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The Effects of the Flipped Classroom Model in a Physical Science Classroom

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An Action Research Report

By Patricia A Price

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Abstract

This study was designed to examine the effects of the Flipped Classroom model; this inquisition was conducted in ninth grade physical science classes at a Minnesota public high school. All participants had school-issued iPads. Data sources included student interest and self-assessment surveys, formative and summative assessment data, teacher observations of student participation and a parent survey. Results showed that formative scores were the same during the first unit and one percent higher for the traditional classroom during the second unit. Scores for the third and fourth units showed opposite results. Summative assessment scores during the first two units were three percent higher for flipped classes compared to traditional classes. Summative scores were the same during the third unit and four percent lower for flipped students during the fourth unit. With the continued implementation of this model, the focus will be to improve student note-taking skills and designing activities to increase student engagement in class.

I was first intrigued with the Flipped Classroom model after I attended a seminar in which Aaron Sams, one of the two educators credited with beginning the model was speaking. Several teachers with whom I work also attended the seminar and with the web cams, microphones and recording technology in hand, we embarked on a pilot program to put Aaron Sams and Jonathan Bergmann's accounts to the test. Personally, I chose to explore the effect video lectures in a secondary physical science classroom would have on formative and summative assessment scores.

As I began preparations to implement the program, I became even more encouraged after reading Sams and Bergmann's book, *Flip your Classroom: Reach Every Student in Every Class Every Day*. Both men taught Chemistry at Woodland Park High School in Colorado, and the two were struggling to get absent students caught up on essential content. The solution to their problem resulted in recording and annotating lessons, which were posted online for their students to view. Surprisingly, Sams and Bergmann discovered that absent students were not the only ones benefiting from the videos. Thus, the two launched into creating videos and removing direct instruction (in the form of lectures) from their classrooms (Tucker, 2012). Moreover, I read a quote from a student who stated, "I liked this approach a lot because when we work on homework in the classroom, (the teacher is) here to help us. Otherwise, I would be lost at home and wouldn't be able to finish my homework because I would have no idea how to do it" (Fulton, 2012, p.12). I was impressed with this notion and curious if my students would have the same opinion.

As flipped classroom programs have progressed, there are two main formats educators have chosen to incorporate into their lesson planning; traditional and mastery.

The traditional flipped classroom involves students watching an instructional video at home as homework. Then, when the students come to class, the content of the video is discussed and students work collaboratively on practice problems, labs and other extensions of the content. With the mastery-based model, students work at their own pace, completing the videos, practice problems and assessments as they become ready. This allows accelerated students to advance quickly and struggling students to receive more one-on-one support from the instructor. To ensure academic integrity, assessment questions are randomized, resulting in no student having the same summative assessments (Ash, 2012). Since our pilot program was just beginning, my implementation involved aspects concurrent with the traditional model.

As with any educational movement, members of the educational community are discovering pros and cons about the flipped classroom model. For example, opponents of the flipped classroom argue that student access issues, classroom management challenges, and production time to develop videos are reasons to stop and think before investing time and funding into such a program.

According to former high school teacher Derrick Waddell, we should be concerned that too many students do not have access to the necessary broadband that flipped videos require.

> Making technology use at home mandatory would serve only to increase the academic achievement gap between high-and-low income students that is already prevalent in education. Until broadband is in every home, the flipped classroom will disenfranchise a segment of students, leaving them lacking in necessary

> instruction while their more affluent peers continue to succeed (Bergmann & Waddell, 2012, p.6).

This statement iterates that it would be essential for a district or teacher considering a flipped classroom model to be proactive about student technological needs. For example, would the district be able to provide students with Internet access at home, if their parents did not have the means? If not, would the instructor be able to provide the videos on a disc for students to watch on a computer at home? Finally, would the student have the option to watch the videos at school if they did not have the opportunity at home? Even if all of these questions were answered, researchers also worry that this model will place too great a demand on the family home computers. Therefore, it would be essential that a district examine student demographics and resources to determine if they could support the technological needs required to incorporate such a program into their classrooms.

Another issue that arises with the implementation of the flipped classroom involves classroom management. Kathleen Fulton interviewed 20-year veteran teacher Rob Warneke who stated, 'Kids need to be trained and guided to stay on task, work collaboratively, solve their own problems, be disciplined...this is harder than making everyone be quiet during lecture. Thinking and learning can be quite noisy!' (Fulton, 2012, p.12). Along with classroom management, a teacher will need to develop a system to ensure that students are watching the videos. The videos need to be engaging and students need to be held accountable to the expectations of the instructor. Several teachers noted that they continued to have difficulties energizing reluctant learners:

> (Our teachers) realized that we were dragging (such learners) along. They may have been in class, but they weren't engaged. I know that we weren't meeting all

> of their needs in the traditional classroom, and I'm not sure that we were meeting their needs in a flipped classroom either (Ash, 2012, p.6).

This suggests that teachers will need to continue to be creative in the methods used to support reluctant learners, even if a flipped model is inserted into the curriculum.

Even with all of the concerns associated with this model, an important point is that a flipped classroom requires students to take responsibility for their learning. This is a step towards 21st Century learning, in which students are prepared to be problem solvers and independent learners. These aspects are evident in Bergmann's discussion about the transformation that occurred in his classroom, as noted here:

> We gained all that additional class time; we re-evaluated every assignment and its place in our curriculum. And today, our videos are optional as well. We give students choices in how they want to learn. Most of our students watch our videos, but others are learning from their textbooks or from online simulations. We have essentially given the responsibility of learning to our students, and that is what the flipped classroom is really about (Bergmann & Waddell, 2012, p.6).

As previously mentioned, many educators are concerned that the videos will not keep students engaged and there would not be a way to ensure that students are watching the videos. To deal with these issues, Bergmann requires his students to take notes on the videos and come to class with a question. Bergmann acknowledged that it takes a little while for students to get used to this new method, but over time, the quality of the questions and their analysis of the content improved. Bergmann was then able to use his class time to work with students one-on-one, combat misconceptions and complete more inquiry-based learning. (Tucker, 2012). Furthermore, students need to accept

responsibility for their work when completing assessments. Teachers can randomize question test-banks, so no student receives the same test as their classmates. This ensures academic integrity, especially if students are all working at different paces on any given day (Ash, 2012).

Another positive aspect associated with the flipped classroom model is that of implementing differentiated instruction in the classroom. Students are able to replay, pause, and review video lectures at their own pace. This is a great option for all students, but especially for students with special needs, who may need more time to process the material than the pace of direct instruction in the classroom. High school instructional coach for the Sioux Falls district in South Dakota, Deb Wolf commented on her experience with the flipped classroom mastery model. "For students who had not been challenged in the classroom, this was an opportunity to just fly, for others, it was an opportunity to take the time that they needed to move slower"(Ash, 2012, p.6). Often, students will struggle to complete homework assignments on their own, resulting in missing or incomplete work. This does not provide an instructor with any insights as to what topics the students are struggling with and how to assist them. Math teacher Darren Nelson from Byron High School in Rochester, MN has implemented the flipped classroom model, and it has changed his classroom dynamic dramatically:

In class, Nelson is always on the move, watching as students do the problems, working with those who have trouble, encouraging students to help each other, offering praise. He believes this approach gives him greater insight into how each student is learning, and more flexibility in his teaching (Fulton, 2012, p.18).

It is evident that there is much more to learn about the flipped classroom model and its affect on student achievement. However, as more is learned, it is likely that such a model will extend beyond the K-12 classroom. I was surprised to discover that medical training professors are already exploring the use of digital media to deliver instruction to their students. This method would provide more class time to "engage students in case, problem, and team based exercises to support knowledge retention" (Vogel, 2012, p.625). Overall, it is important for educators at all levels to make curriculum decisions based on what will have the greatest, most positive impact on their students.

My study took place in a large public senior high school in a suburb of Minneapolis, Minnesota. The demographics of the school consist of 90.4% White, 3.9% Asian, 3.0% Black, 2.4% Hispanic and 0.3% American Indian students. The percentage of students receiving free or reduced lunch services is 7.3%. Overall, the high school has a graduation rate of 96.3%. The course examined was ninth grade, general level physical science. The participants consisted of approximately 160 students. Of these participants, 21 identified as having a special education course during their school day. Four of the students reported English as their Second Language. All of the students who participated in the study had personal, school-issued iPads to use at home and school. Overall, there are 1,600 ninth and tenth graders using iPads to access digital curriculum materials and receive individualized instruction in all subjects. If a student or parent reports that there is no internet access at home, the district will provide the family with the necessary equipment; this affects approximately 1% of the population attending the high school. The iPad program is currently in its second year of implementation and will be expanded in the 2013-2014 school year.

Description of Research Process

While implementing my action research project, six data sources were utilized over the four months between November, 2012 and February, 2013. These data sources included: student interest and self-assessment surveys; formative and summative assessments for each of four curriculum units; teacher observation of student participation; and a parent survey.

The student interest and self-assessment survey was the first data to be collected (see Appendix A). The students completed the survey during their science course using a Google Form. The purpose of the survey was to obtain information about the student's perception of their engagement while watching the Flipped Classroom videos, in addition to student likes and dislikes about the process. Students were provided with the opportunity to write comments and suggestions they felt would increase their learning while watching the videos. The student interest survey consisted of questions asking the students to state if they liked learning through videos, if they wished that more of their classes used videos, and if they had experienced any technical difficulties with the videos. Additionally, examples of questions included in the self-assessment survey included, "What do you like about learning from the videos?" "Describe how the videos could be modified to increase your understanding." and, "When I watch videos at home, I find class time most beneficial when..." The results of the student interest and self-assessment surveys informed my process of planning and preparation for flipped classroom lessons.

Furthermore, formative and summative data were collected during four different curriculum units: Chemical Reactions, Acids and Bases, Motion, and Newton's Laws.

The first two units involved chemistry topics and the second two units involved physics concepts. To begin data collection, I divided my classes into two groups, flipped and non-flipped. Each group consisted of two class periods; after each unit I rotated morning and afternoon classes to avoid having the time of day affect the assessment scores. Scores for both formative and summative assessments were tabulated at the end of each unit.

The daily events of each group varied due as a result of video lectures. For example, the flipped classroom group of students received direct instruction through video lectures I created. The students were told when to watch the video assignment as we would be completing extension activities about the content during the next class period. Students accessed the video through the materials section on my Schoology page (see Appendix B). Using this method of distribution allowed each student to watch the video on his or her iPad, or a desktop computer. Students were instructed to take notes on the content of the video using a method of their choosing and fill out a Google Form once finished (see Appendix C). The purpose of the Google Form was to provide a way for students to record any questions they had about the video. As the instructor, I used their input to determine if the students had understood the core concepts of the video lecture.

When the students arrived in class the next day, we discussed questions that appeared on the Google Form and answered any other questions the students had about the material. Depending on the content, this usually took about 10 minutes. We then transitioned into the activities planned for the day. The daily events included practice problems, group work and/or laboratory experiments. Students in this group were usually able to complete the "homework" assignment in class as they had 25-35 minutes of work time. During this work time, I walked around the room to answer questions and ensure

the students remained on task. I talked with each student at some point throughout the class period before the bell rang. Consequently, rarely was there a need for students to complete assignments at home, aside from the video lectures.

Conversely, students in the non-flipped classroom group received their direct instruction during class time. I gave lectures using the Smart Board in my classroom and the students downloaded fill-in-the blank notes from Schoology (see Appendix D) onto their iPads to complete as the lecture progressed. Typical lectures lasted between 20-35 minutes, and students asked questions throughout the lesson. With the remaining time in the class period (15-20 minutes), I introduced the homework assignment for the next day and the students worked individually or in small groups to begin the assignment. As with the flipped group, I walked around the room and answered questions. Reaching every student depended on the overall amount of questions and the students typically needed to complete the assignment at home.

The next data source, teacher observation, consisted of several items. I monitored how many students watched the videos based on the students' completion of the Google Forms. This assisted in determining if the students were prepared for the lesson. Additionally, I made observations about time-on-task behavior in the classroom for both the flipped and non-flipped groups of students. Finally, I asked students about their note-taking strategies while watching the videos and offered advice or encouragement as necessary.

The final data source utilized was the parent survey (see Appendix E). I created a Google Form survey and emailed the link to all of the parents whose students were involved in the study. The survey asked parents if they were aware of the flipped

classroom model and to identify their opinions about online learning. In addition, I asked how often they discussed homework completion and study skills with their student. Moreover, I asked if the parents felt discussions about schoolwork had changed as a result of the video lectures. Finally, parents were asked how well they thought a flipped classroom program would work if their student did not have access to an iPad.

In the next section, I will analyze all of the data sources as outlined, with the focus being to determine if formative and summative assessment scores increased as a result of the flipped classroom program.

Analysis of Data

The student survey was the first data collected. The survey was given twice. With the semester change in January, I had many new students who had no previous experience with the video lectures. The results for each survey were analyzed separately. Survey results for the first semester are labeled "Group A" which consisted of 118 student responses and results for second semester students are labeled "Group B" consisting of 101 responses. The first question on the survey asked students how they engaged with the videos. Students were provided with a checklist, the results for both groups are in Figure 1.

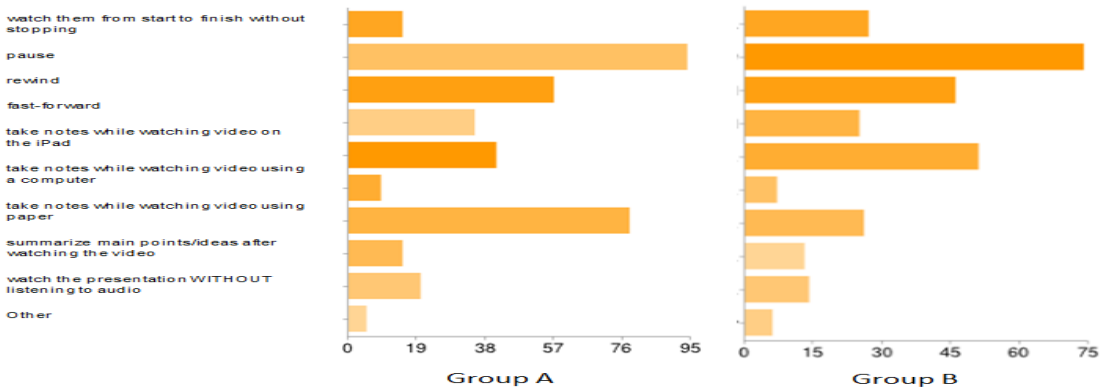

Figure 1. How do you engage with the videos as you watch them?

Additionally, the students were asked to identify when they watched the assigned videos (see Figure 2). This was to determine if the students were watching videos as homework per expectations, as well as, if they were using the videos to review before assessments. As with the first question on the survey, students were given a checklist of options for their responses.

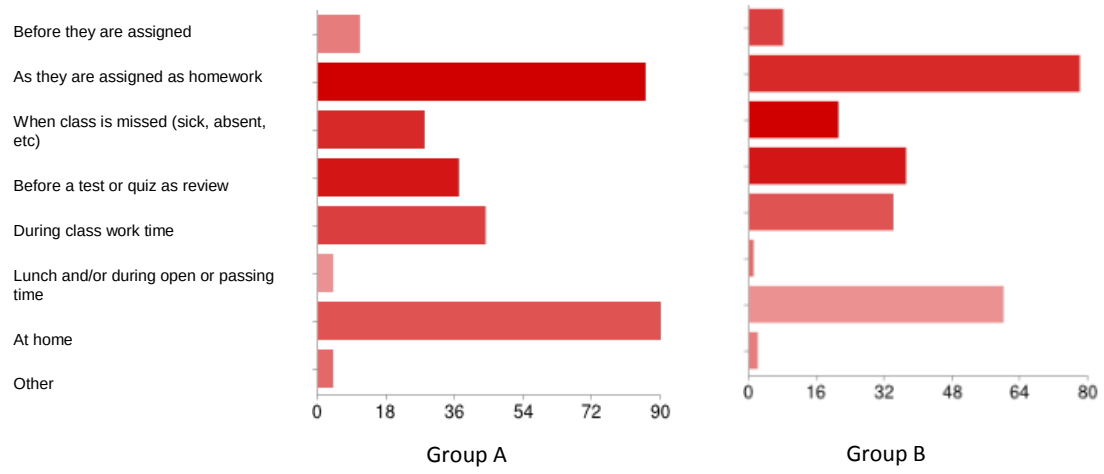

Figure 2. When do you view the videos?

Furthermore, I wanted to know what device students were using to watch the videos. All of my students have school-issued iPads, but I was curious if students preferred to watch the videos using a different device, the results are shown in Figure 3.

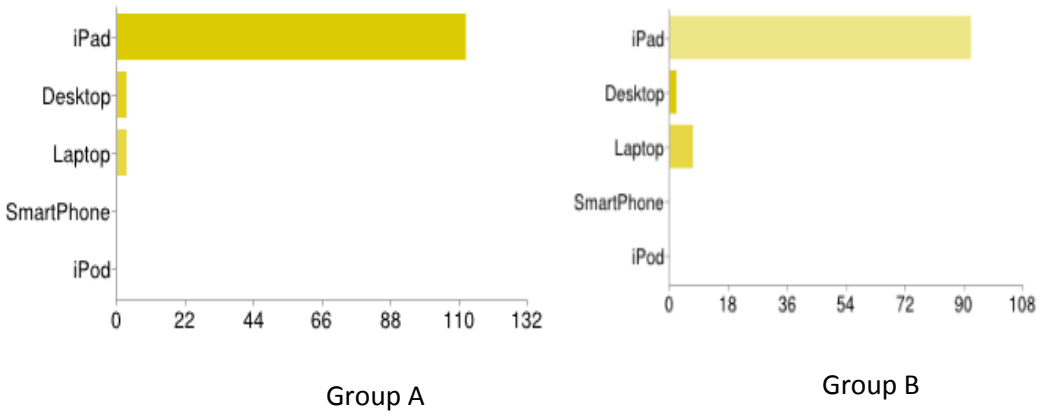

Figure 3. What device do you watch the majority of the videos on?

Finally, I wanted to know whether or not the students liked to learn through video lectures and how their perceptions, related to the impact of watching the videos, affected their learning. Students were provided with a scale of one to four, a choice of one meant that they strongly agreed with the statement, a choice of four meant they strongly disagreed. Figure 4 shows responses for students liking or disliking the videos, while Figure 5 depicts responses for how they felt their understanding of the content was affected by the video lectures.

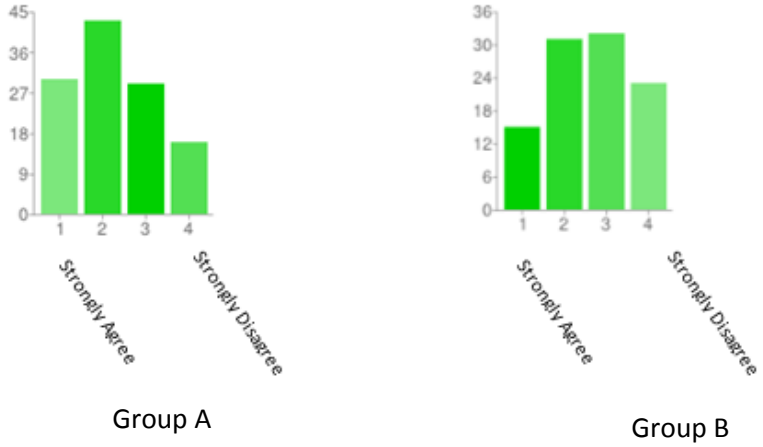

Figure 4. I like learning through videos

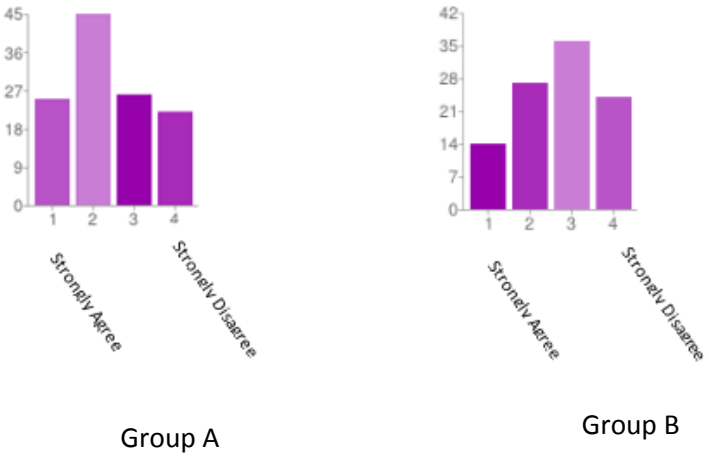

Figure 5. I understand content better when learning through videos versus lectures

To complete the survey, students were provided with the opportunity to comment on their likes and dislikes regarding the video lectures in addition to any suggestions for improvement. The following are quotes from both groups of students. One student commented, “You can see how the problem is being worked out and can go over it as many times as needed, if you get the material right away, you can move faster and at your own pace.” Another student stated, “The videos are short and to the point. I don't need to worry about other kids asking questions during the lesson getting off topic. They go through lots of examples that really help explain the lessons.” One student focused more on what happens during class and noted, “I like learning information from the videos because it lets us have class time to do labs and other activities.” Another positive comment was related to absences, “I like learning the lesson through videos because we can always go back to the video and watch it again, if we forget what we have learned and also if we are absent from class, we can watch the videos, so we get an idea of what we missed.”

In terms of dislikes concerning the videos, students were frustrated that they could not ask questions and receive an answer immediately when watching the videos, they had to wait until the next day. Furthermore, a student commented, “I would rather learn in school, not attempt to learn on my own.” Several students commented on how they felt in class if they had not watched an assigned video stating, “If we forget to do it and the homework or lab the day afterwards is based on the video, then we do not know what to do and how to do it, but the teacher usually lets us watch the video(s) before we begin.” Finally, one student alluded to the necessity of the internet in order to watch the videos, the student noted, “I don’t have time to watch the videos, and when I DO have time for

homework it's when I'm in a car and I don't have Wi-Fi anyway. I like learning where I can ask the teacher direct questions as they are going over the material."

Upon completion of the student survey, the next data analyzed were the formative and summative assessments scores. Four different curriculum units were examined during the study, two for Group A students and two for Group B students. Group A assessments involved chemistry topics and Group B assessments concerned physics topics. The bar graph in Figure 6 shows all data collected for formative assessments and summative assessment class averages are shown in Figure 7.

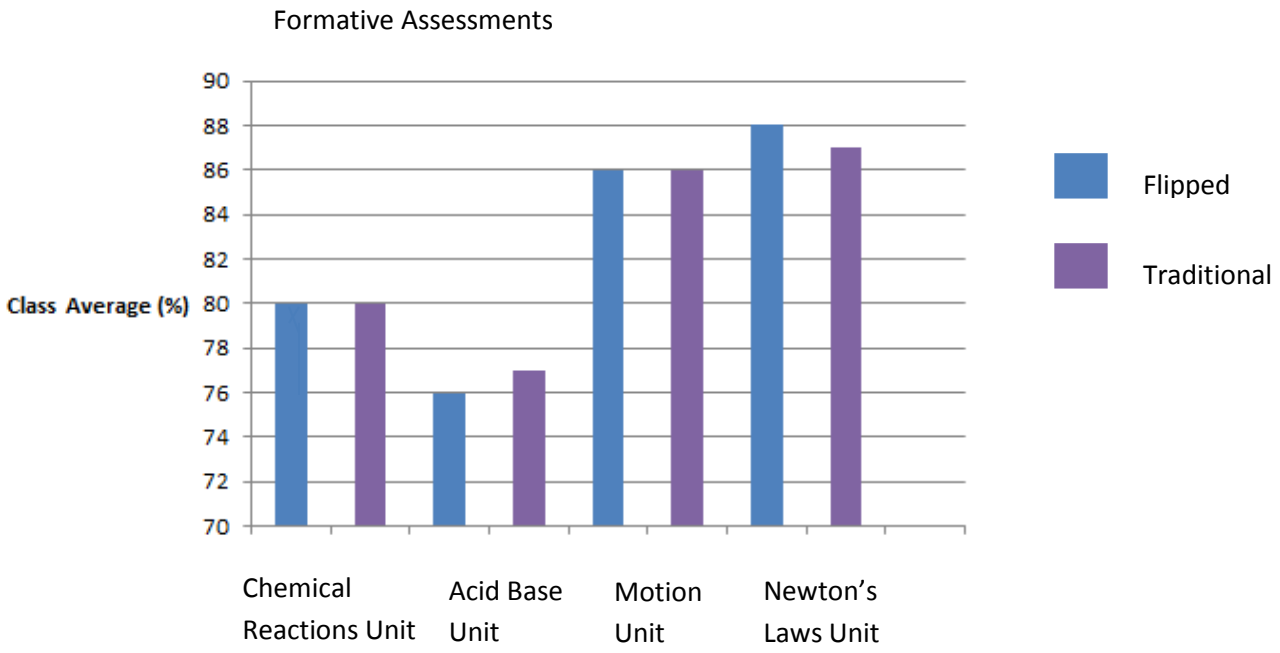

Figure 6. Formative assessment class averages for Flipped and Traditional units

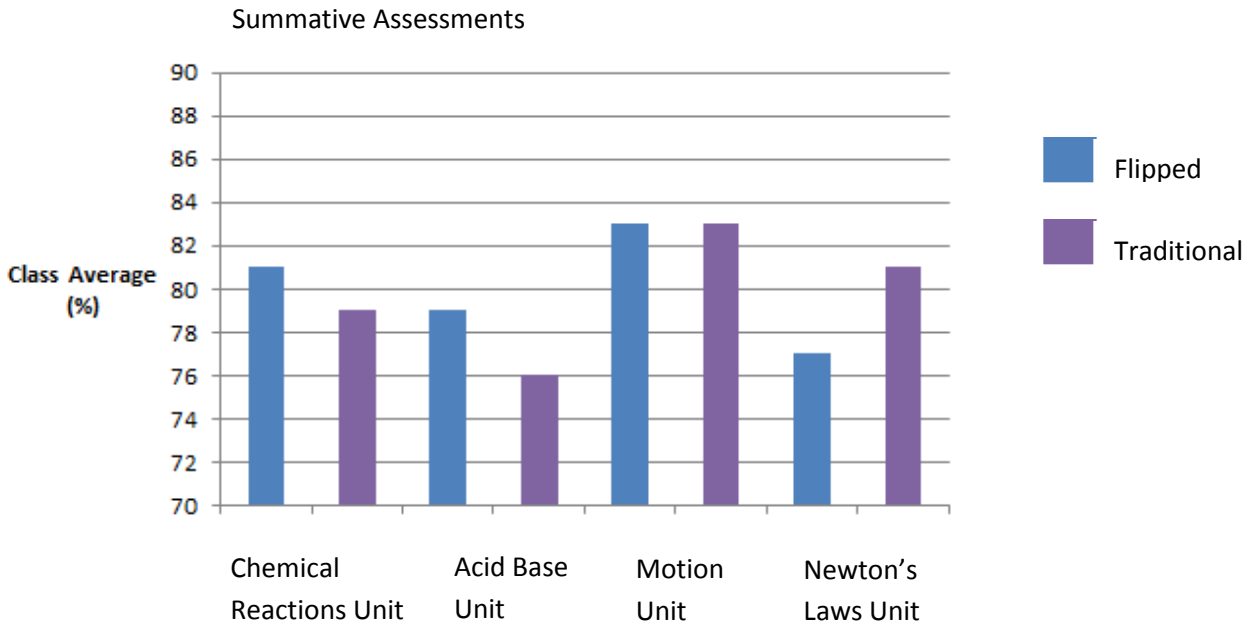

Figure 7. Summative assessment class averages for Flipped and Traditional units

The next data source involved teacher observations; I made observations about time on task, classroom management and student participation. Right away, the key issue that resulted from using the flipped classroom model was utilizing "time on task" throughout the entire class period. When I began using the videos, I found that I was running out of activities and laboratory experiments to use with the students since I was no longer lecturing for 20-30 minutes each day. I wanted to increase time on task while avoiding "busy work," this has been a continuous process throughout the pilot.

I also observed that my classroom management strategies needed to be altered, since being able to self-monitor and do independent work proved to be challenging for many students. Overall, I noticed that my morning students typically were focused and ready to complete all activities for the day, with little to no prompting from myself. On the other hand, my afternoon students often struggled to stay on task and were distracted easily. The afternoon students in Group B had an especially difficult time remaining

focused on tasks for more than 10-15 minutes at a time. One of the benefits of independent work time was that I was able to talk to every student at least once throughout the class period, however, spending more time with individual students did make it easier for the iPad to become a distraction instead of a learning tool.

I felt another important aspect of the flipped classroom to monitor was how many students were watching the videos as they were assigned. I determined the best way to track this was through the implementation of Google forms. The forms consisted of several short questions related to the videos, with the purpose of measuring student understanding and preparedness for the lesson. The forms also provided the students with the opportunity to record any questions they had about the video. These questions were reviewed during the next class period, typically as a large group, but I did address some questions on an individual bases. Overall, Group B students did a better job of watching the videos prior to coming to class, while Group A students would often watch the video and fill out the form in the first few minutes of class. This habit of Group A did improve over time as students began to notice that their questions did not get answered right away if they filled out the form late.

The final data source collected was a parent survey, given to the parents of both groups of students. The purpose was to obtain information about parent perceptions and opinions about the flipped classroom's philosophy of teaching and learning. The parent survey results are provided in Figures 8-13.

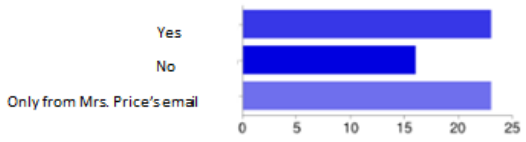

Figure 8. Have you heard of the flipped classroom before?

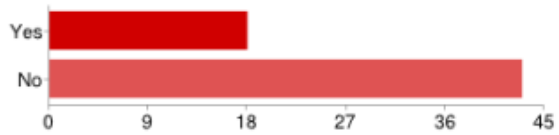

Figure 9. Have you had the opportunity to view any of Mrs. Price's lectures on Schoology?

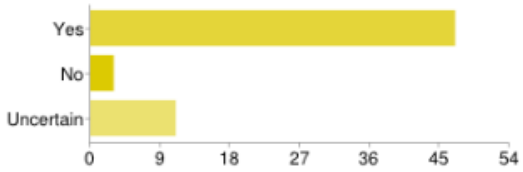

Figure 10. Do you think that videos posted to Schoology, which are always accessible to students through Schoology, is beneficial to their learning?

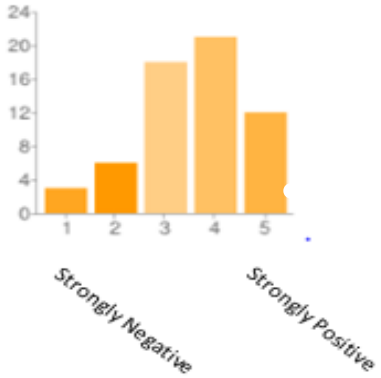

Figure 11. What is your overall opinion about online learning?

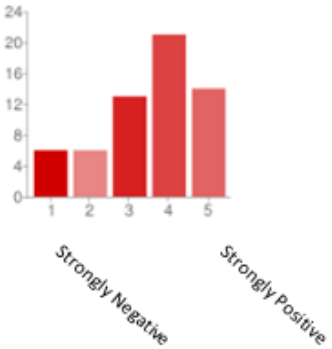

Figure 12. What is your overall opinion about video lectures?

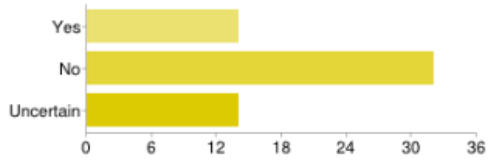

Figure 13. If students did not have access to an iPad, do you think this program could run as efficiently?

The parent survey completed the data collection for this project. In the next section of the report, I will discuss conclusions drawn from the data, in addition to implications for future research and possible adaptations to the program.

Action Plan

The student survey results generated important information about student engagement with the video lectures, in addition to the differences between both groups of students. I was glad to see that students in both groups were pausing and rewinding the videos, as students may not take advantage of this when receiving traditional direct instruction. Additionally, this is an aspect of classroom direct instruction students cannot utilize when completing assignments and practice problems at home.

Moreover, I found it interesting that a smaller amount of Group B students chose to take notes on the videos when compared to Group A students. This may be a contributing factor as to why Group B flipped students had lower summative assessment scores versus flipped Group A students. Perhaps, by not taking notes and listening to only the audio, Group B students were not processing the information as thoroughly as Group A students. The survey results also indicated that the majority of students were watching the videos on their iPad. This may be an additional reason for students lack of note-taking on the videos as I can see it being challenging and time consuming to flip back and forth

between video and note tabs on the iPad. I had anticipated that more students would watch videos on a home computer and take notes on their iPad, or if they watched the videos on their iPad, students would take notes on paper. Overall, we did not talk much about the note taking options in class, so this will be something I will focus on next year.

When asked if students liked learning through videos and if the content was understood through the videos the two groups of students differed slightly in their responses. Group A students replied more positively about both questions when compared to Group B students. A key factor in these results could be related to the semester switch that occurs at our school. The majority of Group B students had a different science teacher at the beginning of the year; therefore, they had no previous experience with the videos. Through my observations, I noticed that Group B students tended to resist this change of pace from what they were used to with their previous teachers. Group A students started with videos at the beginning of the school year, and overall, they seemed more enthusiastic about the program.

My assessment score results generated many questions about student performance in a flipped classroom versus a traditional classroom. For the first two units, (Group A students), formative scores were the same during the chemical reactions unit and one percent higher for the traditional group during the acid base unit. For the next two units, (Group B students), formative assessments were the same for the motion unit and one percent higher for the flipped classroom students during the Newton's laws unit. In terms of overall class averages, Group B formative assessment scores were six to eight percent higher than Group A students. I was quite curious about these results. I wondered that since Group B students were typically watching the videos before they came to class,

they were more prepared for daily assessments. This would be in contrast to Group A students, who may have been using the videos more as preparation for summative assessments since they were typically watching the videos during the first few minutes of class.

The summative assessment scores during the chemistry units were three percent higher for my flipped classes compared to my traditional classes. However, this trend did not continue into the second semester as summative scores were the same during the motion unit and four percent lower for my flipped students during the Newton's laws unit. It is important to note that the Newton's laws summative assessment did fall just after a hectic week of school, in which the students were participating in fundraising events involving guest speakers, dress-up days and no classes on Friday. In an effort to minimize the effects of this week on the assessment scores, I delayed the exam. However, since the summative scores were almost ten percent lower than formative assessment scores were for this unit, I feel the previous week did have an effect on the results. Furthermore, "time on task" for the Newton's laws unit was especially challenging since the students were excited and distracted about the fundraiser during much of the work time provided in class. It was easier to focus my traditional classroom students during these events as we were taking notes and having large group discussions as a class. As a result, there was less time for groups of individual students to become distracted.

Finally, I found the parent survey results to be indicative of the shift that we are seeing in the educational system. Even though most of the parents had not seen any of my videos, they were still open to the idea of online learning and felt that videos posted on Schoology would be beneficial to student learning. I was encouraged by these results as I

know how greatly parental opinions and influences can impact my students. It is helpful when parents and teachers are on the same page and able to present a united front when discussing course expectations with students.

My overall experience as an educator implementing the flipped classroom has been positive thus far. When students have access to lectures that are relevant to their current coursework, which they study at home, the benefits of using class time to apply the concepts becomes apparent. As the pilot program moves forward, I plan to improve student note-taking skills and monitor student notes on a daily to weekly basis. Additionally, I want to continue increasing student engagement while in class by improving classroom management techniques and "time on task" to encourage depth in student comprehension. Finally, I want to implement support systems for students transitioning from a traditional classroom to a flipped classroom during semester changes. I am encouraged by the success of Aaron Sams and Jonathan Bergmann's chemistry courses and their evolution to the Flipped Classroom Mastery Model (Bergmann & Sams, 2012). I am confident that by encouraging students to take responsibility for their education, we are actively preparing them future endeavors in education and the workforce.

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Appendix A Student Survey

Flipped Student Survey 2013

This survey is for students participating in a "Flipped" classroom pilot this year. When you answer the following questions, please only think about the class where your teacher is asking you to watch videos for homework. (Not for classes that are teaching everything in class and providing supplemental videos.)

---

* Required

Which teacher is asking you to take this survey? *

- Physical Science H: Mr. Cutshall
- Physical Science H: Mrs. Hoehne
- Physical Science H: Mrs. Peterson
- Higher Algebra: Mr. Schellhammer
- Chemistry: Mr. Kokesh
- Physical Science G: Mrs. Price
- AP Physics: Mrs. Hoehne

How do you engage with the videos as you watch them? (Choose all that apply) *

- watch them from start to finish without stopping
- pause
- rewind
- fast-forward
- take notes while watching video on the iPad
- take notes while watching video using a computer
- take notes while watching video using paper
- summarize main points/ideas after watching the video
- watch the presentation WITHOUT listening to audio
- Other:

When do you view the videos? (Choose all that apply) *

- ☐ before they are assigned
- ☐ as they are assigned as homework
- ☐ when class is missed (sick, absent, etc)
- ☐ before a test or quiz as review
- ☐ during class work time
- ☐ Lunch and/or during open or passing time
- ☐ At home
- ☐ Other: _____

What device do you watch the majority of the videos on? *

- ○ iPad
- ○ Desktop
- ○ Laptop
- ○ SmartPhone
- ○ iPod

I like learning through videos. *

	1	2	3	4	
Strongly Agree	○	○	○	○	Strongly Disagree

I understand content better when learning through videos versus lectures. *

	1	2	3	4	
Strongly Agree	○	○	○	○	Strongly Disagree

Which do you prefer? *

- ○ Watching videos of the class lecture for homework, then doing problems or applications of the content in class with the teacher and classmates.
- ○ Participating in a classroom lecture at school, then doing problems for homework.

I wish more of my classes used videos for instruction. *

	1	2	3	4	
Strongly Agree					Strongly Disagree

What do you like about learning from the videos? Think of a video that helped you understand the material.

What do you NOT like about learning from the videos?

Describe how the videos could be modified to increase your understanding? Examples: more pictures, more examples, length of the videos etc.

Think back to the beginning of the semester to now, how does the flipped classroom look different?

When I watch videos at home, I find class time most beneficial when the following occurs: *

- Discussing the video and going over material that relates to the videos we watched.
- Collaborative activities with classmates (i.e. labs, group problem solving, etc)
- Working independently in class to understand class material, asking for help as necessary)
- Watching a video in class, then working independently and asking for help as necessary
- Other:

When I watch videos at home, I find class time least beneficial when the following occurs: *

- Discussing the video and going over material that relates to the videos we watched.
- Collaborative activities with classmates (i.e. labs, group problem solving, etc)
- Working independently in class to understand class material, asking for help as necessary)
- Watching a video in class, then working independently and asking for help as necessary
- Other:

With laptop computers, iPads, and cell phones in class everyday: *

	Strongly Agree (Happens many times during the day)	Agree (Happens a few times during the day)	Disagree (Happens, but not very often)	Strongly Disagree (Never happens)
I am distracted by technology (ie: internet surfing, playing games, texting, watching music videos, and the like) in class ..				
I am distracted by others when they are internet surfing, playing games, texting, watching music videos, and the like in class .				

What class(es) are you watching videos in? *Only choose Math if you are in Mr. Schellhammer's Class.

- Math (Schellhammer's class only)
- Science
- Both Math and Science (Schellhammer's Math class only)

Continue »

Science Question

How often do you view science videos? *(include each time you watch/rewatch)

- never
- 1 time per week
- 2-3 times per week
- 4-5 times per week
- 6-7 times per week
- 8-9 times per week
- 10 or more times per week

In Science, I ..... *Choose the response that best describes what you do for this class.

- watch all the assigned videos.
- watch at least 3/4 of the assigned videos.
- watch at least 1/2 of the assigned videos
- watch less than 1/2 of the assigned videos
- never watch any of the assigned videos.

Are you in Mrs. Price's Physical Science Class? *

- Yes
- No

Mrs. Price's Questions

What is your gender?

- Male
- Female

Do you have an LC class during the day?

- Yes
- No

Is English your first language?

- Yes
- No

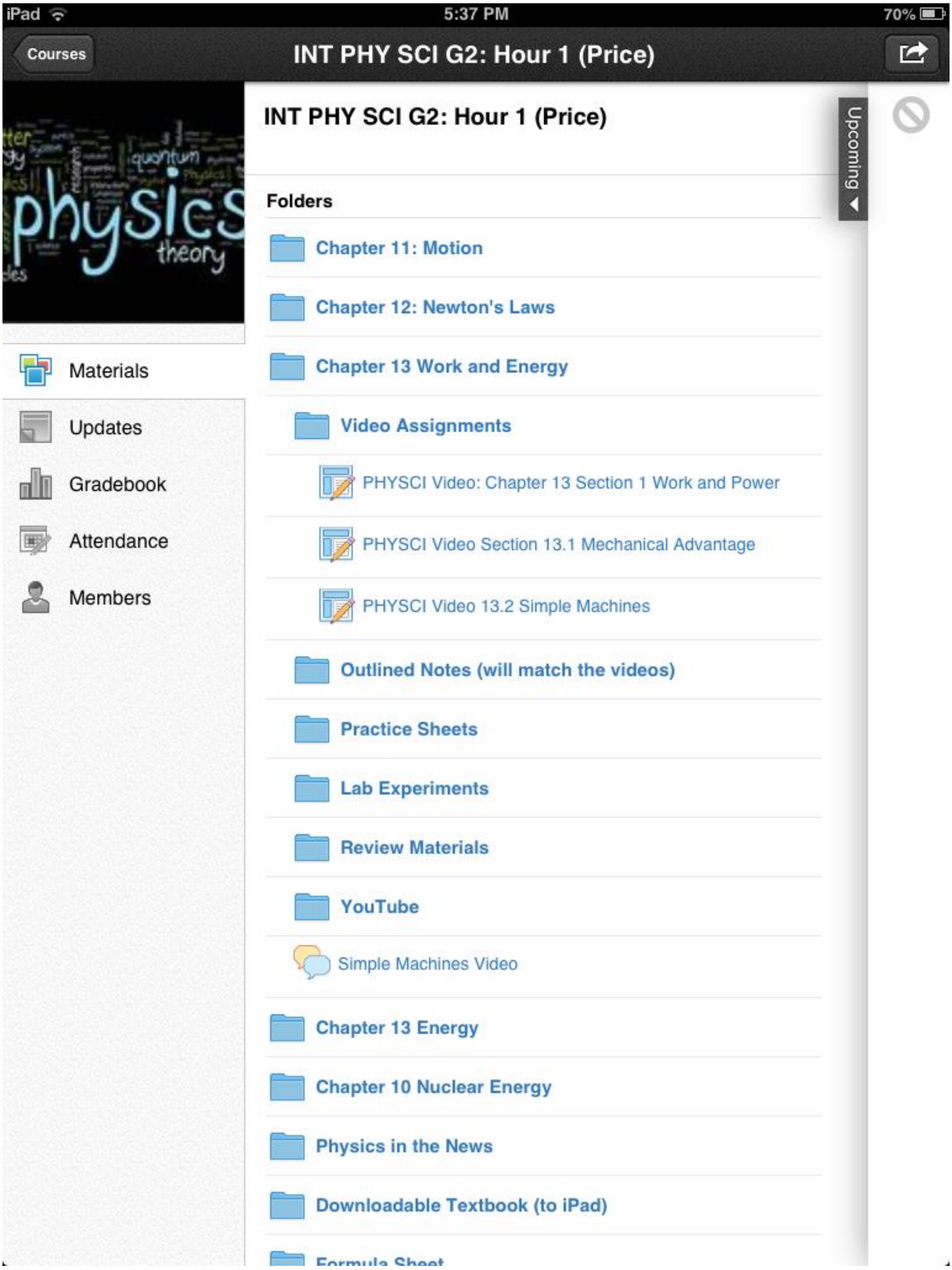
« Back | Continue »

Final Survey Questions

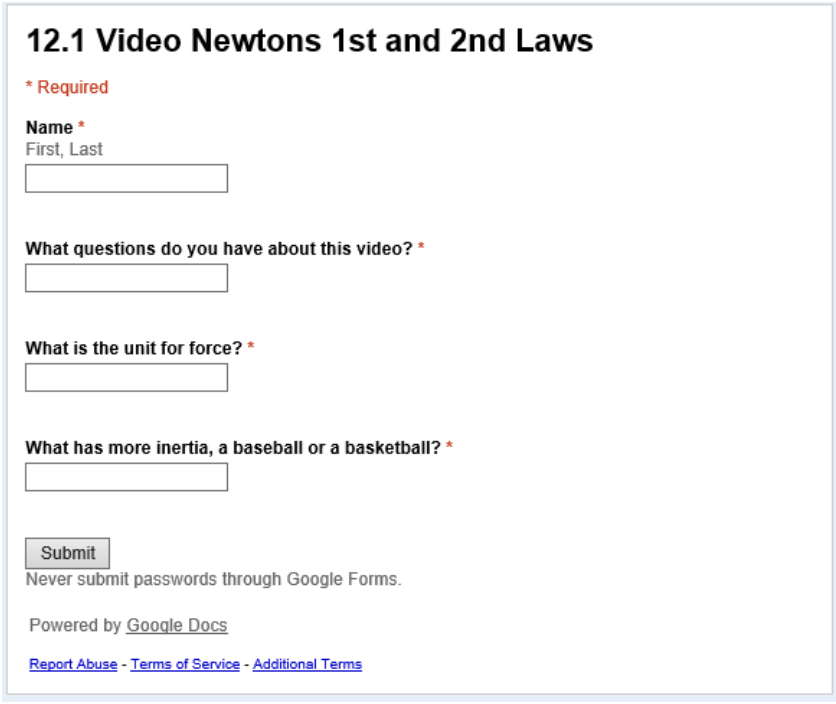
Additional Comments and Feedback

« Back | Submit

Appendix B Video Access



Appendix C Google Form Examples



12.1 Video Newtons 1st and 2nd Laws

* Required

Name *
First, Last

What questions do you have about this video? *

What is the unit for force? *

What has more inertia, a baseball or a basketball? *

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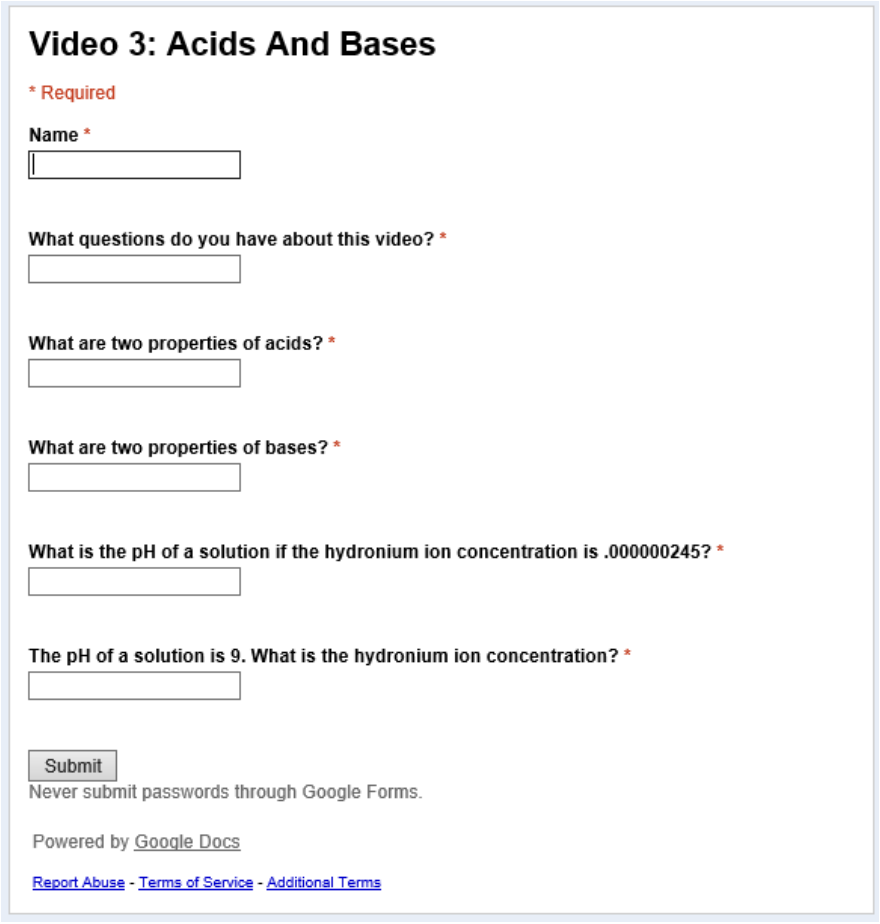

Video 3: Acids And Bases

* Required

Name *

What questions do you have about this video? *

What are two properties of acids? *

What are two properties of bases? *

What is the pH of a solution if the hydronium ion concentration is .000000245? *

The pH of a solution is 9. What is the hydronium ion concentration? *

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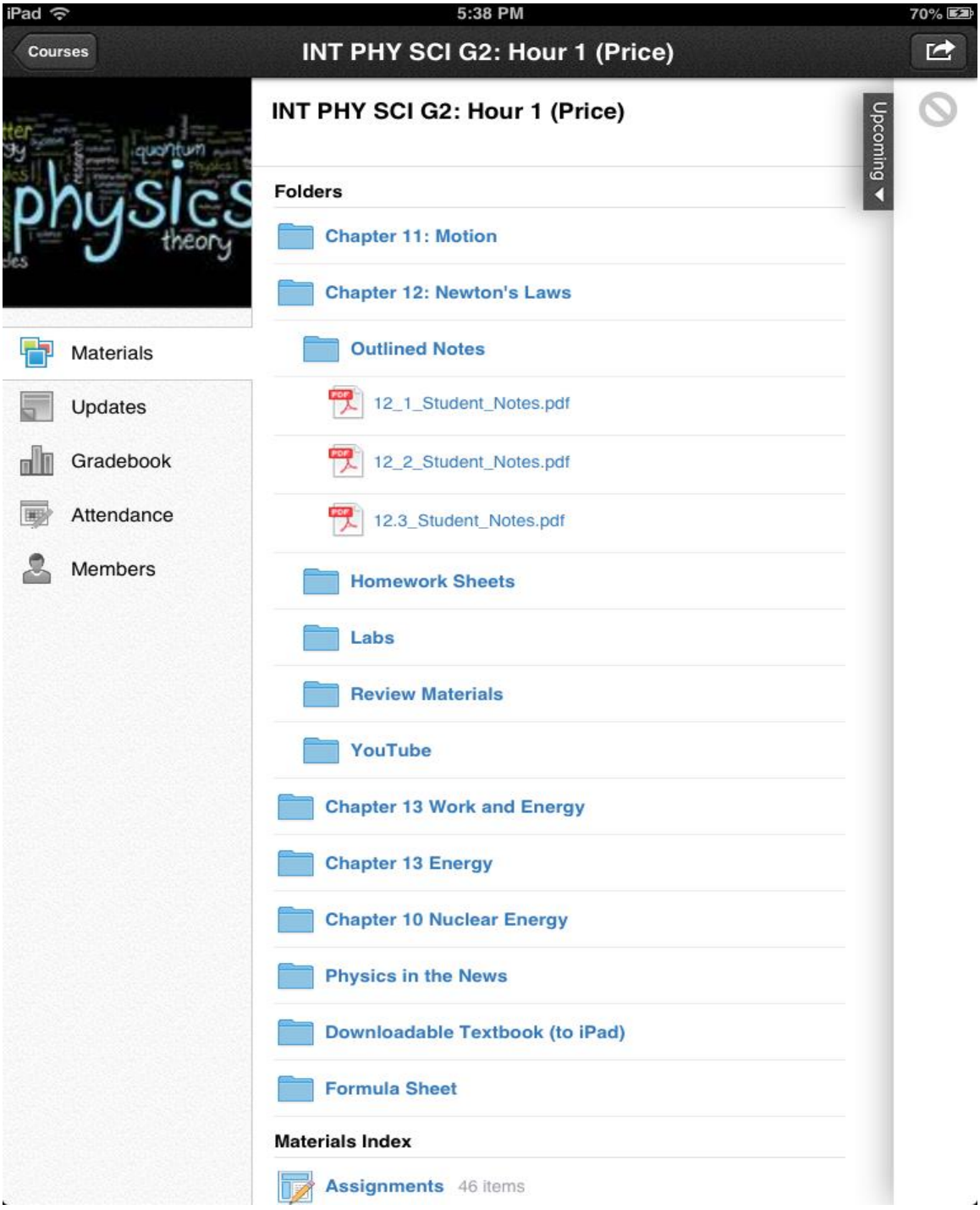
Appendix D Outlined Notes Access



Flipped Classroom Parent Survey

Thank you, your feedback is appreciated!

Have you heard of the Flipped Classroom model before?

- ☐ Yes
- ☐ No
- ☐ Only from Mrs. Price's email

Has your student commented on the use of video lectures in science class?

- ☐ Yes
- ☐ No

Have you had the opportunity to view any of Mrs. Price's video lectures on Schoology?

- ☐ Yes
- ☐ No

Do you think the use of video lectures, that are always accessible to students through Schoology, is beneficial for their learning?

- ☐ Yes
- ☐ No
- ☐ Uncertain

How often do you have conversations with your student about homework completion?

- ☐ Daily
- ☐ Weekly
- ☐ End of the Semester
- ☐ Never

How often do you have conversions with your student about test preparation and study skills?

- ☐ Daily
- ☐ Weekly
- ☐ End of the Semester
- ☐ Never

Overall, do you feel you are having more or less conversations about schoolwork as a result of video lectures?

- More
- Less
- No Change

What is your overall opinion about online learning?

	1	2	3	4	5	
Strongly Negative						Strongly Positive

What is your overall opinion about video lectures?

	1	2	3	4	5	
Strongly Negative						Strongly Positive

If students did not have access to iPads, do you think this program could run as efficiently? (on a home computer for example)

- Yes
- No
- Uncertain

Additional feedback about this program.

Submit

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