On Demand Lecture Content for Online Courses Using Boogie Board Rip ™ and Jing ™ Screen and Audio Capture

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Abstract

Feedback from students in the author's online classes has demonstrated desire for better explanation of the text book material. One method of delivering on demand lecture content to online students is described. The delivery, assessment, and technology used will be discussed. Initial feedback from the students will be described, as well as, the author's perspective on the tools versus other methods currently used for online course content delivery. Also, plans for use of this method in the traditional on-site class will be discussed.

Acronyms

USB   Universal Serial Bus
LCD   Liquid Crystal Display
SWF   An Adobe TM flash file format for multimedia network applications
PNG   Portable Network Graphics file

Background

The author teaches in a Masters of Engineering Technology program in the College of Technology at Pittsburg State University in Pittsburg, Kansas. The author participated in a study group initiated by the Provost at Pittsburg State University during the 2012 Academic year. The focus of the study group was course redesign, and all participants were challenged to read "Next Generation Course Redesign" [1]. Further all participants were encouraged to pick a course for redesign according to one or more concepts in the reference. It was the author's intent to make his online graduate level Quantitative Analysis course more interactive to all course students and more understandable to students who speak English as a second language. The other objective was to make the online course more like a traditional on-site classroom experience in order to address the students' desire for more explanation of the textbook material.

Delivery

Lecture content is delivered in short video segments up to five minutes each. The video is representative of the audio and visual portions of a traditional lecture on white or black board. Depending on the flow of the material covered, up to seven segments of lecture are provided before students are requested to work with the material. Observation thus far indicates that four segments are optimal, from a short term retention point of view, for students to quickly be able to demonstrate understanding of the material.

Students are working with the material at this point in a risk-free fashion and are allowed to rework the assessment vehicle as many times as desired. An observation here is that many students will work as hard as necessary to obtain a 100% score on the interim assessments.

This has the advantage of increasing quality time on task and engagement with the material during learning of the concepts, and should, therefore, help with retention of the material.

The video segments and interim assessments are named in such a way that it is easy for the students to quickly find the lecture material desired to be able to respond to a particular assessment question. Also, these short segments decrease the amount of time a student will spend to be able to find the information desired from the lecture. Consider a one to three hour audio or video capture of lecture as the other end of the spectrum.

Assessment

Assessments are included to provide opportunity for the students to work with the concepts delivered in the on demand video segments discussed above. Interim risk-free homework assignments are interwoven into the segments as noted previously. This approach has the advantage of allowing students to work with the material in piecemeal fashion, proceeding at individual learning rates.

Whenever possible, formula based questions, with correct answer feedback, are used to allow the students to assure themselves of concept understanding. This type of question presents the student with a different set of variables in the problem statement each time the problem is attempted. Students self-confidence is apparently improved when they are successfully able to solve the formula based question multiple times. These questions also provide excellent examination review material.

When it is not possible to employ formula based questions, other question types and question banks are used. Immediate correct answer feedback may or may not be used according to the question, and situation. Again the goal is to increase the amount of time that the students spend with the material. In the case where correct answer feedback is not provided, students are able to assess their score on the question to determine answer correctness. In this case, the quality of the question and answer are very important to avoid student frustration.

A key point here is that these interim homework assignments are self-grading instruments which allow the students to immediately assess veracity of their answers. A summative homework assignment is provided at the end of the lecture content for a week of the course. This review assignment may only be taken once. This provides incentive for diligence in the risk-free focus assignments. All of this assumes course delivery via a learning management system of course.

Of course, quizzes, exams, writing assignments or projects are employed during the semester to help the student master the subject material. The LCD tablet and screen capture software explained below is useful in all of these assignments except the writing or project assignments.

Technology

A Boogie Board Rip^{TM} LCD electronic writing tablet with a USB connection to a Windows 7^{TM} computer is used for capture of writing. The tablet has about 6 by 4 inch useable area for writing with a magnetic stylus. The device retailed for $129.99. The USB connection and driver software makes a replica of the device on the computer monitor, such that what is written on the tablet is displayed on the monitor in real time. But at the same time the writer

need only focus on the tablet because the visual feedback from the tablet is much like a pen and paper. This is much more intuitive than, for example, a Smart Board [TM]. Noted also, of course, the tablet is much more affordable and sustainable from a hardware and software support point of view. Note Figure 1 for a picture of the device.
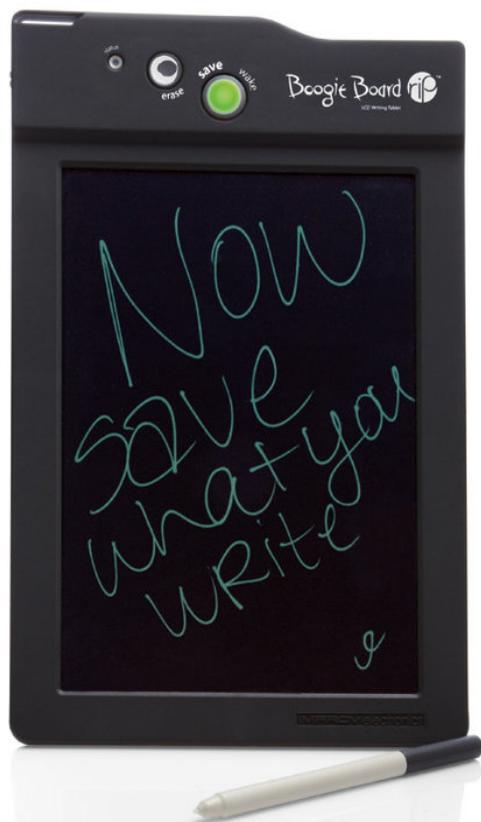
Figure 1. Picture of Boogie Board Rip TM LCD Tablet and Stylus [2]

Any, run of the mill, USB microphone may be used to capture the sound portion of the lecture. One will need to experiment with the audio levels and microphone positioning the first time the capture is attempted.

In addition to the LCD tablet driver and USB Microphone, Jing[TM] Software is used to capture the real time notation on the LCD tablet as well as comments via a USB microphone. The Jing[TM] software allows the lecture content to be saved as a SWF file viewable on most any modern web browser. These flash files are much less memory intensive than conventional video file formats. The fact that they are supported by modern browsers simplifies the online software support inventory.

The Jing[TM] software is also useful for screen capture to show students how to operate different software tools. For example, in the course noted, students were shown how to construct a Microsoft Excel[TM] spreadsheet to form a Monte Carlo simulation of a problem. Other applications could include training on Solid Modeling Software, Circuit Simulation Software, Mathcad[TM], Matlab[TM], or other more discipline specific tools.

The USB LCD tablet, USB microphone, and Screen Capture Software combination is also useful for improving communication when a particular student is struggling on a particular

problem. It is a simple matter to provide a custom video for that student to clear up the difficulty. Oftentimes more than one student will need the video for this particular problem.

The screen capture software will also capture still image files. The images are saved in PNG format. Imagine then that one needs to grab a quick and dirty sketch to help set up a problem on an assessment. Note Figure 2 for an example of sketch of a network scheduling problem which would be included with a problem statement requesting information about critical path and normal project completion. This sketch took seconds to create and capture to the computer for inclusion with the problem. Compare this with drawing on a tablet, scanning it, then getting it from the scanner output format to inclusion format, then finally including it in the problem.
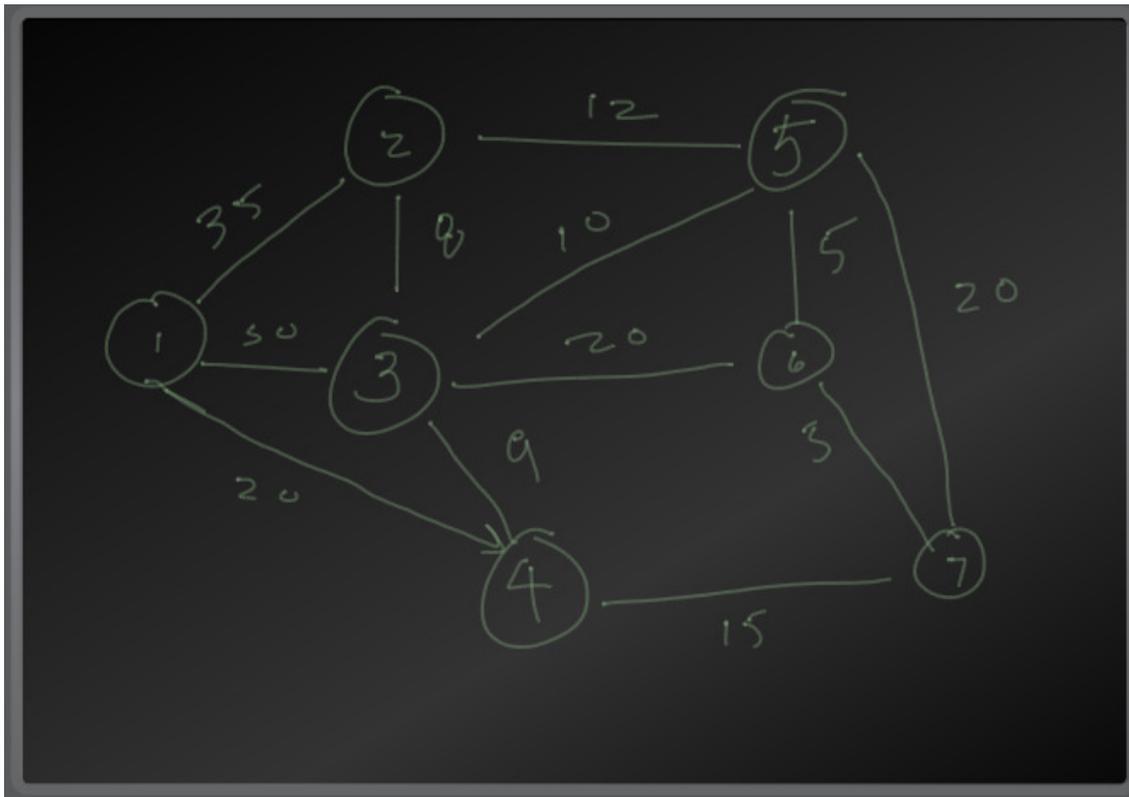

Figure 2. An Image File captured with Boogie Board Rip TM [3]

The audio and video files are loaded into the lesson content on the university learning management system for availability to the student. This approach could be used on most modern learning management systems. The Angel Learning Management Suite TM was used for the semester discussed herein. Since then, Pittsburg State University has adopted the Canvas TM Learning Management System. This is due to the fact that the Angel Learning Management Suite TM will become unavailable due to its purchase by Blackboard TM.

From a hardware perspective, the above combination has tested on a Windows 7 TM desktop platform, an old Windows XP TM laptop platform, and a Mac OSX TM 10.4 G4 Dual Processor desktop platform. Only the first configuration was successful.

Perspective

Student evaluation of teaching performance administered during the semester that the above tools were introduced to the author's online Quantitative Analysis course has indicated that the students overwhelmingly support this method of on line course delivery. Noted, of course, more samples are required. The class size was 12 students. However, many of the students had experience with online classes with the instructor before.

Some readers will note that the method could use other tools such as Microsoft Powerpoint^{TM},   and this is certainly true. In the case where the instructor has the luxury of teaching the same courses year after year without significant change, such a tool may be useful.   The author's belief is that even so, the approach discussed is much more efficient. For the rest of us, the technology mentioned above may save a lot of time.

Future Plans

The author plans to use the content, technology, and the organization mentioned above to redesign traditional on-campus courses. This means that the students will be expected to have reviewed the on demand lecture content before the class meeting and be able to show other students how to solve homework assignments, explain the concepts covered, or participate in meaningful discussion of the material during the class meeting. Please note the reference [1] discussed in the background section regarding current thinking about gaining engagement using course design.

Bibliography

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Biographical Information

Ronny N Galloway is an Assistant Professor at Pittsburg State University in Pittsburg, KS. This is a second career after over 30 years of increasing responsibility in Industry. He was awarded a BSME from University of Missouri, Rolla '80, and a MSME from Massachusetts Institute of Technology '82. He was recognized as a co-inventor on two United States Patents. He is a licensed Professional Engineer in Kansas.