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“SCIENCE WITH BOBERT” A SUCCESSFUL ONLINE
INTRODUCTORY SCIENCE COURSE CREATED
WITH THE HELP OF MY DOG

SMITH, CHARLES

DEPARTMENT OF CHEMISTRY

OUR LADY OF THE LAKE UNIVERSITY

TEXAS

Dr. Charles Smith
Department of Chemistry
Our Lady of the Lake University
Texas.

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Synopsis:

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.

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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.

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.

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.

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:



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.



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.



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...



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.



I never think any of these are going to work. So I tried the one that seemed the least reasonable, and of course it worked. The first time it didnt spin because I had actually made a slight hole in the top and pushed the skewer in. The second time I just placed it on top to balance and then it worked. I tried with construction paper since it was heavier but I couldn't get it to balance to take a picture and I almost dropped the candle. But this was a cool experiment.



For this experiment, I did the cellphone radio signal activity. I first started out with the aluminum foil and wrapped it around my little sister's phone. I then placed it in the oven and tried to call it. As in the video, the phone did not pick up since the blocking of signal. I then use two aluminum trays instead of the foil and then place it inside the oven. This was a success because the radio signal did not reach my sister's phone.



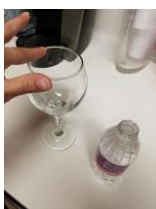
I created a mobius strip optical illusion out of two single-ply pieces of toilet paper, a stapler, and a brown permanent marker. I stapled the two strips together and then twisted one piece of paper before stapling the other end. Sure enough, when I drew a single line down the center of one side, it ended up right back where it began! So it's technically a one sided surface object. Pretty cool!!



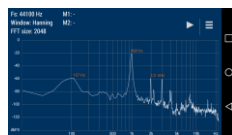
This experiment has been my favorite so far. Before watching the video, I was intimidated by the title of the experiment "build your own microscope." After learning how to make a D.I.Y. microscope and actually doing it, I found that it was both fun and easy...Out of all of the liquids that I tested, I found that #1, the Tap water, had the least amount of micro-organisms.. After conducting this experiment, I was a little bit concerned to be drinking the water that I had tested, because there appeared to be so many different micro-organisms floating around. Overall it was a fun experience to see what exactly is in the micro world around me.



In T19...I finally had the patience...but none the less I think it's pretty cool that the center of gravity allows the salt shaker to stand up like that in this position, it also worked with a soda can that I had recently purchased from HEB.



For Activity T23, I decided to experiment with resonance and frequencies and how it occurs when friction provides a perfectly matching energy to the energy of the standing wave to be created in the glass. I first acquired a wine glass...The first try I experimented simply with my partially wet finger...It took several attempts until I got the right amount of moisture, pressure, and speed but once I achieved that I was able to hear the standing wave sound. I altered the experiment by using vegetable oil on my finger...Im guessing because like having too much water the oil probably is too thick...



This experiment was definitely entertaining. I used a single wine glass, water, and a frequency app. I manipulated the sound several times by using different amounts of water. I came to find that smaller amounts of water in the glass produce a higher pitched frequency.



For Activity T22, I decided to do the Penrose Triangle experiment using Legos. Since my son is a huge Lego fan he was excited and more than willing to help...For the first attempt he built the structure as instructed by your video using all the required pieces. The result was when you look at the structure at just the right angle your brain creates a Penrose Triangle. I modified it using... but it was just slightly harder to find the Penrose at just the right angle to create the illusion... Definitely a Family fun activity!



For this activity my son wanted to experiment with angular momentum. He basically removed the wheel of his bike. We hung the wheel from two strings and then cut one off, the wheel kept on spinning and we also observed precession...also experimented with the rotating chair...didn't believe that the wheel would make him spin.



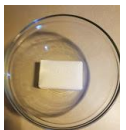
For this activity I created the centripetal force board. I didn't have a wine glass, therefore I used a tequila shot glass with water. I first changed the activity to test it, (I was afraid I was going to break a window) and tried it with a plastic bottle of water with the cap on, once I was convinced that it wasn't going to fall, I tried the tequila shot glass. I very impressed and this was a very good experience to see that the water did not spill.



For this experiment I used the needle and water, in which I was able to make the needle float. For the additional activity I used a similar needle that had different shape. It took me a while to get it to float, but it floated for less time than the previous needle and then sank. I also used...but I was not successful...



For T25 Assessment, I decided to create static electricity by blowing up a red balloon from my little cousin's hair, and then turning on the sink and then try rubbing it against the water. The results are as follows.



I repeated the Ivory in the microwave experiment from the Science with Bobert video... For the modified version of this experiment I used one of my favorite soaps, a Dove bar... it did not create a fluffy...However, it did seem to melt and was hard to remove the residue from the bowl.



For this t15 experiment, I decided to use a diet coke can, a diet coke bottle...I found it very interesting...I also found it very interesting how the regular coke bottle somehow floated...how I changed this experiment up is putting the extra bottles...made the experiment a whole lot more interesting



For this experiment I froze a glass bottle and put a quarter on top of the mouth of it. I saw that the quarter was moving around...modification in which I added was adding water to the bottom then freezing it again. I did not notice any movement from the quarter ...



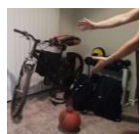
...I chose to do the corn starch and water test and I compared it to flour and water. I could not believe that the corn starch was extremely hard to stir and it got as hard as a brick when hitting it...The spoon bounced off the mixture, but when you did it slowly, it would go through the mixture like butter...shown in the picture using my finger. My second experiment, I used regular flour...



For this activity, I chose to replicate the button and string experiment...I used: a large black button...I tied the opposite end...this began to reverse its motion...To modify this experiment...This time when I wound the string, the smaller button became wound and unwound faster than the larger button.



For Bernoulli's experiment, I tried the bottle and paper test, except that I used a very large vase instead and a blow dryer. I tried the test with two different...Not one of the items would fly into the vase. It is safe to say that nothing will fly into the vase due to Bernoulli's principle..



In this activity, Newton's third Law Linear Momentum, I duplicated the exercise with the basketball and the tennis ball...My second experiment...This reminds me when I was a kid...when one person would hit the trampoline right before the second person it would always propel that person high in the air...we used to call it the "double bounce" ...



My daughter and I tried to do the experiment with the potato and straw. We did not believe that a straw would be able to go through a potato... as you can see in the second picture that meal and experiment did work out for us!



For this assignment I chose to do the ruler assignment but instead of a sheet of news paper I used a notebook sheet which also seemed to work...



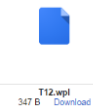
For this activity, i decided to do the cloud in a jar. I used plastic bottle...I put a small amount of...A cloud wasn't forming so i used an alternative to a match, Lit paper, and put it in the water. I then pumped air into the bottle and a heavy cloud formed...it lasted about 20 minutes! it was a pretty awesome experiment



This had to be one of my favorite activities we performed this semester. I had no expectations this was going to work. In fact, I thought the bag full of water was going to burst and get me wet. However, the stick got all the way across.



Bernoulli's Principal – I chose the experiment with the ping pong balls and the hair dryer. The first experiment was the re-enactment of the hair dryer and a ping pong ball showing the ping pong ball...Then I used a toilet paper tube that did increase the height that the ping pong ball would go. My alternate experiment included a Styrofoam cup...



This activity was really fun. It is so interesting to see how people look at capturing and studying data. Who knew that you could capture and creates notes with radiation isotopes? I played around with several and chose the song attached. It reminds me of the Bahamas.



For this activity, I chose the Dog Intelligence Test – I was curious to see how well one of my dogs would do. My easiest participant was Winston, my 5 year old Australian Shepherd/mix. This was fun to do! Test 1, I chose a small dog bowl instead of a soup can. Winston failed at getting...



So for this one, daughter right next to me and unbelieving, we tested the properties of a ballon filled with water held above a candle. We left it there for a good 15 minutes. We then...



For this activity, I used...then I filled then water bottle with the distilled water and placed it in the freezer for approximately two hours...like in the science with Bobert video...i tapped it and a cloud like formation formed inside the bottle...For the modified activity...added food coloring to the distilled water!!! The result...it was weird!!!

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..

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!

This was a fantastic class...clearly outlined, creative and kept me motivated! Great way to learn about science great class. made learning science fun!

The videos has great explanations of each topic that made is easy to understand.

I can't think of anything that was not done to help me learn. This was a great course and I especially enjoyed doing the experiments.

The professor provided many videos that made learning easier. Every topic was explained clearly, and would also include great examples that made it easier to get a visual understanding. As a result that made the labs less complicated.

The experiment and multiple videos over each individual topic helped to reinforce the information.

This is the best online course, I've ever taken. Dr. Smith created a fun and active learning environment. I would recommend this course to students in a heartbeat. Excellent!!!

This course provides an in dept of the world we live in and is fun.

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