

Using a Virtual Classroom to Teach Online Mathematics

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Abstract

The purpose of this study was to share the author's experience of using the virtual classroom when teaching online mathematics course. Various softwares including MyMathLab and Wimba are introduced and the teaching methods and tips are provided and analyzed. Results show that the use of the virtual classroom enhance the communication in the online mathematics teaching. Educators are recommended to adapt the virtual classroom to enhance their communication.(Contains 1 figure)

1 Introduction

Online education has become a popular topic in academic communities of U.S.A. More and more efforts, studies and technology are being dedicated to making online courses a preferred method of teaching. However, communication is one of the most difficult problems many instructors have to deal with when teaching online courses, especially mathematical course. There are many interesting articles [see [1], [2], and [3], and powerful softwares including MyMathLab, Wimba (see [5] and [4]) to make communication more interactive. This article will describe my experience of teaching online courses in Kutztown University of PA, with the focus on how to use virtual classrooms to enhance the communication with the students off campus.

The mathematical content of the online course is finite mathematics, which is offered at Kutztown University of PA as MAT121: mathematics for business. This course has been offered online using various textbooks, and so with different publisher softwares: webassign, wileyplus, and MyMathLab. I chose the Textbook: Finite Mathematics with Applications by Lial, Hungerford and Holcomb, 10th Edition. Topics covered in the course include functions and graphs, mathematical finance, System of linear equations and matrices, Financial math, linear programming and probability. In order to take the online course, a student needed to purchase MyMathLab access code available from the the publisher's web site. The code enabled the student to log in to CourseCompass.com, a portal website for the MyMathLab software. CourseCompass.com was the place on the web where students did their coursework: they learned the material, as well

as completed their homework, quizzes, and exams. As the online course instructor, I set up our course on CourseCompass.com by building exams, homework sets, and choosing a variety of settings. Students were not required to come to campus for the online course except for the three tests. However, they were able to do all other coursework (learning the course material, submitting quizzes and homework) from any computers with the internet access.

Before the course started, I emailed the class a brief introduction about how to register for the MyMathLab account and how to use the MyMathLab to study and to complete the assignments. Once the students log in, they will be able to find all the information through MyMathLab: the daily announcement, course calendar, homework, quizzes, grade book and all the learning tools, including the ebook, powerpoint, animated lessons, videos of professors presenting solutions. MyMathLab provided us a variety of settings to create assignments in the Homework and the Quiz/Exam modes. When a student opens a particular homework problem online, four learning tools appear next to the homework question: Help Me Solve This, View an Example, Video, and Textbook Pages. The learning tools appear only in the Homework mode and not in the Quiz/Exam mode. Each of the learning tools can be set up so that students can use an unlimited number of times on a single question. Moreover, in the Homework mode only, once a student types in the answer to a question, the computer provides immediate feedback.

Most students are comfortable with the course in the online setting. However, sometimes the students who are taking online course feel much more frustrated when they are not able to solve the problems with all available learning tools. So it's time for the instructors to step in and offer the help in person, by phone, or through internet. Most of the students who took the online course were off campus, and it was difficult for them to ask questions in person. It sounds convenient to discuss problems by phone, but sometimes it is confusing with all the mathematical symbols and concepts, and it will be helpful to see and write the context down. Communication by emails works better, but most undergraduate students don't know how to type and/or read Tex, and so it is not easy to input the appropriate mathematical symbols when writing emails. Furthermore, it is hard to allow other students to participate the discussion at the same time. So it would be more convenient for both the instructor and the class to discuss the problems through the internet. Fortunately, MyMathLab offered several communication tools including: discussion board and virtual classrooms. Our school also provide us the Wimba classroom through Desire2Learn for the faculty and students to communicate effectively. In the following sessions, I will discuss about the communications tools I have used so far, and share some experience and thoughts about them.

2 the Communication Tools

Generally, online courses are taught in two different ways, synchronous and asynchronous. Synchronous technology allows for students and teacher to be

online at the same time and interacting with one another, while asynchronous technology allows students and teacher to interact at other times. For example, classroom lectures in a traditional course setting, are synchronous, while homework assignment is asynchronous. My course had two parts: two hours a week of synchronous class time, two hours a week of synchronous office hours, and the rest of the interaction with the students was asynchronous. I offered the synchronous class time through the wimba classroom through Desire2Learn provided by Kutztown University, and offered the synchronous office hours through the virtual classroom provided by MyMathLab. The class is required to do the assignment and take quizzes online through MyMathLab, they are also encouraged to use the Discussion Board and group email to communicate with peer students.

2.1 the Wimba Classroom

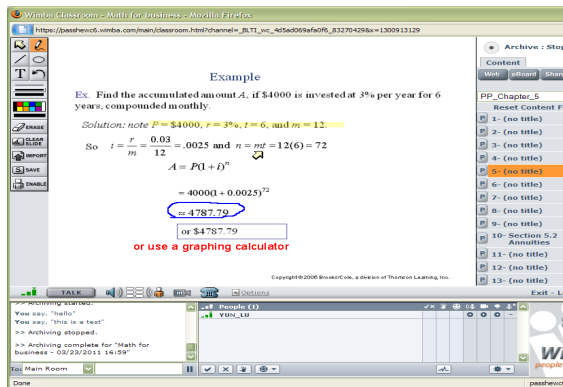
Wimba Classroom is a powerful classroom software designed for distance education and collaboration. Wimba Classroom allows faculty to create fully-featured live virtual classrooms in a content area in Blackboard/Desire2Learn. Wimba Classroom is a live, virtual classroom environment with various features that include audio, video, application sharing and content display, and MP4 capabilities. Advanced features such as polling, whiteboarding, presenter on-the-fly, resizable chat areas and participant lists, usage analytics tools, and MP3 or MP4 downloads enable further dynamic interaction between students and educators. The content area allows offers instructors the freedom to share files such as PowerPoint, Word, Excel, HTML, web pages, images, movie clips, PDF, Flash, or CMS pages. Some of my favorite communication features available for Wimba are: talk via the internet using a microphone attached to your computer, chat (type messages to each other in a chat window), share applications from my desktop (write and emphasize on the powerpoints), and whiteboard (draw and annotate pictures on the electronic whiteboard that is shared among all). This software also has video capability, but I decided not to use it, since many of my students may have slow internet access. For some of you who are not very familiar with Wimba Classroom, here is a brief introduction.

Wimba Classroom interface consists of four main areas: content frame, presenter's console, text chat area, and participate area. The Content Frame is the main focus of a presentation. Almost all content, such as images, charts, and text will appear in the Content Frame. The Text Chat Area is where I can communicate via text chat (public and private) with participants and other presenters. The Participant Area lists all the presenters and participants currently in a presentation. There are various indicators listed next to each participant. For examples: Yes/No Indicator is the button that is used for instant polling; Hand Raising indicator is a number appears next to a users name when they click the Hand Raise button below the participant list. This number indicates in which order participants raised their hands. The presenter's console includes the Wimba Classroom eBoard, which allows you to annotate slides, import images, and take screenshots of anything on your desktop. This feature is useful

when creating interactive exercises. You may use the eBoard with PowerPoint files. The Wimba Classroom eBoard is an electronic whiteboard that includes a set of tools that allow you to mark-up and emphasize content during a live presentation by drawing shapes and lines, typing text, and importing graphics. You can also show screenshots of desktop applications through the eBoard. These tools can be very useful to make the synchronous class time interactive.

I used Microsoft PowerPoint to create outlines for my lectures and then uploaded these to Wimba and on the course website so they they could write notes on the slides. My slides contained definitions, theorems, examples, and questions with no solutions. During class, I used the Power Point slides as the foundations for the discussion. After I went over the examples, I asked students to fill in the solution by writing/typing on the whiteboard. I encouraged students to send their question or/and their solution using Power point, so we can comment, write and discuss about it. In the office session, I let students to ask the question, and gave the opportunity for the class to share and contribution to the solution. Wimba Classroom Offering also offers other features including polls, quizzes, surveys and whiteboard exercises, which keeps students highly engaged. I really like the whiteboard feature, since I can actually write on it like I do in the regular classroom, and students can write on it too. This makes it much easier for me to control the class and encourage the interaction.

Here is the a screen shot that shows the white board feature on the power points.



2.2 MyMathLab Virtual Classroom

If you don't have an access to the wimba classroom through Blackboard/Desire2Learn, MyMathLab also offers a similar communication tool called the Virtual Classroom or the lightweight Chat sessions to communicate with the students synchronously. Lightweight Chat sessions are real-time online text-based discussions. You may choose to discuss a particular topic during the session, or host an office hour question-and-answer forum. The Virtual Classroom sessions give you access to a whiteboard in addition to real-time chat, and are ideal for lectures or tutoring sessions. Both types of sessions are included in your MyMathLab course as Collaboration Sessions. It provides both instant messaging and the ability to draw graphs and equations. I used the Virtual Classroom to set up real-time online classroom discussions, extra-help sessions, and office hour question-and-answer forums. You can use the Virtual Classroom toolbar to control or clear the display, select the features available to passive and active users, end the session, or create small group discussions. The Whiteboard in Virtual Classroom is where the instructor will work problems in real time, however, you are not allowed to upload the powerpoint. This makes the virtual classroom less powerful. But this is still a good alternate for communication and interactive teaching and learning.

3 the Course Assessment

The final grade for the course is a combination of the participation, homework, quizzes and two tests. Generally, I have students taking online course using a virtual classroom having a slightly better grade than the students in the traditional classroom setting. However, the effective of the using the virtual classroom is hard to determine from their course grade, since the students with better performance may not participate a lot for the problems discussion, depending on their personality. So I designed a survey for students' feedback about the effectiveness of the virtual classroom. They are asked to select from "Strongly disagree, Slightly disagree, Slightly agree, agree, and Strong agree" for every question asked in the questionnaire. About 89 percent students agree/strongly agree that the virtual classroom helped their learning the materials, and about 91 percent agreed/strongly agreed that the virtual classroom should be continued to use for the future. Furthermore, we can find the effectiveness from the students' comments at the end of the course period: the students really appreciate the availability of the virtual classroom, and they are feeling more comfortable with all the resources and help around. Some of the comments are: I like the virtual office hours- so I don't have drive one hours and ask questions in person." "I really enjoyed the course, especially the virtual classrooms" ., "I learned a lot from taking this online course, will take more", "It is fun!", "appreciate having unlimited tries for the homework". "it's convenient" etc.

4 the Conclusion

Since I had a great experience teaching the online mathematics course, I want to share some of my experience about using the virtual classroom:

- Provide the students as much information as possible at the very beginning of the course by offering a tutorial session, daily announcement, and event calendar etc.
- Set up the assignments carefully with appropriate time line and prerequisite.
- Get familiar with the software and hardware, and be willing to help students solve technical problems.
- Make yourself available by checking email frequently and giving quick feedback.
- Keep a close eye on the class's performance by checking their grade for the submitted assignment and how much time they spent on the work.

Furthermore, it is always a good idea to give a midterm survey to collect suggestions and comments from students and accommodate students' needs if possible. I have found MymathLab and wimba classroom are very powerful tools for the online teaching, and it can be used for teaching other courses in mathematics, especially for the intro-level mathematics.

References

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