The Income Tax Return: A Framework for Engineering Economics

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Abstract Statement

This paper will explore the use of the income tax return as a capstone project in an Engineering Economics course.

Introduction

As educators, we are faced with the task of connecting textbook theory to real-world application. In Engineering Economics courses, the income tax return is the ideal way to tie together all 'engineering economics' topics while, at the same time, demonstrating the practicality of the course topics. 'Engineering economics' courses have an overarching goal of analyzing the economic aspects of engineering and industrial projects. Focus is on decision making. Typical topic coverage includes the following components.

- capital budgeting
- Project cost estimation
- Break-even analysis
- Depreciation
- Taxation

Each of these concepts can be reinforced through the study of the individual income tax return, and the process allows for thought-provoking pro-forma decision analysis. This paper will explore all aspects of this Kansas State University student project, while giving practical advice in implementing its use in other university 'engineering economics' classrooms.

Student Needs and Project Objectives

An income tax return project utilized in the undergraduate Engineering Economics course at Kansas State University originated to meet three objectives.

- Create students' awareness of the federal income tax system and reinforce their responsibilities as U.S. taxpayers.
- Demonstrate the tax implications of business investment transactions.
- Provide for students a framework that binds all topics covered in the engineering economics course.

After teaching the course for the first time, the instructor found there was a need for such a project. She found a majority of students enrolled in the engineering economics course were interested in someday owning their own businesses. These traditional-aged college students

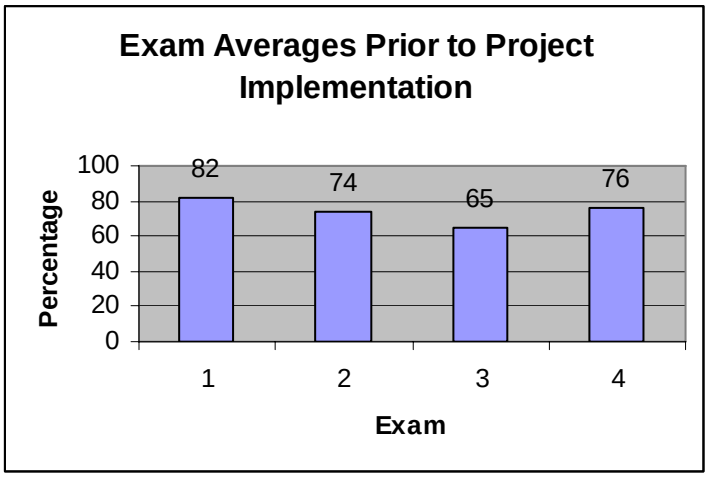
lacked life experience, though, and were unaware of critical small business issues, such as taxation. The students, having been taught the importance of treating the federal government as a partner when analyzing potential investments and ventures, would be more likely to have profitable future business endeavors.

According to the Internal Revenue Service, 40% of American taxpayers are out of compliance with the income tax code. Additionally, sole proprietors in the trade finance and service sectors have a negative impact on tax filing compliance.(1) Additionally, in testimony before the National Commission on Restructuring the Internal Revenue Service, Lynda D. Willis, Director for Tax Policy and Administration Issues, General Government Division, stated that self-employed individuals who formally operate report only 68% of their business income.(2) Students—future business owners--educated about federal income tax and aware of tax assistance resources would be more likely to comply with the tax code.

The Engineering Economics course at Kansas State University at Salina is divided into four sections over a sixteen-week semester. Each section has requisite homework and projects and concludes with an exam. *Section one* topics include an overview of economic analysis methods, types of costs, and break-even analysis. *Section two* topics include project cost estimation and before-tax capital budgeting. *Section three* topics include tax implications of business investment, including depreciation, and after-tax capital budgeting. *Section four* covers additional capital budgeting applications.

As *section three* material was being covered in class, students seemed to struggle with understanding after-tax issues. Reading the textbook, discussing the concepts in class, and working through the end-of-chapter problems did not seem to help the students "connect the dots". Students did not see the connection between the transactions covered in sections one and two with the transactions' tax implications. Never having personally experienced tax issues, students struggled with the concept of tax deductions, such as depreciation. The instructor found that the third exam's class scores were lower than the other three exams given during the semester as shown in Figure 1. This signaled the need to revamp and strengthen this section of the course.

Figure 1.



Project Implementation

To reinforce the tax implications of business investment, the instructor created and implemented an income tax return project. Students were given details of a tax case. The case included income and expense information for a married couple with two children. The wife had W-2 income and the husband was the owner of a consulting business set up as a sole proprietorship. The sole proprietorship owned three depreciable assets. These assets related to specific net present value problems taken directly from the engineering economics textbook and discussed previously in the semester. Students were given a list of tax forms and were required to visit the Internal Revenue Service website at www.irs.gov to download the forms. Students brought the forms to class. In class, students completed the tax return with the assistance of the instructor. The class members discussed the tax return line by line. Questions and classroom discussions were encouraged for the benefit of all present. This process took multiple class periods.

This instructor emphasized how the investments analyzed previously in the semester fit into the income tax return. The placement on the tax return of the investment's additional revenues and operating costs was highlighted for the students. In this way, the income tax return brought all the semester's discussions together in one place.

Once students were comfortable with the tax return preparation process, the class reworked the tax scenario, leaving out the depreciation deduction for one of the three depreciable assets of the sole proprietorship. The returns were compared for tax savings. It then became clear to the students that after-tax savings from depreciation can be calculated by using the following.

Depreciation deduction *x* (1 – tax rate) = tax savings

Once students felt comfortable with the tax return preparation process, they were given another tax scenario that was similar to the one prepared in class. Once again, they were required to download the appropriate tax forms from the Internal Revenue Service website. But this time, students prepared the returns individually and submitted the completed documents for grades.

Results

Exam three scores for the second semester were higher than those of the previous semester, as shown in Figure 2. Additionally, the *exam three* scores were more in line with the other semester exam class averages as shown in Figure 3.

Figure 2.

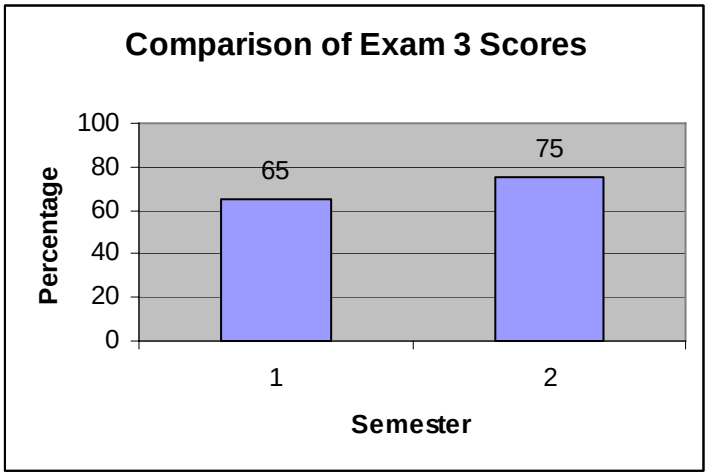
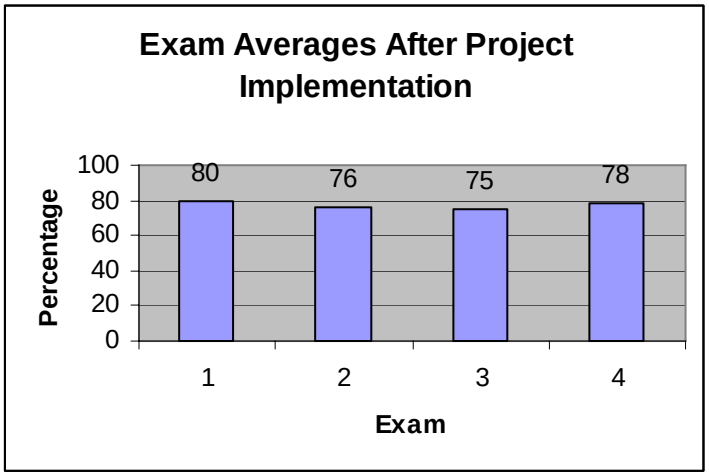


Figure 3.



Conclusions and Extensions

Based on the exam scores, strengthening the third section of the Engineering Economics course at Kansas State University with a federal income tax return preparation project increased student knowledge of the tax implications of business decisions. Through the federal income tax return exercise, the instructor demonstrated to students the real-world implications of semester's course topics.

Based on the results at Kansas State University, students at other colleges and universities might benefit from similar federal income tax projects being implemented in Engineering Economics courses. One difficulty with this might be that engineering faculty members may not have expertise in dealing with federal income tax reporting or may be afraid to approach the topic. This could be overcome by partnering with local CPA's and IRS agents. The faculty members could extend invitations to these professionals to visit the Engineering Economics classroom.

These guests could discuss tax issues with the students, thereby providing an even greater "real-world" experience for the students.

Several related extensions could come from this tax study project. In future semesters, a tax case for various forms of business entities, such as a partnership, could be created. Additionally, the topic of income taxes could lead to discussions of ethical behavior in a business setting, with possible development of a class project on ethics. From a broader standpoint, the income tax return project could be a springboard for discussion on the role of U.S. taxpayers in the shaping and adapting the U.S. tax system. The class could discuss ways in which citizens get involved in the modification of the tax system through contact with legislators. Additionally, the class could study alternatives to the current income tax system, such as a national sales tax or a flat tax. In summary, basic knowledge when applied to real-life processes helps students know and grow.

Bibliography

(1) Internal Revenue Service
The Determinants of Individual Income Tax Compliance: Estimating the Impacts of Tax Policy, Enforcement, and IRS Responsiveness Publication 1916 (Rev 11-96) Washington DC: 1996

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Ms. Brockway is a graduate of Kansas State University, having earned her Bachelor of Science Degree in Business Administration and her Master of Accountancy Degree. She earned her CPA designation in 1991. Kathy is an assistant professor at Kansas State University. She was named the recipient of the 2004 Marchbanks Memorial Award for Teaching Excellence and the 2005 KSU Presidential Award for Outstanding Undergraduate Teaching.