Designing an online in-house major field learning test
By: Gilda M. Agacer, Andreas Christofi, and Don Moliver
Leon Hess Business School, Monmouth University
West Long Branch, New Jersey 07764-1898

Perspectives

Assessing learning is a responsibility of every progressive learning institution and for many it is a mandate for maintenance of their program accreditation. This is especially true for private colleges and universities which must remain competitive in their curriculum development and instructional delivery. According to Palomba, Banta and Associates (1999), "Assessment is the systematic collection, review, and use of information about educational programs undertaken for the purpose of improving student learning and development."

At the heart of the Assurance of Learning (AoL) process are the two principles which constitute the foundation of most accreditation requirements: 1) accountability and 2) continuous curriculum improvement. AoL activities are ongoing and aim at improving both, student learning as well as the environment for learning. As such, learning assessment is an evolutionary process that shares a joint and congruent path with curriculum development, for the benefit of a systematic and holistic learning.

According to AACSB Standard 8, "Assurance of learning refers to processes for demonstrating that students achieve learning expectations for the programs in which they participate. Assurance of learning also assists the school and faculty members to improve programs and courses. By measuring learning, the school can evaluate its students' success at achieving learning goals, use the measures to plan improvement efforts, and (depending on the type of measures) provide feedback and guidance for individual students."

The purpose of this article is to outline the design and implementation of an in-house online assessment test with the goal of assessing learning as well as retention of such learning at the completion of a student's program of study. Even though we will use the development of an assessment test for a business program, the methodology can be applied to other areas and degree programs.

Since the process of assessing learning is part of a school's curriculum design and implementation, it must involve the entire faculty. In a recent article, Farmer and

Abdelsamad (2014) cited several reasons contributing to a business school's being placed on a sixth-year review, or commonly referred to as "deferment." One of these reasons is problems related to the School's AoL process; in particular "Faculty do not provide leadership and direct the AoL process. The Assurance of Learning Committee (AoL), the Curriculum Committee and the Chairs of the respective departments are purely facilitators of the faculty efforts to maintain a competitive and applied curriculum. Assessing learning is, without a doubt, a challenging endeavor and all schools can learn from sharing their experiences in designing, pilot-testing and implementing assessment processes and tools to accomplish such an undertaking. Here are some of the challenges that need to be kept in mind as the AoL process evolves:

- Does our mission support the overall University's mission?
- Are our learning goals and objectives congruent with the School's mission?
- Which learning goals should we assess during the current assessment stage?
- Were the results of a past assessment cycle incorporated into the current (or next) assessment cycle?
- Which means will we use to carry out our assessment?
- Where will we assess a particular learning objective?
- What constitutes a satisfactory level of accomplishment?
- How will we determine if we have achieved our intended outcomes?
- How often should we assess a particular learning objective?
- What is the best procedure in assessing a particular learning objective?
- How do we inform and motivate students to participate in our AoL process?
- How does faculty incorporate curricula changes in their syllabi and their pedagogy?
- How will we use the overall assessment results to improve and strengthen our curriculum?

As an evolutionary process, assurance of learning demands an incredible amount of collective effort and preparation to produce even a slight and meaningful outcome. As such, it requires thoughtful planning and organizing and most importantly, collective cooperation of faculty and students. In addition, it requires a resourceful management of information, gathering and storing of data, and a bit of providence. Unavoidably, technology is an integral part of the entire AoL process and it must be leveraged efficiently and effectively from the onset of the process. This is the thrust of our paper, to outline several attributes of an effective use of technology to achieve a meaningful AoL process. Such attributes include: the richness of the assessment database, the quality, flexibility and suitability of the test questions as determined by the entire

faculty, the effective storage and retrieval of information gathered with inter-temporal continuity and much more. Details, such as the order in which a student answered the questions, how much time he/she spent on each question, did they take it seriously or just skimmed through the questions, how did students with high versus low GPA perform, how did students in various majors and related attributes perform, are critical to a reliable and efficiently designed database.

In our School, we made it a priority to engage the entire faculty in the development and implementation of several in-house assessment tests dealing with multidiscipline learning, such as the MFLT, and discipline specific tests called departmental assessment tests. The primary reason for this endeavor was the fact that the ETS test was too long (consisted of 120 questions and required at least two hours) and it infringed on instructional delivery time. In addition, the test cost the School a considerable sum of money and it did not provide us with any meaningful or timely assessment statistics. Our online departmental tests were primarily designed to assess learning retention in the interim and at a later stage of the program and secondarily to acquaint our students with our online AoL assessment process on an ongoing and gradual way. By the time students in BM490 (the capstone strategy course) take the MFLT they would have progressively taken all the departmental tests and have been acquainted with our online AoL assessment process and survey objectives for strategic planning.
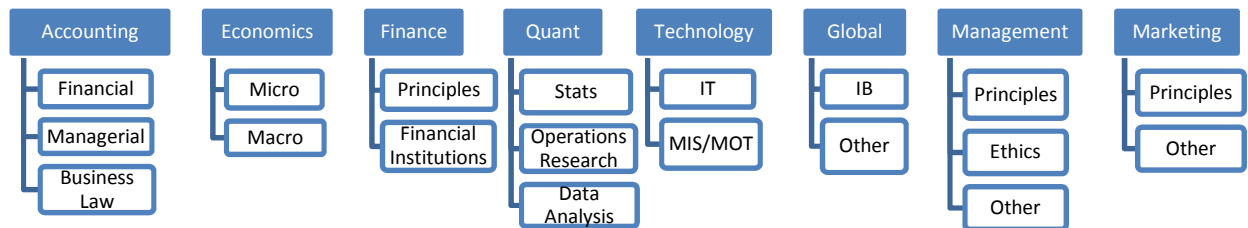
The need for home-grown tests is recognized by the entire higher education community and several schools have implemented a variation of what we are describing in this paper. In a related article, Martell (2005, p. 243) stated " Standardized measures can be quickly implemented, but can be relatively expensive and are not, generally speaking, as tied to the school's curriculum as are homegrown measures." This view is also supported by Hogan, Lusher, and Mondal (2012), who stated that "… a home-grown instrument can achieve acceptable reliability across two samples of university seniors and potentially yield valid and actionable information upon which universities can make decisions." Additionally, Benjamin (2012) asserted that although standardized tests are necessary, they are not adequate to assess learning and teaching in institutions with varied missions and visions, thus rendering comparisons of results meaningless." The fact that homegrown and formative or directly connected to coursework learning assessment tests are favored over standardized tests, was also stated by Berrett (2014), in a recent *Chronicle of Higher Education* article.

Design

The end result of a well-designed online assessment test should be to measure learning at the point of origin and retention of learning at the point of exiting the program of study. It should support the goals of the program but it should be designed to measure content. According to AACSB, Standard 9, "Curriculum content refers to theories, ideas, concepts, skills, knowledge, etc., that make up a degree program."

Inevitably, content is linked to objectives which lead to learning goals. Using the metaphor of travelling to a destination point, goal is the destination point and objectives are the steps (means) which lead to the destination. So, if the most general goal of a business program is to prepare graduates for business and management careers the objectives could be that students have acquired and retained certain core knowledge and skills upon completion of their business program. This is precisely what a well-designed assessment test should be able to measure and aid in the evaluation of the relevance of the curriculum in reaching the desired goal.

A typical list of core courses in a business program includes the following:

Accounting	Economics	Finance	Quant	Technology	Global	Management	Marketing
Financial	Micro	Principles	Stats	IT	IB	Principles	Principles
Managerial	Macro	Financial Institutions	Operations Research	MIS/MOT	Other	Ethics	Other
Business Law			Data Analysis			Other	

From the onset, the online assessment test must be designed to assess learning and retention of learning. As such, it must have the following attributes:

- **Consistency**
  Since these are core program courses, the database should include questions common to the departmental tests, where learning first occurs, and the capstone comprehensive Major Field Learning Test (MFLT), where retention of learning is intended to be assessed. These questions should derive from the respective course learning objectives and be linked to the overall program goals and objectives. The departmental tests may include more questions relevant to the course material but the database of the MFLT should be at most a subset of the departmental database. For example, suppose that a financial accounting test has a question on cost accounting that only accounting majors will build on

that concept throughout their program while other students may never hear about it again. Such question may not be appropriate for the MFLT.

- **Richness/Extensiveness**
  The database should have a sufficient number of questions to allow for randomization of the tests. However, the MFLT database should be a subset of the departmental tests and should only include questions which intend to assess retention of learning at the completion of the program.

- **Quality/Relevance**
  Ordinarily, the test will consist of multiple-choice type questions. Above all, the questions should be reflective of the learning goal(s) and objectives of the program but general in nature and of good quality. By quality we mean the design of the question, such as the phraseology, length, sensibility of choices. There are more than one ways to ask the same question and careful thought should be given to the design of the question. The best way to demonstrate our point is to provide some examples. First, let us take a look at some "bad" questions.

Bad questions:

Q. Managers:
a. manage
b. plan
c. control
d. all of the above

The question above does neither assess learning nor retention of learning. Ideally, questions should not include choices "all of the above" and never "none of the above." If "all of the above" is present, it is normally the default choice and if "none of the above" appears, it is normally irrelevant and redundant.

Below is another example of a bad question, using the "none of the above" option. A better choice would be "d. mode."

Q. After the data has been arranged from smallest value to largest value, the value in the middle is called the_____
a. range
b. median
c. mean
d. none of the above

Q. Which of the following is not one of the responsibilities in Carroll's four-part definition of corporate social responsibility (CSR)?

a. economic
b. social
c. legal
d. philanthropic

In the question above, the word "not" may be overlooked in the haste of reading the question and focusing on Carroll's definition of corporate social responsibility. We therefore recommend the word "**not**" (or "**not true**") appear as bolded and underlined. Also, while the question may be appropriate for a business ethics class, it may not be appropriate for retention of learning purposes, since it requires memorization of a name rarely used in subsequent courses in the program. Moreover, while Carroll discusses social responsibility, the word "social" while not explicit in his definition of corporate social responsibility, it is implicit. [Carroll, 1979]: "The social responsibility of business encompasses the economic, legal, ethical and discretionary expectations that a society has of organizations at a given point in time."

The question below involves extensive terminology on financial statements but it may not be appropriate for assessing learning or retention of learning. However, it may be useful for assessing math skills and, to some extent, reasoning and critical thinking.

Q. A firm shows $50 as Net Income in their Income Statement of which 98% was from normal operating activities and the remaining from non-operating activities. The firm noted that this year's Net Income from operating activities was 50% lower than last year's Net Income from operating activities. What was last year's Net Income, if non-operating income was the same for both years?

a. $50
b. $98
c. $100
d. $99

However, the question below may be appropriate for retention of learning, since the concept of marginal product is assumed to be applied throughout the entire program, including the capstone course.

Q. The production of pizzas (Y) as more workers are hired (X) for the first two workers is given below:

Workers	Pizzas
1	5
2	?
.	.
.	.
.	.

If ΔY/ΔX = 4 (Δ means "change"); what would the missing number in the table above for Worker 2, under Pizzas?

  a. 10
  b. 9
  c. 5
  d. 4

Here is a fair and clearly stated question which was answered correctly by only 42.02% of the students. As many who teach Accounting or Finance know, the statement of cash flows is always a challenge for students. Clearly, this is an area where instructors need to allow more time lecturing and show improvement in subsequent assessment tests.

Which of the following statements is **CORRECT**?

In the statement of cash flows, a decrease in accounts receivable is reported as a use of cash.	19	(15.97 %)
Dividends do not show up in the statement of cash flows because dividends are considered to be a financing activity, not an operating activity	29	(24.37 %)
⇒ In the statement of cash flows, a decrease in accounts payable is reported as a use of cash.	50	(42.02 %)
In the statement of cash flows, depreciation charges are reported as a use of cash.	12	(10.08 %)
In the statement of cash flows, a decrease in inventories is reported as a use of cash.	9	(7.56 %)

- **Reasonableness/Practicality/Timeliness**
  The MFLT, by nature, is a comprehensive test and it is given at the end of the program where "senioritis" is common to students. For better participation and best results, break the test into parts (at least two). The Bloomberg Aptitude Test (BAT) is a two-hour test and covers 100 questions. A two-hour test is hardly motivating for students to take, let alone give it serious consideration. Moreover, the MFLT is not an IQ test; it is a "retention of learning" test. Also, since it is a comprehensive test which intends to assess learning from earlier stages of the program, it will be wise to make it available before final exams period; schedule it right after mid-semester but at least one month before finals.

- **Faculty and student engagement**

  Faculty should be partners in the design and implementation stages. Communicating the importance of the assessment test to students along with a merit reward system is critical. Faculty should convey to students the importance of assessing learning for improving their courses and the overall program/curriculum. Also, the significance of the accreditation implications should be emphasized.

  If possible, a third person (AoL Committee liaison) visits the classroom and presents the test to give the proper signal to students that the test is special and it is designed to help their program and ensure reaffirmation of accreditation.

  The above notwithstanding, instructors may find it advantageous to reward students for their effort and feedback by offering performance-based bonus points. Never offer participation points for simply taking the test. Students will be tempted to sign in, randomly check some answers and never give the test a fair attention. As such, results become meaningless for assessing learning. Suggested formula:

  Assuming 50% is the cutoff point of rewarding students with 5 points as the maximum performance points:

  Bonus points = $\max\{0, (\text{test score}-50)/50\} \times 5$

  This will yield (with fractional points in between):

Test score	Bonus points	Test score	Bonus points
100	5	70	2
90	4	60	1
80	3	<50	0

  A performance-based reward system does not imply that information for students scoring below 50% is not useful. To the contrary, assuming no skimming, such feedback is extremely useful. This is especially true when the performance of such students is linked to their major, or GPA, or course section.

  A more detailed discussion on motivating faculty to participate in learning assessment can be found in Martell (2005) and Sujitparapitaya (2014).

- **The ultimate test of the MFLT**
  In a well-designed test the performance of the students should be highly correlated with their GPA, indicating that students take the test seriously even though good students often do not need the extra credit. This feature is verified after pilot-testing the test.

MFLT SCORES BY GPA

Spring 2013	GPA 1.9 to 2.48	GPA 2.49 to 2.9	GPA 3 to 3.49	GPA 3.5 to 4
MFLT score	56.51	62.55	66.53	70.47

The test should have auto save feature at the end of every page or every so many answers. The reason for this is to have a log of student activity during test; such as, time spent per question, times visiting the same question, sequence of answering the questions, etc. Also it is a safety feature in case of a system crash.

- **Other attributes and suggestions**

Confidentiality is of utmost importance. The test should not be used for promotion and tenure decisions or any form of faculty evaluation.

Include a statement in all syllabi on "Assurance of Learning" describing the purpose and significance of the School's program accreditation, learning assessment and curriculum improvement.

Assign a contact person with e-mail address for mishaps and legitimate resetting of student attempt.

The options below, will allow weeding out "skimmers." In the example shown below, since the student score was 35% and the time spent was 12 minutes while the average time spent by all students was 30 minutes for 20 questions, the student may be labelled as a "skimmer." In that case, you may choose to reset the student's attempt and request that s/he retake the test, assuming the student had a legitimate explanation, or omit it from the calculation of test statistics.

Attempts with score: <= | 50 %

Timing
Time Limit: 0:40:00 (enforced)
Grace Period: 0:05:00 before being graded as late
Time Spent: 0:12:00

Grading Feedback

Auto-Grade
Final Score *
35 / 100

The test should be first pilot-tested before it is used for curriculum consideration. Unavoidably, even after careful consideration of all the issues mentioned here, there will be plenty of slip-ups and oversights which will require attention and tweaking. Even though it is tempting and logistically quicker to address these concerns in a committee setting or some administrative level, it is recommended that the results are disseminated to the entire faculty and engage as many faculty members as possible so as to legitimize faculty ownership of the test.

Conclusion

The concept of homegrown formative or directly connected to coursework learning assessment tests has gained popularity in recent years. Several reasons are cited for their partiality over standardized tests, such as costs, storage and access to information, flexibility and most importantly, their uniqueness in linking them to the school's curriculum. A recent article in *The Chronicle of Higher Education* stated that "professors have become more interested in tools that allow them to standardize their assessment of their students' performance on homegrown assignments instead of using outside tests."

Our paper provides some critical attributes of an online homegrown assessment test, which we labelled Major Field Learning Test (MFLT). These attributes are also valid for departmental tests, directly connected to coursework which makes up the MFLT. Our motivation was to assist other schools endeavoring to develop online in-house tests and add to the forum of exchange of ideas of assessing learning, in general. Even though several schools have gone through the tedious process of developing such tests, there is very little discussion in the literature to assist other schools struggling with this idea.

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