Ready, Set, Podcast!

Using Cutting Edge Technology to Deepen Students’ Understanding of Science Concepts

Brittany Bird
Radio Park Elementary, SCASD
Intern, Third grade
Penn State University
blb247@psu.edu
April 28, 2007
# Table of Contents

Abstract ........................................................................................................................................... 3  
Description of Teaching Context ........................................................................................................ 4  
Rationale ............................................................................................................................................ 6  
Wonderings and Sub-questions .......................................................................................................... 8  
Inquiry vs. Project ............................................................................................................................... 9  
Inquiry Plan Description .................................................................................................................... 10  
Data Collection .................................................................................................................................. 12  
  - Reflective journals  
  - Recorded planning sessions  
  - Interviews with podcast students  
  - Student pre and post assessments  
Data Analysis ....................................................................................................................................... 14  
  - Reflective journals  
  - Recorded planning sessions  
  - Interviews with podcast students  
  - Student pre and post assessments  
Claims and Evidence .......................................................................................................................... 17  
Conclusions ......................................................................................................................................... 30  
New wonderings ................................................................................................................................. 35  
References .......................................................................................................................................... 36  
Appendix A: Data analysis notes on podcast planning sessions .......................................................... 37  
Appendix B: Data analysis notes on interviews with podcast students .............................................. 42  
Appendix C: Assessment scores chart ............................................................................................... 44  
Appendix D: Percentages of scores from assessments ....................................................................... 45  
Appendix E: Data analysis notes on podcast students’ assessments compared to others ............... 46  
Appendix F: Student DM’s pre and post assessment ......................................................................... 47  
Appendix G: Student KD’s pre assessment ......................................................................................... 48  
Appendix H: Student KD’s post assessment ....................................................................................... 49  
Appendix I: Podcast student DS’s pre-assessment ......................................................................... 50  
Appendix J: Podcast student DS’s post-assessment ........................................................................ 51  
Appendix K: ESL podcast student MJK’s pre and post assessment .................................................. 52  
Appendix L: Student SP’s pre and post assessment ......................................................................... 53  
Appendix M: Student OS’s pre and post assessment ....................................................................... 54  
Appendix N: Student BB’s pre assessment ....................................................................................... 55  
Appendix O: Student BB’s post assessment ...................................................................................... 56  
Appendix P: Podcast student AC’s assessment ................................................................................. 57  
Appendix Q: Podcast student AM’s assessment .............................................................................. 58  
Appendix R: Learning support student BB’s assessment ................................................................. 59  
Appendix S: Learning enrichment student DS’s assessment ............................................................. 60  
Appendix T: Podcast student JHM’s assessment ............................................................................. 61  
Appendix U: Student HK’s assessment ............................................................................................ 62  
Appendix V: Student SP’s assessment ............................................................................................ 63  
Appendix W: Journal Entry .............................................................................................................. 64
Podcasting: Using Cutting Edge Technology to Deepen Children’s Understanding of Science Concepts

Abstract: Does the creation of podcasts deepen students’ understanding of science concepts and support teaching science as inquiry? In my third grade classroom, we explored ways podcasts could support the learning of science processes, reinforce concepts the students had learned, and provide opportunities for students to research their wonderings. Groups of four at a time created a podcast based on the science topics the class studied during the Energy and Electricity unit. This paper explores not only the use of science podcasts in an intermediate classroom but also the benefits they have in supporting students’ understanding and thinking about science concepts. Through my data collection and data analysis, I found that creating podcasts deepens students’ understanding of science topics as well as engages them in a creative way to share their learnings with others.
Description of Teaching Context

My inquiry project takes place in a 3rd grade classroom. In this class, there are twenty-five students, eleven of which are females and fourteen that are males. There is a wide variety of academic abilities as well as social and emotional differences. Five of the students are of Asian decent. Of these five, two of them are ESL students as well. The one ESL student speaks fluent English, while the other just arrived from Korea a few months ago. Two students are African American and two others are bi-racial.

When it comes to academic ability, four of the students, all males, go to math enrichment every week while another four are learning support students. One of these students goes to learning support for both math and language arts. Another goes for just math. The other two have in-class support from a para-professional. There are also three Title I students in the class. Two of them go for reading and math support while one only goes for reading.

Some students have great difficulty getting their work done. In particular, three students have trouble getting started and finishing a task. One in particular shows signs of ADHD, although he has not been diagnosed. However, there are a handful of students who are easygoing and get their work done in a timely fashion. Two students are extremely quiet and anxious to get the teacher’s affection. They are very kind-hearted, but they do not have a lot of friends because they are so quiet.

As far as social behavior is concerned, there are a few leaders that stand out in the crowd. There are about five students that tend to take the lead. Two of them are girls and the other three are boys. These students can influence others easily and are not afraid to do so. Two students have challenges in their behavior; they are defiant and have trouble respecting authority figures.
In this class there are a variety of academic, social, emotional and behavioral levels. As in the school, students come from a variety of academic backgrounds and socio-economic statuses. I have students that are from single-parent homes that live in apartment complexes and also students with two parents who are Penn State professors. The level of home support varies with each family. The school is culturally diverse, with a lot of PSU grad students’ children attending.

Since my inquiry deals with technology and science, I feel it is important to discuss how “science talks” operate in the classroom. First off, “science talks” involve the students engaging in a conversation about their claims, evidence and experiments in a large group setting. During these “science talks”, usually only the higher achieving students volunteer to participate. Most of the students that struggle in science remain silent and eventually begin to daydream, become off-task or disengage from the conversation.

Each student has his or her own strengths, needs, and challenges. Each one contributes to the mosaic that is “Room 3.”
Rationale

The reason I want to investigate this topic is because I am very interested in how technology enhances student learning especially in inquiry-based science classrooms. I wanted to see what effect technology had on students in terms of their thinking processes and their achievement. Technology is becoming more prevalent in classrooms today and in students’ lives. I am curious about the integration of it and the results it can produce. Technology is something that is relevant in almost all my students’ lives through Playstation 3, computers, and DVD movies.

I do not consider myself someone who is overly confident when it comes to technology; however, I think I have a solid understanding of it. I believe that the only way to learn more about technology is to use it and work with it as much as possible. Bringing technology into the classroom is something that I value and it has become important to me as a teacher. I can see tremendous benefits of using technology and how it directly relates to my students’ lives. Most students deal with technology in the form of a computer everyday, so incorporating technology into lessons and my classroom in general is important to me.

Through the creation of my own podcast with other interns at my school, I became interested in this fairly new form of technology. From this, I started wondering how my students would react to this new technology and the benefits it could produce in the classroom. O’Hear (2005) states in his article that,

The word "podcasting" originates from the words iPod and broadcasting, and a podcast is best described as "radio" content, which a listener subscribes to via the internet. Once subscribed, the listener receives a new podcast as soon as it's available, which can then be played on either a computer or portable MP3 player (it does not have to be an iPod), at a time that suits them. The ability to subscribe and the "on-demand" feature of podcasting, together with the rising popularity of MP3 players, are what makes it so attractive. For education, the potential is huge (p. 3).
I wanted to see what effects using podcasts, could have on their learning and understanding.

Since my classroom is always buzzing with science learning and is very rich in scientific inquiry I decided to combine podcasts and science.

This exploration of podcasts will affect my teaching based on the results of this inquiry project. I feel that having a good grasp on the use of podcasts will help me to incorporate even more technology into the classroom and feel comfortable doing so. In the future, I hope to introduce the use of podcasts to co-workers and colleagues so that more students can benefit from the use of technology in the classroom. Because I will be familiar with how to create podcasts I can spread the information to others and hopefully help them to become comfortable trying new things and integrating technology.
Wonderings and Sub-questions

Driving Question: Does the use of podcasts deepen students’ understanding of science concepts while supporting scientific inquiry in an intermediate classroom?

- What do my students know before being involved in a podcast? Is there a significant increase in their understanding of the science topic after participating in the podcast?
- Does viewing and listening to a podcast created by peers increase students’ understanding of science concepts?
- Does having ownership in the creation of a podcast encourage student involvement or increased interest in the topic?
- Does the small group dynamics that are produced during podcast sessions increase the level of student understanding or student learning? Does this small group setting encourage more participating?
- Do students participate differently within the podcast small group than when in a whole class science talk setting?
Inquiry vs. Project

This inquiry project has been a true inquiry because of my desire to research something that is unknown. To start the process, I came up with a list of wonderings that I thought about throughout my days as a teacher. From there, I looked at each one and found one that I was most interested in and curious about. Using technology has always been something that I value and this year I have observed the benefits of pairing it with instruction. From this initial wondering of how podcasting influences student learning, I came up with more wonderings and sub-questions. Also, I devised ways to test my wonderings and obtain data in order to understand this topic better. I developed multiple assessments and forms of data collection that would help lead me to a better understanding however not necessarily an exact answer. I started with wonderings, which turned into an overall inquiry question. Next, I moved on to data collection through science journals, voice recordings, child interviews and assessments. The following step was to analyze this data and use it to find a deeper understanding. I made claims and supported each claim with evidence from data analysis. These steps were part of the inquiry process and therefore make my project a true inquiry.

In addition, this was not a project or improvement in the classroom because the answer and results were unknown at the time. I began generating numerous further wonderings, and all the answers to my wonderings were unknown to me. My desire to research this in more depth made it an inquiry not a project. I searched for something that is truly unknown because the new technology of podcasts has not been written about or researched in much depth. I believe this was truly an inquiry because of my quest for the unknown, my generated wonderings and the assessments and forms of data collection that I undertook.
Inquiry Plan Description

Timeline of events:

January:
- Record podcast planning sessions

February:
- Record podcast planning sessions
- Researching literature on: podcasting, using technology in the classroom, and teaching science as inquiry

March:
- Background/context, annotated bibliography, inquiry vs. project paragraph, wonderings: due on March 7
- Pre assessments on Switches, Static, Electromagnets (after doing lessons in class and before viewing of podcasts)
- Interview podcast students about their experience
- Post assessment for Switches podcast
- Analyzing data: recorded sessions, recorded interviews

April:
- Post assessment for Static/Electromagnets podcast
- Final analysis: pre and post assessments rated; recorded interviews transcribed

The first step in this process was to introduce the concept of a podcast to my students. I came up with a concrete definition that all of my third graders could understand. I defined podcasts as similar to a radio broadcast show where “reporters” relay information to an audience. I explained it is mostly audio but that we would add pictures, music, and sound effects as needed. It was not until the first podcast premiered that most of the student fully comprehended the concept.

Moreover, before the podcasts were created, the science lessons had to be taught. A series of lessons and investigations on energy and electricity were taught between January and April. As the teacher, I first engaged students in “science talks” about our classroom investigations and then asked them to make claims about what they had learned and to support their claims with evidence.
These claims and evidence were then recorded on a KLEW* chart. As the “science talks” were conducted, students often had further questions or wonderings that arose. These were then added to the Wonderings section of the KLEW chart.

To begin the process of podcasting, the students worked in small groups. Groups of four at a time worked with either my mentor or me to create the podcast. Each podcast took about 2-3 weeks to complete. The groups met for a half hour each day to write the script. Each student was assigned a role; one student became the reporter and the others took the role of scientists or professors who described the investigations, claims and evidence. Using the KLEW chart from science class, the students were able to create lines and write down what each person was to say. Each group learned to use the completed KLEW chart as the organizing device for writing the script. Next, students would research answers to one or two Wonderings and add this information to the script. Finally, we would record voices, and add pictures, music and sound effects. The podcast would then be published to the Internet and premiered with family, community members, and classmates.

*KLEW stands for:
K: What we think we KNOW
L: What we are LEARNING
E: Our EVIDENCE
W: Our WONDERINGS
Data Collection

Reflective Journals

As part of the PDS program, interns write weekly reflective journals discussing issues, challenges, or teaching strategies that may occur within the classroom. I chose to write some of my journals reflecting on these podcasts that I was creating with my students. Mostly, I wanted to think about the students who seem to “come alive” during podcasting but are not usual participants in science talks. I was seeing vast differences in the participation levels of students in the small group setting versus whole group science talks (Appendix W).

Recorded planning sessions

I used an iPod with a voice recorder to track the podcast planning/script writing sessions. I simply set the iPod on the table and let it record everything that was happening. The students acted as if it was not there at all. I could then review these recorded sessions later and see if patterns arose throughout the various groups. These could be used to compare and contrast the different groups that created podcasts (Appendix A).

Recorded student interviews

I used the iPod with a voice recorder to directly interview six students, which had participated in the podcasts, about their experience. Again, I just set the iPod down and let it record the conversation between the student and me. I wanted to get their view of podcasting and if they thought it helped them to understand science concepts better. I asked them several questions in order to obtain their thoughts (Appendix B).
Pre and Post Assessments

I gave the students a pre-assessment on topics that two of the podcasts discussed: #1 Switches, Conductors and Insulators, and Plasma Ball and #2 Static Electricity, Electromagnets and Series and Parallel Circuits. These were given before the students saw the podcast that four of their peers had created but after regular instruction of these concepts in the classroom. The pre-assessment on switches, conductors and insulators, and the plasma ball was given while the podcast group was working on it (Appendices P, Q, R). Then, after the whole class viewed the podcast, I gave the students blue pens and had them add to or correct information on their original pre-assessment.

The other pre-assessment on static, electromagnets, and series and parallel circuits was given before four students had started creating the podcast (Appendices F, G, H, I and J). I chose to break these up into 3 sub-assessments: static electricity, electromagnets and circuits. This time after the whole class viewed the podcast, I gave the students completely new sheets to fill out. The questions on the post-assessment were exactly the same, in the same order and with the same formatting as on the pre-assessment.
Data Analysis

Reflective Journals

I reviewed the reflective journals I wrote that discussed my inquiry project. One journal in specific really showed insight into the podcasting that was taking place (Appendix W). I wrote about the differences in the participation and enthusiasm levels of students in science talks versus their participation at podcasting time. This journal entry discusses the differences in children who are reluctant to talk in science class but had an overwhelming desire to participate in the podcasts. They were eager to learn more and add their opinion and thoughts into the general discussion during podcasting. I was able to read through this journal and look for quotes that described student behavior, patterns across the groups, and student participation levels. This was a form of evidence that I used to support one of my claims.

Recorded planning sessions

Using an iPod to record the script writing and podcast planning sessions allowed me to go back and listen more intently to what was happening during these times. As I listened and analyzed, I took notes on what I was hearing and the patterns that I was observing. I could do this by comparing and contrasting the different groups that created podcasts. I was interested to see how different groups acted during the podcasting times and how each group went about writing the script and preparing the podcast for its premiere. I was able to record different behaviors like level of participation, and students’ reactions to various parts of podcasting. These sessions, accompanied with my notes, allowed me to analyze and think about why students behaved in certain ways during podcasting compared to science talks in the classroom. As I listened to and analyzed each planning session, I wrote down patterns of behavior or direct
quotes either from the students or myself. Many times I scripted out part of the conversation that took place so that I could look at the interaction between teacher and student.

These recordings, along with my notes while analyzing, became supporting evidence for some of my claims, because I was able to pull out direct quotes from students that supported them.

**Recorded student interviews**

In these interviews, I asked students a series of questions, and they were instructed to answer however they felt appropriate (Appendix B). I explained to the students that this was not a test and that they should feel free to express their true thoughts. The main objective of these interviews was to get an idea for how my students viewed working on the podcast, what they believed where the important aspects to include and to have them describe through metacognition how, and if, their own understanding had changed. I was able to compare the students’ responses to each other as well as to my beliefs and viewpoints on the use of podcasts. I wrote out each student’s response under the specific questions. Next, I reviewed each question and the responses in order to compare and analyze. This allowed me to look for patterns of consistency among the various students.

**Pre and Post Assessments**

I used assessments that related to two of the podcasts in order to assess the students’ understanding before and after viewing the podcast. I had two wonderings when collecting this data: #1 How do the podcast students complete the assessment compared to the other students in the class and #2 How does each student compare to him or herself when completing the
For this first wondering, I took notes on how the podcast students’ assessments compared to the other students in general (Appendix E). I looked at and compared the detail that was put into each response by these two groups of students. I checked for understanding by looking at not only the amount of information they wrote but also the content that was included with each response. I wrote down observations and notes about how the podcast students’ assessments compared to the other students’. I analyzed each student individually and then made comments concerning what I was seeing throughout my data (Appendix E).

For my second wondering, I used a rating scale to analyze the data (Appendix C). These assessments were individually rated on a per student basis. The scale consisted of a 1, 2, or 3 rating that centered on the amount/content of additional information that was added from the pre-assessment to the post-assessment. A student received a “3” if a substantial amount of information/content was added. A “2” was given when students added some information/content on the post-assessment. Lastly, a score of “1” was received when no additional information was added to the post-assessment.

In order to obtain a more analytical and numeric form of data, I calculated percentages for each of the four assessments (Appendix D). For each score (1, 2, or 3) I determined the percentage of students who received it for each individual assessment. Then I calculated the overall percentage of students who scored a 1, 2, or 3 on all the assessments combined. Next, I created graphs that displayed the total number of students that received each score on the four different assessments. This was a way for me to compare and contrast scores from the four assessments. The graphs are explained in more depth in the evidence section of this paper.
Claims and Evidence

In this section of the paper I will discuss the claims and evidence I found while investigating my wonderings as part of this inquiry project. Some of my initial wonderings and sub-questions I was not able to answer explicitly but found some evidence that supported them indirectly. These sub-wonderings will be answered directly in the conclusion section at then end of this paper.

Claim:

*Being involved in a podcast helps students to make their thinking public and engages them in discourse about science concepts.*

Evidence:

In the podcasting sessions, students were invited to freely express their thoughts, ideas and wonderings in a supportive environment. My notes on the analysis of the planning sessions showed that this was a time to discuss wonderings as well as investigations done in class in more depth. Most of the podcasting time was used as a conversation between the group and myself rather than a teacher-directed discussion. This was clearly a time where students made their thinking public to their peers in addition to me. Douglas Llewellyn (2002) states in his book, *Inquire Within*, “…using exploration and discourse strategies stimulates students to think critically about the data and evidence accumulated during their inquiry” (p. 58). Throughout the entire process of creating a podcast the students were engaging in discourse about relevant science topics. Everything was taken from our science lessons and the claims and evidence placed on the KLEW chart.

This part of the podcast script on electromagnets demonstrates how students were able to make their thinking public:
MJ*: We took a nail and wrapped a wire around it. Each end of the wire was left sticking out a little bit. We connected each end of the wire to a battery.

D: The nail became magnetic. We call this an electromagnet! You can make a nail magnetic by giving it electricity.

J: The nail was able to pick up 6 large paper clips, 13 butterfly clips and 9 small paper clips. This is our evidence that the nail is magnetic now.

The final product, the podcast itself, showed how students used their ability to engage in discourse and make their thinking public. Students were sharing and discussing their learnings with a general audience. This clearly shows they participated in scientific discourse. In addition, because only four students worked together at a time, the use of cooperative learning groups was used to promote peer interaction and discourse in inquiry learning, which are important skills to acquire as a young science learner (Carin, Bass, & Contant, 2005). The podcasting sessions, that encompass script writing, and the final product are both evidence that support the claim that podcasts helped students to make their thinking public and engaged them in scientific discourse.

Claim:

Creating and writing a script for podcasts helps students to understand the process of using claims and evidence and supports their scientific thinking.

Evidence:

The book, Teaching Science as Inquiry, describes how learners develop descriptions, explanations and predictions using evidence as an integral part of inquiry (Carin, Bass, & Contant, 2005). Carin, Bass and Contant (2005) go on to state how, “Children gradually learn that explanations must always be based on evidence” (p. 101). Through engaging in script writing, the students were able to identify claims and support them with evidence. JD stated that “…so people know you did it and that it is true” when asked why evidence and details are important to incorporate into the podcast. The recorded student interviews showed that all students knew that it was not only important to include details but why this is important when

*student initials are used to protect their privacy
creating a podcast. As appendix B shows, when interviewed later about the important aspects to include in a podcast script, students were able to identify three key aspects: claims, evidence and explanations of experiments in detail. The interviews that were conducted with students after they had been involved with a podcast demonstrate their understanding of the importance of using claims and evidence. One question was *What’s important to include when writing a science podcast script?* HK answered right away, “The claims, evidence and experiments in detail.” Another student, OS, answered the same question saying “…a lot of the experiments in detail and our evidence of how we know what the answer of a question is.” Both go on to state why each is important in to include (Appendix B). This shows how the students are not only able to use the processes of science but understand them as well.

From my notes on the recorded planning sessions, I found that this was a time to investigate wonderings and for me, the teacher, to push students further in their science thinking. I would constantly ask them questions about the experiments the class performed during science lessons and have them state it in their own words. I found that a majority of the time I was asking, “What do you think about that?” or “What do you think we should do?” Also, from my scripted notes, I can see trends developing regarding the science content. For example, I listened and heard myself asking, “What did you discover from that experiment?” and “What’s our evidence to support that? How do we know that claim is true?” This directly shows how the podcasting supported scientific thinking. From this data, I found that these podcasting sessions provided an opportunity for student choice, peer-to-peer explanations, and teacher-to-student questioning, which all supported students’ scientific thinking in addition to the concept of using claims and evidence.
Claim:

Engaging in script writing encourages students to ask new questions about the science topic.

Evidence:

As part of the pre-recording part of podcasting, students wrote scripts to help organize their thinking and sort through their own thoughts. The book, *Primary Science: Taking the Plunge* (1985), states that:

The atmosphere in the classroom must also be conductive to encouraging children to ask questions. Some ways of showing that questions are welcome are by adding questions to displays and collections, introducing a problem corner in the classroom, creating lists of questions to investigate, making sure an work cards or sheets are framed in terms of investigable questions. Regular discussion of questions is also important (p. 56).

The podcast planning and script writing sessions provided an environment that showed students that questions were welcome. The participating students were encouraged to ask questions and work with each other to investigate wonderings. The podcasts provide a clear forum for showing students that their questions were important. For example, a wondering that a student had during podcasting was incorporated into the script:

A: Well I have a question. Can you take the lid off the flashlight and use a wire and battery and still make the bulb light? Using just the top part of the flashlight?
H: Yeah! Can you think of what you would have to connect? Remember you need to make a complete circuit!
A: Well I guess you would have to connect the metal nub to the positive end of the battery. Then, put one end of the wire on the negative side and the other end connecting to the metal rim like this. Oh yeah! It works!

This part of the script is taken from an exact conversation that went on between the others students, this young boy and myself one day at podcasting. We took this initial wondering and conversation and included it in our script so that all the students could benefit from the information. When wonderings are recognized and responded to in this way, the students understand their questions are valued because they become a significant part of the podcast.
As part of each podcast, the group looked at the wonderings from the KLEW chart and chose which ones to pursue in more depth. Discussions arose about these wonderings and new questions even fostered from them. For example, during the January 23rd podcasting time, one student, A, brought up a new wondering he had based on our previous discussions (Appendix A). He explicitly says, “I have another wondering.” The students know how to use this terminology in order to discuss science concepts appropriately. This particular new wondering led to a group conversation with input from all members discussing what A was thinking and possible explanations:

A: “I have another wondering”
Miss Bird: “You have a wondering! What is it?”
A: “We were using 2 D batteries in our flashlights. My friend’s dad has a big boat light that uses 2 D batteries too and it is much stronger than our flashlight. How is that possible?”
Miss Bird: “Hm, what do you guys think?”
A: “Is it the light bulb?”
Miss Bird: “That’s a great wondering, do you want to look that up?”
J: “Maybe it’s the light bulb?”
Miss Bird: “Is the light bulb bigger?”
J: “Maybe the lights use less power?”
A: What do you mean by that?
J: Maybe those lights conserve energy and they don’t use as much power?
Miss Bird: “So which lights would conserve more energy? The flashlights for the big light that A is talking about?
J: “The big light. Unless it has more D batteries”
Miss Bird: “A, do you think it only has 2 D batteries?”
A: “Yeah, isn’t D the biggest?”
J: “No and I don’t know D is the strongest though”
Miss Bird: “Well can you go home and check it out? Look at it?”
B: “Yeah that’s a good idea!”
A: “Well I don’t think they have it anymore because that was like in 1st grade”
A: “It might have had 3 Ds but I don’t know”

Like this scripted conversation, the discussion of new wonderings happened multiple times throughout different podcasting times and groups (Appendix A).
These podcast sessions clearly emerged as an opportunity for students to ask questions, come up with new wonderings and make connections. They investigated these new questions by researching existing scientific literature. After investigating these additional wonderings, the students took ownership through an attempt to answer their peers’, as well as their own questions.

Claim:

Engaging in a small group setting increases participation of students who are reluctant to share in large group science talks.

Evidence:

Each podcast group consisted of four students and either my mentor or myself working with them to create the final product. These students were taken out of the classroom setting and away from other peers. They had to learn to work cooperatively with each other in order to achieve the group goal. As my notes from the recorded podcast planning sessions show, this was a time where students could freely express themselves (Appendix A). The environment was conducive to exploring wonderings, asking questions of each other and offering peer-to-peer explanations when necessary.

The journal that I wrote on my experience with podcasts and the profound effects, both academically and socially, supports this claim of participation levels (Appendix W). I wrote and discussed observations that I was seeing with various students. This section of the journal described my experience with a particular student:

This leads me to my next realization that I found when listening to my voice recordings from podcasting time: students who are not generally participatory during whole group science talks, overwhelmingly contribute to the podcast. Through the recordings, I have seen three students who struggle in science and the understanding of scientific concepts really excel during podcasts. One student makes reference to her journal pages and explains back to me why certain things happened and the experiments we performed in
This particular student has rarely shared a response in science class and now is coming forth with information and wonderings that I never thought she was capable of.

The notion that podcasts are a rewarding and motivating task coupled with the small group environment makes reluctant students more willing to participate. There were three students in particular, which through the recordings, I was able to see their participation level drastically increase during podcasting. These three children are not usually the top participants in our science talks and rarely contribute to the general discussion and the adding of claims and evidence to the KLEW chart. They usually only respond when called on rather than offering their own ideas freely. However, during podcasting, the situation reversed and their ideas, comments, and wonderings were shared without restraint. For example, my notes from the March 6th podcasting session showed that student L could explain how an electromagnet works:

L (reluctant to participate in science talks) showed the other students the electromagnet in the book and explained how it was similar and different to the ones the class made:

L: “it is more wrapped around each time, this one is 20 times, this one is 40 and this one is 60. Each one has more. So that’s kinda why I thought when we were talking about electromagnets why having more electricity and having it wrapped around more times would help it to flow.”  [pictures of three different electromagnets with different numbers of times the wire is wrapped around. The more times it is wrapped around the more paper clips the picture shows it picking up]

L: And this is a really big electromagnet that they use in dumpsters (to pick up trash)

L does not participate in whole group science talks but was eager to express her thoughts voluntarily here (Appendix A).

This journal entry along with my notes on the recorded planning sessions support the claim that students who are usually reluctant to participate in science talks are overwhelmingly eager to in this setting.

Claim:

Working on a podcast partnered with the small group setting deepened scientific conceptual understanding for those students.
Evidence:

Because these podcasts were group projects, I saw my students learning and benefiting from each other. One research group states how “…the interaction among students around cognitively appropriate tasks increases the mastery of critical concepts via discovery, idea generation, argumentation, verification and criticism” (Yiping, Abrami, & d’Apollonia, 2001). My recorded notes on the podcasting sessions clearly showed that all of these things took place and benefited the students’ understanding (Appendix A). In addition, this same research group discusses how oral rehearsal affects student thinking in a drastic way (Yiping, Abrami, & d’Apollonia, 2001). Clearly the podcasts used direct oral rehearsal through the actual recording stage and therefore was a factor that increased students’ thinking and learning.

Being able to work with the science concepts in more depth and at a deeper level inherently increased their level of understanding. Martha Wiske (2005) discusses in her book, *Teaching for Understanding with Technology*, “Social interaction and reflective conversation within communities of learners have long been recognized as important aspects of developing understanding” (p. 8). These two aspects were prevalent in each podcasting group. The interaction among peers allowed these students to work together to reflect, collaborate, and negotiate. For instance, one student explained, in the recorded sessions, how blinking lights work to another child who was absent from the group the previous day:

\[ J: \text{See if you look at this picture you see how the filament breaks apart from the circuit when it gets hot. This breaks the circuit and turns the light off.} \]
\[ H: \text{Oh okay.} \]
\[ J: \text{Then when it cools it bends back down to complete the circuit again and the light comes back on.} \]
\[ H: \text{Oh I get it!} \]

The interviews with podcast students also provided evidence toward this claim (Appendix B). When I asked the students about their own learning and understanding of science concepts,
all six stated that they felt they understood these things better because of being involved in the podcasts. For instance, student SP, responded to the question, *How does working on a podcast help your science understanding or what you are learning in science?* by stating that creating a podcast “helps you learn stuff you didn’t know before…it helps you remember what you did and how you did it…” In addition, JD responded to the same question that podcasting helped his understanding “because you are telling other people things and you have to learn things for the podcast so it helps you…” Also, OS clearly expressed her views on how the podcast helped her understanding: “it helps because I am understanding more. If I didn’t get something before, writing it down helps me to understand it more.”

Wiske (2005) goes on to state how, “Community-based learning takes place in a social context in which learners interact with other people and collaborate on work that is meaningful to the group” (p. 8). These two aspects were prevalent in each podcasting group. Podcasting was a time where students collaborated on work, in an engaging social context, and therefore came out with a deeper level of knowledge.

The assessments are another piece of evidence that directly support this claim. Because the podcast students generally scored higher and had more precise responses on the assessments, this shows how their scientific conceptual understanding was expanded as a result of being a part of the podcast (Appendix E). I noted that the podcast students’ pre and post assessments were generally far more detailed and explanatory when compared to the students who did not create the podcast (Appendix E). The podcast students’ drawings were more accurately labeled and their responses included more details and evidence. This part of my data collection and analysis supported my claim that students’ understanding of science concepts deepens because of being involved with a podcast. When asked on the assessment, *Why does a fluorescent bulb light from*
the plasma ball but a regular one does not? a learning enrichment student, who was not involved in the podcast, wrote, “Because fluorescent bulbs have gas in it and regular bulbs have wires” (Appendix S) compared to another podcast student who wrote, “A fluorescent bulb is different from a regular bulb because a fluorescent has argon gas and mercury vapor but a regular bulb has wires not gas. And fluorescent last longer too” (Appendix T). When I compared these two, it was evident that the podcast student’s response was more detailed and substantial. This directly showed how the podcast students came out with a deeper understanding of science concepts.

Claim:

*Listening to a podcast prepared by peers increases and reinforces students’ understanding of science concepts.*

Evidence:

It was evident from the assessment scores that most of the students were able to include additional information after viewing the podcasts made by their peers. More students received 2s and 3s on the assessments (30% and 42% respectively) than those who received 1s (29%). The results from the data analysis of the pre and post assessments (Appendix D) showed that a total of 54% of the students got a “3” on the switches assessment, a total of 25% of the students received a “3” on both the electromagnets and circuits assessments, and finally 10% of students obtained a “3” on the static assessment. For the students who received a “2” on the assessments, the percentages for switches, static, electromagnets, and circuits were as follows: 46%, 55%, 10% and 55%. Finally, the percentages of students who obtained a “1” rating on the assessments, in the same order, were 0%, 35%, 60% and 20%. I then organized this information into graphs as a way to look for patterns and trends across the data samples. The graphs below illustrate how many students received 1s, 2s and 3s on the four assessments.
Switches Assessment

Electromagnets Assessment

Circuits Assessment
The percentages from each assessment and number of student receiving 2s and 3s compared to the number receiving 1s are relatively close. Therefore, I can conclude that the viewing of podcasts mostly reinforced students’ understanding of science concepts they previously learned in class with some slight increase in that knowledge base. The assessments scores (Appendix C) and my notes on the assessments from the whole class, in general, (Appendix E) supported this claim.

Again, looking at the individual assessments, it was evident how students’ level of understanding increased. For example, one student had no response on the pre-assessment for the question, *Why does a fluorescent bulb light from a plasma ball but a regular bulb does not?* Then, after viewing the podcast, she responded that, “When a fluorescent bulb touches the plasma ball it allows electrons to jump to the fluorescent bulb and light up. It only works with the fluorescent bulb because it has gas and the regular bulb has wire” (Appendix U). Also, another student responded, “I don’t know” on the pre-assessment that asked, *Explain how an electromagnet works.* For the post assessment he was able to write, “An electromagnet works by putting wires around a nail, and then you take the nail and put on something metal and pick up
the nail then whatever you put on that is metal will come up with the nail” (Appendix F). These assessments support the claim that students’ understanding increases as a result of viewing a podcast created by peers.

In addition to the assessments, the student interviews showed that the students believed that watching others’ podcasts helped their thinking and understanding as well (Appendix B). I found that the students mostly responded that listening to podcasts helps them hear the information again and in more detail, which helps them to understand it better. For example, when asked *Do you think listening to other podcasts helps you learn more?* student SP answered that “It can. It helps you think about it again. It can help you learning something new too.” One student OS said, “Yes because they are kind of showing how they did it in more details. I understand more of it.” These interviews with podcast students clearly showed that they not only felt that working on a podcast deepened their level of understanding but also viewing the podcast had the same effect.
Conclusions

I have some additional claims that stem from my initial driving question and also this inquiry project in general. I have found that not only have the students enjoyed doing the podcasts, and are eager to do more in the future, but they have been able to take away a deeper knowledge for several of this year’s science concepts. Their own thoughts in the recorded interviews and the assessment scores clearly show that not only the podcast students came away with an increased level of understanding but also most of their peers, who simply viewed the podcast, did as well (Appendix B and C).

Working with a small group in more depth, as my notes reveal, has allowed students to ask new wonderings and work with information at a more profound level (Appendix A). Because of this, I believe that podcasts are an excellent tool to use to support teaching science as inquiry in an intermediate classroom. At each session, I was constantly asking students questions and having them explain to me why they think a certain way. These times allowed me to interact with students on a more personal level while still using inquiry to foster the discussion. The podcasts reinforced and expanded upon what was done in the classroom.

I can also draw conclusions regarding my sub-questions:

What do my students know before being involved in a podcast? Is there a significant increase in their understanding of the science topic after participating in the podcast?

The pre and post assessments served as the main piece of evidence in order to investigate this question in more detail. In each pre assessment I found that the students were able to answer the questions in a very general way and some students did not even answer parts of the assessment at all (Appendix E). In the post assessment, students responded more completely and were able to provide more concrete examples and explanations.
Does viewing and listening to a podcast created by peers increase students’ understanding of science concepts?

Again, I have found that the other students’ knowledge did increase slightly as a result of viewing the podcast. The pre and post assessment scores indicate that the majority of students added either some additional information or a substantial amount of additional information. The students not only enjoyed watching their classmates in the podcast, but they were able to gain a deeper level of understanding based on viewing it.

Does having ownership in the creation of a podcast encourage student involvement or increased interest in the topic?

I did not collect a lot of data on this sub-question because I was mostly preoccupied with finding out how the level of understanding changed for my students as a result of the podcast. However, the student interviews that I conducted show that creating a podcast, in general, was an extremely motivating task that allowed students to take ownership in a project, which indirectly supported their new level of knowledge. From my journal entry, I saw that each student thoroughly enjoyed working on the podcast and that this was an engaging and motivating task. The recorded planning sessions revealed how I had students say to me, “I’d rather stay in here and do podcasting than go outside for recess!” and “Aw, do we have to stop for today?” (Appendix A). This leads me to conclude that the podcasts were not only a rewarding experience but a motivating and engaging one as well. I do not have data that can conclude if the ownership piece had anything to do with the motivation and engagement and if this was a factor in an increased interest in the topic. However, Hung and Khine (2006) discuss how, “Engaged
learning is grounded on recent notions of active learning where learners take responsibility for their own learning” (p. 30).

Does the small group dynamics that are produced during podcast sessions increase the level of student understanding or student learning?

Again, I did not collect specific data in order to analyze the impact of the small group setting. The assessments clearly show that the podcast students were able to write in more depth, even on the pre-assessment, when answering the questions. Because of this small group time, the students could talk more freely about their ideas and wonderings in an intimate and welcoming setting. Again, Hung and Khine (2006) support the notion of collaborative effort to increase understanding,

Learners are responsible for their own learning when they are actively developing thinking/learning strategies, and constantly forming new ideas and refining them through their conversational exchanges with others…there is active engagement in the learning process when the learners are constructing knowledge from experience through their interaction with peers and teacher to make meaning or to interpret information… (p. 30).

The assessments along with my journal led me to believe that the small group dynamic was one of the factors that had an impact on student understanding. This collaborative small group effort achieved a deeper and more intense level of understanding for those students who worked on each podcast.

Do students participate differently within the podcast small group than when in a whole class science talk setting? Does this small group setting encourage more participating?

I believe my journal (Appendix W) that describes how participation increased during podcasting, especially of those students who are reluctant to participate during whole class
science talks was evidence towards this wondering. I wrote that I saw students “eager and enthusiastic to participate during podcasting that I had barely heard talk during science class.” I think because of the small group environment students felt more willing to share and express their ideas. The students did participate differently when comparing podcasting to science class, and I believe that the small group really supported their level of sharing. The recorded planning sessions served as evidence for this wondering also. For instance, in the recorded sessions I heard one student, MJ, describe the experiment with static electricity. She explained that rubbing a balloon on your hair created static because electrons were jumping from the hair to the balloon. This student only participated in the science talks when called upon and rarely showed excitement for what the class was learning. During this podcasting time, she was able to answer my questions as well as express her own thoughts without any prompting from me. The dynamics of podcasting really encouraged more participation from all who were involved.

Implications for future teaching

Through this inquiry project I have seen how third grade students react to the introduction of a new technology. Before this, none of my students had even heard of podcasts. I have seen how technology can be a rewarding task that allows all students to excel and feel significant. There were 17 students that were involved overall throughout the four podcasts. I had an ESL student, four learning support students, and three of my learning enrichment students participate. The diversity of student involvement shows that podcasts allow all children of different academic ability levels to succeed. I look forward to introducing podcasts to my future classes and seeing what directions they take it in. I have a solid background in how to successfully plan
and produce a podcast now. I can foresee this knowledge being very valuable as I continue my teaching career.
New Wonderings

Throughout this inquiry investigation I was constantly questioning how my students would respond to podcasts and if it could be used to not only support learning but also as an instructional tool. During this process, I have explored my initial wonderings and also derived even more questions. My new wonderings include:

- Would podcasts work for other academic subjects? How can they be used to support other areas of curriculum? What could be used to lead/help the process of script writing, like the KLEW chart did here?
- Would using podcasts in other academic areas yield the same beneficial results?
- Can the podcasts be used as a motivational tool for students? Can this be used to motivate them to get their work done in a timely fashion?
- How can I, as the sole teacher in a classroom next year, find the time to help students write and produce a podcast?
- Next year, will these technological resources be available and how will a new class of students adapt to this new technology?

I look forward to using podcasts in the future because I believe they have benefits that reach beyond the academic level. I have seen how they are an extremely motivating and engaging task for students, and it is something they can take ownership in. Their pride shines through as peers, teachers, and family members view the podcast. It is an accomplishment that I know all my students have benefited from.
References


Appendix A

Podcast #2 Circuits

January 22, 2007
getting ready to write the script
assigning parts
  1st person-claim
  2nd person-evidence
  3rd person-experiments
telling them what to write
asking questions about what they want to talk about
who wants to talk about what
using the KLEW chart to write the script
asking questions of students to “jog” their memory of what we did in class
B (not participatory in science class) is answering my questions first and explaining to me why each statement is true “I know because of the experiment we did and how the circuit lights”
helping them write out their lines (each person is writing their own parts)
more teacher directed→you are writing this, you are writing that (from KLEW chart)
have students read back their lines to me after writing them out
working with the students to come up with the lines (using their ideas about what to ask from reporter)
helping each other with lines and what to say
one student was marking how many people/lines talked between each of his lines
each student wanted to do certain claims, certain evidence (they knew which parts they wanted to talk about <themselves>).
practicing the lines written during this session at end
teacher helping them make their statements more clear and more detailed
don’t want to stop doing podcasts—want indoor podcasts
Miss Bird: “We are actually going to stop for today so you guys can go...”
Students: “Oh man!” “Nooo!”
Miss Bird: “Oh did you like doing it?”
Students: “Yeahhhh!!” “Can we have inside recess to keep doing it?”

January 23, 2007
start with reading over lines from pervious day
more figuring out who is doing the next claim, next piece of evidence and experiment
following the order on the KLEW chart
asking the students what they think about different parts and how to write them (their choice)
having the students write out in detail the experiments “so someone else could repeat them”
“What other experiments did you guys do that we should include?” “What else should we talk about?”
“What does it say on our KLEW chart for evidence?”
Discussing the wonderings to research→blinking lights
  Should Alex introduce it b/c it was his wondering?? What do you think?
  We can look it up on the Internet so we know more about it
Wanted to bring out the extension we did in class taking a part the flashlight and using that light bulb everyone wanted it to be organized and know when they were speaking 2 of the “scientists” were specific with which parts they wanted to talk about, I took whatever was left/assigned to her

Going off on a tangent b/c of a new wondering:

A: “I have another wondering”
Miss Bird: “You have a wondering! What is it?”
A: “We were using 2 D batteries in our flashlights. My friend’s dad has a big boat light that uses 2 D batteries too and it is much stronger than our flashlight. How is that possible?”
Miss Bird: “Hmm, what do you guys think?”
A: “Is it the light bulb?”
Miss Bird: “That’s a great wondering, do you want to look that up?”
J: Maybe it’s the light bulb?
Miss Bird” “Is the light bulb bigger?”
J: “Maybe the lights use less power?”
A: What do you mean by that?
J: Maybe those lights conserve energy and they don’t use as much power?
Miss Bird: So which lights would conserve more energy? The flashlights for the big light that A is talking about?
J: The big light. Unless it has more D batteries
Miss Bird: A, do you think it only has 2 D batteries?
A: yeah, isn’t D the biggest?
J: No and I don’t know D is the strongest though
Miss Bird: Well can you go home and check it out? Look at it?
B: Yeah that’s a good idea!
A: Well I don’t think they have it anymore because that was like in 1st grade
A: It might have had 3 Ds but I don’t know
talking about which way the electricity flows inside a flashlight
talking about the voltage of AA batteries using what they know (1.5 volts in a D battery)

January 24, 2007
explaining how we need to explain the experiments in more detail so that others will clearly know what we are talking about
going back and describing each of the four ways to light a bulb using a wire, battery and bulb
going back and reworking with what we already had written, making statements more clear and adding detail
B, a student who does not participate in science talks, is describing which things she thinks need to be included: “we need to put in more detail so like people understand it more” “I think this claim should come before this one”
B: I have a push button flashlight at home. I can bring it in and we can see how that works. I think it might be the same way, the copper rod moving up to touch the metal rim.
January 25, 2007
new typed script—each student highlighted their parts (previous day parts were added and everything was unorganized)
typing out lines from now on so students don’t waste time writing out everything (much faster)
“I wanna do this part!”
“I wanna do that evidence!”
Asking questions about the experiment with motors “What did you guys have to do” “then what?” “How did you really know if it was spinning the other way”
“Making wings”
Use the KLEW chart to read off of…claims and evidence
told them we are going to have to stop for the day and continue tomorrow→ “Oh can’t we do one more claim?”, “Do we have to stop?”

January 29, 2007
start by reading over the script so far
making them describe to me why a circuit works
explaining how batteries work by reading a book to them
A: “That answers one of our questions”
A: “Wow I was really wrong in my prediction. I thought the wire just had to be connected to one end of the battery.”
Miss Bird: “Both ends need to be connected in order for electricity to flow”
B: It goes around in a circle, right?
Miss Bird: “…they come together to form H2O which is water”
A: But wouldn’t water put out the electricity inside the battery?
Miss Bird: I dunno, would it?
A: So if you’re in a pool during a lightening storm that why it would strike the water?
Miss Bird: What do you have to do at a pool when it’s storming?
A: The lifeguard blows the whistle and makes you get out.
Miss Bird: Why do they want everyone to get out?
A: B/c water allows electricity to flow!

discussing how a flashlight with a push button works vs. one with a switch—how does it work compared to the ones we worked with in class?
using the internet to find out how blinking lights work
teacher reads off the explanation, students asking clarifying questions
A: So that is probably why when regular light bulbs are about to go out, it flickers b/c it is slowing being disconnected. The circuit is slowing breaking. Then the light bulb goes out.
using a picture in a book to show how the filament breaks away and then reconnects→”Oh I get it!” “I see”

January 30, 2007
explaining actually how to record and what is going to happen with actually recording the podcast
practice lines first
“pausing, using different tones in your voice” “don’t mumble, speak clearly”
**February 1, 2007**

trying to take apart the push flashlight that a student brought in
Miss Bird: “Can we make a prediction about how this one is going to work?”  “What do you think happens?’’
A:  “I think when you push the button in, the copper rod touches something.”
J:  “But the copper rod doesn’t move!”
Miss Bird:  “What else could move in a flashlight, if it’s not the copper rod?”
H:  “I think another part of the copper rod move that we can’t see”

**February 8, 2007**

students are choosing the music for the podcast
each person gets to choose a song and then they work together to pick the rest
make a list of all the songs
one student, H, took charge writing down the songs and asking them which ones they wanted
next and having me play each one again
taking pictures of the various investigations the podcast discusses
taking pictures of the students interviewing each other
the students worked together to set up the pictures and directed each other of what to do
“How do you know that it needs to be set up that way?”

**Podcast #4-Static, Electromagnets, Parallel/Series Circuits**
**March 6, 2007**

One student brought in a science experiment book to share
L (reluctant to participate in science talks) showed the other students the electromagnet in the book and explained how it was similar and different to the ones the class made:

L:  “it is more wrapped around each time, this one is 20 times, this one is 40 and this one is 60.  Each one has more.  So that’s kinda why I thought when we were talking about electromagnets why having more electricity and having it wrapped around more times would help it to flow.”  [pictures of three different electromagnets with different numbers of times the wire is wrapped around.  The more times it is wrapped around the more paper clips the picture shows it picking up]
L:  And this is a really big electromagnet that they use in dumpsters (to pick up trash)

Reviewing what the group did yesterday
L:  Oh I want to show you static in this book!
Miss Bird:  “Does your hair get static in the winter?”  “Why do you think that always happens?”
D:  It is just like the paper b/c instead of the balloon bringing up the paper.  It’s the hat bringing up your hair.
Miss Bird:  So you are comparing those two?
Using the KLEW chart to define static
Miss Bird:  Do you remember why static happens in the winter?
L:  b/c it’s cold and doesn’t electricity work or do better in the cold?
teacher typing the script as the students dictate what they want to say
Teacher explaining why a shock is created when you rub your feet and touch a door knob:
D:  So like you are picking up extra electrons from the floor or something?
Miss Bird:  Yeah!
D: So the electrons go from your hand to whatever you touch
Miss Bird: Which creates…
J: A shock!
practice script so far at end

March 8, 2007
each student got a book and read more about static
Miss Bird: Is there anything you want to include?
making a list throughout of pictures that need to be included
using data (journals) as evidence to include in podcast
telling the students that we have to practice reading over the script and then stop for the day→
“Noooo”, “Oh can’t we just stay here a little longer?”

March 19, 2007
reading in a book about how electricity and magnetism are related (wondering)
asking the students, “What did we do with electricity and magnetism?”
“Make electromagnets”
children talking with each other about materials that create electromagnets (besides a nail)
“I know what I can say…” students know what they want to say and how to say it
they make decisions about what to include and what not to
have students read books to understand topics better (i.e. how electricity and magnets are related)

IN GENERAL→opportunity for teacher to challenge students, ask them to explain in their own
words what we did/found in science class, time to explore wonderings and think about new
wonderings as they come up, great opportunity to ask “Why do you think that happens?”,
students questions get answered and misconceptions are cleared up
Appendix B

INTERVIEWS about Podcasts:

What’s important to include in a science podcast script?
SP: name, what you did, details
JG: details about the experiment and the answer
OS: a lot of the experiments in detail and our evidence of how we know what the answer of a question is
HK: experiment, claim and evidence; experiment is important b/c when ppl hear the podcast they can do what we did by following the experiments, evidence is good so they know we are not telling a lie, claims are what we learned
AM: details, important stuff from books and KLEW chart
JD: questions and details, questions of how things work, facts

What did you use to help you write the script?
SP: You need to include what you did, how you did it, how you did the experiments and tell about if it worked or not; evidence that it worked or look back to other experiments that were similar, KLEW chart
JG: KLEW chart
OS: KLEW chart
JD: KLEW chart, what we learned and evidence parts of it

Why is it important to include details about the experiments?
JG: So that other people can do the same experiment
OS: then it will be easy for people to understand

Why is it important to include evidence?
SP: so people know you actually did it and not copying someone else
JD: so people know you did it and that it is true

Anything else that’s important to include?
JG: the claim, claim is important b/c someone else knows what you are trying to do

How does working on a podcast help your science understanding or what you are learning in science?
SP: helps you learn stuff you didn’t know before (gives example of the sun and its energy), it helps you to remember what you did and how you did it
JG: I like figuring out wonderings, figure out wonderings by looking in a lot of different places: computer and books; podcasting helps to learn about new things; helps with stuff we did do in class
OS: it helps b/c I am understanding more, if didn’t get something when writing it down understand it more, learn something new—how the sun gets its energy
HK: don’t exactly understand what ppl are talking about so in podcasting it helps you learn more b/c you speak more of it and you (teacher) helped us by showing us how things worked, we used the internet to find more information on the wonderings
AM: learn some stuff I didn’t know, how a doorbell works
JD: b/c you are telling other people things and you have to learn things for the podcast so it helps you, read a book about the sun and it’s main fuel is hydrogen
Do you think listening to other podcasts help you learn more?
SP: it can, it helps you think about it again, it can help you learn something new, the circuit podcast talked about how a circuit works and a flashlight, new learnings about blinking lights
JG: yes
OS: yes b/c they are kinda of showing how they did it in more details, I understand more of it
HK: yes, we learned how the sun gets its energy (another podcast)
AM: sometimes yeah, I learn a little bit more so I can understand what we are doing
JD: yeah; b/c listening to the podcast, it tells you more facts, teach you more things

Do you like doing the podcasts?
SP: Yeah! I hope I can do another one.

What did you like about doing them?
SP: I like how you can make predictions and then test them out and research them during the podcast
JG: Figuring out the wonderings
OS: choosing the music, small groups better than whole class
HK: I just like everything, recording, pictures and music
JD: how we recorded it and all the cool stuff we learned

IN GENERAL—students enjoyed working on the podcasts, everyone would like to do another one, they thought podcasts helped their own understanding of science concepts—when doing a podcast and when watching another group’s, the all knew the important aspects to include and why they were important
### Appendix C

<table>
<thead>
<tr>
<th>Student</th>
<th>Switches</th>
<th>Static</th>
<th>Electromagnets</th>
<th>Series/parallel circuit drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>AC</td>
<td>3*</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>BB</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>CS</td>
<td>3*</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>DS</td>
<td>2</td>
<td>2*</td>
<td>1</td>
<td>2*</td>
</tr>
<tr>
<td>DF</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>DM</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>HK</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>JG</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>JI</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JP</td>
<td>3</td>
<td>3*</td>
<td>1*</td>
<td>2*</td>
</tr>
<tr>
<td>JHM</td>
<td>2*</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>KD</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>LD</td>
<td>2*</td>
<td>2</td>
<td>1*</td>
<td>1*</td>
</tr>
<tr>
<td>LW</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>MJ</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>MP</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MH</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>MJ</td>
<td>3</td>
<td>2*</td>
<td>3*</td>
<td>2*</td>
</tr>
<tr>
<td>NJ</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Amount of information added on science assessment after watching/completing a podcast:
1. no additional information
2. some additional information
3. substantial information was added
## Appendix D

### Percentages of scores on student assessments:

<table>
<thead>
<tr>
<th></th>
<th>Switches</th>
<th>Electromagnets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Got a 3</td>
<td>13/24=54%</td>
<td>Got a 3: 6/20=30%</td>
</tr>
<tr>
<td>Got a 2</td>
<td>11/24=46%</td>
<td>Got a 2: 2/20=10%</td>
</tr>
<tr>
<td>Got a 1</td>
<td>0</td>
<td>Got a 1: 12/20=60%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Static</th>
<th>Series/Parallel Circuits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Got a 3</td>
<td>2/20=10%</td>
<td>Got a 3: 5/20=25%</td>
</tr>
<tr>
<td>Got a 2</td>
<td>11/20=55%</td>
<td>Got a 2: 11/20=55%</td>
</tr>
<tr>
<td>Got a 1</td>
<td>7/20=35%</td>
<td>Got a 1: 4/20=20%</td>
</tr>
</tbody>
</table>

Average percentage of students that got a 3: 30%
Average percentage of students that got a 2: 42%
Average percentage of students that got a 1: 29%
Appendix E

Notes about podcast students’ assessments compared to others’:

Switches and More podcast
CS → drew and labeled a correct picture of a switch; gave one example of a conductor, correct defn. of conductor, correct and complete explanation of fluorescent bulbs
AM → correct picture of switch; correct defn. of conductor, wrote details: “argon and mercury gases” are inside a fluorescent bulb while a regular bulb has “wires that burn out”
JM → very detailed drawing of a switch with correct labels (additional explanation in writing); correct and detailed defn. of conductor with two examples; complete and accurate explanation of how a regular bulb is different than fluorescent
AC → detailed drawing of switch with correct labels; correct defn. of conductor with 3 examples; correct explanation of fluorescent bulb

IN GENERAL — drawings are more detailed with actual labels, the content of answers is more accurate and precise, better examples are provided

Electromagnets, Static and Series/Parallel Circuits
MJK → no defn. of electromagnet before, correct defn. after podcast; correct example of how to make static, correct drawings/labels for circuits
MP → correct defn. of electromagnet; incorrect drawing of circuits; one way to make static explained
DS → no defn. of static before, correct defn. after podcast; detailed drawings of circuits; good example of creating static; correct and complete defn. of electromagnet
LD → accurate and complete defn. of electromagnet; correct drawing of circuits, correct defn. of static
JP → correct and complete defn. of electromagnet; circuit drawings correctly labeled; no defn. of static before, gives an example of static instead of defn. after

IN GENERAL — definitions are more complete, drawings are more accurate and detailed, better and more sufficient evidence provided

Assessments’ content, in general, podcast viewing/creating before:
- general comments and descriptions, few examples, scarce labels, some parts left completely blank, 17 students left at least one part blank between the four assessments, “I don’t know” or “I forget” are common responses, the question most unanswered: What is static electricity?,

Assessments’ content, in general, after viewing/creating podcast:
- added more details, more abundant examples, more thorough explanations, one question left unanswered still: What is static electricity?, still some parts left blank: 7 students left at least one section blank between the four assessments
Appendix F

Name  #2 - DM

Electromagnets

3/8/09

Explain how an electromagnet works:

I don't know

4/9/09

Name  #2 - DM

Electromagnets

Explain how an electromagnet works:

A electromagnet works by putting wires around a nail, and then you take the nail and put on something metal and pick up the nail, then whatever you put on the nail is metal will come up with the nail.
What is static electricity?

Explain what static electricity is:

Static electricity is a power that shocks you and it makes your hair go up sometimes.

Describe one way to make static electricity:

One way to make static electricity is to go down the slide and your hair goes up sometimes. The sound is like paper cracks.

Series and Parallel Circuits

Draw a series circuit:  

Draw a parallel circuit:
Appendix H

What is static electricity?

Explain what static electricity is:

static electricity is
a type of electricity that is made
to jump from one thing to the other.

Describe one way to make static electricity:

One way to make static electricity is to rub
a balloon to your hair.

Series and Parallel Circuits

Draw a series circuit:

Draw a parallel circuit:
Appendix I

Name #3 - DS

What is static electricity?

Explain what static electricity is: I don't know

Describe one way to make static electricity: One way is you rub your feet against the floor and touch the doorknob.

Series and Parallel Circuits

Draw a series circuit:

Draw a parallel circuit:
Appendix J

What is static electricity?

Explain what static electricity is:

Static is when something that gains or loses electrons

Describe one way to make static electricity:

Rub your feet on a rug then touch a door knob and you will feel a shock.

Series and Parallel Circuits

Draw a series circuit:

[Diagram of a series circuit]

Draw a parallel circuit:

[Diagram of a parallel circuit]
Appendix K

Electromagnets

Explain how an electromagnet works:

I don't know

[Diagram of an electromagnet with a wire wrapped around a nail]
Appendix L

Electromagnets

Explain how an electromagnet works:

You battery in a holder

Electromagnets

Explain how an electromagnet works:

an electromagnet is a nail with wires raped around - with a battery connected to it.
That's how you make an electromagnets.
Appendix M

Electromagnets

Explain how an electromagnet works:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Electromagnets

Explain how an electromagnet works:

adding electricity to a metal turns it into a magnet.

________________________________________________________________________
Appendix N

Name: [Redacted]

What is static electricity?

Explain what static electricity is:

I don't know.

Describe one way to make static electricity:

How to make static electricity
is when you can rub a [barber] on
to your hair.

Series and Parallel Circuits

Draw a series circuit: ____________________________

Draw a parallel circuit: ____________________________
Appendix O

What is static electricity?

Explain what static electricity is:

Describe one way to make static electricity:
Static electricity is everywhere and how to make static:
Rubbing on something that you think will work.

Series and Parallel Circuits

Draw a series circuit:

Draw a parallel circuit:
Appendix P

Switches and More

1. Draw a picture of how a switch works.

![Diagram of a switch with labels: brass, paper, index card, like bulb, battery, wire.]

2. Explain a conductor and give examples.

A conductor is a material that conducts electricity. A conductor could be water, paper, or metal, such as a metal spoon or the handle of a pair of scissors. There is also plastic.

3. Why does a fluorescent bulb light from the plasma but a regular bulb doesn't? Because the fluorescent bulb has gas and the regular bulb has wires. When the fluorescent bulb is near the plasma bulb, the gas gets excited and makes light.

*The underlined sections represent the information the student added after viewing the podcast (was done with pen on the original)*
Appendix Q

Switches and More

Name

1. Draw a picture of how a switch works.

2. Explain a conductor and give examples.

A conductor is something that lets electricity flow so if you were in a pool and there was a storm, would it still flow?

3. Why does a fluorescent bulb light from the plasma but a regular bulb doesn’t?

*The underlined sections represent the information the student added after viewing the podcast (was done with pen on the original)
Appendix R

Switches and More

Name _________________________

1. Draw a picture of how a switch works.

2. Explain a conductor and give examples.

A conductor makes the light bulb work because it is made of metal. The electricity is going through the conductor and into the wire.

3. Why does a fluorescent bulb light from the plasma but a regular bulb doesn’t?

The fluorescent bulb and the plasma bulb has electricity in them and the long light bulb has no wire hanging out of it and the other one has a wire so it can work.

*The underlined sections represent the information the student added after viewing the podcast (was done with pen on the original)
Appendix S

Switches and More

1. Draw a picture of how a switch works.

2. Explain a conductor and give examples.
   A conductor is something that can complete a circuit. Some examples: copper, pure and water. A conductor allows electricity to flow.

3. Why does a fluorescent bulb light from the plasma but a regular bulb doesn’t?
   Because fluorescent bulbs have gas in it and a regular bulb has wires.

*The underlined sections represent the information the student added after viewing the podcast (was done with pen on the original)
Appendix T

Switches and More

Name

1. Draw a picture of how a switch works.

When the paper clip touches both battery terminals, the electricity flows from the battery through the wires and paper clip and into the bulb and the bulb lights. But if the paper clip is not touching both terminals, the circuit doesn’t close and the bulb doesn’t light.

2. Explain a conductor and give examples.

A conductor is something that allows electricity to flow, like water, and not good conductors, like brass fasteners.

3. Why does a fluorescent bulb light from the plasma but a regular bulb doesn’t?

A fluorescent bulb is different from a regular bulb because a fluorescent bulb has argon gas and mercury vapor, but a regular bulb does not. If the gas in a regular bulb doesn’t work, the bulb doesn’t light.

*The underlined sections represent the information the student added after viewing the podcast (was done with pen on the original)*
Appendix U

Switches and More

1. Draw a picture of how a switch works.

![Diagram of a switch](Image)

2. Explain a conductor and give examples.

   A conductor is something in a circuit that allows electricity to flow. For example, the paperclip is a conductor. If you moved the paperclip away from the brass fastener, the circuit would →

3. Why does a fluorescent bulb light from the plasma but a regular bulb doesn’t?

   When a fluorescent bulb touches the plasma bulb it allows the electrons to jump to the fluorescent bulb and light up. It only works with the fluorescent bulb because →

   It has gas and the regular bulb has wire.

*The underlined sections represent the information the student added after viewing the podcast (was done with pen on the original)*
Appendix V

Switches and More

1. Draw a picture of how a switch works.

2. Explain a conductor and give examples.

3. Why does a fluorescent bulb light from the plasma but a regular bulb doesn’t?

*The underlined sections represent the information the student added after viewing the podcast (was done with pen on the original)
Podcasting

I had never even heard of podcasts before I entered the PDS program this year. I had no idea that technology like this even existed, let alone actually used in schools today. However, I have become interested in how technology can impact student learning. Specifically, these new and exciting podcasts that everyone seems to be creating.

My first experience with podcasting was when I saw the Gray’s Woods interns’ podcast show up on my iTunes. I listened along and didn’t think much about it after closing iTunes and moving on with my other work. Then, we, the intermediate interns at Radio Park, suddenly were required to do our own podcast! I have to admit that this was not the most pleasurable experience. None of us knew how to use garage band, record or add music or pictures to this “so-called” podcast. We got it done just to do it and I walked away from the experience with little new knowledge than when I started.

However, through working with a mentor who is very much involved in teaching science through inquiry, I started thinking about how to support this approach with technology. Since podcasts are a fairly new technology and both my mentor and I were interested in finding out more about them, we decided to combine podcasts and scientific inquiry. This then turned into my inquiry project: How do podcasts impact/affect students’ understandings of science concepts?

Our class has completed four podcasts so far on the various science concepts we’ve been studying. I have done two of the podcasts, while my mentor has done the other two. Through
working with this small group of children (4), I have seen how much students can grow in their understanding of science ideas. When going back through my recordings, I noticed that within the podcast planning sessions I have seen students ask new questions that emerge from the general discussion. It makes me wonder why they struggle to come up with “Wonderings” to add to the KLEW chart during whole-group science talks, but can’t seem to stop wondering during our podcasting times. Maybe students feel more comfortable in the small group, therefore they are more willing to ask questions, gain clarification or pose new wonderings.

This leads me to my next realization that I found when listening to my voice recordings from podcasting time: students who are not generally participatory during whole group science talks, overwhelmingly contribute to the podcast. Through the recordings, I have seen three students who struggle in science and the understanding of scientific concepts really excel during podcasts. One student makes reference to her journal pages and explains back to me why certain things happened and the experiments we performed in class. This particular student has rarely shared a response in science class and now is coming forth with not only information and wonderings that I never thought she was capable of. This makes me wonder why I am seeing this change from science class to podcasting? I feel that students feel more comfortable in small groups and really look forward to doing the podcast. Therefore, they strive to do their best work because they know their peers and parents will be viewing the podcast. For most of the students, being a part of a podcast is a privilege. I think this makes them want to do their best work. This combined with the small group setting really allows students who normally struggle in science the change to really shine. I believe these podcasts have really helped my students not only learn more about science concepts but also shine in a way that they may not have normally in a classroom.