

# WIP: Using Podcasting in an Inverted Classroom

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**Abstract** - One of the challenges facing educators is the constant tension between coverage and depth while enhancing the classroom experience with meaningful in-class experiences. New technologies, such as iPods, and new broadcast methodologies, such as “podcasting”, have made access to multimedia data more accessible and ubiquitous. While many educators are exploring a wide variety ways to utilize the iPod for instruction, there has yet to be any consensus on the most effective use of the technology in the classroom. An “inverted classroom” is a teaching environment that mixes the use of technology with hands-on activities. In an inverted classroom, typical in-class lecture time is replaced with laboratory and in-class activities. Outside of class, lectures are delivered over some other medium such as video on-demand. As such, learning activities, which typically are done outside of class, are done in-class in the presence of the instructor. Passive activities, such as listening to lectures, are performed outside of class. In this paper, we describe the use of podcasting in an inverted classroom environment with the explicit goal of reclaiming lecture time for in-class laboratories and learning activities. This Work-in-Progress paper focuses primarily upon the description of the approach being piloted, technologies being utilized, and the characteristics of the pilot course.

*Index Terms* – Inverted classroom, Podcasting, Technology

## INTRODUCTION

One of the challenges facing educators is the constant tension between coverage and depth while enhancing the classroom experience with meaningful in-class experiences. New technologies, such as iPods, and new broadcast methodologies, such as “podcasting”, have made access to multimedia data more accessible and ubiquitous. While many educators are exploring a wide variety ways to utilize the iPod for instruction, there has yet to be any consensus on the most effective use of the technology in the classroom.

An “inverted classroom” is a teaching environment that mixes the use of technology with hands-on activities [1]. In an inverted classroom, typical in-class lecture time is replaced with laboratory and in-class activities. Outside class time, lectures are delivered over some other medium such as video on-demand. As such, in a three credit hour course for instance, during class students are with a faculty member and actively engaged in learning activities. Outside of class, students are focused on viewing 3-6 hours of lectures per week. Additional time outside of class is spent completing in-class activities.

Past uses of the inverted classroom have included the use of video tape, DVD players and downloadable media files. As

such, learning activities, which typically are done outside of class, are done in-class in the presence of the instructor. Passive activities, such as listening to lectures, are performed outside of class. As a result, valuable faculty “face” time is not spent merely communicating information, but rather is spent engaging directly with students when they are involved in in-depth learning activities.

Many computing courses ultimately involve hands-on activities. While significant long-term projects are a staple of computing programs, short high-payoff homework and lab assignments can benefit greatly from a more traditional laboratory environment. However, as more programs move toward a lecture-only format, the benefits of laboratory experiences are lost. In this paper, we describe the use of podcasting in an inverted classroom environment with the explicit goal of reclaiming lecture time for in-class laboratories and learning activities. This Work-in-Progress paper focuses primarily upon the description of the approach being piloted, technologies being utilized, and the characteristics of the pilot course.

## EXPECTED OUTCOMES

The intention of the project is to study the effect of using podcasting in an inverted classroom setting upon the ability to meet course learning outcomes, faculty preparation overhead, and student effort. One of the difficulties in gauging real cause and effect is that there is no available control or other experience in which to measure faculty overhead or student effort other than through self-reporting. As a result, our eventual focus will be on perceptions of students through indirect measures such as pre-semester and post-semester surveys as well as measurement of coverage of topics. Specifically, it is expected that one of the outcomes will be that more topics can be covered while not sacrificing student learning (and student perception of learning).

## COURSE DESIGN AND EVALUATION PLAN

The activities described in this paper are being piloted in a special topics course on web services and service-oriented architecture. The course is a cross-listed undergraduate and graduate course and thus is made up of students either close to graduation or in the midst of a two-year masters program. The objectives of the course are to establish a foundation for developing distributed applications, to provide students with experience developing cross-platform web service-based applications using C# and Java, and to provide students with experience in the use of integration technologies for distributed applications. As such, the course is centered primarily upon the theories and technologies related to web services.

The course has approximately sixteen learning outcomes and upon completion of the course, students will have been assigned between sixteen to twenty learning activities that are either seventy-five minute in-class assignments that are turned in at the end of class, or are one-week assignments that are assigned at the beginning of the week and are turned in at the end of class at the end of the week. For example, for a Tuesday-Thursday class, the in-class learning activity is assigned on Tuesday and turned in either on Thursday at the end of class, or by the end of the school week, depending on the content of the assignment. During class, students work on the assigned programming project, with questions and problems being resolved in consultation with the instructor and fellow students.

Course lectures are produced as podcasts approximately one week prior to the corresponding assignments. The software used to produce the podcasts (all for the Mac) include ProfCast [2], for capturing Microsoft Powerpoint presentations with voice overs, Snapz [3], for capturing full-motion presentations of software use, iMovie [4], for capturing full-motion talking head lectures, and iWeb [4], for deploying the podcast on a standard web server. Blackboard [5] is used to save and deploy Powerpoint and PDF files, as well as for gradebook and assignment management. On the student side, students use either the iTunes music software system as a podcasting client, or a non-podcasting client such as a web browser to view video on a web page.

The course has or will be evaluated in a number of different ways. First, as an indirect measure, a pre-semester survey was administered to judge the abilities of students along the sixteen learning outcomes of the course. A corresponding post-semester survey will be administered to determine student self-assessment of learned outcomes. Second, at approximately the middle of the semester, an outside consultant was invited to the course to perform a Small Group Instructional Diagnostic (SGID). The purpose of the SGID is to determine, in the middle of the semester, strengths and weaknesses of a course. Third, a full-semester peer review is being performed by a senior faculty member in the department. The colleague is actively participating in the course by viewing the podcast lectures and performing the in-class exercises. Finally, with each assignment, a set of rubrics have been developed that will allow for post-semester direct measurement of the learning outcomes of the course.

### CURRENT PROJECT STATUS AND PRELIMINARY RESULTS

At the writing of this paper, we are on schedule to complete between sixteen and twenty learning activities in the course. The average for the instructor in other non-inverted, non-podcasted project-based courses has been between seven and ten assignments and in-class learning activities. In addition, the coverage of learning outcomes has been on-schedule.

Based on the SGID analysis performed on the course, student acceptance of the inverted classroom process has been well-received. Over eighty-five-percent of the students (in a class of twenty) have responded favorably to the inverted

classroom structure, while over ninety-percent prefer the short learning activities over more prolonged assignments. In regards to the use of podcasting as a lecturing medium, students have indicated that the ability to use the play, pause, reverse, and fast-forward capabilities of the podcasted videos beneficial to their ability to learn the material.

Suggestions received from students have focused primarily upon the production of the podcasts rather than course content, with the concerns primarily being centered around volume of podcasts, size of video windows in their non-podcasting viewer, and the use of the Mac as the demonstration platform (rather than Windows). As all of the primary concerns were of a technology variety, some improvement is necessary on the podcasting production front.

From the viewpoint of the instructor overhead, effort has increased in the area of creating learning activities. Lecture production effort is perceived as also increasing due to the time needed to do lecture production. While the time spent in creating lecture slides has not increased, the overhead of "doing the lecture" has increased due to the podcast production effort. So, while the actual time delivering the lecture is the same (50 minutes for a lecture, 25 minutes for demonstrations of software and examples), the added overhead of deploying the podcast has increased effort. In subsequent semesters, it is expected that production time will decrease significantly with added lectures covering primarily new material or removal of outdated material.

### CONCLUSIONS AND FUTURE WORK

To date, the lessons learned in using podcasting in an inverted classroom have been many. First, the podcasting medium appears to be well-suited for the type of course described in this paper. The topic is a highly grounded in new technology and hands-on activities. Second, the ability to cover more topics is no longer hindered by a lack of in-class time. Since the podcast medium is free of time constraints, more (or less) can be covered during individual lectures. Third, students must be proactive in order to succeed in courses of this structure. Specifically, they must view podcast lectures prior to attending class. Finally, students appear to be receptive to this medium combined with the inverted classroom.

In future semesters, we will study faculty overhead when podcast production is limited to minor editing and adding new material for new advances in a field.

### REFERENCES

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