

**A Diagnostic Test and Follow-up Survey: A Practical Assessment Tool**

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## The Test: Implementation, Content, and Purpose

Despite notoriously low attendance, Le Moyne College schedules classes for the Monday and Tuesday of Thanksgiving week. So I do not take attendance that week and usually search for an activity (semester project or guest speaker) that does not cover new lessons. But in 2004 I decided to try something different by conducting an experiment. On the Wednesday prior to Thanksgiving week, I informed my Intermediate 301 class that I would be giving a diagnostic exam during the last class before their holiday break. I explained that the exam would cover the accounting cycle and that I did not expect them to prepare. Twenty-nine students (out of a total population of forty –three) came to class that day at either 3:30 PM or at 5:30 PM.

The diagnostic exam consisted of forty multiple choice questions taken from the Spiceland *Intermediate Accounting* text book chapter two test bank (3<sup>rd</sup> edition, Irwin McGraw-Hill). Students also got a one page nine question survey form which I asked them to complete upon finishing the diagnostic test. I used the final thirty minutes of class time to go over the correct answers. Students turned in the testing instrument. But to facilitate the feedback process, I provided them with a separate answer sheet to keep so they could recall their responses when I placed a blank test on the classroom overhead. When students came back from Thanksgiving break, I returned to them their actual corrected test.

Why assess knowledge of the accounting cycle? Because two months had passed since the individual chapter on the accounting cycle had been covered in class. I wanted to investigate if general conceptual lessons get lost while students study more intricate chapters on specific issues like cash, accounts receivable and inventories. Also from a practical perspective, I thought that a relevant review class makes a great deal of sense in a pre-holiday situation where absence rates would be extraordinarily high.

### MY OBSERVATIONS

1.	In spite of the fact that students did <i>not</i> prepare for the diagnostic exam, the median score of 70% correct answers was similar to my experience when I give an exam that counts toward the final grade.
2.	Diagnostic exam yielded more questions (nine) where students performed superbly versus four questions where performance was substandard.
3.	The top three incorrect answers involved topics either referred to sparingly or totally ignored during the first teaching unit in <i>Intermediate Accounting</i> .
4.	30% of the forty questions asked involved calculations. Of the seven questions where students performance was the worst, three (43%) involved calculations. Students performed best on seven questions that involved no calculations at all.
5.	When removing the four best and worst performing questions, the “calculation” type questions performed marginally better as a group, while the “concept” questions performed marginally worse as a group.
6.	In the survey, students gave strongest agreement to statement: “I intend to pursue the Accounting major all the way to graduation”.
7.	While students did not strongly agree that they “did well on the test”, they did strongly agree that the “test was a good experience”, and that it “helped (them) understand Accounting basics that (they) need to know”.

8.	Class <u>not</u> in relatively strong agreement that the major course projects of a case study and reading the Wall Street Journal helped them to take the test.
9.	Class strongly agreed that the “test was a good experience” and that “Thanksgiving week is a good time to take a diagnostic test”.
10.	Only four students surveyed were not confident that they would earn a final grade in excess of a “C+”.

<b>(See Exhibit 1 for DIAGNOSTIC TEST RESULTS)</b>
<b>(See Exhibit 2 for SURVEY RESULTS)</b>

**Relevant Assessment Literature Related To My Observations**

In a 2003 article in *BizEd* titled “The Learning Curve”, Peter Ewell stresses the benefits of embedded assessments. He explains that unlike other older assessment techniques, embedded assessments are (1) given within the standard curriculum and (2) provide an opportunity to evaluate the class “as a whole”. My diagnostic exam meets these two norms and with the follow-up survey, provides an atmosphere where students understand that the exercise is a serious one (Observation #7). Ewell maintains that students don’t take assessment activity seriously when given outside the curriculum.

Ammons and Mills (2005) shared their experiences with selecting course-embedded assessment methods. Of particular relevance to this report are these comments:

Assessment results at the course level can provide information to individual students about their learning, and can lead to changes in classroom activities, assignments, and grading methods. Thus, the course is an ideal level at which outcomes assessment can create a feedback loop on the quality of learning experiences within an accounting program.. Then assurance of learning results at the course level can also flow upward to support program-level assessment and can provide evidence regarding the contribution that an individual course makes to a related learning goal of the program.

As Ewell (2003) also noted, Ammons and Mills (2005) contend that course-embedded assessments improve student motivation to do their best during the evaluation process, with the additional benefit to them of quick feedback. (As to motivation levels of students in this study see Observations #6 and #10.) My diagnostic test qualifies as a course level assessment. Students did get quick feedback, specifically the day of the test. While the diagnostic test did not count towards the final grade calculation, the results from the consecutively administered survey in my opinion confirmed that the students did indeed take the diagnostic exam seriously (Observations #1 and #10). As a direct assessment method, Ammons and Mills (2005) assert that objective examinations “may be a good choice...when the outcome of interest is the demonstration of knowledge acquisition.” Therefore the use of forty multiple choice questions on my diagnostic test appears to be an appropriate method to test knowledge of the accounting cycle.

Akers, Giacomino and Trebby (1997) detailed the Accounting Department assessment process at Marquette University. The first step involved developing six (for them) intended student learning outcomes. What is relevant to my diagnostic test is their “SOISO #4 – Accounting graduates should possess the technical accounting knowledge necessary to obtain an entry-level accounting position”. By testing the fundamental accounting cycle, my diagnostic exam was consonant with Marquette’s fourth intended student learning outcome. Would a student be ready for an entry-level job without a working knowledge of the accounting cycle? Motivated students (Observation #6) bought into the premise (Observation #7).

In explaining how Kansas State University restructured its Accounting curriculum, Ainsworth and Plumlee (1993) incorporated the format for an assessments plan. By developing statements of intended student learning outcomes in the initial restructuring phase, KSU came to a curriculum objective of “To provide accounting students with sufficient technical and professional knowledge to form the foundation for a successful career in accounting”. Ainsworth and Plumlee (1993) expounded “we want our students to understand that accounting is an information discipline based on notions of capturing, controlling, and reporting information to interested parties”. As I see it, Ainsworth and Plumlee eloquently explained the importance of the accounting cycle (the goal of my diagnostic test) within the context of the conceptual framework as to who uses the information. Not only do these two KSU professors validate my diagnostic test’s objective, but they also ratify the objective question assessment technique. They write: “The lecture method of teaching, with objective testing, is very appropriate for lower-level classes where knowledge and comprehension are the desired cognitive objectives and professional skill development is not critical” (Ainsworth and Plumlee 1993). While the Intermediate I course should not be classified as a lower-level class, the accounting cycle lesson is essentially a review one to summarize and establish the learning that should have taken place in the sophomore course(s). Therefore, the multiple choice diagnostic test would be appropriate to establish a fundamental knowledge base from which to progress to professional skill development.

Kimmell, Marquette and Olsen (1998) surveyed a group of 300 schools, 200 of which had AACSB accreditation. Survey goals included determining assessment methods used. They reported that “pass rates on certification exams” ranked fourth in usefulness out of eighteen potential measures with 67.6% of respondents collecting that information. As the CPA exam looks to the AICPA for sponsorship, my diagnostic test was also established by an external agency, Irwin McGraw-Hill. While the CPA exam uses a great deal of objective questioning, my diagnostic test exclusively used objective questions. In addition, Kimmell et al reported that “scores on major field tests” ranked sixth (out of 18) in usefulness with 36.2% of respondents collecting that information.

Stivers, Campbell and Hermanson ((2000) share assessment lessons learned from the design and implementation of an Accounting assessment program at Kennesaw State University (GA). Of the eighteen points given, the applicable five are:

1. Be specific in stating learning outcomes. Developing general learning outcomes, such as “accounting knowledge”, makes it difficult to evaluate specific competencies.

2. Plan to use multiple measures to capture different aspects of your program over time.
3. Focus on group results rather than individual student results. A group focus allows you to capture and understand your program strengths and weaknesses without incurring the additional cost (in time and money) to focus on individual students.
4. Nationally averaged standardized tests may not meet your needs.
5. Scheduling exams can be difficult. Students may not be willing to take time outside of class and faculty may not be willing to give up class time for assessment.

In regards to the five points listed above, I can relate my experience to that of the authors. Diagnostic test focused specifically on the accounting cycle which overcomes problems with setting a too general outcome (1). The objective test and the survey were multiple measures (2). I developed results by each test question thus focusing on group results (3) (i.e., students performed superbly on nine questions, below standard on four others – see Observation #2). A national standardized test was not necessary (4) as I used a text test bank. By using down time in the semester, a holiday week, I avoided scheduling difficulties (5). (In the survey, class strongly agreed that the “test was a good experience” and that “Thanksgiving week is a good time to take a diagnostic test” – see Observation #9.) Also, I did not give up teaching time (5) since I developed a review lesson with an assessment angle. Survey indicates that the exercise was an effective one since students strongly agreed “test was a good experience”, and that it “helped (them) understand Accounting basics that (they) need to know” – see Observation #7.

## Conclusions

The diagnostic test and follow-up survey were a wise use of slack class time. Students agreed that lessons about the accounting cycle were basic ones that they needed to know (Observation #7). Plus they agreed that the diagnostic test helped them measure their learning progress during the semester (Exhibit #2 Question #3). By using this time wisely the professor discovered that the accounting cycle lesson retention rate was 70% which mirrored historical class averages on multiple choice questions given on a unit exam where students prepared since test affected final course grade (Observation #1).

Observations #3, #4, #5 and #8 apparently relate exclusively to the personal pedagogy of the instructor because no connections were made with relevant assessments literature. This conclusion supports the notion that learning outcomes are not dependent upon any individual pedagogical practices. Observation #8 provides validity to this study as the major course projects were designed not to facilitate any one accounting lesson like the accounting cycle. Rather, the case study and the *Wall Street Journal* project were assigned to promote professional skill development in the areas of analytical thinking and communication. These skills represent other appropriate student learning outcomes that should be measured in ways other than objective tests. The fact that the students did not see a connection between major course projects and the accounting cycle topic indicates that they answered the survey truthfully and not in a way that they might have anticipated that the professor would like to see them respond.

A diagnostic test is an excellent example of a course-embedded assessment tool. The diagnostic test legitimately used class time by providing an authentic review lesson of a topic, the accounting cycle, that is relevant part of an outcome assessment such as: “to provide accounting students with sufficient knowledge to form the foundation for a useful career in accounting”(Ainsworth and Plumlee, 1993). This connection to a student’s career further compounds the effectiveness of the time invested to establish and complete this test and follow-up survey exercise. With AACSB and regional accreditation bodies like Middle States either explicitly or implicitly adopting outcomes assessment, a diagnostic test represents a classroom-useful approach to a necessary requirement that educational institutions justify their use of individual and state resources.

The data observed and reflections made upon it presented in this report (like the crucial one just made in the above paragraph) support the statement made by Ammons and Mills (2005) that: “assurance of learning results at the course level can also flow upward to support program-level assessment” by providing “evidence regarding the contribution that an individual course makes to a related learning goal of a program”. Establishing such evidence represents the ultimate practicality of a diagnostic test within the confines of a finite semester. Simply stated, outcomes assessment can be accomplished within legitimately structured and appropriately timed review in-class exercises embodied within a diagnostic test and follow-up survey.

## REFERENCES

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**EXHIBIT 1**  
**(Parts A, B, C & D):**  
**DIAGNOSTIC TEST RESULTS**

**A. Median Score was 28 Correct Answers; Mean Score was 27.79 Correct Answers**

Range of incorrect responses	questions within the range
15-19	4
10-14	12
5-9	15
Less than 5	9
Total Questions Asked	40

**B. Questions with an Extreme Number of Incorrect and Correct Responses**

Total Wrong	Question Number	Question Category	Question Topic Description
19	33	Calculation	Cash flows (net) from operating activities
18	24	Example	Deferral – expense AJE (income statement approach)
18	32	Calculation	Accrual accounting income from cash basis records
15	8	Example	Permanent accounts (negative approach)
14	1	Example	External Events (negative approach)
14	7	Example	Permanent accounts (negative approach)
14	39	Calculation	Revenue earned – cash collections to unearned a/c
3	12	Concept	Accrual accounting and the need for adjusting entries
3	18	Example	Adjusting entries (negative approach)
3	26	Example	Deferral – revenue AJE (balance sheet approach)
1	13	Concept	Prepayments – cash flows before expense recognition
1	23	Example	Perpetual inventory – JE to record purchases
0	15	Example	Contra Account – accumulated depreciation
0	17	Concept	Closing entries – final transfers to owners' equity

**C. Incorrect Responses to All 40 Multiple Choice Questions**

Question Category	Total Questions In the Category	% of total	Total Incorrect Responses	% of total
Calculation	12	30%	141	41%
Concept	11	27%	60	17%
Example	17	43%	147	42%
Total	40	100%	348	100%

**D. Analyzing Incorrect Responses by Removing the Four Best and Worst Performing Questions**

Question Category	Total Questions In the Category	% of total	Total Incorrect Responses	% of total
Calculation	10	31%	104	38%
Concept	9	28%	59	21%
Example	13	41%	113	41%
Total	32	100%	276	100%

**EXHIBIT 2: SURVEY RESULTS**

Statement	<i>Neither Agree nor Disagree</i>					Mean	Std. Dev.
	<i>Strongly Agree(1)</i>	<i>Agree(2)</i>	<i>Disagree(3)</i>	<i>Disagree(4)</i>	<i>Strongly Disagree(5)</i>		
1. Test was a good experience	7	21	1	0	0	1.79	.48
2. Test helped me understand Accounting basics that I Need to know.	12	17	0	0	0	1.59	.49
3. Test helped me measure the Progress that I made this Semester in comprehending Financial Accounting.	8	17	4	0	0	1.86	.63
4. Gateway Hardware case gave me background that helped me take this test.	6	10	8	4	1	2.45	1.07
5. Wall Street Journal project gave me background that helped me take this test.	1	1	15	10	2	3.38	.81
6. My final grade for this course will exceed "C+".	12	13	4	0	0	1.72	.69
7. The Thanksgiving week class is a good time to take a diagnostic test.	11	12	5	1	0	1.86	.82
8. I did well on this test.	3	12	11	3	0	2.48	.81
9. I intend to pursue the Accounting major all The way to graduation.	22	6	0	1	0	1.31	.65