

Harnessing Spreadsheets to Model Retirement Savings

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Spreadsheet software provides fertile ground for active learning techniques in financial and economic education. It is widely acknowledged that the use of technology is an important component of an active learning based curriculum, but also that the use must be *appropriate* in order to be effective. In addition, research suggests that spreadsheet software is equipped to be a particularly fruitful technological tool for use in the classroom. For this to occur, though, the technology must be *purposefully* integrated into the curriculum to ensure students can appreciate its utility.

This proposal aims to increase understanding of the role of spreadsheets in education and connect their use explicitly to research surrounding best practices. In addition, we aim to provide practical tools for educators that allow them implement active learning through spreadsheets in the classroom. First, we present a research informed discussion of the value of spreadsheets in promoting active learning. In doing this, we make explicit connections with research about best practices for the use of technology in education. Second, we outline a strategy for incorporating spreadsheets within the high school classroom through a lesson-series on retirement savings. In doing this, we *demonstrate* how spreadsheets bring about a wider range of educational benefits.

From the research, we identify two key features of effective use of technology:

1. The task promotes *reasoning* and *sense-making*
2. The technology does not require a large body of prerequisite procedural knowledge before it can be used for active learning

A task that involves simply ‘playing around’ with the technology without requiring any analysis fails to meet the first condition; a technology with a steep learning curve may fail to meet the second. We believe that spreadsheets succeed in meeting both conditions. Due to the ability to

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repeatedly alter values and see the results almost instantly, they encourage open-ended investigations and active learning. Due to the intuitive display and input system, learning the language is not a significant barrier to using this technology to do mathematics.

With this background in place, we demonstrate *how* spreadsheets can be integrated into the classroom through a specific application: retirement savings. A crucial virtue of this application is that it is an *authentic* problem: calculating how much to save for retirement is a genuine issue most people will face, and the process employed in the lesson-series matches the process that must be used in the real world. It does not need to be idealized or simplified. This means students are able to use their background knowledge about working and retirement to engage in *generative learning* to discover the parameters of the model.

In addition, modeling the payment series allows students to engage with the fill function and explore its interaction with variable inputs and relative and absolute reference. Once students have created this model, they are able to interact with it to see how changing the parameters affects the output. Spreadsheets are ideally suited for this kind of exercise, as work can be saved and copied, and any cell can be changed with a mouse click.

As a possible activity here, the initial set up should be arranged so that the subject is *not* on track to meet their retirement goals. Students can alter the variables in the model to see what options are available. Because the application is authentic, it allows for critical analysis. The students need to think carefully about what changes to the model imply about the real world scenario, and they must offer a solution which is realistically achievable. For example, they could make the numbers work by increasing the interest earned on savings or increasing the subject's salary. However, these are not changes that are usually within a person's power to implement. On the other hand, increasing the rate of savings or the age of retirement are measures a person could realistically take.

The poster will provide instructions on how to scaffold this lesson series, including images taken from the spreadsheet templates to be used in the classroom. It will explain the components of the model, a sequence in which they can be introduced, and the spreadsheet functionality that will be used.