

Action Research Project

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Action Research Project

Entry 1: Introduction (2/9/2015)

I am currently student teaching in a fourth grade classroom at Brecht Elementary School, located in the Manheim Township School District. According to Proximity One, an online demographic database, a 2014 survey indicated that Manheim Township schools cater to a local community consisting of 85.8% Caucasians, 6.1% Hispanic, 4.7% Asian, and 3.3% African Americans. This school district is home to a predominantly Caucasian population of students. However, there are still a significant percentage of other races due to its close proximity to Lancaster City, Pennsylvania. As for gender statistics, Proximity One reported that there were 46% males and 53.7% of females within the district during the year of 2014. My classroom contains 18 students, including 3 learning support students who perform on-level with minor accommodations.

Within Brecht Elementary School there has been an obvious lack of technology. In this day and age, most schools and staff have been exposed to Smartboards and are involved in one-on-one Macbook programs. However, due to lack of funding there has been little integration of new technologies in the classrooms at Brecht Elementary. As far as technology goes, every classroom in Brecht has a standard overhead projector and that is all. The entire school shares one Macbook Pro cart, which consists of eighteen Macbooks, as well as a slightly larger computer lab. This extreme lack of technology has kept teachers from branching out and incorporating more technology into their lessons. Fortunately, my fourth grade cooperating teacher saw this lack of technology as an opportunity to write a grant in order to obtain iPads for Brecht. Her grant was accepted and a brand new iPad cart was delivered in January of 2015.

Now that this new technology has been obtained it needs to be used as a learning tool when developing and implementing lessons. My cooperating teacher uses the iPads for students to complete independent work especially during math centers. I have noticed that during implementation of the iPads that there is the lack of differentiation as well as a way to keep track of the students' progress. My cooperating teacher has found some

applications on the iPads that the students are able to use for math centers. However, some of these applications lack the ability to differentiate as well as track how students are performing during those times that they are working independently. Because of this, it is hard to determine if the students are benefiting from their assigned iPad work or if they are just finding ways to complete it. I observed that many students will rush through the work just to get it done or they will struggle through the assignments. There is no evidence demonstrating that the students understand the concepts, which seems to be one of the major issues.

With all of the new technology being introduced into Brecht Elementary School it is imperative that teachers find a way to incorporate technology into every day lessons in a way that is both meaningful and effective. Therefore, I decided to explore the question: How can I meet the needs of individual students through technology-based differentiated math instruction?

While growing in a suburban school district outside of Philadelphia, I was extremely accustomed to using technology in the classroom. My home school district was provided with a grant for not only Smartboards, but also a one-on-one Macbook program that allowed all students to have their own personal Macbook Pro. In past placements, I have been provided with many opportunities for developing lessons with different types of technology such as Smartboards and Macbooks. Unfortunately, I was not given much access to iPads in classrooms unless I was in an Elizabethtown College classroom. I have worked with technology in the classroom as both a student and a teacher. Therefore, I see the potential that technology brings to the educational setting. As a constructivist, I believe there is a lot that technology has to offer when it comes to working not only collaboratively, but also independently. This research will provide me with numerous resources and vast knowledge for integrating technology into my own classroom.

Entry 2: Action Plan (2/23/2015)

The main goal of my action research is to ensure that when students are working on independent math instruction with the use of technology that they are benefiting from it. While conducting my research, I hope to learn more about the needs of my students and how to best assist them in a time where technology is being increasingly used and relied upon in classrooms. I also hope to influence my own and my cooperating teacher's way of implementing independent math instruction and enrichment. Hopefully, the information and data that I collect will be effective tools when determining if my methods are beneficial. That gathered knowledge along with the applications that I discover will hopefully impact the different learning styles and levels of all of my students in a positive manner.

My plan for implementation is to determine how much my students already know about the math concept we are beginning to learn. For this research we will be looking at my students' knowledge of "Measurement and Data". The students will first be required to take a pretest in order to figure out how much they know. Then my students will be differentiated based on their performance on the pretest. I will continue to monitor their progress on the subject via their performances on the applications *Front Row* and *Socratic*. I will then modify instruction for the entire class or provide more one-on-one assistance after reviewing the students' progress at the end of each week. This plan will be implemented every Math class during individual work periods from February 2015 until March 2015.

In order to determine where to begin with my students I needed to find applications that allowed for differentiation. During my search, I found a math application called *Front Row*. The application *Front Row* allows me to not only differentiate the math skills that my students are working on in class, but it also has my students take a pretest to determine where they should begin. Therefore, I began by having all of my students take the pretest for the unit on called "Measurement and Data" because that was what we would be working on in math instruction. The pretest consisted of about 20 questions, but varied depending on how the students performed on each

question. After students took the pretest, it would give them a level to begin on. The levels were from 1 to 45. My students ranged from level 15 to level 33. The results from the pretest demonstrated a strong need for differentiation on this specific skill. From there I was able to assign specific problems to my students that were within their level, focused on a skill we were working on in class, and was aligned to the Common Core Standards. This application also has reteaching tutorials built into so when students get a question incorrect the application teaches them how it should be done. Then it gives the student another opportunity to correctly answer the question.

The *Front Row* application provides me with a data collection each week. In this weekly data collection the teacher receives the grade level equivalency average of the entire class, the percentage of students that worked on *Front Row*, the grade equivalency that they either increased or decreased during the week, and the amount of questions they answered as a whole group. It also provides data pertaining to individual students. It names the students that have shown the most improvement, students that are on level, students who are below average, students who are above average, and students who performed the highest in the category. As my students work on *Front Row*, I can monitor their performance each day. My teacher account gives me access to the amount of questions they got correct and determines what areas they expressed difficulty in. It gives me their overall percentage correct as well. All of this information will allow me to assess my students each day after they complete their assignment as well as each week to see if they progressed.

I also have decided to use the application *Socrative* with my students. Through this application I am able to go on and create a series of questions that my students are required to answer. They log on under their names and it tracks the amount of questions they got correct as well as sends me an immediate data report accompanied with the answers that each individual selected. From there I am able to establish on which specific questions students demonstrated difficulty. I can also determine any misconceptions my students may have based on their selected answers. This information will aid me in deciding on whether or not I need to modify instruction for the next lesson.

I will be collecting the data in multiple ways. The most heavily relied on data will be collected through weekly updates that are sent by the *Front Row* application. *Front Row* sends a progress report for the class each week based on how they performed on the application during their independent practice. I will also collect data based on how they perform on the application *Socrative*. The grades that they obtain from *Socrative* will also be taken into account when collecting data. Since the lessons I teach play a significant role in my students' understanding of the materials I will also be analyzing my lessons to determine if I cover all of the material represented on *Front Row* and *Socrative*. If not, those questions will be discarded and will be labeled as invalid and unreliable data. I will also interview the students in order to gather feedback on the programs that we use. Finally, I have decided to also provide my students with their daily scores as they exit the classroom. This will allow them to focus more on specific areas of need for the following day. I will not necessarily be collecting data based off of the daily progress reports, however it is important to recognize that they may contribute to the next day's increase or decrease in performance.

Entry 3: Reflection on Intervention and Approach Part I (3/16/2015)

My action research plan has been fully implemented over the last few weeks at Brecht Elementary School. In order to implement my action research plan I needed to have all 18 students set up their own accounts. On my first day of implementing the plan, I had begun the class by having students create their accounts. I did this during whole group instruction in order to make sure each student completed all of the required steps. Then we did a practice round in order for the students to become acquainted with the site. When using the program it was important to stress that we would be working on the “Assigned Problems” for class. However, I students were permitted to work on the “Adaptive Problems”, a compilation of recently learned material, once they completed the “Assigned Problems”. During these centers, students would typically be practicing assigned problems from their textbook using pencil and paper. Adding the technology aspect to the centers became a way to engage and motivate the students.

They have been using the *Front Row* application every day during our math center time. After receiving my first weekly update from the *Front Row* application I noticed that many of my students seemed to be performing tremendously well (See Appendix A). I also noticed that during this time, some of my students began to flourish in mathematics while others are remained rather stagnant in their progress. After looking over the weekly update from Front Row I noticed that the class’s overall grade equivalency increased and they correctly answered 504 questions. Because of this, I believed the application was benefiting the majority of my students.

As for my students who did not improve or who performed below average on the application I decided to look further into that in order to find a solution. After observing the students for a day or two I realized that all of the students who fell below average or did not improve were skipping the tutorials offered to the students. After seeing this, I decided to pair these students with the tutors that *Front Row* suggested within their weekly update. They were instructed to perform the problems together and to watch each tutorial together as well.

After each week I decided to continue pairing students together based on their scores in order to aid the students who were having the most difficulty with the concepts being taught. Therefore, while other students were working independently with *Front Row* the groups I would pull lower students to work with me instead on the application or I would reteach the material to them. If a student remained in the below average group or they did not improve group I would pull them to work one on one during the individual technology center time. This only happened on one occasion however with a student that was sick for multiple days. This lead me to believe that once my students realized what was expected of them while they were on the program they were able to take the information they learned during lecture and demonstrate it on *Front Row*. I was able to support this idea with the use of the *Socratic* assessments that were given at the end of each class. They allowed me to double check that these students did in fact understand the concepts and could apply them. I also used daily formative assessment during lecture/whole group instruction in order to make sure students understood the material.

Reflecting back on the management of the different leveled groups I believe it worked well. I never had a group larger than three students working in a small group with me. I was never overwhelmed by the amount of students I was working with, which was originally a concern of mine. I also felt that because the students expressed so much interest in the program they strived to perform well each day so they could continue their independent work. Therefore, managing the small groups and the independent practice seemed to be easier than I had originally anticipated.

Entry 4: Reflection on Intervention and Approach Part II (3/30/2015)

Since the beginning of my action research plan, all aspects have been implanted. Thanks to the research I collected, I have been able to determine some patterns within my data. The data suggests that many of the same students are remaining in the bottom half of the class each week (See Appendix A). Due to these findings, I have needed to make some adjustments. In order to continue to have my students to continue their individual center work with *Front Row*, I have needed to set new expectations. Students who rank lower than 70% during their *Front Row* time are placed on a probationary period. The next time that we use *Front Row*, they will be required to sit near me so I can monitor their performance on the application. This will allow me to see if they are misusing the application or if they genuinely do not understand the concepts. If after that day they prove to me that they can use the application correctly and can obtain a score of at least 70% they will no longer need to be monitored by me. If they are misusing the application or do not understand the concept they will be pulled into small groups with me.

I also interviewed the students in order to assess their continued interest in the programs. I developed a set of questions that would help me to evaluate the usefulness of the programs as well as the students' interest in continuing them (See Appendix C). After interviewing the students, I discovered that all students enjoyed using the iPad applications as opposed to working with just pencil and paper in their notebooks. I discovered it not only motivated them to perform well, but it also helped them to better understand the concepts. The students stated that they felt the tutorials were extremely helpful when they were stuck on a problem. Some students admitted to liking the tutorials more simply based on the fact that they did not have to ask another student or teacher for assistance on the problem. Therefore, I decided to continue the use of technology during the individual practice time, but felt that there were some things that needed to be adjusted.

After making these adjustments to my action research plan, I saw a significant change in my students' performances. My students who were originally coming in at the bottom of the class began to demonstrate prominent gains. I discovered that many of my

students were not using the application correctly, and were not watching the tutorial completely. Once I was able to get them to use the application correctly they did extremely well on their own. However, I did still have students that were not performing well. Not due to the misuse of the application, but more so because they simply did not understand the math concepts we were learning. I was able to determine this after analyzing their performances on not only *Front Row*, but also on their *Socratic* assessments and class observations while teaching. At that point, I was able to pull them in order to work with them one on one or in small groups.

Entry 5: Conclusions and Final Reflection (4/20/2015)

The main purpose of my action research project was to determine how I could differentiate for individual students during math centers when using technology. In order to achieve this I taught my students how to use the programs that we would be working with. Following that, I implemented the technology into my class's daily math centers. I monitored their progress every day as well as every week through the *Front Row* immediate data collection and weekly updates. In order to check for understanding I used *Socrative* assessments. Based on how specific students performed, I would either allow them to continue working independently, pull them for small group instruction, pull them for one-on-one instruction, or assign them a tutor. I was able to monitor their progress through the applications, but also formatively during the implementation of my own lesson plans. Finally, I surveyed the students to see how they felt about the programs. I wanted to determine if the students thought they were engaging and helpful. The interview questions also allowed me to see how they felt about using technology and iPads during their independent math centers.

My research allowed me to experiment with different programs in order to find the best fit for the students. After implementing the lessons, *Front Row*, *Socrative*, as well as reading the results of the interview questions I was able to determine that using technology to differentiate during independent math instruction is not only possible, but also beneficial. The programs kept the students engaged, but more importantly they provided individualized practice on their level, reteaching tools, and embedded assessments. Students who demonstrated difficulty with the material early on in the use of the programs quickly began to show growth each week. An example of this is student JP. She started in the below-average category, however after adjustments and frequent use with the programs JP showed significant growth jumping from below average to most improved after only a few weeks (See Appendix A).

Due to the lack of ability to download any application onto the iPads without district consent; I was unable to find any other applications that could potentially benefit the students. I think having access to all of the applications out there would have been

beneficial to all of the students. This would have allowed me to differentiate instruction even more so than I already had, which I suspect would have proven to be valuable alternatives for all students. However, the data and information collected was still able to prove that these students benefited from the provided technology and their differentiation.

The majority of my action plan worked relatively well. I am glad that I chose to use *Front Row* and *Socrative* as the means of technological differentiation. Those two applications provided an immense amount of benefits for the students as well as the teachers. I was able to view specific questions and responses of individual students, which allowed me to best support my students during lessons and in small group/one-on-one instruction. It benefited students by allowing them to work independently on the material, reteaching them the material if they did not answer correctly, and provided motivation within the applications. The success of these applications is evidenced by the students' performances on both *Front Row* and *Socrative* (see Appendix A and Appendix B). It was also demonstrated through the interview questions that were given to the students to determine their interest in the applications and the iPads (see Appendix C).

One of the biggest challenges I had was determining whether my lower students did not understand the material or if they were simply misusing the applications. This was evidenced by some of the same students pulling consistent below-level scores each day. Because of this, I was required to adjust how I was monitoring my students. I made new expectations in order to make sure that students were meeting proficiency daily. If I were to implement this lesson again I would try to use other applications as well in order to provide more individualized instruction for all students. This would allow students multiple ways in which they could practice, sharpen, and improve their skills. It could even be used to provide enrichment for the students that are performing above average. I would also devise more ways in which I could monitor my students' progress. One way that I would do this is through anecdotal notes. I would select specific students to observe in order to determine how they performed on the application.

As a result of my action research, I was able to determine that differentiating with technology during math instruction was not only beneficial for all students, but was also engaging for all students. I was able to differentiate instruction through the use of iPad applications such as *Front Row* and *Socrative*. I was able to meet my students' needs in a variety of ways including the applications, whole group, small group, and one-on-one instruction. The use of student interview questions allowed me to determine the effectiveness of the programs and the students' interest in the applications.

Through this project I learned that all of my students learn in different ways. They are all capable of learning and understanding the same materials, but they need to go at different paces and begin on different levels. One of my favorite things about the *Front Row* application is the pretest feature, which places the students based on their background knowledge of the concept. The program contains built in levels, which allows teachers to differentiate without all the hassle of coming up with different materials to do so. This allowed me to aid them because it gave me a starting point with each student. I was able to assist them on a level that they were able to comprehend using the level they were placed on. When teaching, it is impossible to try to have all students learn when using the same materials. Differentiation is necessary when working with students of all levels and learning styles. When adding in the technology component it also brings a new level of engagement and desire to do well for students. I will continue to incorporate technology into my math lessons, and even within all other subject areas that I teach.

Teacher research is one of most difficult things to implement, but is one of the most necessary as well. It can be extremely beneficial to teachers as well as students. However, it also takes an immense amount of time to implement all parts of the plan, make significant and meaningful adjustments, and to gather and analyze all of the data. Although it may be challenging at times, the pros still outweigh the cons. Teacher research provides students with cohesive and well-developed instruction. Teacher's benefit from it as well through the data and information they collect. This allows them to better support their students and be the best teacher for them that they can possibly be.

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Appendix A: Front Row Updates

Front Row Weekly Update: After First Week

- Subject: Measurement and Data
 - The average grade level equivalency is up to 4.1, up from 4.0 last week, and up from 3.7 at the beginning of instruction.
 - 18 students (85%) worked on the Measurement and Data domain last week, and they used the app for an average of 3.9 games. They grew an average of 0.1 grade levels.
 - Last week, your students answered 504 questions correctly. They have answered 2,156 questions in Measurement and Data domain so far.
- Student Level Data
 - Most Improved: EG improved the most last week, 0.8 grade levels on average.
 - Below average students who didn't improve last week: JP, DL, JA, and TC.
 - Above average students who didn't improve last week: AS and KT.
 - Students who didn't work on Front Row this week: NS, IC, and NM.
 - The highest students in Front Row this week: BD, GF, JD, and IF.
 - We recommend using them as student-tutors.

Front Row Weekly Update: First Week After Adjustments

- Subject: Measurement and Data
 - The average grade level equivalency is up to 4.2, up from 4.1 last week, and up from 3.7 at the beginning of instruction.
 - 18 students (85%) worked on the Measurement and Data domain last week, and they used the app for an average of 4.0 games. They grew an average of 0.1 grade levels.
 - Last week, your students answered 523 questions correctly. They have answered 2,566 questions in Measurement and Data domain so far.
- Student Level Data
 - Most Improved: JP improved the most last week, 0.7 grade levels on average.
 - Below average students who didn't improve last week: JA and TC.
 - Above average students who didn't improve last week: VS.
 - Students who didn't work on Front Row this week: IC, and NM.
 - The highest students in Front Row this week: BD, GF, JD, and IF.
 - We recommend using them as student-tutors.

Appendix B: Socrative Assessments**Example of Below Level Student:**





Name: JP

Date: 02/24/2015

Quiz name: Length Warm Up

Score: 50%

1. The length of a paperclip is closest to...

✓

A

1 foot

☒

1 inch

C

1 yard

D

1 mile

2. The length of a skateboard is closest to...

✗

A

1 inch

☒

12 inches

C

30 inches

D

2 yards

3. How many inches are in 2 feet?

✓

☒

24 inches

B

36 inches

C

12 inches

D

25 inches

4. How many feet are in 4 yards?

✗

A

12 inches

☒

15 feet

C

12 feet

D

8 feet

Example of Above Level Student:

Name: AS

Date: 02/24/2015

Quiz name: Length Warm Up

Score: 100%

1. The length of a paperclip is closest to...

- ☐ A 1 foot
✓ ☒ B 1 inch
☐ C 1 yard
☐ D 1 mile

2. The length of a skateboard is closest to...

- ☐ A 1 inch
☐ B 12 inches
✓ ☒ C 30 inches
☐ D 2 yards

3. How many inches are in 2 feet?

- ✓ ☒ A 24 inches
☐ B 36 inches
☐ C 12 inches
☐ D 25 inches

4. How many feet are in 4 yards?

- ☐ A 12 inches
☐ B 15 feet
✓ ☒ C 12 feet
☐ D 8 feet

Appendix C: Interview Questions***Interview Questions***

1. Have you enjoyed working with the applications *Front Row* and *Socrative*? Explain your answer.

2. Would you rather work on the iPads or go back to working in the textbook?

3. Do you feel like you can successfully use the applications?

4. Would you like to continue using the iPads during math centers?

YES

NO

5. Do you think the applications help you better understand what we are learning?

Explain your answer.

6. What is your favorite part about using the iPads for independent practice?

References

ProximityOne, Census Bureau. (2015). *General demographic characteristics*. [Data file].
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