Chapter 5
Best Practices for Hybrid Mathematics Courses

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ABSTRACT

This chapter is designed for the mathematics teacher, experienced or not, who is interested in incorporating Web-based content and activities into her face-to-face (F2F) classroom (i.e. creating "blended" or "hybrid" classes). It is not a "technical manual" nor is it meant to be exhaustive; rather, the intent is that of describing, colleague to colleague, things that work in an online environment. I will discuss, as if we are sitting in the teacher's lounge with a laptop in front of us, how I use Web-based content in my mathematics instruction and how my students benefit from it in their mathematics learning. I will attempt to present some specific examples for clarity; be aware that these are just guides for you and not strict demarcations. For ease of discussion I will choose common tools / programs (e.g. Microsoft Word, GoogleDocs, Adobe Acrobat, etc.) and for cost effectiveness I will choose Open Source items whenever possible.

INTRODUCTION

The chapter will have a workbook-like structure in that, for each tool or best practice, there will be a description (including advantages / disadvantages), action example(s) related to mathematics teaching and learning, and a practice assignment (e.g. "now you try it"). There will be screenshots and links to give the teacher a picture of what it would look like in his or her own hybrid course, plus, websites and other resources will be included for "where to go to learn more". Specific topics will include: Content Presentation, Interactive Elements, Communication, Demonstration, and Assessment.

For each topic, I will discuss one or more web-based tools that I use in my mathematics classes; also, I will explain how I use that tool to accomplish a specific goal. Please note that the topic categories: content presentation, interactive elements, etc. are just used to describe the tools that I generally use for that purpose, not to rigidly define them. In other words, a tool like YouTube, which I include in the "interactive elements" category (as I most often use it for that purpose: to increase student interaction and engagement with the content) could also be including in a category like "communication" or "assessment" if the teacher wanted to use it in that way. For example, if I give my students a cooperative learning project in which they are to create some type of presentation to make to the class as a whole and, instead of having them do in during regular F2F class time, I ask them to create a video and upload it to YouTube, then I have used that tool for multiple purposes: to increase interaction, to communicate information, and to assess performance.

A word of caution is also in order before we begin: please do not make the mistake of thinking just because you provide a list of websites to your students that you have "incorporated technology". That applies for every "new thing" in education and educational practices: manipulatives, prob-lem solving, reading, modeling, student-centered learning, etc. None of those items can simply be put "on top of" an existing, otherwise-unchanged, traditional course – no, they must be truly incorporated, and this requires much thought and effort. You must thoughtfully integrate the tools and techniques with a clear and defined purpose in order for them to have the chance to transform both your course and your teaching practice.

Lastly, I offer a bit of context and some caveats: this chapter reflects my personal experiences in teaching mathematics and mathematics education courses at several different universities for over twenty years; it is not meant to be an extensive and exhaustive "proof" for hybrid instruction. Instead, it is meant to be personalized evidence of one teacher's journey and what she has learned in the process. My experience has included: two-year colleges, four-year colleges, universities, K-12, fully online courses, hybrid courses, fully face-to-face courses, private institutions, public institutions, HBCUs, nationally located institutions (United States: mostly South, Midwest, and East coast), and internationally located institutions (Rwanda). My students met with me in F2F time approximately 3 – 4 hours per week and spent, on average (taken from both the LMS records and their self-reports) 4 – 5 hours per week online (as well as an additional 2 – 4 hours on outside-of-class but not online work). The specific examples and screenshots used in this chapter were drawn from the following courses: History of Mathematics (offered to mathematics majors as well as secondary mathematics education majors), Algebra & Functions (offered to middle school and elementary school education majors), and Geometry & Measurement (offered to secondary mathematics education majors as well as middle school and elementary school education majors) taught from 2008-2010. Although these particular courses were not heavily symbolic mathematically, I have taught courses that were (both hybrid and fully online) and had similar successful results as those I present here. However, the scope and

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