Econ Reimagined:
Creating a Highly Interactive Economics Course with New Online Tools and Open Educational Resources – at NO MONETARY COST to Students!

by

Amy Ehinomen Eremionkhale, Mya Lin Eveland, Shelby Frost,* and J. Todd Swarthout†

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ABSTRACT

We highlight the development of new online interactive tools for teaching economic concepts. These tools were combined with Open Educational Resources (OER) to provide a principles of microeconomics course with no monetary cost to students for course materials. Affordability of course materials can be a barrier to success for many students, and the recent pandemic has highlighted the disparities for lower-income students. One hesitation for moving to OER materials is the lack of substantive interactive economics tools which have significant randomization providing students with ample formative practice, including automatic feedback, while reducing the potential for cheating. We developed over 100 interactive tools which can be integrated into a Learning Management System, so grades are automatically recorded. We have piloted these interactive tools in several sections of principles of microeconomics in fall 2021 and spring 2022. Student feedback and performance in fall 2021 is positive. We share our story about the course redesign, data from the pilot, and plans for the future.

* Corresponding author

† Department of Economics, Andrew Young School of Policy Studies, Georgia State University, USA (Eremionkhale); Dean's Office, Andrew Young School of Policy Studies, Georgia State University, USA (Eveland); Department of Economics, Andrew Young School of Policy Studies, Georgia State University, USA (Frost); Department of Economics and Experimental Economic Center, Andrew Young School of Policy Studies, Georgia State University, USA (Swarthout).

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Introduction

The cost of college textbooks increased astronomically between 1977 and 2015 at four times that of the currency inflation over the same period (Perry, 2015). These increasing costs of obtaining a college education, including the rising cost of textbooks, are felt acutely by students from historically underserved backgrounds, part-time, and first-generation financial aid recipients. It is imperative to find ways to slow these cost increases without sacrificing student learning outcomes (Virginia Commonwealth University, 2022; Jenkins, et al., 2020). The rising cost of obtaining a college education coupled with increasing student loan debt highlights the need to create courses which do not require students to purchase expensive college textbooks and course materials.

In response, many colleges and universities are moving to courses which utilize open education resources (OER) (Hanson, 2022). Creative Commons defines OER as "teaching, learning, and research materials that are either (a) in the public domain or (b) licensed in a manner that provides everyone with free and perpetual permission to engage in the 5R activities– retaining, remixing, revising, reusing, and redistributing the resources. OER are openly licensed materials that can be accessed, edited, and shared without cost or restriction" (Hewlett Foundation, 2017; Creative Commons, 2022). The use of OER in courses at two- and four-year institutions nearly doubled between 2016 and 2017 (Seaman & Seaman, 2017). However, the take-up rate is still low and transitioning to OER likely depends heavily on the quality of the course materials. Instructors don't want to sacrifice the quality of education in the interest of free materials/lowering costs to students. Before agreeing to adopt OER, most faculty desire that the OER be at least as good as the costly materials the faculty are more accustomed to using in their courses (Martin, Belikov, Hilton III, Wiley, & Fischer, 2017; Martin & Kimmons, 2019).

Monetary costs to students are not the only consideration for adoption of course materials; there is also the time costs for instructors. For some faculty, an important deciding factor of which

textbook to use in their courses is the availability of suitable supplemental materials, including online assessment of the students' understanding. Most textbooks from publishers include many instructor and student resources which can lower time costs of class preparation for instructors (Skinner & Howes, 2013). Many educators have focused on creating new OER content or improving the quality of OER available, with some success. Although numerous faculty members are satisfied with the quality of open learning materials, as noted by David Wiley, founder of the OER support provider Lumen Learning, there is a need for effective course assessment that keeps students engaged and improves their outcomes (Straumsheim, 2014; Ossiannilsson & Creelman, 2011; Irvine, Kimmons, & Rogers, 2021). In line with this need, we created a substantive OER Principles of Microeconomics course that includes a package of highly iterative and interactive assessment tools. We present herein our story of instructionally designing, developing, and piloting the course.

Background

There has been increasing interest in our college and economics department for the conversion to OER courses in recent years because of the high course enrollments and potential cost savings for students. Aligned with these efforts we also recognized the need for:

- Students to access course materials on the first day of classes (Skinner & Howes, 2013; Martin & Kimmons, 2019; Irvine, Kimmons, & Rogers, 2021).
- Reduce the cost of introductory economics courses that frequently require each student not only purchase books/eBooks but also access to online course material software bundles offered by the publisher.
- To use high quality OER materials, and not just "free" replacements.
- To provide quality well-rounded educational experience for our students that would also be manageable and easily facilitated by our faculty.

The primary hesitation in moving forward with an OER course among our economics faculty has been the lack of assessment tools that could be delivered to large numbers of students with relative ease.

While there are abundant OER resources available online, there are not nearly as many associated OER software learning and assessment tools (e.g. manipulatives and/or interactives) that aid in the thorough practice and assessment of economic concepts and provide feedback and automatic grading similar to what faculty would experience when they use the online homework management systems that the publishers offer (Martin, Belikov, Hilton III, Wiley, & Fischer, 2017; Martin & Kimmons, 2019).

In response to these needs we set out to develop a new OER Principles of Microeconomics course which includes a variety of learning materials and assessments at no monetary cost to students. Of course, this effort did not come for free; it required a substantial amount of work from a team of dedicated faculty subject matter experts, an instructional designer, and a software engineer with significant experience coding economics experiments. We leveraged some funding from the U.S. Department of Education Higher Education Emergency Relief Fund (HEERF) and a grant from Affordable Learning Georgia. The process we followed to create a high-quality OER Principles of Microeconomics course is described herein, as well as key elements of our new course. Our plan is to help reduce the up-front costs for others creating an OER Principles of Microeconomics by sharing the unique products we created in a flexible format that suits other's needs through a project website. Some instructors might want to download parts of the course (i.e., tools, learning content, quizzes, workbooks) to use in their existing courses, while others might be interested in a full course package.

Developing the OER Course

The OER course redesign completely reimagined the course learning framework, content, and materials. Our main objectives were to instructionally design and develop a sustainable and replicable course that increases student engagement in the digital space, increases active learning options with hands-on problems and materials that deepen student learning, and provides course materials at zero monetary costs for students. We wanted to create something that supports faculty by reducing the stress of facilitating large classes due to grading and student monitoring. We felt it was important to create a sustainable course which can be delivered in any modality – online, hybrid, and in-person.

We embarked on the complete redesign of our principles of microeconomics courses by following best practices. We used a learner-centered instructional design that focused on creating a strong learning foundation with primary learning goal, learning objectives, and assessments that were directly aligned with the student learning outcomes. We ensured that the learning content also aligned with the learning objectives and assessments that supported a student's ability to complete the assessments successfully and provided supportive learning materials such as a "workbook study guide". The course content was stripped down to the absolute essentials, adhering to a "less is more" approach (Frank, Bernanke, Antonovics, & Heffetz, 2022).

Once we settled on a learning framework (e.g. learning goal and objectives, assessments, and learning content), we built new assessments. We started with using existing tools native to our LMS, namely, quizzes and discussion boards. For each learning objective that we assessed using the quizzes native to our LMS, we created a pool of comparable questions – mostly multiple-choice, but also some matching, multiple-select, and algorithmic. Each quiz randomly presents questions from each pool, which helps reduce cheating, but this level of randomization is limited. At the same time, we determined which concepts were best for learning and being assessed using with the new

interactive tools we planned to build. These new interactive tools and the native LMS quizzes include targeted feedback for the students, which research has shown to enhance the quality of student learning (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010).

A central component of this project was building the new tools to align with learning outcomes and learning content. We endeavored to create interactive tools that cover economics concepts which students tend to have a harder time learning via text, illustration, or video alone. More detailed information about these tools is available in Eremionkhale, Eveland, Frost, and Swarthout (2022).

As previously mentioned, although some freely available online interactive tools exist in the public domain, most do not integrate into an LMS, automatically entering scores into the LMS gradebook, helping faculty track students' performance directly. We were able to replace the value of the publisher-provided interactive platforms by building new online interactive tools which communicate with the LMS gradebook and are linked to OER leaning content within the LMS environment. Students can use these tools to learn concepts through "practice" (formative assessment) and for final grading (summative assessments). Our interactive tools report an overall score to the student as soon as they complete the activity, and a grade is automatically recorded in the LMS gradebook upon submission.

We designed two versions of each tool: a Knowledge Check (Practice) which is primarily intended as formative assessment and a Mastering Micro (Quiz) which serves as a summative assessment. Both support student learning. Both involve significant randomization (beyond what is possible with assessment tools native to most standard LMS systems) which can help reduce student cheating.

Discussion

Developing a new OER course with interactive learning tools is a significant undertaking that requires a combination of skills. Our project would have been markedly less successful if we did not have the expertise of an instructional designer, experienced instructors, and a software engineer. Further, these experts must be willing and able to interactively collaborate throughout the life of the project.

Our new OER course "does no harm" in terms of learning outcomes while saving students money on course materials. Purely from a student cost perspective, if our OER course is adopted on a more permanent basis – even if only at our university, then the costs of developing the material will be dwarfed by the recurring savings to students each semester the course is taught. This alone is viewed as a success by many.

To be sure, developing and implementing an OER course from scratch requires a degree of institutional commitment. Often, the instructors most valuable to this process have the highest teaching loads. Yet, to best focus on the development of this sort of project, they will need some time to focus on the creation of the OER course. So, departments must be willing to allow course buyouts for these instructors.

Additionally, departments must be willing to allow an OER course to actually be taught in classes. Some faculty may be skeptical of advantages of an OER course or unwilling to consider a deviation from the traditional paradigm, or even take umbrage at the suggestion from others to consider adopting a new teaching style. While it is beyond the scope of this paper to address these issues, we feel it is important for expectations of all stakeholders to be properly aligned. Our project was – and still is – a process that requires piloting and fine tuning, and not simply an activity that could have been completed perfectly in its entirety before ever being piloted in a live class with actual students.

Overall, our results have been encouraging. For sure, the journey has not been easy, nor do we see it as done, but we do see this as a proof-of-concept that a highly engaging course with course materials available to students at no monetary cost is possible to produce and deliver.

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