INTEGRATING ASSESSMENT OF STUDENT LEARNING INTO THE ACCOUNTING AND FINANCE CURRICULUM: A COURSE-EMBEDDED TECHNOLOGY PROJECT

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The new AACSB Eligibility Procedures and Standards for Business Accreditation (AACSB 2007, http://www.aacsb.edu/standards.asp), approved in 2003 and fully implemented in 2005, explicitly recognize the importance of assessment of student learning in the continuous improvement of the curriculum in its Assurance of Learning Standards. This change in the Assurance of Learning Standards requires all business schools (those currently accredited by AACSB and those seeking initial accreditation) to adapt their assessment activities to meet the new standards.

In response to the new Assurance of Learning standards, we have developed a capital budgeting project appropriate for cost accounting, intermediate accounting, or financial management courses to assess students’ ability to use technology appropriate to their discipline.

CURRICULUM AND ASSESSMENT

AACSB Standard 15, Management of Curricula, requires that schools use systematic processes to develop curricula. Standard 15 states that the use of information technology is important in both general knowledge (use of information technology) and management-specific (how information technologies influence organizations and the role of management) curriculum areas. Professional organizations, such as the American Accounting Association (AAA) and the National Business Education Association (NBEA) have also incorporated the importance of technology into their position statements. In 1995, the Accounting Education Change Commission (AECC) and the AAA published a position paper titled “Intentional Learning: A Process for Learning to Learn in the Accounting Curriculum” that outlines the skills and knowledge necessary for accounting professionals of the future. This paper discusses the importance of developing competency in Information Development and Distribution Skills that include: 1) Understanding the role of information technology in business, 2) Ability to plan, implement and evaluate an information system, and 3) Applying programming skills to business problems (http://aaahq.org/aecc/intent/1_1.htm). The NBEA states in their Policy Statement 63 that beyond the knowledge obtained via classroom experiences, students must develop technological competence and skills to gather, create, and analyze data to produce usable information (http://www.nbea.org/curriculum/no_63.pdf).

Because the use of technology in the business environment is a key outcome for business students, our assessment plan includes a learning goal concerning the use of technology: students are to effectively use technologies appropriate to their discipline or major area. Our school’s departmental assessment committee surveyed accounting and finance faculty in the school and found that all faculty felt overwhelmingly that accounting and finance students should be able to demonstrate proficiency in using Excel spreadsheets when they graduate from college.¹

¹ There are several other technology applications that are relevant to accounting and finance students, including Power Point, Access (or other databases), and statistical programs such as SPSS or SAS. The use of these technologies can be assessed using different types of assessment tools.
AACSB Standard 16, Undergraduate Learning Goals, requires that schools employ
direct measures of assessment (including standardized exams, written assignments, oral
presentations, computer projects, simulations, and other projects) for their learning goals to
provide evidence of student learning. The instructor can embed the assessment within existing
courses using current assignments and projects that lead to assessment that is tied directly to the
curriculum. Because the project assessed is also part of the course grade, student motivation to
do well on the project is high.

The capital budgeting project described in the next section is a method of direct, course-
embedded assessment. The project is assessed (and graded by the instructor for part of the
course grade, if desired) using a rubric designed to evaluate the students’ work. The results of
this evaluation are used to provide feedback to students regarding the quality of their work, to
provide useful data for assessment of the curriculum, and ultimately to improve the curriculum.

THE PROJECT

The assignment used for assessment of students’ ability to use technology appropriate to
their discipline is one that involves using capital budgeting techniques to forecast cash flows for
two mutually exclusive projects; to calculate the NPV, IRR, and MIRR for each using formulas
and built-in Excel functions’ and to determine which (if either) project is acceptable. Students
are then asked to answer some what-if types of questions, where they are to determine how
changes in some of the key input variables affect the projects’ NPVs. Students also create a
sensitivity analysis with graphs and use Scenario Manager to conduct a scenario analysis to
determine the risk of the project. The results of scenario analysis are used to adjust the project
hurdle rate for its risk level if necessary. Students are asked to create and interpret an NPV
profile for each project. Finally, they determine the optimal capital budget for the company
using the Solver feature. \(^2\) Exhibit 1 contains the assignment. \(^3\)

RUBRIC DEVELOPMENT AND USE OF THE ASSIGNMENT FOR ASSESSMENT

Many different methods for scoring and assessing this assignment exist. The rubric we
used to assess this assignment was developed using primary trait analysis, by which a list of the
criteria by which the project will be assessed is developed. This rubric identifies three
benchmarks for each trait—very good (3), good/satisfactory (2), and poor/unsatisfactory (1). For
each criterion, the student’s spreadsheet is rated 3, 2, or 1 and the ratings are totaled to determine
the student’s score on the project. The instructor and the Assessment Committee determine the
appropriate cut-off score for competent performance. (See www.csufresno.edu/cetl/assessment,

\(^2\) The project and rubric have been used successfully in an Advanced Financial Management
course.

\(^3\) If the school has a learning goal to measure accounting or financial knowledge or acumen; this
assignment can be used as an assessment instrument. Additionally, students could be asked to
make an oral presentation based on their results, for which their Power Point skills could be
assessed.
and http://webquest.sdsu.edu/rubrics/rubrics.html for more information about primary trait analysis and rubric development.) This rubric is found in Exhibit 2.

Students complete the assignment and submit their solutions to the instructor electronically for grading. The instructor grades the assignments and gives the grades and rubrics to the assessment committee. The committee analyzes and summarizes the results to determine if the learning outcome is met. If the committee finds any areas (traits) where students in general do not have adequate skills, they meet with the curriculum committee to determine how to address the problem area(s) in the general computer concepts course all students take or whether the issue may be more accounting-specific or finance-specific and changes should occur within the curriculum. The key to effective assessment is using the information learned from assessment activities and using them to improve student learning (closing the loop).

SUMMARY AND CONCLUSIONS

Assessment of student learning outcomes is a critical component of continuous improvement of the business curriculum and is required by AACSB in its Assurance of Learning Standards. This paper describes a project that can be used as a course-embedded, direct assessment of student learning in cost accounting, intermediate accounting, or financial management courses. The process for using the project for assessment purposes, including the development of a rubric to assess the project is also discussed.
REBEW FARMS (Farm) is looking to replace two older tractors. You have been asked to assist them in making the decision on their options. You need to analyze whether the Farm should purchase two new tractors or one larger tractor. Under the first option (A) the Farm can purchase the two new tractors for a total of $215,000 with an additional cost of $5,000 to install tracks and $5,000 to ship. Under the second option the one larger tractor will cost $210,000 delivered. Under either option the Modified Accelerated Cost Recovery System (MACRS) 3-year property class will be used to set the depreciation schedule. Under either purchase option there will be an increase in inventory of $10,000 and an increase to accounts payable of $5,000. The old tractors have been depreciated to a zero book value and can be sold for $20,000 each. The Farm’s marginal tax rate is 25% and the Farm’s cost of capital is 11%.

Option (A)
The two new tractors will increase the Farm’s before-tax revenues by $50,000 per year. The tractors will increase fuel costs by $5,000 per year but decrease labor costs by $10,000 per year. These tractors will be used for 5 years and then sold for an estimated total value of $40,000. If the two tractors are purchased, then both old tractors will be sold.

Option (B)
The large tractor will increase the Farm’s before-tax revenues by $35,000 per year. The tractor will increase fuel costs by $6,000 per year and decrease labor costs by $20,000 per year. This tractor will be used for 5 years and then sold for an estimated total value of $84,000. One of the two older tractors will be retained to give the Farm some flexibility.

1. Determine the incremental changes in the cash flow for both options (all of your work should be completed using a spreadsheet).

2. Analyze this base-case information by calculating the Payback Period, Net Present Value (NPV), Profitability Index (PI), Internal Rate of Return (IRR), and the Modified Internal Rate of Return (MIRR) for both options.

3. Using the information that has been completed thus far determine the acceptability of the options. Explain which, if either, option you would choose and why you made the decision you did.

4. The Farm would like you to perform a “what if” analysis. Management is concerned about high fuel prices and wants to pursue options to reduce overall costs. Assume that the large tractor (Option B) can be adapted to burn renewable fuel at an initial cost of $10,000. This will result in no increase in fuel costs. This option is not available for the smaller tractors (Option A). Now, calculate the NPV, IRR, and MIRR. Using this new information, determine the acceptability of the options. Explain which option you would choose given this new alternative.
5. The Farm would also like you to conduct a sensitivity analysis to determine the sensitivity of the projects’ NPVs to changes in revenues, fuel costs, labor costs, and the cost of capital. Set these variables’ values at 10% and 20% above and below their base case values for each option. Include a graph in your analysis. Given the results of your sensitivity analysis, which option appears riskier?

6. Now the Farm wants you to conduct a scenario analysis using the Scenario Manager in Excel. It has been determined that the revenue estimates are accurate to ±10%. It is assumed that there is a 30% probability of the best-case revenue, 40% probability of the base-case conditions and a 30% probability of the worst-case conditions. The Farm would like to know the expected NPV, standard deviation of NPV, and coefficient of variation of NPV for both options. The Farm has added 2% risk premium to the cost of capital to any project that has a coefficient of variation greater than .50. If this is true for either or both of these options what is the effect on the NPV(s) and on your choice of options?

7. Create an NPV profile chart for Options A and B. Indicate the exact crossover rate for these projects. Explain the significance of the crossover rate for firms choosing between mutually exclusive projects.

8. The Farm has the following list of capital investments that are being reviewed. The Farm has a limited Capital budget for the coming year of $550,000.

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>A New Tractor(s)</td>
<td>$200,000</td>
<td>Option A or B (base case above)</td>
</tr>
<tr>
<td>B New Air-Seeder</td>
<td>150,000</td>
<td>$25,000</td>
</tr>
<tr>
<td>C Cultivator</td>
<td>125,000</td>
<td>33,000</td>
</tr>
<tr>
<td>D Grain Bin</td>
<td>300,000</td>
<td>62,000</td>
</tr>
<tr>
<td>E Grain Bin</td>
<td>175,000</td>
<td>45,000</td>
</tr>
<tr>
<td>F Combine</td>
<td>275,000</td>
<td>46,000</td>
</tr>
</tbody>
</table>

9. Using Solver, determine which of the projects should be included in the capital budget if the Farm's goal is to maximize the owner wealth. Make sure to set the Solver options to Assume Linear Model.

10. Now assume that the Farm has informed you that projects D and E are mutually exclusive, but that one of them must be selected. Show in Solver the constraints for this new information and the new solution.

11. Given the constraints of grain bins, the Farm has also added the fact that the Combine purchase is of strategic importance to the Farm's survival. Show the change to the solution based on this new constraint.
EXHIBIT 2
ASSSESSMENT RUBRIC
CAPITAL BUDGETING ASSIGNMENT

Intended Outcome: students will effectively use technologies appropriate to their discipline.

<table>
<thead>
<tr>
<th>Performance Area</th>
<th>Very Good</th>
<th>Good/Satisfactory</th>
<th>Poor/Unsatisfactory</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spreadsheet Design/</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formulas/Functions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Cash Flow Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision Methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPV Profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solver</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Our assessment committee and the course instructor determined that a score of 18/24 (75%) or above indicates that student has performed at a satisfactory/competent level. Each implementing school would determine the cut off point for competent performance.