



“Science with Bobert” a Successful Online Introductory Science Course Created with the Help of my Dog

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Abstract

A highly successful online introductory science course (with lab component) has recently been developed at Our Lady of the Lake University (OLLU) in San Antonio, Texas. The course is designed for undergraduate non science majors. The objective of the course is to introduce today's science in a fun and interactive way through “do-at-home” activities, original video, and animations of scientific concepts. Integral to the course is a YouTube Channel titled “Science with Bobert” where the videos in this channel revolve around the instructor, Dr. Smith, and his dog, Bobert. The videos combine humor, music, slow motion video, and Claymation to explain scientific concepts found in our daily lives. Topics include Newton’s Laws, pressure, density, and forces. Fundamental discussions of probability, surface area, meteorology, polymers, radioactivity, and microbes are also investigated. The course guides students in applying scientific concepts through hands-on activities demonstrated with each topic. For instance students create their own cell phone blocker through a simplistic understanding of light, make objects levitate using static electricity, or play catch with bubbles with an appropriate application of surface tension. All activities students are asked to perform require the use of items found in the home or easily available at a store. In each activity students repeat what they saw in the video and document (i.e. take pictures) their successful attempt. This is followed by the student modifying the activity in some minor way at their choosing and documenting any change in the result of their modified activity. Students then post a statement along with their documentation on an online discussion group devoted to the course. This presentation discusses common barriers to a successful online course and an overview of how “Science with Bobert” appears to overcome these barriers. The positive impact of the course on student interest and engagement in science is evidenced through student course evaluations, improved passing rates, and the excitement reflected in postings obtained from the online discussion group.

Keywords: *online education, science, outreach.*

1. Common barriers to a positive student outlook in an online science course

Online courses offer flexibility and convenience making them in high demand by students (Aslanian and Clinefelter 2013; Benbunan-Fich and Hiltz 2003; Farris, Haskins, and Yemen 2003; Hittelman 2001; Flowers and Cotton 2003; Kariya 2003). However, the barriers to create a highly anticipated by students online science course with lab can be difficult to overcome. One barrier is the fact that negative technical experiences can greatly impact the student outlook of an online course (Bambara et al. 2009; El Mansour and Mupinga 2007; Hara and Kling 1999; Mupinga, Nora, and Yaw 2006; Navarro and Shoemaker 2000; Rivera, McAlister, and Rice 2002; Wang 2008). When online course related procedures and technology are not well explained but left ambiguous, students can become frustrated with the course. A second barrier includes students feeling less instructor and student interaction in their online course (Bambara et al. 2009; El Mansour and Mupinga 2007). An online course can feel impersonal, unwelcoming, and even independent of other students in the course. Alienation is not helpful when attempting to teach students about science nor does it make learning fun for the student. And, finally, a third barrier consists of an anecdotal study of online science courses at OLLU which revealed the majority of students failed their online science courses simply because they missed too many assessment deadlines. Perhaps a third barrier in creating a successful online science course especially at OLLU is the absence of time management skills in students (Bork and Rucks-Ahidiana 2013; Yen and Liu 2009). These barriers are common hurdles to the success of all online classes and can be difficult to overcome. A major concern during development of our “Science with Bobert” course was that students would be asked during the course to repeat many hands-on activities and modify each activity. The activity would then be repeated with the modification. In all, students would be performing at their home forty plus hands-on activities (including those with modifications) throughout the course on often complex topics. There was great trepidation and concern that students in the course would be constantly bombarding their instructor



with questions. However, our developed “Science with Bobert” course appears to not only overcome this barrier and others, it has surpassed our expectations including an enhanced positive student outlook as reflected in end of year anonymous student comments. Perhaps even more importantly, the student passing rate for this course has improved to be in line with the student passing rate of our face-to-face versions of our introductory science courses for non-science majors.

1.1 Overcoming barrier #1: negative experience with technology within the course

In order to remove ambiguity from course procedures an entertaining 15 minute video was created that discusses and illustrates in visual detail all aspects of the course including performance of assessments, locating videos, performing activities, and posting to a discussion group. The goals of the course and necessary technological skills required of the student for a successful completion of the course are also presented. The introduction video walks students through each step of every technical aspect of the course including accessing videos, and online discussion groups, performance of assessments, the different types of assessments including grading of assessments. The video concludes with how students access, perform, and document the multitude of hands-on activities distributed throughout the course. The video allows students to witness each technical aspect of the course and how it is performed in real-time. Bulletins are also posted throughout the course with common questions students have and hints for success for full credit when performing assessments. Throughout the course there are many technically challenging hands-on activities that students repeat, modify, then document on a discussion group. Surprisingly, student questions regarding procedures and use of technology have been found to be very few in this course. This is perhaps a tribute to the course videos where step-by-step procedures are clearly observed combined with explanations of the scientific concepts behind the activities. To alleviate remaining student questions and concerns regarding any aspect of the course, the instructor’s contact information is advertised throughout the course and consists of an email account sent to his cellular phone. In this way when a student finds an obstacle or concern in the course, the instructor can provide rapid feedback.

1.2 Overcoming barrier #2: students feel less instructor and student interaction in online courses

The online discussion group has proven to be integral in creating a community of learners in this course. The beginning of a learning community is created with the first assessment which is an introduction of one’s self including the posting of pictures of a favorite hobby. The assessment starts with the instructor and quickly takes off from there. Students for the most part appear to very much enjoy this aspect of the course. Individual student posting in the discussion group continues throughout the course with each student posting their individual results of repeat and modified hands-on activities. The postings are read by all in the course and reflect the enjoyment many have with family and friends in performing and documenting their activities for this course. Comments obtained from the discussion group include the following where triple dots “...” indicate text omission for purposes of brevity in each response:



Fig. 1. Testing out the flexibility of thermoplastics I used a wooden skewer...I never thought that putting something through a balloon would work without it popping. I next tried it with a plastic bag full of water. The wooden skewer also went all the way through! Very cool.



Fig 2. For this experiment I didn't have a speaker small enough to swing around my head so I swung my headphones. It was pretty cool to hear the doppler effect. To change it up I swung the headphones back and forth below my waist it had the same results.



Fig 3. For this experiment I put my treadmill at an incline to make a ramp and I rolled a full soda can (left) and an empty soda can (right) down it at the same time. Just like in the video, the full one reached the bottom first because it's heavier... I remember from the experiment where the diet soda floated and the regular soda sank...I used that information to modify my experiment. I figured...



Fig 4. When doing this experiments I used a string and pen and a wine glass. the first time I did it the glass came flying off I think it was because I wasn't spinning it fast enough. I ended in spinning it perfectly and the centripetal force kept it in place.



1.3 Overcoming barrier #3: students lack of time management

An overarching goal of this online science course is to increase student interest and engagement in science. Simply put, time management skills are not taught in the course and simply avoided all together through the absence of deadlines in the course. In fact, only one hard deadline exists for all assessments in the course. This is explained in the introductory video and students work at their own pace. Perhaps a motivational factor to complete the course is how the grades are computed. Students are given a grade of zero for all assessments at the beginning of the course. Therefore, at the beginning of the course each student's overall course grade is 0.0%. As students perform assessments they see that their grades slowly improve. Students find quickly the amount of work and time necessary on their part to increase their grade by a single percentage point. A suggested schedule, discussion of grading, and the single deadline is clearly expressed in the introductory video. Email reminders and bulletins posted throughout the course also aid in this practice. Surprisingly, an absence of a calendar of deadlines has received a majority positive feedback from students as perhaps it allows flexibility in an otherwise inflexible online course created through the use of multiple deadlines.

2. Conclusion

Perhaps the actual sights, sounds, and instructional content of the course itself must be witnessed to best reveal how this course overcomes the common barriers to success for an online introductory science course. Since that is not possible with the written word it will be left to the anonymous comments from students who completed the course. Student comments reflect a high degree of satisfaction and positive outlook of our online science course "Science with Bobert." The course has been taught twice including Spring semester 2016 and Summer session 2016. Below are anonymous student comments from these periods of instruction of our new online introductory science course "Science with Bobert."

This course helped me gain an interest in science in a fun and interactive way because of the videos that we had to watch while doing the assignments. I believe the Science With Bobert were did help me understand them more because it wasn't just strictly professional. It was fun and kept me entertained and wanting to watch more.

Actually seeing the experiments made want to learn more. It gave me a way to learn and compare the material to real life situations.

There were videos and assessments to help us learn the topics, as well as videos that demonstrated the different topics and how they worked. We also had to do experiments which helped in learning the topics as well, as a hands on approach.

Experiments and learning materials were presented in such a way that I highly enjoyed this course, thus with such enjoyment it helped me learn by keeping me engaged. The way everything was explained was perfect. I loved everything about this class. Highly recommended!

References

- [1] Aslanian, C. B., and D. L. Clinefelter. 2013. "Online college students 2013: Comprehensive data on demands and preferences." Louisville, KY: The Learning House, Inc.