

Spring 5-12-2018

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Grace Diana Cozby
gdc12b@acu.edu

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Recommended Citation

Cozby, Grace Diana, "Engagement During Math Small Groups Using the Interactive White Board" (2018). *Masters of Education in Teaching and Learning*. 5.
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Engagement During Math Small Groups Using the Interactive White Board

Grace Cozby

Abilene Christian University

Abstract

Interactive whiteboards are an integral part of many elementary classrooms. These boards are becoming increasingly common in the early childhood setting. This study looks at how the interactive whiteboard impacts engagement in a Head Start, pre-kindergarten classroom. This study was done by teaching math small groups, both with and without the use of the interactive whiteboard, and recording the results in regards to engagement. Interviews, surveys, checklists, tally sheets, and journaling were used to garner both teacher and student perceptions about the use of the interactive whiteboard. This study found that interactive whiteboards increased direct instruction engagement and were perceived overall as positive by students. The study also revealed that using the interactive whiteboard with hands-on manipulatives increased engagement. The last finding in this study was that engagement is affected by a variety of factors and should be accounted for when implementing new technology or routines into the classroom.

Engagement During Math Small Groups Using the Interactive White Board

I sat in an interview with Robin asking her why she likes it when she gets to go up to use the interactive whiteboard when she promptly told me “because it make[s] my heart happy.”

The interactive whiteboard (also commonly known as a Promethean Board) is a technology that has quickly found its way into the modern classroom. The interactive whiteboard takes the average whiteboard to the next level combining traditional whiteboard usage with multimedia content and student interaction. Through my time in schools I have seen there are conflicting views on whether the interactive whiteboard affects engagement, but the simple fact is that it is and will continue to be a part of the classroom. Furthermore, I have observed both teachers and students have varying perceptions about this technology. In this study, I examined the impact the interactive whiteboard has on engagement and sought to understand the perceptions of those who use it in hopes of discerning how to best use the interactive whiteboard in the classroom.

Purpose

The purpose of this study was to discern if student-interactive lessons using the interactive white board increased engagement in math small groups in a pre-kindergarten, head start classroom. Additionally, the purpose of this study was to discover the students’ and teacher’s perceptions of interactive whiteboard use during math small groups in a pre-kindergarten, head start classroom. I focused on one main research question and two sub questions. Research Question: Does use of an interactive white board in a math lesson in the pre-kindergarten classroom increase engagement?

Sub Question 1: What are the students’ perceptions of using the interactive white board during lessons?

Sub Question 2: What is the perception of the teacher when using an interactive white board during lessons?

This action research study took place during my year-long clinical teaching placement and is a required part of my master's program in teaching and learning. This research took place at Luton Early Learning Center (all names are pseudonyms). Luton Early Learning Center (ELC) is in the Addersfield Independent School District. Addersfield is a town in west Texas with roughly 122,000 people. Addersfield ISD has an ethnic breakdown of 43% Hispanic, 39% Anglo, 12% African American, 4% two or more races, and 2% Asian/Pacific Islander. Luton ELC provides multiple programs within its building for the entire district. These include Head Start, Pre-Kindergarten, Preschool Program for Children with Disabilities (PPCD), Regional Day School for the Deaf, and Kids Learning Together. In total there are over 800 students on Luton ELC's campus. This study was done in a pre-kindergarten, Head Start classroom.

Related Literature

Interactive whiteboards are a technology being implemented in classrooms across America. These boards have been shown to have many positive effects such as engagement, participation, motivation, helping students with a variety of needs, and improved achievement.

Engagement

Onder and Aydin (2016) found in their study that classrooms with teaching technology, such as the interactive whiteboard, had students that showed increased engagement in learning material. Manny-Ikan, Dagan, Tikochinski, and Zorman (2011) interviewed students and teachers about their experiences using the interactive whiteboard. They found that student interest and engagement in course material increased when the interactive whiteboard was used. Waqar, Butt, Bokhari, Dogar, and Qaisar (2016) obtained student and teacher perceptions of

interactive whiteboards and found that student interest was increased. Students reported that “learning becomes fun” (Wagar, Butt, Bokhari, Dogar, & Qaisar, 2016, p. 221). Chou, Chang, and Chen (2016) implemented interactive whiteboards in kindergarten. They found that interactive whiteboards created an environment of engagement and excitement. Betcher and Lee (2009) had classroom teachers report their experiences with the interactive whiteboard. One teacher claimed that “communal engagement” of the whiteboard was “the most powerful aspect” (Betcher & Lee, 2009, p. 118).

Participation

Participation is another positive effect that interactive whiteboards can bring. Aktas and Aydin (2016) observed increased student participation in their study on interactive whiteboard use in a seventh grade science class. Manny-Ikan, Dagan, Tikochinski, and Zorman (2011) found that when students had in interactive whiteboard they were more motivated to be active participants in the lesson. Betcher and Lee (2009) continued to ask classroom teachers about their experiences, and one teacher reported how she believes that a critical part of participation in her classroom is the interactive whiteboard. Chou, Chang, and Chen (2016) found that kindergarten students showed more interest in lessons and some students who were typically disengaged began participating.

Varying Educational Needs

Interactive whiteboards have been shown to be useful in helping students with varying educational needs. Chou, Chang, and Chen (2016) in their study with kindergarten students had three students who needed extra attention during lessons. They found that when using the interactive whiteboard these students became more engaged and participatory. Manny-Ikan, Dagan, Tikochinski, and Zorman (2011) found that teachers were able to more easily

differentiate for varying needs and abilities with the interactive whiteboard. Betcher and Lee (2009) discuss in their book about how “TWBs [interactive whiteboards] can accommodate all teaching styles and can be used to support whole-class, small-group and personalized teaching” (p. 7).

Achievement

One other positive effect of interactive whiteboards is that of achievement. Sen and Ağır (2014) did a study that used the interactive whiteboard to teach an English unit to fourth grade students. They found that students who were taught the lessons using the interactive whiteboard performed better on the post-test than those who were taught without it. Aktas and Aydin (2016) carried out a study with seventh grade science students and found that students taught using the interactive whiteboard performed better on the unit post-test. Marzano (2009) discusses in his article about how interactive whiteboards have shown a “...16 percentile point gain in student achievement” (p. 80).

Retention of Concepts

One part of achievement is retention and understanding of the learning material. Aktas and Aydin (2016) found that when lessons were taught with the interactive whiteboard the academic concepts were more permanent for the students. Sen and Ağır (2014) found similar results in their study, noting that the interactive whiteboard provides a variety of teaching techniques that help make learning more permeant. Manny-Ikan, Dagan, Tikochinski, and Zorman (2011) found that interactive whiteboards lead to students having better understating of the material. Marzano (2009) discusses how graphics and visuals help students in understanding and achievement. Betcher and Lee (2009) describe how teachers have used interactive whiteboards to increase the depth of understanding. One study by Yildirim (2016) about

interactive white boards in preschool classrooms researched how preservice teachers felt about interactive white boards. They found that it can aid preschool students in processing new information into their long-term memory (Yildirim, 2016).

Overall, the number of studies done on interactive whiteboards in the pre-kindergarten classroom are lacking. My study could help reduce the lack of research done on the correlation between student engagement as related to the use of interactive whiteboards in early childhood education. This study could also help discover if the interactive whiteboards are helpful for engaging students who are typically disengaged with traditional methods. Additionally, this study will be helpful in guiding my use of the interactive white board that will most likely be in my future classroom. It is to my advantage to utilize it to the best of my ability for the benefit of students. If the interactive white board is engaging, then I can plan lessons around its use. This study will also hopefully help other practitioners gain knowledge in how to implement effective interactive whiteboard usage in their classroom.

Theoretical Background

My educational philosophy and pedagogy are influenced by a variety of educational theorists. However, Jean Piaget has been one of extreme importance for me in the process of this research and my time in the early childhood classroom. Piaget is a proponent of constructivist learning (Betcher & Lee, 2009). This is, according to Betcher & Lee (2009) the idea that if we are going “to learn something so that we understand it, then we need to somehow engage with it, manipulate it, touch it, move it, and play with it” (p. 71). It is through this play and discovery that learning is constructed (Betcher & Lee, 2009). This idea of self-discovery of educational concepts with hands-on learning is something I use in my everyday classroom and in this research. The interactive whiteboard allows objects to be explored and manipulated by students

as well as allowing for multimedia aspects. This provides an “explorative, manipulative environment that promotes constructivist-type learning experiences” (Betcher & Lee, 2009, p. 72). Chou, Chang, and Chen (2016) found that the interactive whiteboard enabled students to construct their own educational experiences and work with other students. Throughout this research, Piaget and his constructivist theory inspired how my lessons were devised and taught as well as how the students and I interacted with the interactive whiteboard.

What I Did

This research study was done following an experimental design. This means one must control one or more variables that affect participant behavior within the study (Mertler, 2009). I controlled the use of the interactive white board during math small groups, and thus assessed if this had an effect of the students’ level of engagement and off-task behavior. This assessment was done through teacher journaling, observation, surveys, tally sheets, checklists, and interviews.

Participant Selection

The pre-kindergarten, Head Start classroom in which this research was conducted has twenty students, ten boys and ten girls. The classroom had ten Hispanic students, seven African-American students, two Caucasian students, and one Asian student. Five students in the class were English Language Learners (ELL). These students’ levels ranged from intermediate to advanced high.

All students were sent home with an informational letter explaining the research, as well as a parent/guardian consent form. The students signed their assent form in class following a verbal explanation of the study. All students who consented in the class were observed and had the interactive whiteboard technology implemented. Additionally, all students who consented

received the surveys after each lesson. However, not every student was chosen for interviews. Purposive sampling (Patton, 1990) was utilized to select students from the class to participate in short interviews. I interviewed four males and four females to look at any difference in perceptions based on gender. I then chose as many different ethnicities for my interview group as possible to get a wide array of data. I also looked at students' survey responses when choosing who to interview. I looked for students who rated the technology lessons very high and the technology lessons low on their daily surveys.

Data Collection

I collected data through observations done through checklists and tally sheets (see Appendix A), which helped in tracking "behavior events and their frequency," in relation to the amount of off-task behavior (Hendricks, 2017, p. 87). My operational definition of off-task behavior was leaving seat, looking off from activity, playing with neighbor, or playing with manipulatives inappropriately. I often referred to student engagement throughout the data collection, and my operational definition for this was that the student is actively engaged with the activity at hand, responding to or asking questions about the subject/activity, and not bothering others. I recorded observations on my tally sheet and checklist for five weeks total. I gave non-interactive white board lessons for the first two weeks and interactive whiteboard lessons the following two weeks. These observations allowed me to see if off-task behavior was reduced during the interactive white board lessons. I also kept a teacher journal containing my field notes, reflections, and personal observations. This helped in gaining my perceptions of teaching with the interactive white board. I journaled four times a week, after each lesson. There were structured questions for this journal as well (see Appendix B). This teacher journal included what Hendricks (2017) encourages researchers to include which is "detailed information about

implementation of the intervention, participant responses, and surprising events” (p. 83). I also had a short survey (see Appendix C) about their experience after each lesson. I had the students pick how they felt about the lesson through four emotion faces: a very happy face, a slightly happy face, a slightly sad face, and a very sad face. Hendricks (2017) discusses how surveys are a good option when interviewing a whole class is not feasible, as similar questions can be asked in a survey that are asked in an interview. The final data collection I engaged in was interviews. I conducted interviews under a semi-structured interview protocol. I interviewed eight students about their perceptions of using the interactive white board. This allowed me to have structured questions while also allowing the students to discuss relevant information that may arise in the interview (Hendricks, 2017). I interviewed students once after the two weeks of intervention with the interactive white board. These interviews were about five minutes long.

Data Analysis

Qualitative data from my interviews and teacher journals were analyzed using the constant comparative method with initial coding followed by identifying major categories with supporting codes (Hubbard & Power, 2003). This type of analysis used the emerging themes to aid in determining what data still needed to be collected. I used what Tracy (2013) discusses as Level I and II codes. I used Level I codes to record any initial themes that appeared. I analyzed the first twenty percent of the data to find fifteen to twenty codes. Then I used these codes on the remaining eighty percent of my data. I then consolidated those level I codes into three to five level II codes that best exemplified the findings of my research study. The next step was that I wrote memos for each of these level II codes (Tracy, 2013). I also kept a codebook (see Appendix D) of all my codes and data that goes along with those codes to help in analyzing data and codes (Tracy, 2013). For my checklists, tally sheets, and surveys, I used descriptive

statistics to analyze them. You can see all the descriptive statistics for my surveys in Appendix E and see Appendix F for the tally sheets. Hendricks (2017) talks of how descriptive statistics can be a great resource in displaying the collected frequency and behavior data.

What I Found

Through study, reflection, and analyzing the data I collected, four major themes occurred: increased direct instruction engagement, hands-on materials plus the board is key, student perceptions of the interactive whiteboard, and engagement is affected by a variety of factors. I discovered that the interactive whiteboard can be a useful tool for teachers to engage students in the classroom and that students view overall positively. When hands-on materials are used in combination with the board, engagement increases even further. However, it is important for teachers to remember that engagement can be affected by situations both without and within their control.

Increased Direct Instruction Engagement

Increased direct instruction engagement is a very important finding of my research. This is something I noticed throughout my time using the interactive whiteboard in my classroom. As I collected data while using the interactive whiteboard during math small groups, I realized how much more engaged students were in my direct instruction. Prior to using the interactive whiteboard, I often had trouble engaging students in any kind of direct instruction that did not involve actively completing a task; however, when I implemented the interactive whiteboard students were listening, answering questions, and not running off. There was a significant drop in off-task behavior at this time. We can compare this by looking at week one without the interactive whiteboard and week three with the interactive whiteboard (see Figure 1). There is a

decrease in the amount of off-task behavior during week three with the board.

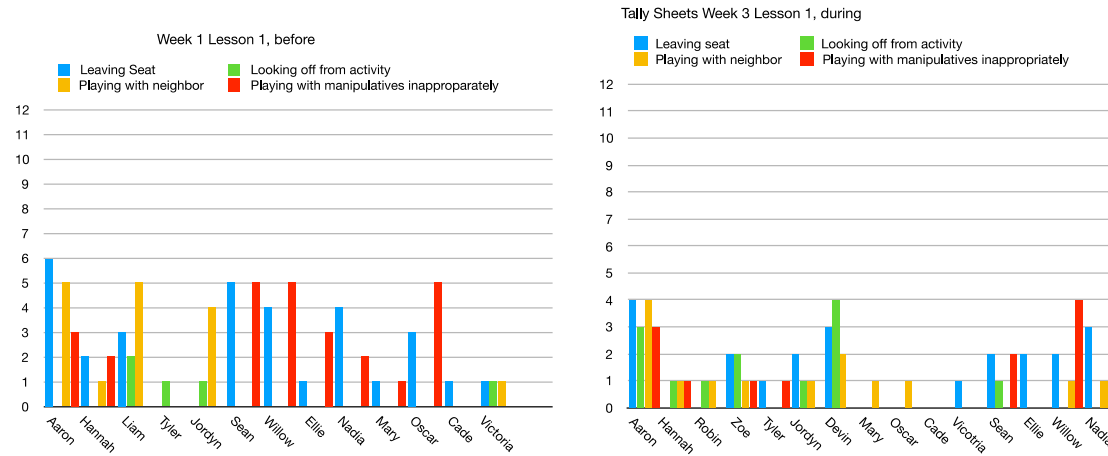


Figure 1. Week 1 vs week 3.

Throughout the two weeks of baseline data that I collected I noticed that student behavior was a key component of student academic opportunities and success. During this baseline time, I was often unable to help and scaffold students who needed more help or extend students who already knew the material. Furthermore, I had so many students leaving their seat that I could not even get through the whole lesson due to having to get up and return run away students to their seat. One student's behavior could hinder a whole group when his or her behavior is so disruptive. Direct instruction is an important part of learning for students and when behavior gets in the way of this learning, students will not be successful in guided practice or independent practice even if they are engaged in those areas. For pre-kindergarteners, just sitting and not doing is very difficult, thus I struggled with engaging them in any kind of direct instruction. However, this all changed when I implemented the interactive whiteboard.

The interactive whiteboard and direct instruction engagement was a big step in offering students academic opportunities. When students were engaged with my direct instruction, I was able to give students the background knowledge they needed to be successful in the activity they were about to perform. Due to students having this background knowledge when it came to the

activities, I was able to bring students to higher levels of thinking and questioning. One example of this was when I taught a lesson on three-dimensional shapes with the interactive whiteboard. I was able to show shape examples and real-life examples with those three-dimensional shapes with the interactive whiteboard. They enjoyed the examples as we learned about each shape, and it helped to make the learning relevant for them. Students were very engaged in this, and thus they were actively making higher order connections to these shapes such as the cone looks like a party hat or an ice cream cone. The direct instruction engagement the interactive whiteboard helps provide aids the students into higher levels of thinking and academic opportunities.

Overall, I found during my study that the interactive whiteboard increased engagement during the direct instruction portion of my lessons. Students were actively watching, answering questions, taking advantage academic opportunities, and moving their thinking to a higher level. As a teacher, I often see behavior hindering engagement and academic opportunities. The interactive whiteboard increased direct instruction engagement, and thus reduced the amount of off-task behavior.

Hands-On Plus the Interactive Whiteboard is Key

Using hands-on manipulatives plus the interactive whiteboard was not a finding I was necessarily looking for in my research. This finding came out of trial and error. Simply put, what I was doing up to the last week with the interactive whiteboard was not working. Students were not more engaged, and if I am being honest some students were even presenting more off-task behavior. I spent the weekend between weeks four and five in heavy reflection over my data thus far, and what I could do to solve my problem. While I looked through my baseline data from the first two weeks of instruction without the interactive whiteboard, I noticed that students were much more engaged when each given hands-on materials to do the activity with. I decided

I would try to combine the two. During my fifth week of data collection I used the interactive whiteboard in combination with hands-on materials, and the results were encouraging. When I used the interactive whiteboard and hands-on materials together I saw much better results than with each individually. As discussed previously, the interactive whiteboard helped to increase direct instruction engagement, and by implementing hands-on materials I received engagement during guided and independent practice as well. While direct instruction engagement increased with just the whiteboard usage, I did not see engagement increase during guided and independent practice until I added hands-on materials for the students to use during the lesson.

A huge problem I had when using the interactive whiteboard was that of students who were waiting to use the board. They often became bored and would engage in off-task behavior. I saw students become antsy and most often walk away from the board or play with their neighbor instead of looking and engaging with the board. Every student wanted to touch the board constantly. Unfortunately, the board can only recognize one point of touch at a time so multiple students cannot touch the board at once. This means they must wait their turn, and this is very hard for four-year-olds. I had one student, Aaron, who consistently cried and became angry or aggressive every time it was not his turn at the board. I had other students as well who showed a lesser version of this behavior. This inability to wait and constant desire to have sole rights to the board caused students to present off-task behavior that hindered individual and group success.

This constant boredom and off-task behavior prompted me to think through what might work. I had seen that hands-on materials helped engage students; however, I worried that the students would fight over materials. Students fighting for materials is something that was a problem both during baseline and during my interactive whiteboard intervention. However, I did

notice that students exhibited less fighting over materials when each student had the same materials at the same time. I noticed this during one of my baseline lessons. I had students take candy conversations hearts and graph how many of each color they had. The students were very engaged and did not fight over the materials because each student had exactly the same and was doing the same activity at the same time. I decided to try and implement this with the interactive whiteboard as much as possible. During week five, I had students do, as close as possible, the same activity with physical manipulatives. For example, during the fifth week, I did a lesson on patterning. Students were given a pattern core and asked to replicate it. I had students move colored squares on the interactive whiteboard and use counting cubes to replicate the pattern on the carpet. Each student on the carpet had the same materials at the same time. This lesson was very successful. Students were engaged with the materials on the carpet which helped limit off-task behavior while waiting. It also kept students from getting upset when it was not their turn to use the interactive whiteboard. One student that really exemplified the success of this method was Jordyn. Jordyn went from twenty-two instances of off-task behavior in week four to one instance of off-task behavior in week five. The graphs below (see Figure 2) show the reduction in off-task behavior between the second lesson of week four and the first lesson in week five when the interactive whiteboard was used in conjunction with hands-on materials.

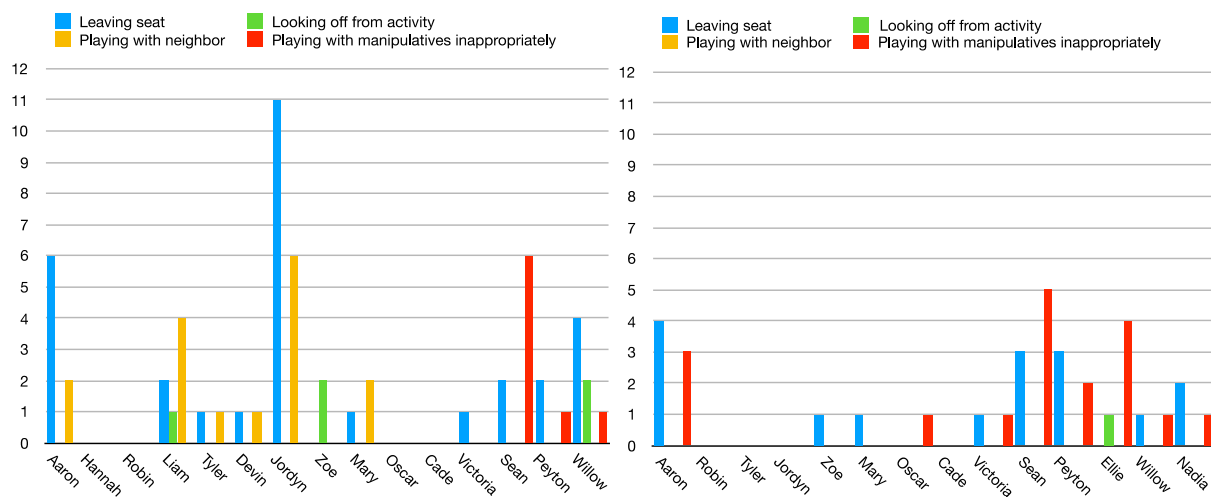


Figure 2. Week 4 lesson 2 and week 5 lesson 1.

Furthermore, when hands-on materials were used in conjunction with the interactive whiteboard students were not bored and getting off task and able to focus on learning. I was able to work with students individually and take them to a higher level of thinking. This ability to work with students individually that needed more help within the group was not something I had been able to do prior to using hands on materials. I had varying levels of students who needed varying levels of support within a lesson. It is almost impossible to provide those varying levels of support when students present large amounts of off-task behavior. During the time I used hands-on materials and the interactive whiteboard, I was able to help students individually in each group. One example is Zoe, who had to sit on my lap to engage, and I was able to do that. Another example is Victoria. She had special learning needs due to a genetic condition. When students were engaged with the interactive whiteboard and using the manipulatives, I was able to scaffold Victoria in the way she needed to be successful. This is seen best in the replicating patterns lesson in week five. She was not ready for pattern cores with three variables; therefore, I had to work with her beginning with two variables and scaffold heavily for three. Due to

engagement and on-task behavior, I could work with the background skills she still lacked. This allowed everyone in the group to benefit academically from the lesson.

Through trial and error, I was able to find a method of instruction using the interactive whiteboard that garnered student engagement and academic opportunities. This is the idea that using both the board and hands-on materials at the same time during small group reduces and essentially eliminates students' wait time for the board and keeps students engaged in learning for the entire lesson as well as letting me better differentiate for students' needs.

Student Perceptions of the Interactive Whiteboard

The student perceptions of the interactive whiteboard are an important finding to discuss. These perceptions were not always easy to determine. This was due to the surveys I gave producing mixed accuracy with results, and simple observations will not totally tell you what someone is thinking. The main way I was able to determine student perceptions was through the interviews I conducted with eight students. When I interviewed students, I discovered different things the students did and did not like about using the board. I also found that students were very focused, if not obsessed, with the rules for how to use the board. I had many students in their interviews make reference to the rules for interacting with the board. This was not something I foresaw coming up, but I feel it is an important part of how students perceive the whiteboard and its use.

The majority of students spoke at least one thing positively about an interaction they enjoyed on the interactive whiteboard. The students would mention different activities we had done on the board and discuss how they enjoy playing on the board. One student, Robin, when asked about why she liked going up to the board, told me "Because it make my heart happy." When I would ask students if they could do anything on the board what would it be, I had

students respond with drawing multiple times. Another activity students mentioned in the interviews that they enjoyed on the board was when I would put on the same game that our class uses on iPads. When I asked Jordyn what makes the board better she told me “by turning it into a tablet.” This was something students seemed to greatly enjoy. Students also mentioned watching videos as another enjoyable activity.

Through my observations in the class, I saw students more engaged with direct instruction when using the interactive whiteboard. While I did not have any student specifically say they liked the direct instruction better when the interactive whiteboard was used, I do believe in order for students to be engaged as they were by listening, looking, and answering questions that there must have been some level of positive perceptions or enjoyment in the activity. Today’s students are far more responsive to digital media, and it is what they find most enjoyable. Students discussed in interviews about how they enjoyed watching videos on the interactive whiteboard. The use of digital media, that of what the interactive whiteboard uses, helps student perceptions and thus engagement.

I spent time in the interviews inquiring about what students did not like about the interactive whiteboard or activities the students did not like doing on the board. Students had trouble coming up with activities they did not like. They would often continue to tell me about aspects of the interactive whiteboard they enjoyed. Now this is not to say they did not enjoy some parts of our using the interactive whiteboard; I just feel young students would rather talk about their positive experiences. I had one student, Devin, distinctly tell me “I don’t like....drawing I like like like the letter R is too hard.” I have seen in observations that writing letters, words, and numbers is often something students do not enjoy as much as other activities. However, I have also observed that using the board is a large motivation for students to write at

all. Another student, Jordyn, told me about not liking a lesson on patterns that we did with the board. When asked what specifically she did not like I was told “sitting down.” Here again I saw that having to sit and wait to use the board was an unpleasant and difficult part of using the interactive whiteboard was for students.

One finding that was surprising for me when it came up during interviews was that of students seeming obsession with the rules that dictate the use of the board. I would begin the interviews by asking students to tell me about the interactive whiteboard. I had multiple students start spouting off the rules for using the board. I had not even asked a question yet in the interview when Oscar told me “so if somebody is touching the board and you hit them in the bottom that is not allowed.” I had students who wouldn’t even answer my question about what they like to do when they touch the board unless I explicitly said it was their turn to touch the board, and they could. For example, Devin, told me “no, I don’t like touching it.” I then inquired about why, and he told me “because I don’t want to get in trouble.” Students’ perceptions of the board were highly affected by the strict rules set in place for using the board. I cannot say if this affected students to view the board more positively or negatively, but it is clearly something that affected their perceptions.

I had hoped the surveys would give me insight into how students felt about lessons both with and without the interactive whiteboard. However, these produced mixed results as some students worked very hard to base them off the lesson we had just had, while others simply picked based on mood or whichever emoji character they liked best. The surveys did not provide any clear distinction between the baseline weeks and the weeks using the interactive whiteboard. If we look at the first lesson during the first week of data collection during the time without the interactive whiteboard and compare it to the last lesson of the week using the interactive

whiteboard there is little difference (see Figure 3). There is a small difference in the number of students who rated the lesson positively, but this was not enough of a significant difference for me to consider student perceptions are more positive with the interactive whiteboard than without it.

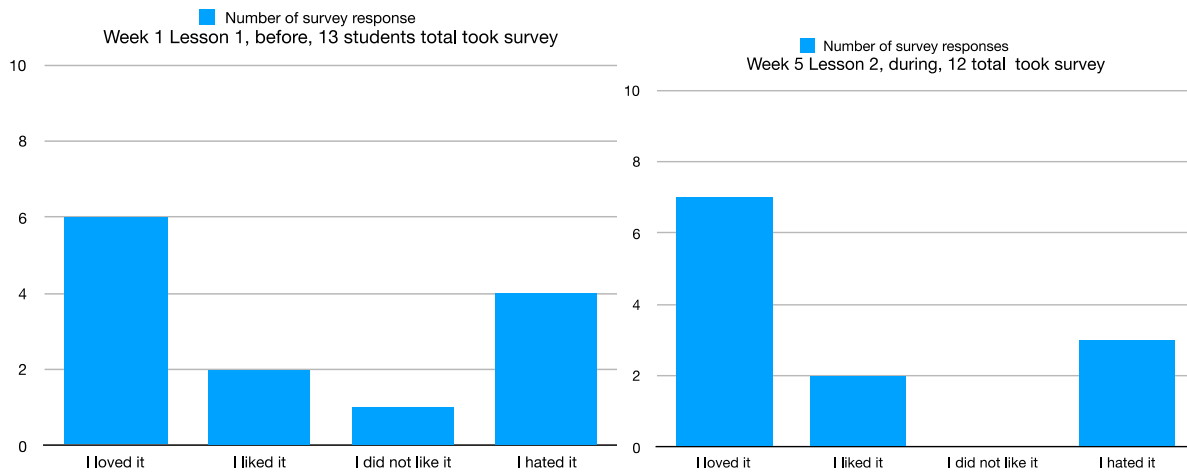


Figure 3. Week 1 vs week 5 survey results.

The students only showed overwhelmingly positive results on the survey during a non-interactive whiteboard lesson during week two where the students graphed candy hearts (see Figure 4). The lesson students rated most negatively was during week three, the first lesson using the interactive whiteboard (see Figure 5). Overall, the surveys did not provide a reliable source of student perceptions of the different types of lessons like I had hoped.

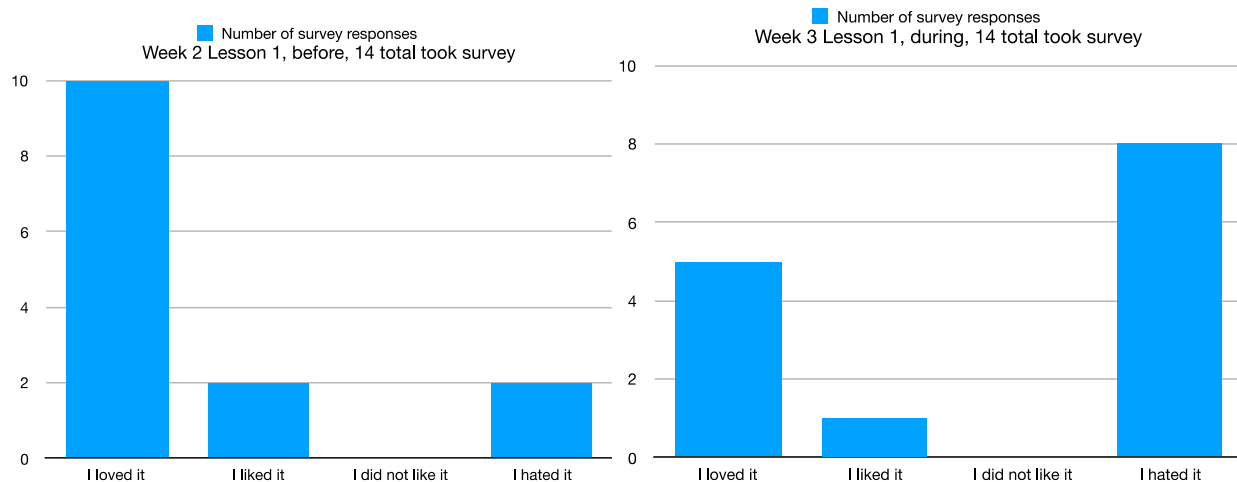


Figure 4. Most positively rated lesson.

Figure 5. Most negatively rated lesson.

In conclusion, the students tended to enjoy using the interactive whiteboard. They enjoyed drawing, watching videos, and playing games on it. The students did express negative feelings about having to sit and wait to use the board and writing words on it. Despite the surveys producing unreliable results, I would say overall students have a positive perception of using the interactive whiteboard during small groups.

Varying Outside Events and Situations Effect Engagement

Throughout this research one thing that became readily apparent was how indiscriminate engagement truly is. Engagement is affected by so many factors from home life, changes in schedule, or simply mood. I can have the most engaging lesson in the world, but if a student got no sleep because he or she spent the night in the emergency room the night before, he or she simply will struggle to be engaged. The different aspects of a lesson do play a large role in engagement, but throughout my research study I watched as so many other factors affected that engagement.

One aspect in the classroom that I saw affecting engagement was interpersonal conflicts or relationships hindering engagement. I have students who would have arguments or altercations prior to the small group and that carried over and affected their engagement. For example, I had two students who got into a small fight during our morning time. When they came to small group, they refused to sit next to each other and refused to participate because the other was in the group. The students even tried to hurt each other again. Throughout the research period I saw interpersonal conflicts affect engagement during small group time. Students struggle to turn off what is going on in their lives to focus on small group learning. I also noticed that changes in schedule affect student engagement. Whenever we would have no school

one day or be forced to do small groups at a different time, the students presented more off-task behavior and struggled more with engagement. Less structured environments affected engagement as well. Students struggled to sit on the carpet which allowed much more movement than sitting at a table with chairs. This can be seen in the difference in the number of occurrences of off-task behavior during week two and week three (see Figure 6). The difference also shows how having a day off can affect engagement as well. I see that it is possible to look at the data and just assume students did not enjoy using the interactive whiteboard, but the interviews with students say otherwise. When I began working with students on the carpet, I noticed it was much more difficult for students to stay with us and not wonder off or play with something else. The students were not confined to a seat or table, but a large open carpet. This takes much more self-control for students to engage with the lesson.

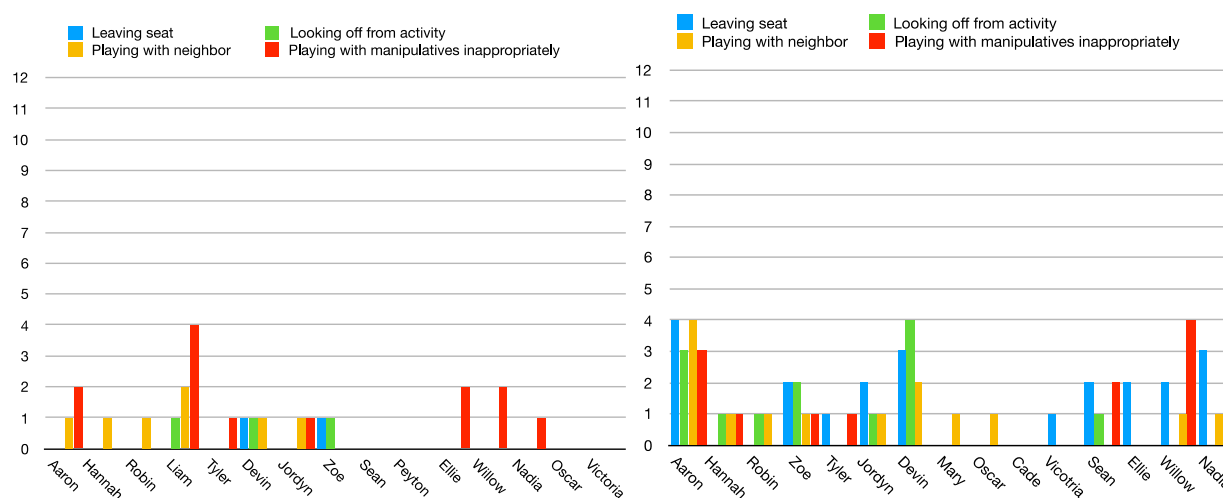


Figure 6. Week 2 lesson 2, sitting in chairs and Week 3 lesson 1, sitting on carpet.

Another aspect of the classroom that affected engagement was the materials and sometimes the interactive whiteboard itself. I saw well intentioned hands-on materials sometimes become a distraction. I saw hands-on materials help and hurt during my research. I saw materials hinder engagement the most when students had to share materials. However,

while materials helped the majority of students, some students could not focus with certain types of materials. One time I saw this was with counting frogs. The majority of students would enjoy the materials and do what was asked of them, but some students could not focus on counting because they wanted to free-play with the frogs, such as ribbiting and hopping the frogs. While this was a small minority of students, it was still something that affected engagement. The interactive whiteboard did have technical difficulties that occurred. Just like with any technology, it is always a possibility. The most often technical issues that occurred were pictures not appearing on the slides or items not moving when they were supposed to. This was frustrating for me and the students. The students want to play the games and use the board and technical difficulties would impede the activity. I even had a student, Robin, tell me in interviews about the interactive whiteboard messing up saying “it doesn’t help me when it doesn’t do it.” Robin summed up the fact that if the interactive whiteboard was not working learning is probably not happening either.

One aspect of engagement that constantly interrupted personal or even group engagement was home life or mood. I had one student, Zoe, who often missed her mom and would cry the entirety of the lesson. Engagement, even with the best lesson, was near impossible during some lessons because of this. Aaron, for example, was often very defiant and simply refused to participate in any lesson. He had issues with his anger that often inhibited the success of the entire group. I could not teach a lesson when one student was throwing materials or harming themselves. I believed this was mostly due to his home life. I could have the most engaging lesson in the world, but Aaron simply wasn’t going to be interested in it when he was in a bad mood. I can illustrate this by looking at one student, Willow. Willow had a home life comprised of food scarcity and parental incarceration. She was very possessive of toys and had attempted

to take them home. If we looked at her number of occurrences of playing with manipulatives inappropriately during week one it was at five and at week five there were four occurrences (see Figure 7). This student's behavior stemmed from her home life, and it would often hinder the group as she would take manipulatives from other students. Using the interactive whiteboard or having an amazing lesson was negligible since this behavior stems from situations far out of my control. Willow was simply an example of students not only in my classroom but classrooms around this country who have home lives that hinder their learning environment and that of their fellow students. At the end of the day, engagement was highly susceptible to the different events that are occurring in students' lives.

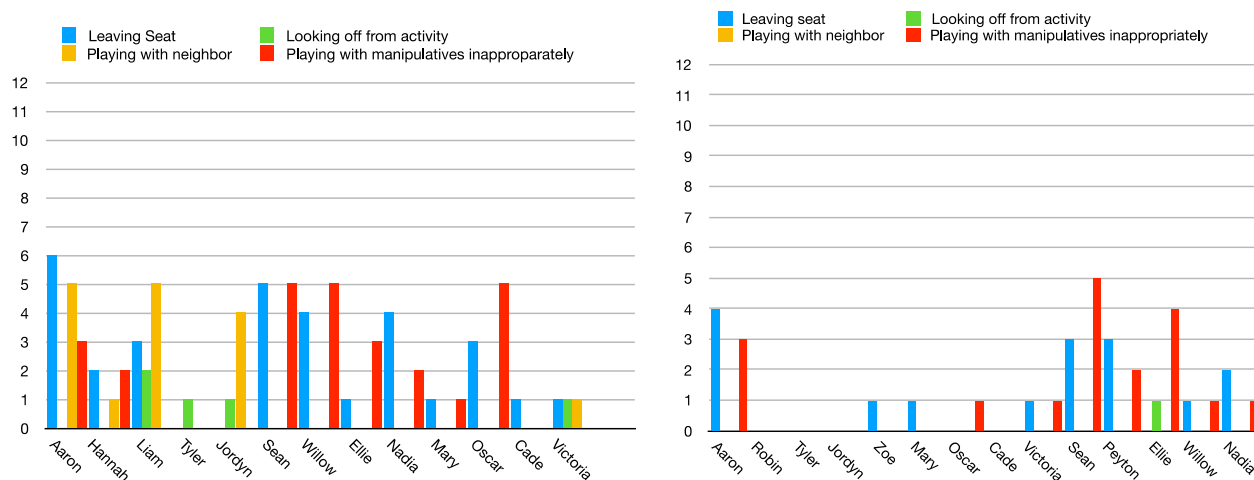


Figure 7. Week 1 lessons 1 and Week 5 lesson 1.

Teacher Perceptions

One perception I had throughout the study was that of the desire today's students have to interact with technology. Students enjoyed the multimedia content and would actively engage with it more readily. In my opinion, their enjoyment of multimedia content is part of the reason why direct instruction engagement increased. Additionally, the use of technology is highly motivating. Students would often fight over who would get to use the interactive whiteboard. I

had one student who would throw a fit anytime he was not using the board. While I would have preferred students to not fight or throw a fit, it did show the value the interactive whiteboard has for them. Students were actively motivated to use the technology and engage in learning.

Another perception I had was that students still need concrete learning. The interactive whiteboard can be highly engaging and immerse students in representational learning; however, students must experience the concrete as well. For example, when I was teaching a lesson on 3D shapes, students were able to see the shapes on the interactive whiteboard in real life situations which provided relevance and engagement. However, allowing students to feel the shapes and angles within their hands gave them a better understanding of the shape. I feel it was important to use not only the interactive whiteboard, but also use hands-on materials as well.

Over the course of my study, one conclusion I came to was that the interactive whiteboard helps students attain higher levels of learning. The study also enlightened me about ways I could use the interactive whiteboard to increase academic opportunities. However, one perception that was evident in almost every lesson I gave, was that student engagement had just as much to do with the individual student circumstances as it did with my lesson. I would have lessons with and without the whiteboard that resulted in wonderful engagement and lessons with and without the whiteboard that had horrible engagement. Students simply are not educational robots. Four-year-olds are young children struggling to understand themselves and the world around them and their engagement can be affected therein.

Overall, a final perception I came to at the end of the study was that the interactive whiteboard is a valuable learning tool. I saw more engagement, which led to more academic opportunities. I saw students who were typically hard to engage become engaged with the technology and media content. The interactive whiteboard allowed me to give more

individualized attention to students who needed it, as well as allowing for differentiation through varying slides and activities. I have a lot of ELL students, and the interactive whiteboard allowed me to add as many pictures as needed to aid in understanding for my students learning English. My perception of the interactive whiteboard during this study was that it was a great educational tool for my classroom.

Implications for Teachers

In this study, I found that there was an increase in direct instruction engagement, and hands-on materials increased engagement as well. I also found the students typically spoke positively about the interactive whiteboard. I discovered that the interactive whiteboard can be a useful tool for teachers to engage students in the classroom that students view overall positively. When hands-on materials are used in combination with the board, engagement increases even further. However, it is important for teachers to remember that engagement can be affected by situations both without and within their control.

This study produced numerous implications for teachers when using the interactive whiteboard both from my successes and my failures throughout the study. The main implication I found for teachers was in the most effective way I found to use the interactive whiteboard. When using the interactive whiteboard for small groups, teachers should not just use the interactive whiteboard in isolation. Include hands-on materials as well. This helps students to stay focused on the lesson and not get bored. I found it was particularly helpful when each student had the same materials. This reduced fighting over what others had. It may also be helpful to make the hands-on activity as close to what is happening on the board as possible.

This helps students to not feel like they are missing out on anything important, instead they are simply waiting their turn.

Another implication that came out of my research was how the interactive whiteboard can be used for individualization. Most teachers are aware of the benefits of differentiation for each student and their level of support needed. The interactive whiteboard can be a helpful tool in this process. The program used for the board consists of slides, similar to PowerPoint just with more features. Teachers could make specific slides for students that need differentiation. For example, in my patterning lesson it would have been helpful to put a slide in working on basic skills for my student who needs more support and a slide with advanced skills for students who needs less support. An implication that came from my failures is that of planning for technical difficulties. As with any technology, it will fail sometimes. However, if you always have a backup plan for technology failure, then it should not impede any learning.

A very important implication to be garnered from my research is that of starting from day one using the interactive whiteboard and using it interactively with students throughout the year. Then it is simply part of the students' daily routines and does not disrupt student learning. Students, especially young ones, need a good amount of time to get used to a different sitting arrangement, such as being on the carpet for small group and learning the rules to use a new technology. Give students time to get used to a new routine or technology before deciding it does or does not aid engagement and learning. It is also important for teachers to be realistic about the aspects of engagement that are within their control. As teachers, we should aim to make every lesson as engaging and educational as possible, but do not get discouraged when every student is not swooning over your lesson. Engagement can be affected by so many factors.

When using the interactive whiteboard, do your best to engage your students in the ways that work best for them, but be realistic about the results. Do not give up prematurely.

In conclusion, the interactive whiteboard can be a useful technology in the pre-kindergarten classroom. The interactive whiteboard can help in increasing direct instruction engagement with multimedia content. Furthermore, with hands-on materials used in combination with the board, teachers can engage students in learning for the whole small group time. While engagement can be effected by many different aspects, the interactive whiteboard can still help engage all types of students and provide numerous educational opportunities for young learners.

If I continued this research further, I would like to look into the effects of the interactive whiteboard in relation to English Language Learners (ELL) specifically. I had many ELL students in my class and questioned how the board was helping them. Does the interactive whiteboard help their understanding of English, grade-level content? Does the interactive whiteboard's visual nature allow ELL students to engage easier with non-ELL peers? One other topic that has emerged since the beginning of my research is that of academic achievement. Does the interactive whiteboard directly affect academic achievement? This question would require a bigger and more randomized study than I was able to carry out through classroom action research. The interactive whiteboard is still relatively new technology that will take further research to fully understand.

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Appendix A

Tally Sheet

Tally Sheet and Checklist for Off-Task Behavior

Student Name	leaving seat	looking off from activity	playing with neighbor	playing with manipulatives inappropriately

Appendix B

Teacher Journal Questions

- 1. What was the lesson about?**
 - 2. What did you notice about student behavior while teaching the lesson?**
 - 3. What did you notice about student academic success while teaching the lesson?**
 - 4. What else did you notice? (general reflections etc.)**
- .

Appendix C**Survey****Survey**

How did you enjoy this lesson?



I loved it I liked it I did not like it I hated it

Appendix D

Codebook

Code	Level	Definition	Example
Interpersonal conflicts hindering engagement	1	Whenever student engagement was hindered by interpersonal conflicts	I had two students who had large meltdowns over interpersonal conflicts happening outside the small group affect learning. Students had been mean to each other earlier in the day or they were simply students that did not get along.
many varying outside events affect engagement	2	Whenever any kind of outside event or situation affected student engagement	The students' ability to focus and engage seems to change daily and is based on a variety of factors from what happened before small group, home life, or mood.
Materials being a distraction	1	Whenever materials became a distraction during the lesson	This student did try to play with the manipulatives inappropriately which made keeping the group focused difficult.
behavior hindering academic success	1	Whenever behavior hindered student academic success during the lesson	I felt as if academic success was hindered do to their behavior. It is very hard to focus on teaching when you are chasing down students.
Student perceptions of board	2	When a student mentioned of I found their perceptions in the data. This also included information about surveys.	Robin: [00:01:15] I liked when I went up there. Grace: [00:01:16] You liked when you went up there. Why do you why do you like it when you get to go up there? Robin: [00:01:23] Because it make my heart happy
fighting for resources	1	Whenever I noticed students fighting over materials even though there were enough for everyone	The students did try to fight over the lily pads even though I had more paper lily pads and frogs than I had students so there was more than enough for them. All the lily pads were the same, but the students wanted their own specific lily pad with their name on it.

surveys producing mixed results	1	If I noticed that the surveys were valid and when they were invalid based on students' behavior with the survey.	Some students actually showed an attempt to base their surveys based off the lesson itself. Some students still picked based on mood or other things.
waiting leads to misbehavior	1	Whenever waiting for something created misbehavior from the students.	when having to wait for the board the students became very antsy and did not want to wait for their turn. Because of this boredom, students began trying to play with materials verses use them correctly and this led to fighting.
defiance leads to lack of engagement	1	Anytime a student presenting defiant behavior effected individual or group engagement.	This behavior and constant stopping meant not every student got a chance to engage personally with the promethean board
less structured environments lead to misbehavior	1	Whenever having a less structured environment then normal (such as not in seats at a table) presented misbehavior from the students.	When using the promethean board, we must sit on the carpet. This made students feel as if they could just walk away from the group as long as they were on the carpet. I also had students doing flips on the carpet. This would not happen in a chair and table. The change of place is hard for young students
Things students like to do on the board	1	Whenever students told me or I observed something students liked to do on the interactive whiteboard	Jordyn: [00:01:01] I like when Mrs. Clark turns it into a tablet.
changes in schedule affect engagement	1	Whenever changes in the daily schedule affected student behavior	Monday was president's day which means there was no school. This seemed to make the class as a whole very emotional. I had many students very tired and crying throughout the day.
Individualization helps engagement	1	Whenever I was able to help	I have one student (Zoe) who is often unengaged with lessons. I

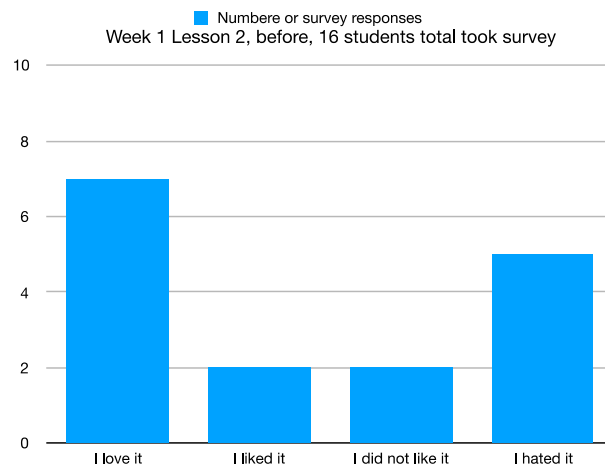
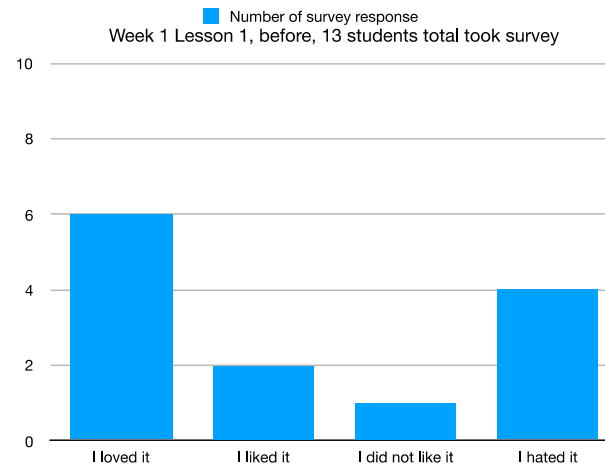
		individualization with students to aid engagement or I noticed that engagement was enhanced with individualization.	have found if I am able to sit her on my lap then she will engage more and participate in lessons,
small misbehaviors can be redirected	1	Whenever I was able to redirect students with small misbehaviors that did not hinder the lesson.	Two students (Devin and Tyler) began looking off from the activity, but I was able to scaffold them back into understanding of the material.
some misbehavior make engagement impossible	1	Whenever a student presented behavior that impeded engagement or made student engagement either individually or group wise.	This defiance greatly hindered the academic success of not only the one student but the group as well. I had to constantly stop and redirect one student. This behavior and constant stopping meant not every student got a chance to engage personally with the promethean board which is part of the academic learning process.
engagement and interest lead to involvement in task	1	Whenever interest in the task and engagement in the task lead to involvement in group and individual work.	The students were actively looking and participating in the activity. As well, students were answering my questions
engagement leads to academic opportunities	1	Whenever engagement in the lesson afforded students more or better academic opportunities.	I noticed in my second group students were able to make deeper connections such as the cone looks like a party hat. I think that a lot of that is due to no major misbehavior inhibiting the lesson, and all students were able to participate with the board.
hands on activities where everyone has same materials at same time reduce off-task behavior	1	When I noticed that students having the same hands on materials at the same time reducing off-task behavior.	The students did not fight over the materials and were sharing with each other. When one student would ask for a rolling pin or cutter, the other student would kindly give it to them. Furthermore, the students

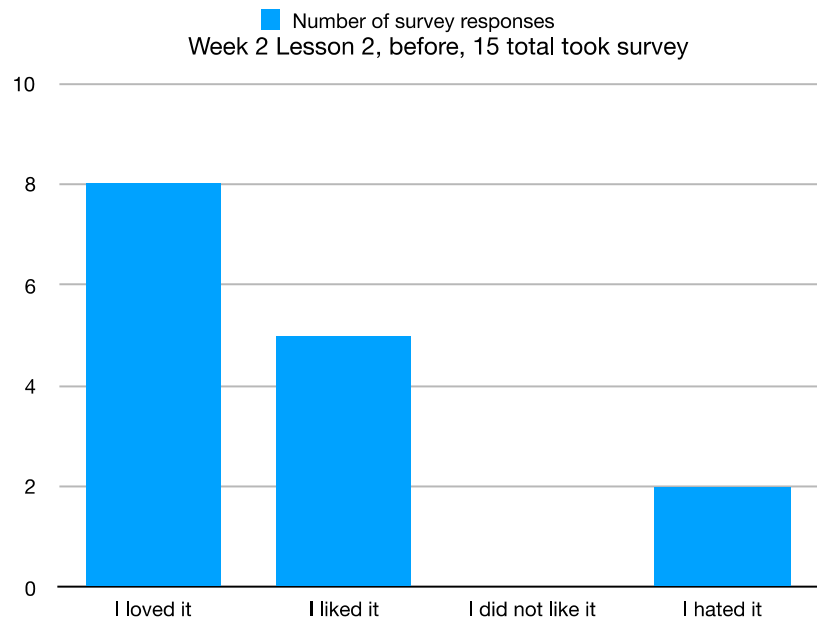
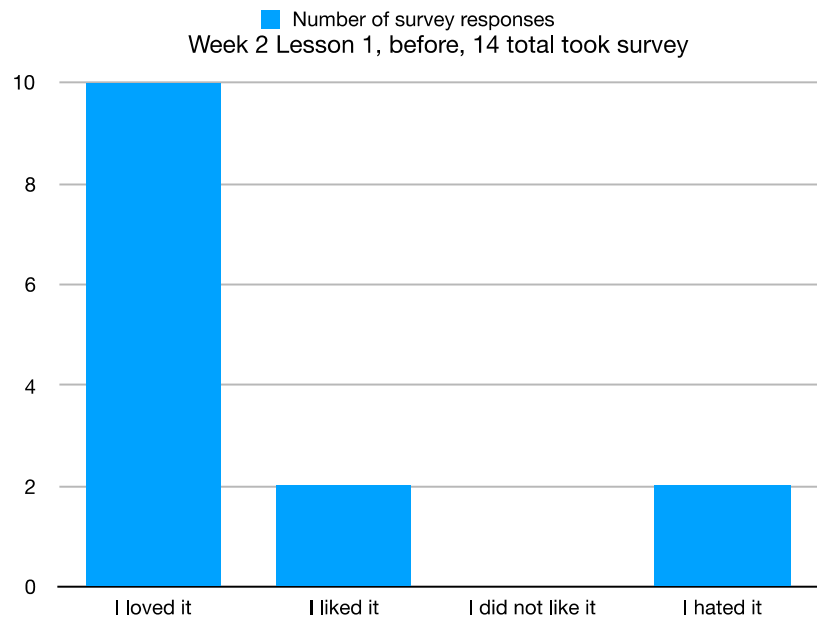
			did not fight over adding the ingredients as we cooked and were patient in waiting to mix the playdough in the bowl
interactive whiteboard increased direct instruction engagement	2	Whenever I saw the interactive whiteboard increasing direct instruction engagement.	The students engaged well during the direct instruction. The students were watching what I was doing on the board, answering my questions, and relating their learning to personal experiences with the shapes.
hands-on materials aid engagement	1	Whenever hands-on materials aided the student or group engagement	My second group often presents a lot of off-task behavior from hyperactivity. However, today there was almost none. Having the hands-on materials was really engaging
everyone wants to touch board all the time	1	Whenever students wanted to touch the board to the point that it became a distraction	I also had issues with students touching the board at inappropriate times when it was not their turn. They would try to mess other students up or try to exit the program all together.
Technical difficulties will happen	1	Whenever technical difficulties with the interactive whiteboard happened	I had technical difficulties during this lesson which made it very hard to keep students engaged. The items would not duplicate making the games very hard to play. I feel like this contributed to some of the behavior because the games would have been engaging for the students to play and caused less wait time
hands on plus the board is the key, less waiting, more engagement	2	Whenever I noticed that students had more engagement when able to have both the board and hands-on materials	The students stayed engaged with direct instruction and guided practice. The students seemed to enjoy both aspects of the lesson. They wanted to use the board but also wanted to use the blocks on the carpet. I did not have students cry or walk away because of boredom from waiting to use the board. I also did not have students fighting over the board or materials.

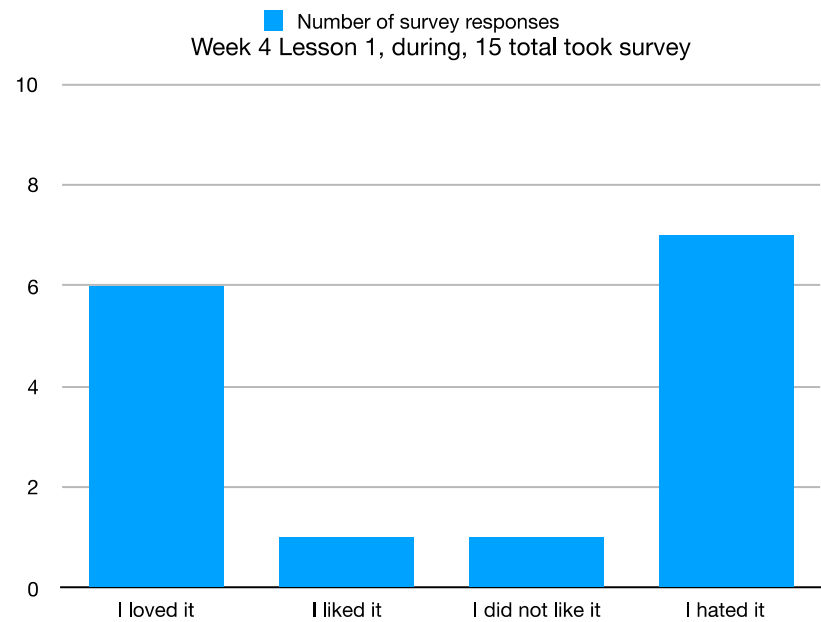
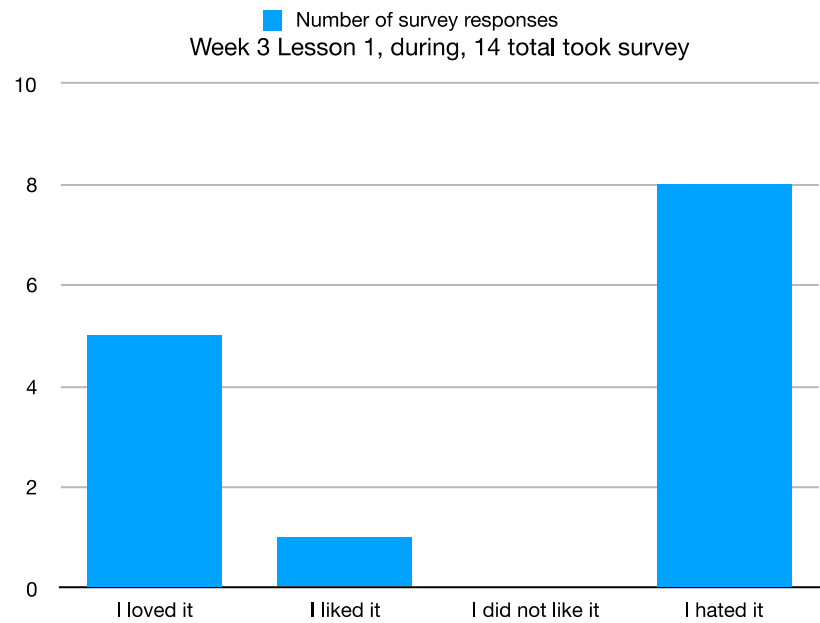
obsession with rules	1	Whenever students said the rules in regards to the board or I asked them what about the board and they responded with rules	Oscar: [00:00:02] So if somebody is touching the board and you hit them in the bottom that is not allowed.
things students do not like to do on the board	1	Whenever I observed or students told me about things they did not like to do on the interactive whiteboard	Grace: [00:01:50] You like putting all the different colors together to make a pattern. What did you not like that we did? Jordyn: [00:02:07] Sitting down.

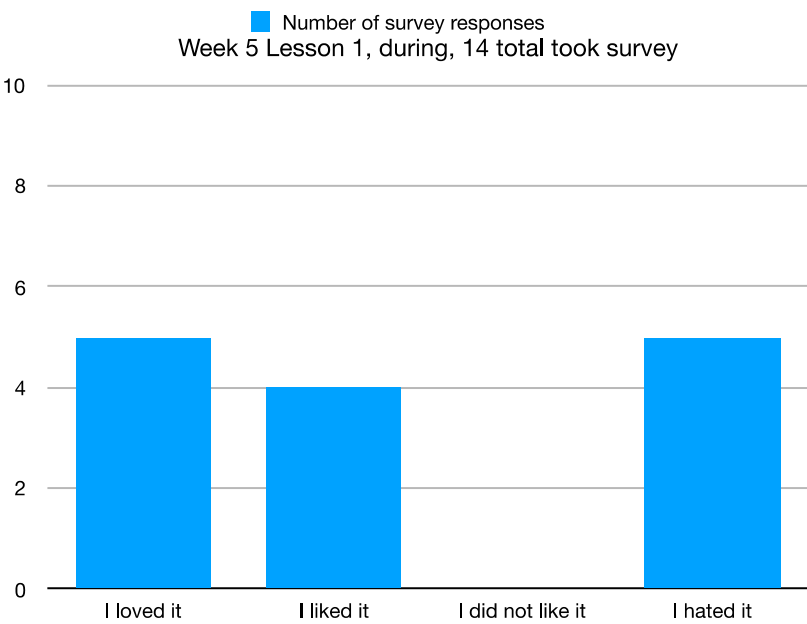
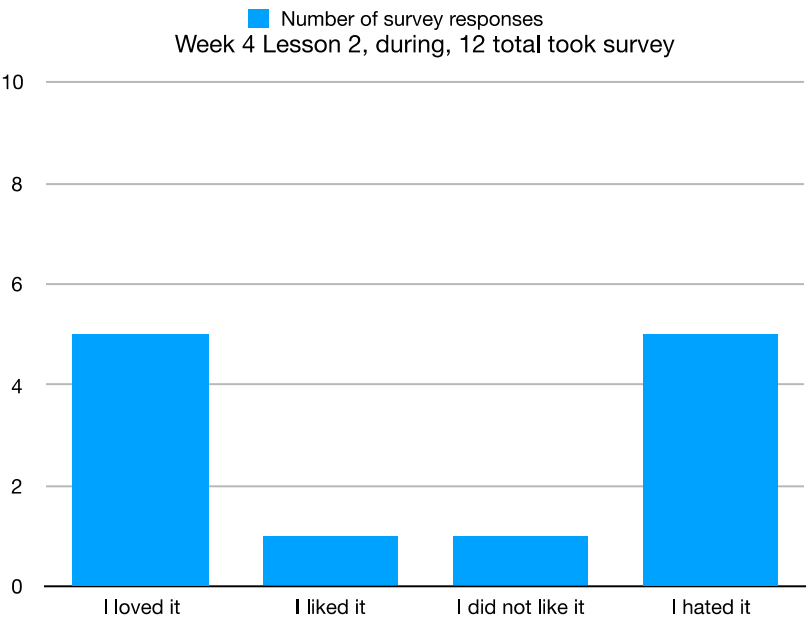
Appendix E

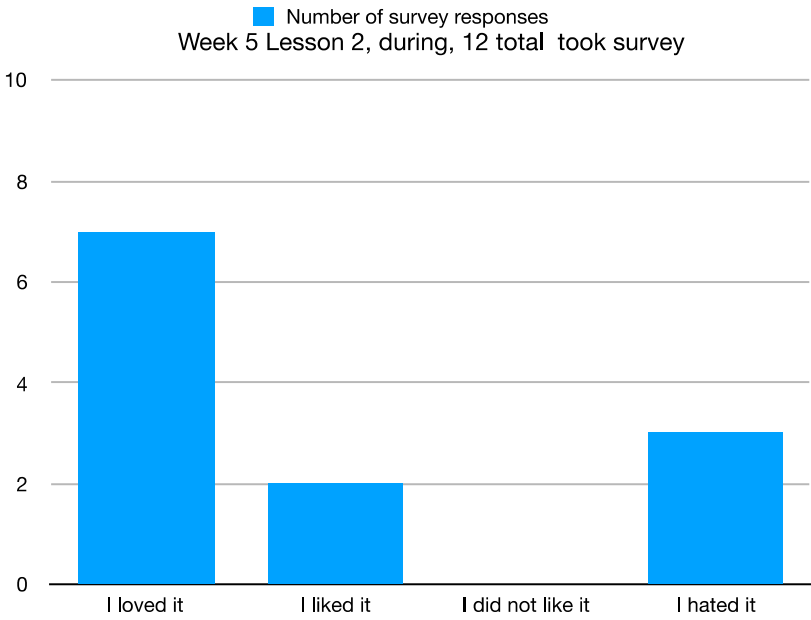
Survey Results





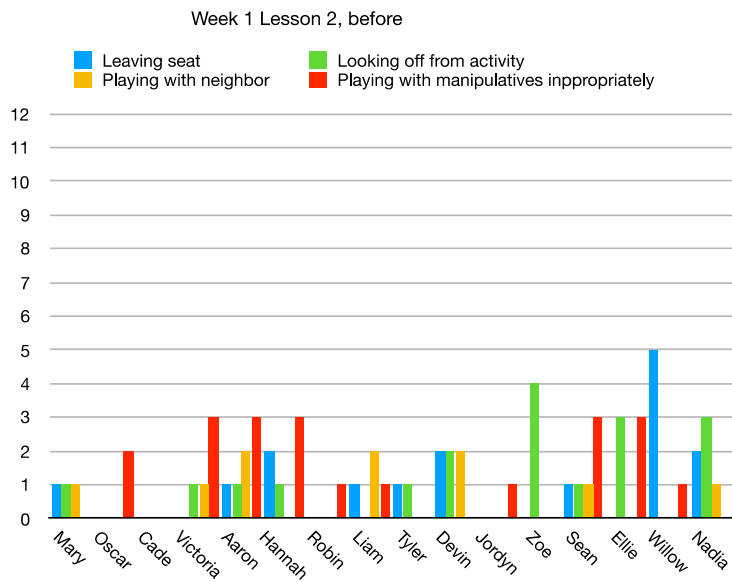
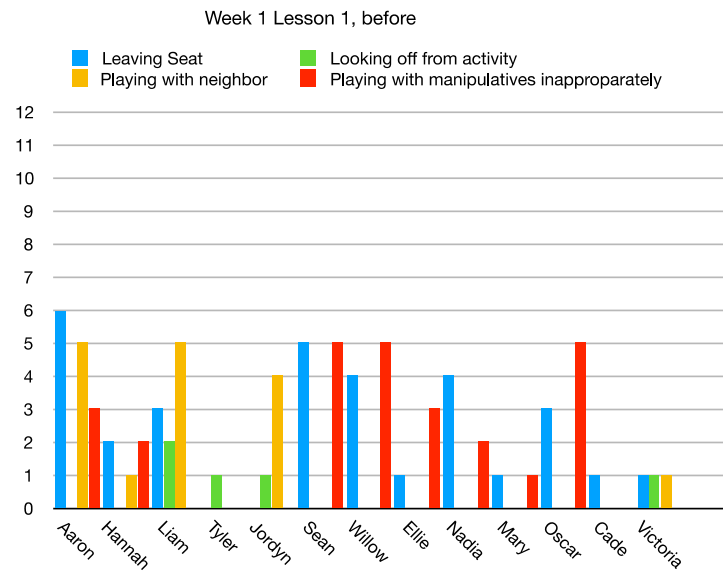




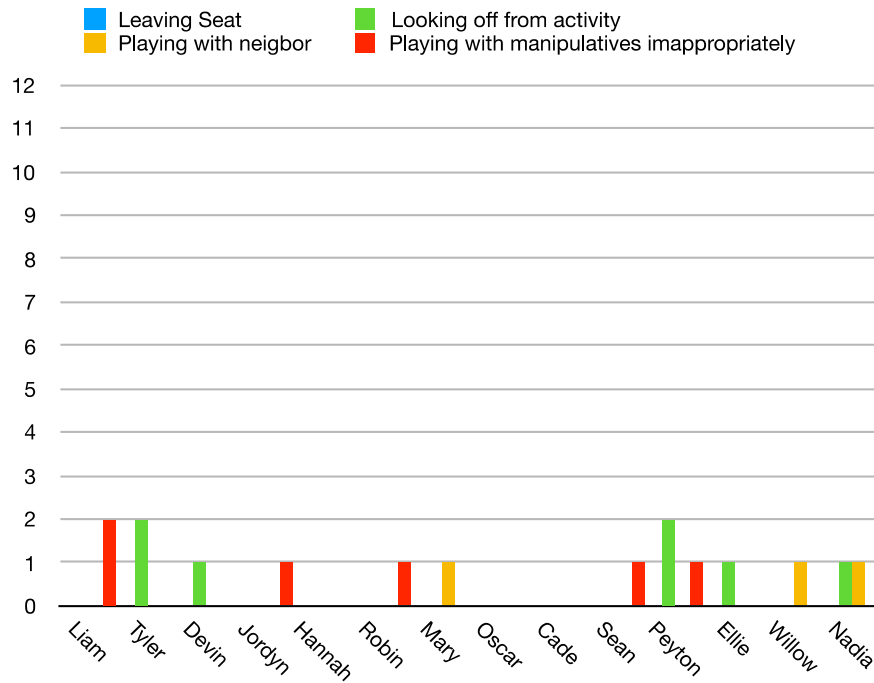


Appendix F

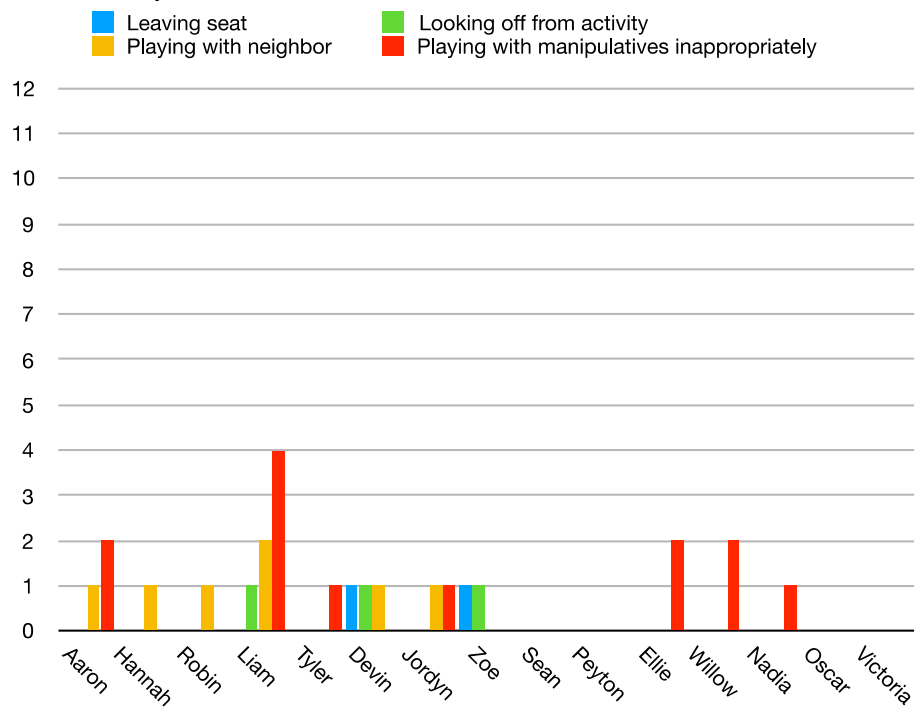
Tally Sheet Data



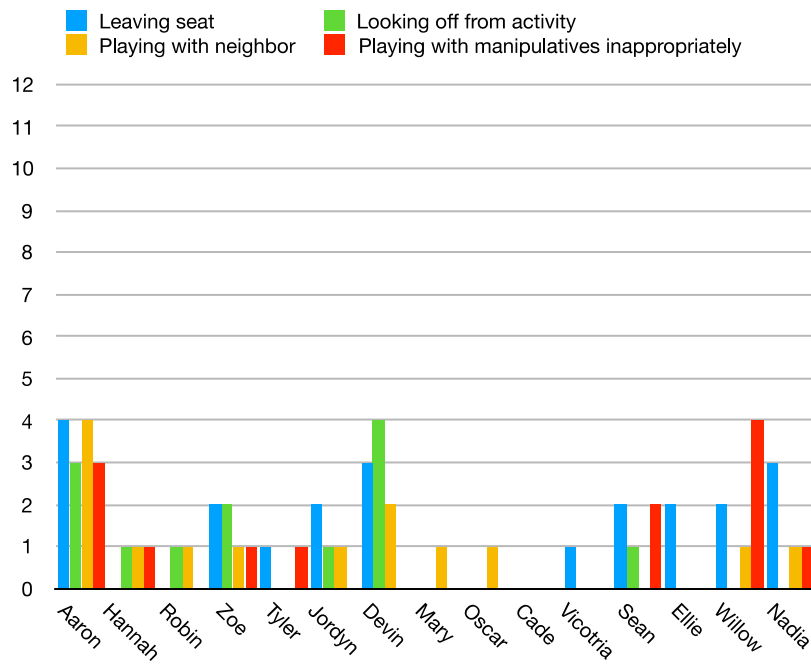
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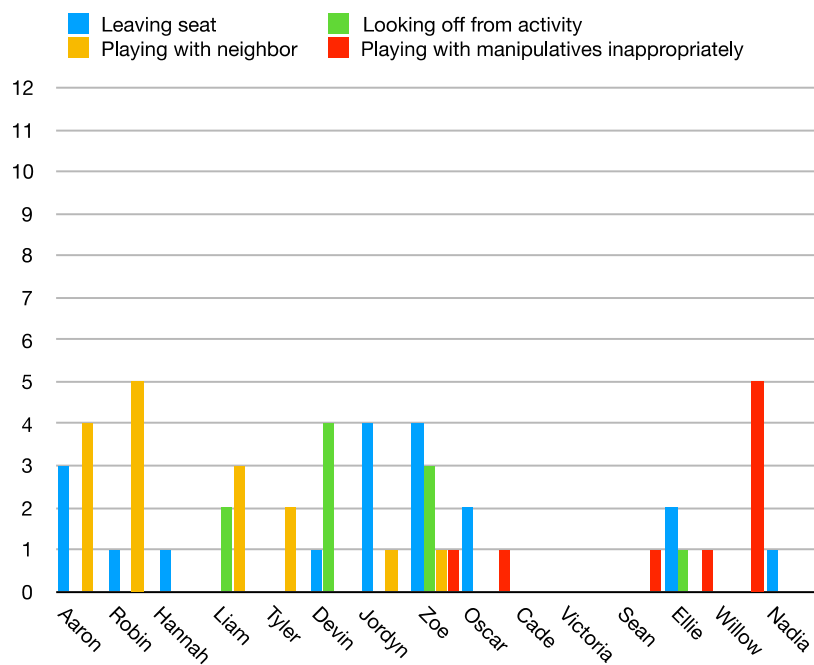
Tally Sheets Week 2 Lesson 2, before



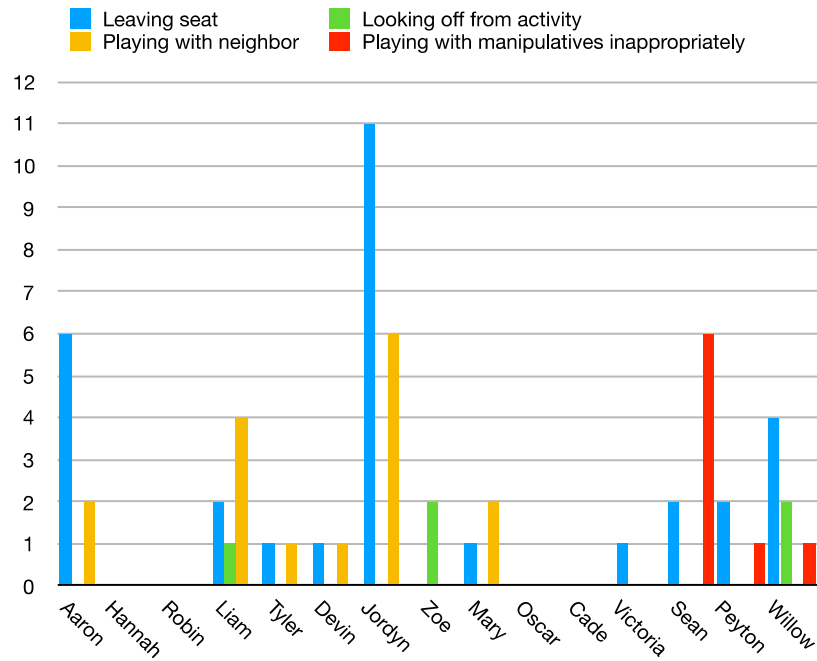
Tally Sheets Week 3 Lesson 1, during



Week 4 Lesson 1, during



Week 4 Lesson 2, during



Week 5 Lesson 1, during with hands-on carpet activities

