

Using Podcasts in a High School Advanced Placement Statistics Course to Encourage a Higher Achieving Learning Environment

Christine Kashiwabara
University of Hawaii - Manoa
Department of Educational Technology
USA
ckashiwa@hawaii.edu

Abstract: The purpose of this paper is to discuss an instructional design project to determine the effectiveness of implementing podcasts as a supplemental online resource on probability in Moodle, an online course management system. Eighteen high school seniors in AP Statistics at a private school in Honolulu, Hawaii, used podcasts to review information previously learned in a traditional classroom atmosphere four months prior to the review. The collected data was used to determine the effectiveness of the module and to analyze the students' attitudes toward hybrid or online learning. Results between a paper-based pre-test and an online post-test showed a general improvement in understanding the content in probability. Student feedback from an attitudinal survey showed a more positive attitude for the convenient resource and the ability to review concepts that were forgotten. Results from the project will guide teachers towards a better understanding of student success in an AP course.

Introduction

In the current age of technology, high school students do not learn in the same way that a high school student may have learned in previous years. Students do not learn best in a face-to-face classroom anymore but through the confines of a private space, sometimes multi-tasking with other activities. “[S]hort, “bite-sized” audio clips can not only fill dead-time moments amidst other day-to-day activities, but also coincide with these activities for pervasive learning that is interwoven into the learners’ lifestyles (Hew, 2008, p. 334). The Advanced Placement (AP) curriculum has not changed over time but the standard high school student has. By combining the advances of technology with the rigor of a traditional classroom setting, a hybrid or online class may be the compromise which complements current students’ study habits. The purpose of this instructional design project is to implement and evaluate the effectiveness of podcasts, as a supplemental online resource, on probability in Moodle for 12th grade students in AP Statistics at a private school in Honolulu, Hawaii.

The generic student at this particular private school tends to participate in numerous activities that go beyond the expectations formerly placed on seniors in the past. Students take multiple AP courses, International Baccalaureate (IB) courses, are involved in multiple athletic sports and clubs, and are involved in student leadership, school plays, dance, music, and theater. Outside of school, they are also involved in community service projects and outside extra-curricular activities. With all these additional time constraints

cutting into study time, students may find advantages in optimizing their study time with supplementary podcasts which “aid student learning and provide support in relation to the core learning materials” (Hew, 2008, p. 338).

Not only do these high school seniors have academics and extra-curricular activities to rule their day-to-day schedules, but also college applications, essays, teacher recommendation letters, and interviews that encompass their November month. AP online forums, available on the College Board website, speculate that the reason behind a lull in understanding of probability is because it is first introduced to the AP Statistics student while they are preoccupied with college applications. Because of the weak foundation in the topic, there is a perception of less understanding on the spring examination. A discussion occurred in which there was a rearranging of topics to discuss probability in a later month, but whatever was put in its place would then be a student's weakness. A review of probability near the spring break, when most of the content was covered, may be one of the best options in assisting AP Statistics students in solidifying the content while preparing for the AP exam. While new material is being taught in the spring, supplemental podcasts could be made available for students to view at their own leisure.

Literature Review

MOODLE, which stands for Modular Object-Oriented Dynamic Learning Environment, creates “an environment that allows for collaborative interaction among students as a standalone or in addition to conventional classroom instruction. Moodle has great potential to create a successful e-learning experience by providing tools that can be used to enhance conventional classroom instruction or in hybrid courses” (Brandl, 2005, p. 16). Future developments include stronger pedagogical support for students and teachers in all areas and a wider range of activities (Dougiamas & Taylor, 2003). Moodle allows students who are normally shy or reserved in class to be quite verbose in a written format (Beatty & Ulasewicz, 2006).

Moodle operates on a variety of platforms, is easy to install, learn, and modify, to upgrade from one version to the next, is modular to allow for growth, and can be used in conjunction with other systems (Chavan & Pavri, 2004). As a course management system, it deals “with the assessment of student's learning performance, provides course adaptation and learning recommendations based on student's learning behavior, deals with the evaluation of learning material and educational web-based courses, provides feedback to both teachers and students of e-learning courses, and detects atypical students' learning behavior” (Romero, Ventura, & Garcia, 2008, p. 369). Moodle provides a means for students and teachers to optimize their time without compromising the effectiveness of a traditional classroom environment.

One type of pedagogical support for both students and teachers are podcasts. “A podcast is the delivery of audio, text, pictures, and/or video to a computer or mobile learning device” (Stiffler, 2011, p. 144). Advantages of podcasts include “providing a human voice and connection to the written text of education,” (Stiffler, 2011, p. 144) and

allowing “spoken words through heightened intonations or subtle nuances [to] communicate emotions and create a sense of intimacy at the same time” (Hew, 2008, pp. 349-350).

According to Hew and Stiffler, podcasts promote student interactivity in the classroom and allows for additional outside assistance where the students can access, at their leisure and a multitude of times, in order to enhance their comprehension. Contrary to the preconception that this would lead to excessive absences from the traditional classroom, more students ended up attending class more often in order to discuss the concepts introduced in the podcasts, and thus enriching the traditional classroom environment as well.

Rather than a repetition of a lesson in class, supplementary podcasts allowed students to take a step further than the basic concepts. Unfortunately, there exist debates that rather than have podcasts that a student could listen to, on the go, the majority of students would rather download podcasts on a personal computer manually, rather than from an RSS feed. “Students both in the traditional and distance courses tend to listen to the podcasts mostly on a desktop computer at home or at their halls of residence rather than on the move on a mobile device. In addition, most students said that they listened to podcasts while not engaged with any other activities” (Hew, 2008, p. 342). Surveys from students indicated that the perception of “listening to academic or educational material are different from listening to music” (Hew, 2008, p. 342) and that it would be difficult to multi-task and process information efficiently.

According to further study, test scores do not increase with the implementation of podcasts. Student satisfaction had increased with the use of podcasts, creating better attitudes towards the course and a higher likelihood of efficient productivity. They were also more likely to learn because a new technology had been integrated into the course. Regardless, the combination of using a course management system like Moodle and utilizing supplemental resources like podcasts prepares “the student for a technology-based society” (Stiffler, 2011, p. 148).

Methods

The subjects in this instructional design project were 22 high school seniors at a private school in Honolulu, Hawaii. Of the 22 seniors, 18 chose to participate in the project. Extra credit to their course grade was offered as an incentive, to compensate for their time, for the participants to complete the module in its entirety. These students have been using Moodle to post homework solutions in forums and have completed online quizzes in multiple-choice format as can be seen below, in Figure 1. Lessons are taught in a traditional lecture format in a classroom with Keynote presentations on a Smart Board. Simultaneously, teacher and students use a graphing calculator connected to a Smart View on an overhead projector. Students can get extra help during an eighth period study hall after school is finished.

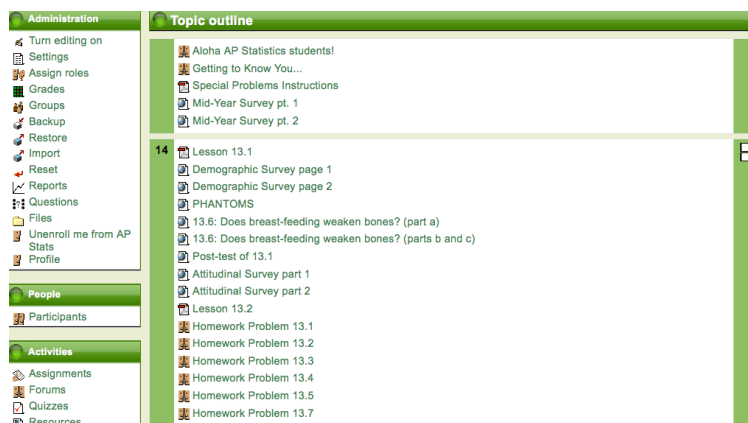


Figure 1. A screen capture of the module: A unit of AP Statistics in Moodle

New presentations covering probability were completed and edited in Keynote, a presentation software, to view extra exercises as additional examples and supplemental information that were not covered in the textbook. These presentations covered additional information to the content covered in the course in November but were reviewed by students in the spring semester. The new Keynote presentations were simultaneously recorded with QuickTime recorder with voice narration and saved as podcasts in .m4v format. Additional podcasts were created on a Smart Notebook page; selected problems from the text were done with the assistance of a tablet. Three podcasts were completed, ranging from five to fifteen minutes, each.

Podcasts were stored on a school-issued laptop computer, uploaded to YouTube, a web-based platform to upload and share videos, and linked to the appropriate unit in the AP Statistics Moodle course, as can be seen on the next page, in Figure 2. Students had iTunes downloaded to their computers to view the podcasts. They had the ability to save the podcasts, pause, and replay portions of the podcasts at their own leisure. They also were given the option to download the podcasts onto their personal mobile device, if they wanted to view and listen to them away from home. Students watched all podcasts in the order that they were posted in Moodle.

A paper-based pre-test was given in November covering material on Probability as a quiz. Students completed a post-test independently by accessing a link in Moodle, provided through a web-based survey provider called SurveyMonkey, as can be seen on the next page, in Figure 3. Students provided feedback in an attitudinal survey by following a link in Moodle, provided by SurveyMonkey. Two faculty members, one in a technology department and one in a math department, provided feedback and suggestions after the implementation of the project. Data was collected and organized in charts and graphs to display information and identify discrepancies.



Figure 2. A screen capture of the module: a podcast posted to YouTube

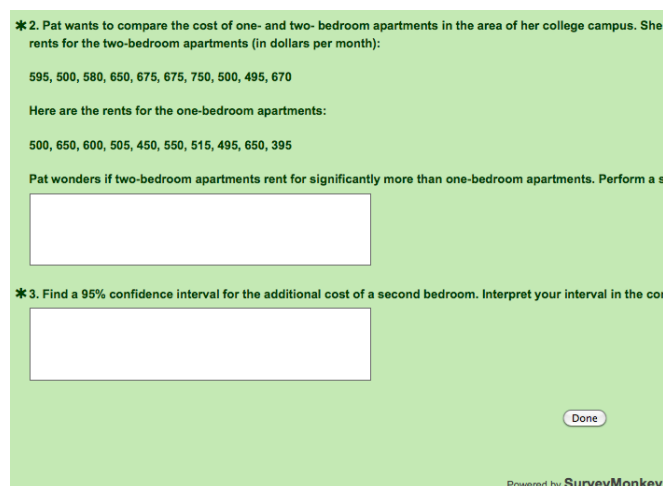


Figure 3. A screen capture of the module: the post-test in SurveyMonkey

Results

Demographic Survey

There is an approximate even split of gender in this AP Statistics course with 55.6% of them being female and 44.4% of them being male. Most of these students are 17 years old (55.6%), while 33.3% of them are 18 years old, and 11.1% of them are 19 years old.

With respect to the number of courses that the students enrolled in through Moodle, for this private school, the majority (77.8%) said that they were enrolled in up to three courses. Otherwise, 27.8% said that they were enrolled in four to six courses. Most of the students set up a profile in Moodle (88.9%) in which they could personalize with pictures and contact information and 77.8% of them did not post any blogs. The average student does utilize Moodle for a smaller number of courses, up to three courses, and then personalized the page, like on a social network with pictures, personal information, yet did not blog. Students most likely treated their online, academic space as their own personalized space, yet limited the activities to academic ones.

The majority of the students (55.6%) said that they logged onto Moodle up to two times per week. Approximately 33.3% said they logged on three to five times per week, 5.6% said they logged on six to eight times per week, while 5.6% said they logged on more than eight times per week. On average, students spent 30 – 45 minutes each time they were logged into Moodle (38.9%). About 33.3% said that they were logged on for 15 – 30 minutes, 22.2% for more than 45 minutes, and 11.1% for up to 15 minutes.

Most students have taken or were currently taking up to three AP courses (66.7%) and the remaining students have taken or were currently taking four to six AP courses (33.3%). On the other hand, a larger percentage took up to three International Baccalaureate (IB) courses (80%) while 13.3% took four to six IB courses and 6.7% had taken 7 – 9 IB

courses. Approximately 77.8% of students were not concurrently taking a math course with AP Statistics. Of the 22.2% of those students that were taking another math class, they were concurrently taking either AP Calculus AB (first year Calculus) or AP Calculus BC (second year Calculus). Prior to the AP Statistics course, the majority of the students had last taken Pre-Calculus (38.9%). About 22.2% had last taken first year AP Calculus, 22.2% had last taken an Introductory Statistics course, and 16.7% had last taken Algebra II.

Pre-Test and Post-Test

Out of the 22 students in the course, one student chose to not participate in both the pre-test and the post-test for personal reasons. Three additional students chose to not participate in the post-test. Of the remaining eighteen students, the individual scores can be seen in Figure 4, below. On average, these participants scored an 83.8 percent on the pre-test and scored an 86.9 percent on the post-test.

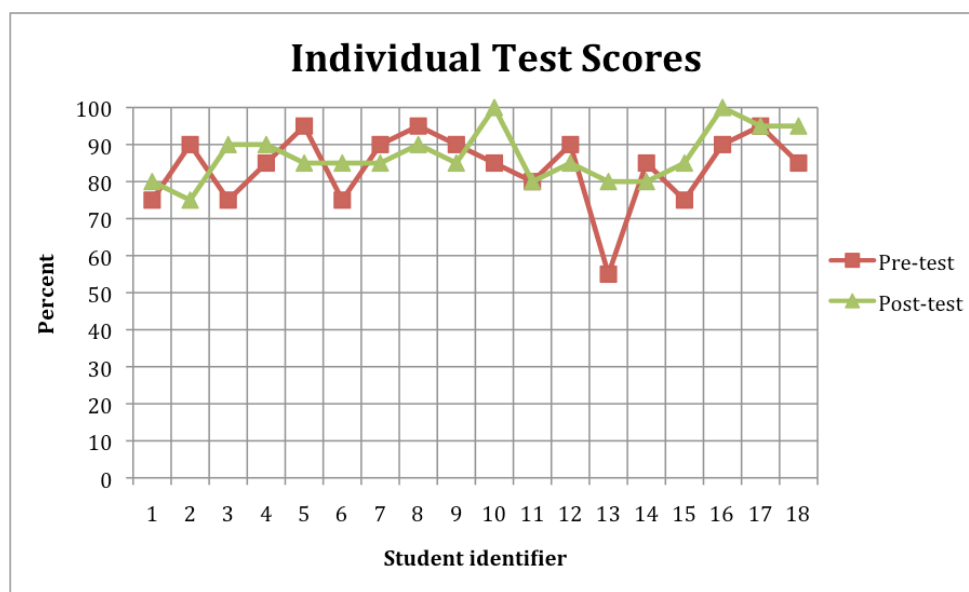


Figure 4. Individual test scores from the pre-test and post-test

Most students had a percent increase from the pre-test to the post-test with an average percent increase of 3.06%. The largest percent increase between the pre-test and the post-test was for student number 13 with a 25% increase in scores. Students number 3 and 10 had a high percent increase of 15% between the pre-test and post-test.

Student number 2 had a percent decrease as low as a 15% between the pre-test and post-test. The next largest percent decrease was student number 5 with a 10% decrease.

Attitudinal Survey

Most students (88.9%) were able to easily locate the podcasts and 100% of them felt that they were appropriate for students in AP Statistics. All of them felt that the podcasts were separated into chunks that made sense to them. On average, the podcasts that covered

examples were viewed as being appropriate and easy to follow (88.9%) but only 16.7% of the students took notes on the podcasts. Approximately 88.9% of them felt that the individual podcast sessions were not too long or too much to handle. But, when asked if the length of the podcasts were too long, just the right length, or too short, 77.8% of them felt that the length was just right and 22.2% of them felt that the length was too long.

Most students (61.1%) felt that they knew just as much about the content while 38.9% of them felt that they understood the content more. None of the students felt that they understood less than they did before. The majority (88.9%) of the students felt that the podcasts did prepare them for the post-test.

More students felt that they would be comfortable with using podcasts (66.7%) than face-to-face lecture for lessons as this unit was treated while the remaining 33.3% felt that a face-to-face lecture was more preferable. But, when asked if they would recommend this course to next year's prospective students should podcasts be completely taught online where podcasts replaced lectures, 52.6% of the students said that they would recommend the course while 47.4% of them said that they would not recommend it.

Discussion

These AP Statistics students log onto the course up to two times per week for 30 to 45 minutes each time. Since students spend time working on online quizzes and posting homework, this seems like a sufficient amount of time to be devoting to the online portion of the course. Clearly, they are of a higher caliber of student; overall, they challenge themselves by taking multiple AP and IB courses and have exceeded the minimum math requirement for graduating from high school (successful completion of Algebra II). For this reason, allowing space for supplemental resources, like podcasts, as an additional activity is appropriate for these motivated students.

The students that had the biggest percent increase had come in after the pre-test for additional help during after school study hall to gain a better perspective on the content. It would be difficult to determine whether the percent increase was attributed to the extra tutorial assistance or from viewing the podcasts. The students that had the biggest percent decreases knew the procedures for completing the tests but neglected to show all work that would have merited full credit. It is possible that missing the crucial steps in the procedure were as a result of failing a problem worth additional credit, so the need to pay attention to details may not have been as evident. It is possible that the testing methods may have confused the students since the pre-test was done on paper while the post-test was done in web-based form.

On the whole, these AP Statistics students could easily locate and view the podcasts. More often than not, the information was chunked at appropriate lengths and was easy to follow enough to not have to take notes. This may be a result of having learned the information before, since the podcasts covered content that was already covered in class.

As was indicated in the literature review, students felt that they learned just as much as they did in a face-to-face lesson. Students felt that the podcasts were more of an affirmation of the knowledge that they had already acquired and viewed them more intensely if they missed something in class due to absence or not understanding of the content beforehand. Overall, students felt that the podcasts better prepared them for the post-test.

A smaller margin of these students felt comfortable with replacing face-to-face lessons with podcasts just as the literature indicated. Being on the mature side, as students with multiple college-level courses would be, these students still valued classroom interaction but continued to view the podcasts as a tool to help solidify understanding of the material. A split percentage of students felt that next year's students could benefit from a completely online course where lessons would be presented as podcasts while the other half of the students felt that face-to-face time was still valuable for learning.

Limitations to this study included the lack of time to make more podcasts and to survey students across a longer period of time. With such a large amount of content to be covered in the course, it was difficult to assess students on the use of podcasts as a useful supplemental resource since it was only covered across one section of a unit or whether the use of a technology related supplemental resource was viewed as a novelty. The possibility that the podcasts were viewed may have even been a result of receiving extra credit for an incentive, rather than viewing the podcasts to gain a better understanding of the material. If there had been a more extensive period of time that these students could have been studied, there may have been a clearer idea of how the podcasts were used and viewed.

In the future, if there were more time and money, it would be interesting to be able to study a longer period of time in which podcasts covered content in more than one section. It would be interesting to view the results of the pre- and post-tests and the attitudinal surveys if podcasts could be made to cover the entire course and could be implemented for half of the AP Statistics students and the other half to cover content with traditional lecture style in a face-to-face environment. It may be interesting to explore suggestions that were made in the literature to examine pre- and post- tests and the attitudinal surveys for students in a different subject to see if the opinions correlated in much the same way as this group of students did.

Conclusion

Podcasts as a supplemental resource have proven to be a useful tool at the collegiate level for hybrid and online courses. An instructional design project was necessary to determine whether podcasts could be a useful tool at the secondary level for either hybrid or online courses. With proper implementation and evaluative forms, students agree that having lessons available for them was convenient and resourceful. But, more students than not, agree that face-to-face time is still valuable for interaction, questions, and general learning.

References

- Beatty, B. & Ulasewicz, C. (2006). Online teaching and learning in transition: Faculty perspectives on moving from Blackboard to the Moodle Learning Management System. *TechTrends*, 50(4), 36-45. doi: 10.1007/s11528-006-0036-y
- Brandl, K. (2005). Are you ready to “Moodle”? *Language Learning & Technology*, 9, 16-23. Retrieved from <http://llt.msu.edu/vol9num2/review1/>
- Chavan, A. & Pavri, S. (2004). Open-source learning management with Moodle. *LINUX Journal*, 66-70. Retrieved from <http://moodle.org/images/Moodle-in-Linux-Journal.pdf>
- Dougiamas, M. & Taylor, P. (2003). Moodle: Using learning communities to create an open source course management system. *Proceedings of World Conference on Educational Multimedia, Hypermedia, and Telecommunications 2003*, 171-178. Retrieved from <http://www.editlib.org/eres.library.manoa.hawaii.edu/p/13739>
- Hew, K. (2009). Use of audio podcast in K-12 and higher education: A review of research topics and methodologies. *Educational Technology and Research Development*, 57, 333-357. doi: 10.1007/s11423-008-9108-3
- Romero, C., Ventura, S., & Garcia, E. (2008). Data mining in course management systems: Moodle case study and tutorial. *Computers & Education*, 51, 368-384. Retrieved from www.elsevier.com/locate/compedu
- Stiffler, D., Stoten, S., & Cullen, D. (2011). Podcasting as an instructional supplement to online learning: A pilot study. *Computers, Informatics, Nursing*, 29(3), 144-148. doi: 10.1097/NCN.0b013e3181fc3fdf