004; Hansen 2006). In addition, when students enter a profession they often encounter work situations in which individuals of differing abilities must work together effectively. Though teams require some interpersonal bonding to function, social loafing can undermine group effectiveness; a free rider also weakens team cohesiveness, as does the workhorse who takes over (Watson & Michaelsen 1988; Siciliano 2001; Yazici 2005; Hansen 2006). Moreover, enhancing the likelihood of active cognitive processing does not arise simply from a shift to the use of a student teamwork format.

The instructor who wishes to implement learning objectives and assessment in a further type of an active, experiential format can adopt the use of a team exam component. In general, this component has been implemented by students completing an exam individually, then immediately retaking the same exam as a team, with the grade based on both the individual and team performance. A number of studies by Michaelsen and his colleagues suggest that engagement and higher level learning are enhanced by multipart, complex tasks that require concrete solutions (e.g. Michaelsen, Watson & Black 1989; Michealsen & Black 1994; Michaelsen, Fink & Knight 1997). The use of team exams incorporates both individual and team accountability to achieve a defined outcome. In addition, the free riding potential is lessened since both individual as well as team performance affect the grade (Stearns 1996; Stark 2006).

What results can an instructor expect from an incorporation of team exams into a course? A number of studies (e.g. Michealsen, Watson & Shrader 1985; Slavin 1983; King 1992; Ravenscroft et al. 1995; Hite 1996; Stearns 1996) have found significantly higher individual performance as well as increased satisfaction with the course. Each of these studies involved assigning students to teams to represent a range of abilities within each group.

The potential for differences in ability to affect performance outcomes was controlled for in the Ravenscroft, et al. and Hite studies. Though higher ability students did have stronger performance, the increases in performance remained significant across all ability levels.

More able students may frequently serve in the role of peer teachers, explaining the answers to particular questions: understanding a subject is often best achieved in the process of explaining. The additional elaboration the less able student receives in the process of discussing answers with their team is likely to improve their recall of content (Hamer 2000; Carini, Kuh & Klein 2006). Moreover, across ability levels, when students build on their comprehension through the elaboration involved in the team exam process, their cognitive skills are enhanced: higher level and more enduring learning occurs (Hernandez 2002; Leamnson 2000).

Use of team exams builds on the elaboration activity of involving students in the development of test questions representing the course learning objectives. As previously suggested, assessment instruments incorporating student designed input can also employ the "opt- in" approach, with each topic area represented by a choice of knowledge level questions. In this approach, correct answers to higher knowledge level questions are worth more points than correct answers to lower level questions. At times, whether from lower ability or lack of preparation, some students may choose only to answer the lower level questions. While high knowledge level questions may be out of reach for some students, their presence on an exam signals that this level of skill is a goal for the entire class. Yet, research demonstrates that learners collaborating with more knowledgeable persons can participate at a higher level of complexity than they are capable of individually (Hansen et al. 1999). The team exam can then be implemented by requiring teams to answer only the questions on each topic at the highest learning objective level. This provides an assurance of a higher level knowledge elaboration process within each team as they work to develop appropriate responses. Students, regardless of ability level, are able to participate in answering high-level questions.

Conclusion

Rather than treating testing as an afterthought, this article recommends procedures by which the assessment process is more fully integrated into the course content. In this approach, each of the procedures described (setting learning objectives as a first step in course design, having students develop and critique test questions at differing levels of knowledge, using the opt-in approach in assessment design and using team exams) becomes a building block for the next procedure. Providing students the opportunity to learn how to more actively engage, as well as the benefits from that engagement should be a goal of any instructional process. Most faculty members have classes with a range of abilities: it can be a challenge to find classroom procedures that will be effective with students of differing ability levels. The benefits of using these

procedures in a classroom begin with the development of course objectives corresponding to desired knowledge levels. From these objectives, students gain a more concrete idea of what is expected of them prior to taking an exam. Bringing students into the assessment process through developing and critiquing questions that correspond to particular knowledge levels provides students an additional means of elaborating on content knowledge. As the instructor implements this procedure, the student role as passive in-taker of structured information shifts to one of greater responsibility for their own learning. As students gain experience with and acceptance of this more engaged classroom role, effective learning also increases (Ramsden & Entwistle 1981).

Use of the opt-in approach in designing assessment instruments allows assessment to become more individualized. While the student is given the ability to select the level of difficulty for each topic area, a point differential is used as an incentive to answer the higher level question. Moreover, when students are given a choice option, research suggests they are often more motivated to push themselves to a higher learning level (Entwistle 1988; Ramsden 1992).

Presenting a higher knowledge level question for each topic covered on an assessment signals to students, that whatever their individual ability level, this level of performance is desirable. Though the high knowledge level questions may be beyond the individual capability of some students, incorporating these items in a team exam procedure allows all students to participate. There are benefits from the additional elaboration involved in discussing and explaining to one another the concepts in these higher level questions. Often less able students are not aware that they have answered incorrectly the question they selected on the individual component of the exam. In the process of answering the higher level questions as a team, students gain more immediate feedback on their individual performance (McKeachie & Svinicki 2006). Building on Bandura's (1977) premise that learning results from observing a more skillful model, the team exam procedure transforms the problem of testing across varying ability levels into an additional learning opportunity.

Meeting the challenge of "pushing up" the knowledge level of students across the range of abilities and engagement is not a goal confined to the classroom. A healthy economy depends on workers who possess higher level thinking skills (Hernandez 2002). Through use of the four procedures recommended in this article, a means of using classroom assessments to foster higher level thing across ability levels is provided.

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