How do you know they are learning?: the importance of alignment in higher education

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Abstract: The success of any learning environment is determined by the degree to which there is adequate alignment among eight critical factors: 1) goals, 2) content, 3) instructional design, 4) learner tasks, 5) instructor roles, 6) student roles, 7) technological affordances, and 8) assessment. Evaluations of traditional, online, and blended approaches to higher education teaching indicate that the most commonly misaligned factor is assessment. Simply put, instructors may have lofty goals, high-quality content, and even advanced instructional designs, but most instructors tend to focus their assessment strategies on what is easy to measure rather than on what is important. Adequate assessment should encompass all four learning domains: cognitive, affective, conative, and psychomotor. This paper describes procedures for the development and use of reliable and valid assessments in higher education.

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1   Introduction

In a two-hour television documentary titled 'Declining by Degrees: Higher Education at Risk', first shown in June 2005 on the Public Broadcasting System (PBS) Network in the USA, John Merrow and his collaborators present a compelling case that Americans do not know enough about the outcomes of higher education in the USA, but that it is convenient for everyone involved (students, professors, parents, alumni, legislators, donors, and the tax-paying public at large) to pretend that high quality teaching and learning are occurring. In the companion book by the same name (Hersh and Merrow, 2005), Schneider (2005, p.62) highlights the problem:
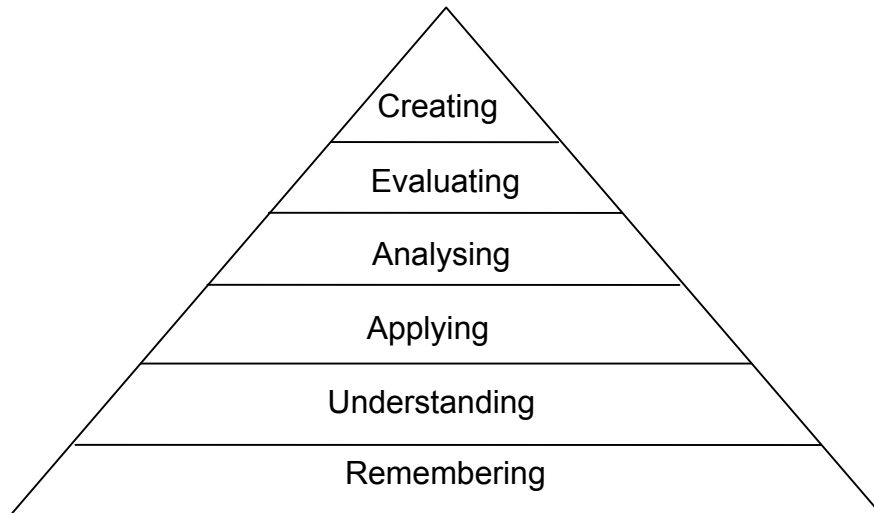
> "Americans are increasingly cynical about their public institutions and public leaders. But their skepticism does not extend to the content of a higher education. Most students–and the public as a whole–assume without question that whatever students choose to study in college, they will learn what they need to know for today's competitive and complex environment. But in practice, college figures in the public imagination as something of a magical mystery tour. It is important to be admitted; it is also important to graduate with a degree. But what one does in between, what students actually learn in college, is largely unknown and largely unchallenged."

In the absence of reliable and accurate information about the outcomes of a higher education, undergraduate students and their parents have increasingly come to rely upon commercial ratings of colleges and university provided by media sources such as *US News and World Report* and the *Princeton Review*. However, the criteria factored into the ratings provided by these and other commercial services do not include any meaningful data about student learning or academic achievement. Instead, numerous proxy indicators of the quality of a higher education are used such as the average Scholastic Aptitude Test (SAT) scores of entering freshmen and selectivity as measured by the ratio of students admitted to students applying. As Erhenberg (2005) notes, the administrators of most colleges and universities in the USA claim that they pay little attention to such rankings, but in truth they do. After all, a detailed analysis presented by Zemsky *et al*. (2005) indicates that what the *US News and World Report* rankings essentially measure is competitive advantage with respect to attracting the best students. Clearly, the rankings are primarily about inputs rather than outputs.
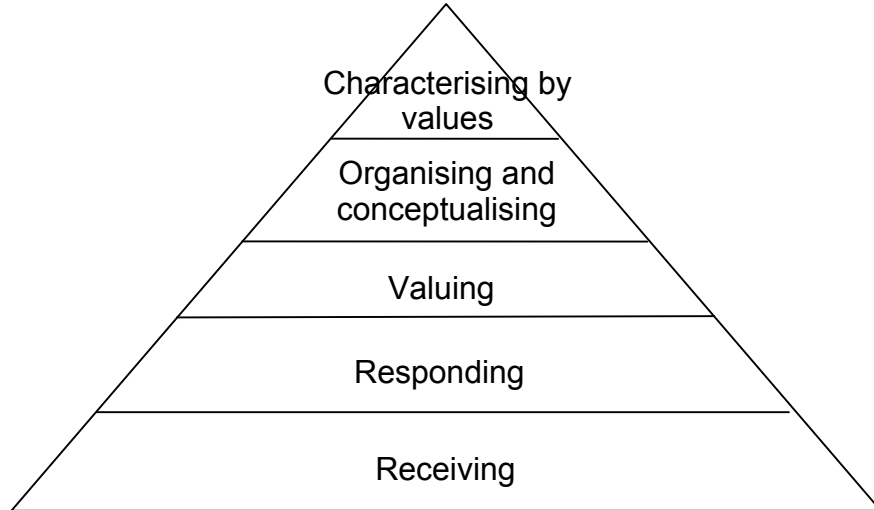
2   What should undergraduate students learn?

Student learning outcomes in both K-12 and postsecondary education are traditionally defined in relationship to three primary domains: cognitive, affective, and psychomotor. The cognitive domain relates to the capacity to think or one's mental skills. As originally defined by Bloom *et al*. (1956) and revised by Anderson *et al*. (2001), the cognitive domain has six levels ranging from remembering to creating (see Figure 1). The affective domain (Krathwohl *et al*., 1964) is about emotions and feelings, especially in relationship to a set of values. It ranges from receiving or becoming aware of stimuli that evoke feelings to manifesting behaviour characterised by a set of consistent and predictable values (see Figure 2). The psychomotor domain (Harrow, 1972) is concerned with the mastery of physical skills ranging from reflexive movements to exhibiting appropriate body language (see Figure 3).

Figure 1   Revised taxonomy of the cognitive domain

Creating

Evaluating

Analysing

Applying

Understanding

Remembering

Source: Anderson *et al.* (2001)

Figure 2   Taxonomy of the affective domain

Characterising by values

Organising and conceptualising

Valuing

Responding

Receiving

Source: Krathwohl *et al.* (1964)

Figure 3 Taxonomy of the psychomotor domain
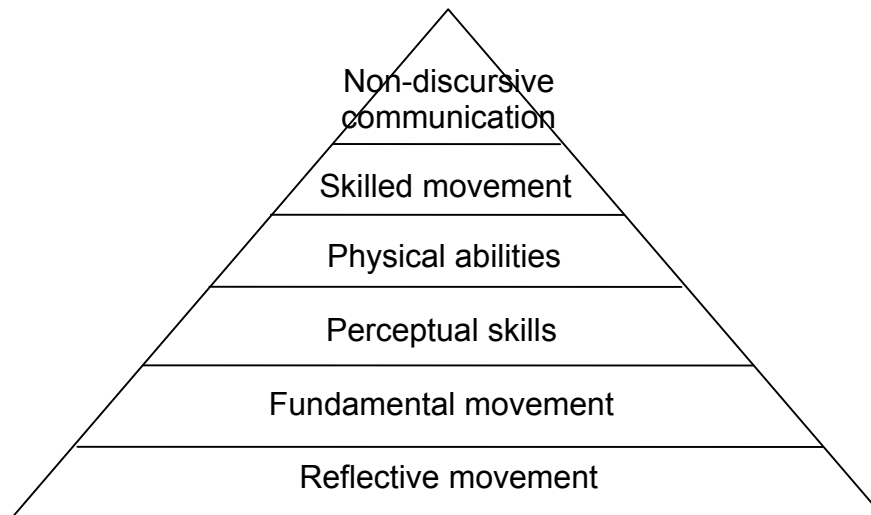
Source: Harrow (1972)

None of these domains are completely satisfactory. In addition, it is clear that most instruction in higher education is focused on the cognitive domain rather than the affective or psychomotor domains (Sperber, 2005). Regrettably, even within the cognitive domain much more attention is paid to the lower half of the domain (remembering, understating, and applying) than it is to the arguably more important upper half (analysing, evaluating, and creating). This problem stems largely from the relative ease with which the skills encompassed in the lower half can be taught and tested within most fields or disciplines. Teaching and assessing the cognitive skills required for analysis, evaluation, and creation takes more time and effort than many, if not most, university instructors feel they have.
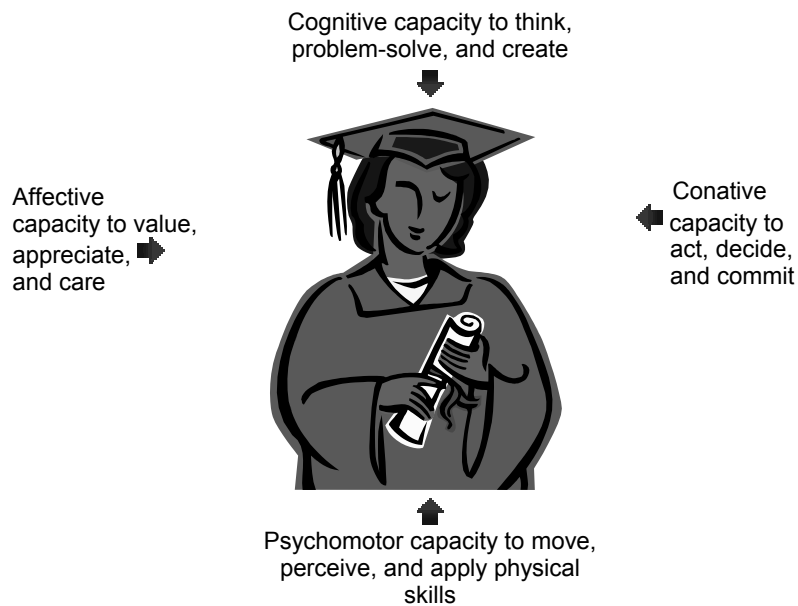
Even more regrettable is the fact that an entire domain is ignored by most instructors in academe today. This is the conative domain (Snow *et al.*, 1996). The cognitive domain is concerned with thinking, the affective with valuing, the psychomotor with skilled behaviour, and the conative domain is associated with action. It is clear that while an individual may possess the cognitive capacity, affective values, and physical skills to perform a given task, whether he or she possesses the will, desire, drive, level of effort, mental energy, intention, striving, and self-determination to actually perform at the highest standards possible remains an unanswered question. The conative domain focuses on conation or the act of striving to perform at the highest levels. With rare exceptions, the literature on higher education teaching, learning, and assessment is not informed by consideration of the conative domain. Ironically, the roots of conation can be traced all the way back to Aristotle who used the Greek word 'orexis' to signify striving, desire, or the conative state of mind. Kolbe (1990) contrasted the cognitive, affective, and conative domains as illustrated in Figure 4.

Figure 4 Kolbe's (1990) comparison of cognitive, affective, and conative domains

Cognitive	**Affective**	**Conative**
• To know	• To feel	• To act
• Thinking	• Feeling	• Willing
• Thought	• Emotion	• Volition
• Epistemology	• Esthetics	• Ethics
• Knowing	• Caring	• Doing

Given the increasingly global nature of competition (Friedman, 2005), the higher education graduate of the 21st century can ill afford to enter the world of work without the opportunity to develop expertise across all four domains of learning. Figure 5 illustrates a comprehensive array of the learning domains that every college graduate should possess. Unfortunately, very few colleges and universities collect evidence that their graduates leave their institutions with comprehensive achievement across the four domains. Indeed, when the National Center for Public Policy and Higher Education (2000), an independent, non-profit, non-partisan organisation, compiled a report titled *Measuring Up 2000: The State-by-State Report Card for Higher Education*, Centre personnel found that they could find data to allow state-by-state comparisons of higher education institutions with respect to preparation, participation, affordability, completion, and benefits, but not for learning.

Figure 5 Comprehensive learning outcomes for 21st century college graduates

Cognitive capacity to think,
problem-solve, and create

Affective
capacity to value,
appreciate,
and care

Conative
capacity to
act, decide,
and commit

Psychomotor capacity to move,
perceive, and apply physical
skills

3 Learning assessment should be the driving force in higher education

Regardless of the field or discipline, there are a set of meta-outcomes that cut across the four domains. The following list, while not exhaustive, suggests the scope of these outcomes:

- accessing and using information

- communication skills using multiple media

- demonstrating understanding accompanied by deep reflection

- applying rules and procedures to structured and unstructured problems

- being creative

- thinking critically

- making sound judgments

- problem solving

- being committed to life-long learning

- exhibiting intellectual curiosity

- proactively seeking to extend knowledge in one's discipline

- exhibiting ethical behaviour.

These kinds of meta-outcomes will not be achieved in higher education unless they are assessed. This conclusion is supported by strong evidence that if something is not assessed in higher education, then it is not learned (Bain, 2004). It may appear to be somewhat cynical to state that assessment drives learning, but it does. Perhaps it is just human nature, but college students choose to focus their study efforts on the things on which they know they will be tested and graded (Napoli and Raymond, 2004). Most students come to recognise that they can get good grades by cramming for tests and then quickly forgetting what they have memorised to allow themselves to focus on other pursuits. Most instructors are familiar with the typical questions asked by undergraduate students in higher education courses such as 'Are we responsible for knowing that material?' or 'Is this content going to be on the test?'.

Instructors recognise the desire of students to focus their study efforts, minimal as they are, on accumulating the 'knowledge' that will be tested, and in far too many cases, instructors give into these wishes rather than pushing their students to achieve at higher levels. When John Merrow, the producer of the 'Declining by Degrees' was asked what was the most shocking discovery he found when he was visiting various US institutions of higher education for his television documentary, he responded:

> "NOT that students are binge drinking, NOT that athletics is a business, and NOT that most students don't seem to have to work very hard to get good grades, because we knew those things. What came as a surprise was what one of our experts calls 'the non-aggression pact' between professors and students. It amounts to an unspoken compact: don't ask too much of me, and I won't expect much from you. This allows the faculty members to concentrate on what their institution values: publications, research and getting grants. And it means that students get good grades and can float though college with plenty of

time for socializing, networking and other activities. Few complain, even though to an outsider it's pretty clear that the emperor has no clothes. That came as a shock."

Few professors design their learning assessments on the assumption that "testing and grading are not incidental acts that come at the end of teaching but powerful aspects of education that have an enormous influence on the entire enterprise of helping and encouraging students to learn" (Bain, 2004, p.150). If we want our college graduates to possess the 21st century skills outlined above, assessment must focus on these higher order types of outcomes. Accordingly, university and college teachers must devote much more effort to the task of assessment because it is the lifeblood of good teaching.

This is no easy task. According to a recent special supplement in *The Chronicle of Higher Education* (Blumenstyk, 2006, p.B30), "more than 40 percent of entering college students [need] to take at least one remedial course in mathematics, reading, or writing". There is ample evidence that American students are graduating from high school without the academic preparation required to engage in higher order learning and assessment. When this fact is combined with the growing pressure on faculty members in research universities to fund and conduct research and on instructors in teaching universities and colleges to teach more students with fewer resources, higher education certainly does seem to be "declining by degrees" (Hersh and Merrow, 2005).

4   The millennial learner: myth or reality

Interestingly, at a time when people both within and outside academe are beginning to question the assumed high quality of American higher education, several pundits and even a few scholars are predicting that a new kind of student is entering our institutions of higher learning that may save the day. According to Raschke (2002, p.68), "Colleges and universities are about to be beset by a new generation of learners whose skills and expectations derive from growing up on the net". Over the past few years, much has been written in both popular and scholarly literature about the generation of students entering higher education today called by various monikers such as "Generation Y", "Millennials", and the "Net Generation" (Coomes and DeBard, 2004; Howe and Strauss, 2000; Oblinger, 2003; Oblinger and Oblinger, 2005; Tapscott, 1998). Prognosticators such as Howe and Strauss (2000, p.4) who wrote "…today's teens are recasting the image of youth from downbeat and alienated to upbeat and engaged" have predicted that the Americans born between 1982 and 2000 constitute the next "greatest generation" that will out achieve previous generations such as the Baby Boomers (born 1943–1960) and Generation X (born 1961–1981). However, the evidence for such optimism appears to be largely drawn from surveys and focus groups conducted with young people living in affluent suburbs, sometimes in the presence of their parents. Twenge (2006) uses empirical data collected over the past 50 years to dismiss most of the optimistic claims about Millennial students.

Meanwhile, the findings of the National Survey of Student Engagement (NSSE) conducted by Indiana University paint a very different story about the current generation of college undergraduates. Conducted every year since 2000 and involving nearly 500 colleges and universities in the USA, NSSE indicates that undergraduate students are much less engaged in learning activities known to foster academic achievement than expected by their professors (Kuh, 2003). The average professor expects undergraduate

students to be engaged in classes or labs 10–15 hours per week and out-of-class studying for another 25–30 hours per week. This does not seem like an unreasonable expectation, but the NSSE data shows that 20% of students spend less than five hours per week studying, 25% spend 6–10 hours per week, 48% spend 11–30 hours per week, and only 7% exceed the 30 hours per week expected by faculty members.

The researchers involved in the NSSE studies point to five essential strategies for increasing student engagement (Kuh *et al.*, 2004):

1   increasing student – faculty interaction

2   engaging students in active, collaborative learning activities

3   encouraging more achievement-oriented 'time-on-task' among students

4   setting high academic challenge

5   providing continuous timely feedback.

All of these strategies have implications for assessment, but especially the last two. Unless professors raise the level of the objectives they are trying to achieve and encompass all four learning domains in their assessments, students will not be compelled to become more academically engaged. In addition, unless professors are willing to become more engaged in high quality teaching themselves, especially with respect to providing continuous timely feedback through better assessment strategies, any increased student interest in academic engagement will diminish quickly.

5   Enhancing assessment in higher education

Bain (2004) describes how the best teachers in higher education focus their teaching assessment activities on "critical thinking, problem solving, creativity, curiosity, concern for ethical issues" as well as "breadth and depth of specific knowledge" and the "methodologies and standards of evidence used to create that knowledge" (pp.8–9). In addition, they use assessment "to help students learn, not just rate and rank their efforts" (p.151).

Pellegrino *et al.* (2001, p.44) describe an assessment triangle (see Figure 6) wherein:

> "the corners of the triangle represent the three key elements underlying any assessment… a model of student *cognition* and learning in the domain, a set of beliefs about the kinds of *observations* that will provide evidence of students' competencies, and an *interpretation* process for making sense of the evidence."

The cognitive corner is based upon a theory of learning underpinning the set of knowledge, skills, attitudes, and habits of mind to be measured. For example, if an instructor subscribes to a constructivist theory of learning (Fosnot, 1996), his or her assessments should focus on cognition related to the production of original representations of knowledge as opposed to the regurgitation of textbook knowledge. The observation corner refers to the tasks or performances that instructors design to provide evidence that students have learned. The nature of this evidence should be linked to the cognitive learning theory in such a way to support the decisions derived from the assessment results. Again, within a constructivist learning theory, an instructor is likely to observe the learner's learning through the analysis of tangible phenomena such as

portfolios, products, or performances. The interpretation corner "expresses how the observations derived from a set of assessment tasks constitute evidence about the knowledge and skills being assessed" (Pellegrino *et al.*, 2001, p.48). With a constructivist learning theory in mind, an instructor might design a rubric that expresses levels of quality for the portfolio, product, or performance being assessed (Miller, 2005).

Figure 6   The assessment triangle

Observation   Interpretation

Cognition
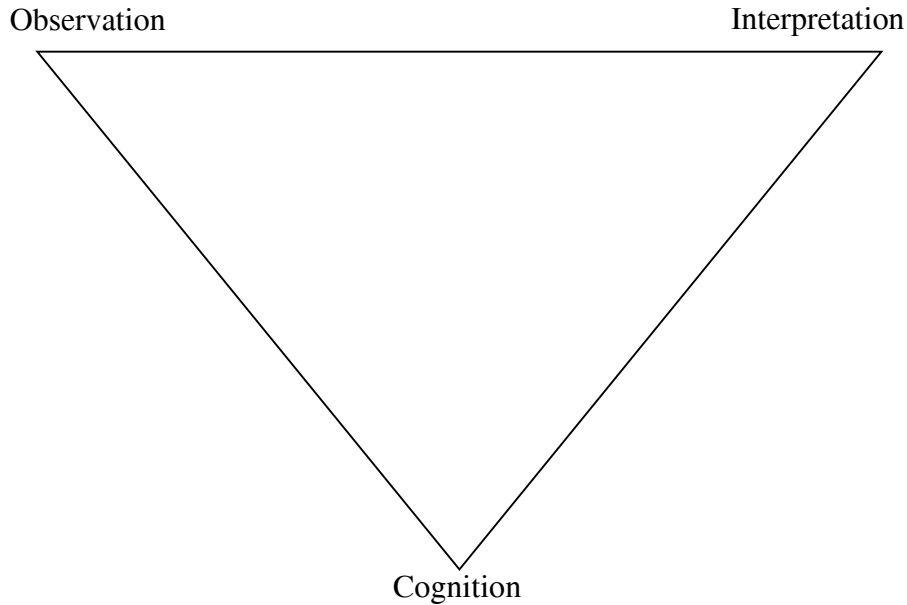
Source: Pellegrino *et al.* (2001)

Obviously, no assessments are perfect, all failing to provide completely reliable and valid evidence of student learning. Some inference is required because assessments inevitably oversimplify the full capacity students possess to perform across all four domains of learning. As Pellegrino *et al.* (2001, p.49) clarify: "A crucial point is that each of the three elements of the assessment triangle not only must make sense on its own, but also must connect to each of the other two elements in a meaningful way to lead to an effective assessment and sound inferences". This implies the need for alignment, not just within an assessment but between assessment and the other critical factors that define a learning environment.

6   The importance of alignment

The success of any learning environment, including e-learning, is determined by the degree to which there is adequate alignment among eight critical factors: 1) goals, 2) content, 3) instructional design, 4) learner tasks, 5) instructor roles, 6) student roles, 7) technological affordances, and 8) assessment. Evaluations of traditional, online, and blended approaches to postsecondary teaching indicate that the most commonly misaligned factor is assessment (Reeves and Hedberg, 2003). Simply put, instructors may

have lofty goals, share high-quality content, and even utilise advanced instructional designs, but most assessment strategies tend to focus on what is easy to measure rather than what is important.

Figure 7   Critical factors that must be aligned in any learning environment

Nature of objectives
Lower order, discrete   Higher order, general
Nature of content
One right answer   Multiple perspectives
Pedagogical dimensions
Direct instruction   Problem-based learning
Learner tasks
Academic   Authentic
Instructor roles
Focus on teaching   Focus on learning
Student roles
Passive orientation   Active engagement
Technology roles
Prepackaged static data   Real world, real time data
Focus of assessment
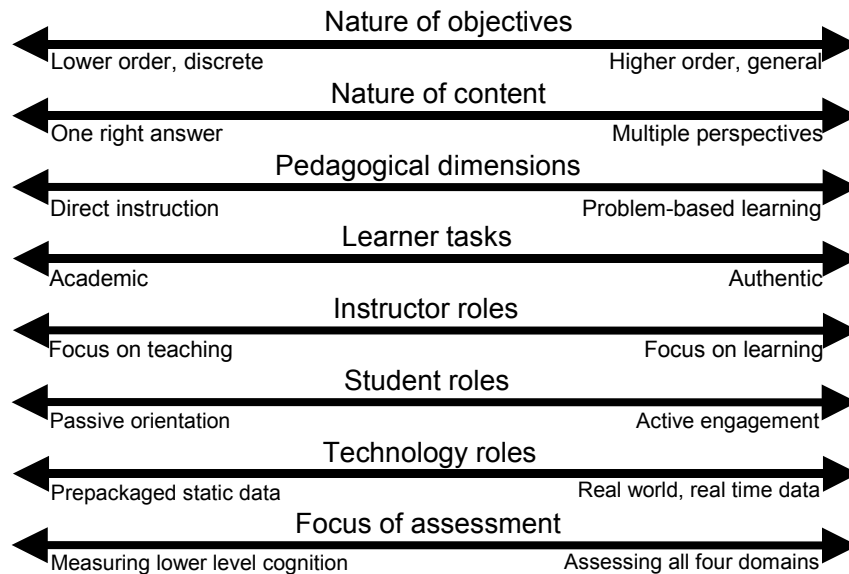Measuring lower level cognition   Assessing all four domains

Figure 7 illustrates the eight critical factors that must be aligned within a learning environment for it to be effective. Alignment cannot be over-emphasised. If an undergraduate course is designed based upon a constructivist learning theory (Fosnot, 1996), the remaining factors must be in alignment with the pedagogical design. A description of these factors follows:

1   Nature of objectives – the knowledge, skills, attitudes, and intentions that students should develop as a result of participating in the course. Objectives are ideally stated as measurable outcomes ranging from discrete knowledge (*e.g.*, students will be able to identify distinguishing properties of a phenomenon) to higher order thinking (*e.g.*, students will exhibit a robust mental model of related systems).

2   Nature of content – the information and data that encompass the subject matter to be taught, studied, and learned in the course. More often than not in undergraduate courses, content is presented in highly structured formats such as textbooks, but content can also be accessed in ill-structured, real-world formats such as original historical documents or scientific data from remote sensors.

3   Instructional design – the overall arrangement of activities, resources, structure, and procedures that an instructor designs to promote learning. Traditional instructional designs employed in higher education are focused on teacher talk (through lecture), static content (through textbooks), and fixed assessment (through tests seeking one right answer). While such designs are ubiquitous, as described above, the evidence

for the efficacy of traditional instructional methods is unacceptably weak. Alternative instructional designs include problem-based learning, project-based learning, authentic tasks, and service learning among others (Fink, 2003).

4   Learner tasks – the strategies used to engage students in meaningful learning activities. The NSSE studies (Kuh, 2003) point out that students are often inadequately engaged by traditional academic tasks such as writing term papers or cramming for multiple-choice tests of lower level cognitive knowledge. By contrast, there is great potential for undergraduate learners to be engaged by authentic tasks (Herrington and Oliver, 2000) such as conducting real world inquiry or service learning (Kezar, 2002).

5   Instructor roles – the learning support (sometimes called scaffolding) functions the instructor will provide while students are engaged in learning. Instructors accustomed to a didactic teaching approach wherein they deliver prepackaged information to students in the form of lectures and assigned readings may struggle with the necessity of allowing their students to grapple with the inevitable complexities of authentic tasks or service learning. Bain (2004) describes how the best teachers surrender some of their power as experts and become co-learners with their students.

6   Student roles – the active cognitive, psychomotor, affective, and conative (Snow *et al.*, 1996) interactions in which students will engage as they grapple with authentic tasks, dynamic content, peers, instructors, and other components of the learning environment. Students accustomed to more passive roles in the college lecture hall may initially resist the active requirements of constructivist pedagogy. The best learning environments often require collaboration and teamwork, and students who resist working in groups may balk. Resistance to changing roles may be especially strong among the students most often rewarded with high grades within the traditional teacher-text-test-centred pedagogy.

7   Technological affordances – the cognitive tools, visualisations, simulations, role-playing games, and other interactive resources provided by technologies such as computers with internet access. An affordance is the interaction possibilities posed by objects in the real or cyber worlds. Thinking of technology as a cognitive tool is an especially effective strategy in higher education (Jonassen and Reeves, 1996).

8   Assessment strategies – the methods used to estimate student accomplishment of the course objectives. Historically, this has been one of the weakest aspects of both traditional and innovative course design and implementation in higher education (Shipman *et al.*, 2003). In most undergraduate courses, assessment and grading are usually based upon multiple-choice tests or academic essays. In an authentic learning environment (Herrington and Oliver, 2000), assessment is based upon observations of student engagement and analysis of artefacts produced in the process of completing the tasks. Rather than using just one method, robust assessment requires the critical analysis of multiple forms of evidence that learning outcomes have been attained.

Failure to align these eight dimensions will undermine the successful design and implementation of an undergraduate course, regardless of whether it is offered in a classroom, online, or via a blended model. The efficacy of any one or a few of these factors cannot be evaluated in isolation from the others. Alignment is essential. If an instructor specifies higher order outcomes for a course, every effort must be made to assess those outcomes in the most reliable, valid, and feasible manner possible. If the learner tasks are appropriately complex and challenging, the instructor must assemble the necessary real world and technological resources to scaffold students as they strive to accomplish those tasks. Although in general higher education practice, innovative approaches to teaching are more the exception than the rule, there are good examples in the higher education literature of undergraduate courses where an appropriate level of alignment has been reached (Bain, 2004). But the weakest component of most designs is assessment, perhaps because both instructors and students are so accustomed to thinking of assessments in traditional ways.

7   Steps toward enhancing assessment in higher education

Better assessment and enhanced alignment in college teaching and learning will require a larger investment in assessment and evaluation than most institutions are expending at this time. For starters, administrators and faculty alike must distinguish assessment from evaluation. Although the terms assessment and evaluation are commonly used interchangeably, they have two distinct meanings. Assessment is defined as the activity of measuring student learning and other human characteristics such as aptitude whereas evaluation is focused on judging the effectiveness and worth of educational programmes, practices, and products. It may help to think that people are assessed and things are evaluated. Of course, the terms are often confused because the same data can be used for both assessment and evaluation. For example, final exams are commonly utilised to assess student learning in courses and provide the basis for grading. The same examination results, however, could be used in the evaluation of the effectiveness of a course, *e.g.*, if an institution wanted to compare classroom and online versions of the same course.

Enhancing assessment will also require higher education institutions to stop hiding the results of the few national and international evaluations in which they participate. Mathews (2005, p.57) points out that "most colleges participating in NSSE have refused to release the results of those surveys, preferring to use them for internal decisions on which courses need to be improved or dropped". This is a risky policy because as Kuh (2001, p.12) points out "Sooner or later, colleges and universities are either going to demonstrate what students are learning or some external entity will impose its own approach". Indeed, there is increasing discussion among legislators and policymakers at the federal and state levels in the USA of extending the assessment practices currently used in K-12 education under the 'No Child Left Behind Act' to undergraduate education (Spellings, 2005).

Fortunately, if institutions and their adherents sincerely wish to enhance how they conduct and use assessment, there is a body of knowledge that can help (Angelo and Cross, 1997; Huba and Freed, 1999; Wiggins, 1998). Assessment has many purposes in

higher education ranging from narrow, formative ones to broad, summative ones (Quellmalz and Kozma, 2003). Terenzini (1989) recommends that the development of student assessments should be guided by three major questions:

1   What is the purpose of the assessment, *e.g.*, formative (to provide information for helping a student learn) or summative (rendering a judgment of a student's achievement)?

2   What is the scope of the assessment, *e.g.*, a quiz administered to a single class immediately after a lecture, or an external assessment of the graduates of a university programme such as a bar examination for law students?

3   What is being assessed, *e.g.*, knowledge, skills, attitudes, mental models, or higher order thinking capacities?

Of course, additional questions must be addressed in any assessment activity related to issues such as reliability, validity, feasibility, and security.

Some faculty members may require assistance from instructional designers and assessment experts to free themselves from continuing to over rely on traditional assessments such as multiple-choice tests and term papers, but most can begin to make improvements in their assessment practices on their own or in small groups of faculty from the same or related disciplines. Excellent guidance is available in resources such as Angelo and Cross (1997) and Wiggins (1998). Angelo and Cross (1997, pp.7–11) describe the following important assumptions about assessment:

- The quality of student learning is directly, although not exclusively, related to the quality of teaching. Therefore, one of the most promising ways to improve learning is to improve teaching.

- To improve their effectiveness, teachers need first to make their goals and objectives explicit and then to get specific, comprehensive feedback on the extent to which they are achieving those goals and objectives.

- To improve their learning, students need to receive appropriate and focused feedback early and often; they also need to learn how to assess their own learning.

- The type of assessment most likely to improve teaching and learning is that conducted by faculty to answer questions they themselves have formulated in response to issues or problems in their own teaching.

- Systematic inquiry and intellectual challenge are powerful sources of motivation, growth, and renewal for college teachers, and classroom assessment can provide such challenge.

- Classroom assessment does not require specialised training, it can be carried out by dedicated teachers from all disciplines.

- By collaborating with colleagues and actively involving students in classroom assessment efforts, faculty (and students) enhance learning and personal satisfaction.

8   Conclusion

For the past 50 years, US higher education has been held up as the best in the world, but that ranking is increasingly being questioned both within and outside the USA (Bok, 2005; Hersh and Merrow, 2005). This is nowhere more evident than in the increasing global competition with respect to online learning (Katz, 1999; Pittinsky, 2003; Reeves, 2003). Technology is presenting higher education with opportunities for rapid and radical change, but decisions about making such changes may be made on the basis of politics or expediency rather than careful evaluation and rational decision-making (Reeves and Hedberg, 2003). Already some critics have suggested that universities and colleges may do well to 'unbundle' their assessment functions from their teaching roles (Baer, 2000; Paulson, 2002). It is clear that colleges and universities and their faculty members are being challenged as never before to answer the question "How do you know they are learning?" If nothing else, hopefully this paper will inspire its readers to address this question through better assessment and enhanced alignment of teaching and learning.

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