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Action Research: Effective Ways to Group Students in a Middle School Classroom

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Abstract

*Effectively grouping students based on the lesson, activity, interests or ability is one of the most challenging things to do in a middle school classroom. This Action Research explores the effectiveness of flexible grouping students in a fifth- grade science classroom, and the impact on the students' learning and engagement. Students were grouped four ways: mixed readiness, same readiness, learner profile, and interest. Six focus students were selected to be interviewed before and after implementing each method for grouping. Formative assessments and learner profile and interest surveys were used to flexibly group the students and create appropriate and engaging lessons. One method does prove to be better than the others. Each method has both benefits and drawbacks which confirms that it is important to continuously group students flexibly in this middle school science classroom.*

## Introduction

Effectively grouping middle school students for optimal learning can be challenging. While it is easy to randomly assign students to groups for a lesson or activity, it is often less beneficial for them than purposeful, flexible grouping is. Flexible grouping is defined as temporary grouping of students to enhance the learning experience of the student. Flexible grouping however, takes careful consideration and continuous assessment to design a meaningful and impactful learning experience for all students. Three flexible grouping methods discussed in this paper are readiness, interest, and learner profiles. Important elements teachers need to keep mind when creating groups are the number of students in each group, the number of materials available that the students may need, what the end goal is for student achievement, and what type of collaboration you want to be going on.

An article published by the Association for Middle Level Education titled *Flexible Grouping in the Classroom* compares flexible grouping to the Fibonacci sequence. In the Fibonacci sequence the sum of two consecutive numbers is the next number in the sequence. For example, the sequence starts with 0,1. One added to zero is 1 so the sequence would look like this: 0,1,1. One plus one is two, one plus two is three, two plus three is five, and so on (0,1,1,2,3,5, . . .). The author of the article states, “And just like those numbers, each new learning is the sum of previous learnings; those pairings and re-pairings matter” (Wormeli, 2010). The experiences the students have in those groups is important and it stays with the students. For example, if a student is always grouped with others who have the same readiness, they miss out on learning from peers who have deeper understanding, new strategies, and/or different perspectives. Exposing students to different people and ideas over and over will give them a

higher quality learning experience. Flexible grouping offers opportunities for students to grow academically and socially in ways random grouping cannot.

The saying “one size fits all” is not true in a middle school classroom when it comes to grouping students. Making informed decisions is key for middle grade teachers when creating groups. Effective grouping in the middle school classroom involves thoughtful consideration and planning. Readiness, interest, and learner profiles are three of the methods for grouping students that teachers can use to maximize student learning and engagement. The purpose of this study is to examine the key aspects of the three flexible grouping methods and how they benefit middle school students.

### **Literature Review**

Flexible grouping in the middle grades has several benefits that increase student engagement, interest, and achievement. First, it is important to consider the varying levels of abilities in the classroom. The book *Children Moving: A Reflective Approach to Teaching Physical Education* discusses multiple ways teachers can be more reflective in their practice. One key is to consider the generic levels of proficiency. Although this method is commonly used in physical education, its basic ideas apply to content area classrooms. The four levels are precontrol, control, utilization, and proficiency, but in a content classroom, these levels would be considered beginner, advanced beginner, intermediate, and advanced respectively. Students in one class can be at varying levels of skill proficiency. In addition, one individual can, and most likely will, be on different levels depending on the concept or activity (Graham et al., 2013, p. 109). For example, a sixth grader can be at the intermediate level when interpreting and calculating the volume of three dimensional solids but at the advanced beginner level when analyzing and calculating measures of center (median and/or mean). These levels of proficiency

often vary greatly within a group of students. For example, if students are learning about place value some may only understand the naming of the place value while others understand how the place values are related. The generic levels of proficiency emphasize that student understanding and readiness will vary in a classroom and that it is crucial for teachers to find ways to cater to each students' needs. One way to achieve this is to group students based on interest, readiness, and/or learner profiles. These groups allow students to receive a more customized and authentic learning experience. In the classroom teachers can observe and match tasks, readings, and activities to students' levels (Graham et al., 2013, p. 109). Understanding the differences in an individual and within a group of students will help teachers create groups that will allow students to flourish.

Grouping students based on readiness, interest, and learner profiles creates small units of students in a big class. Creating smaller units encourages building understanding from various viewpoints, promotes communication, and promotes teamwork (Sandoval, 2013; Williams, 2015). When students work together they learn from one another and discover how people think and learn differently from them. Flexible grouping helps students develop insight and discover new methods for analyzing information (Williams, 2015). It is common for students to have one method for solving a problem or one way of looking at a problem, especially in math. Flexible grouping exposes students to new and different ideas. Students share ideas, teach one another, and build off of each other's strengths. Within the small units, peer assistance and teaching (e.g. tutoring) can occur (Williams, 2015). Both the student learning the new information and the student explaining it will develop a deeper understanding of the content. Ninety percent of information is remembered when students are able to explain it to others. It is important for students to learn about a variety of methods and perspectives for solving problems because

outside of the classroom will have to solve real world dilemmas in which they can apply these problem-solving skills. If students can learn multiple ways to tackle problems and apply their knowledge then they will build a skill set to aid in successful outcomes in and outside of the classroom.

Flexible grouping encourages teamwork and responsibility. Teachers can elect to have students take on roles in the groups catering to learning styles or interests (Sandoval, 2013). A student who likes to write could be the recorder. A student who likes to read could be the reader. A student who likes to draw could be the artist. When the students take on a role they are more invested in the learning and each have a unique way of contributing. Through these roles, they develop a sense of responsibility and teamwork that will stay with them when in other areas of their life as well.

When flexible grouping is implemented there is ongoing, continuous assessment. Teachers are evaluating student progress and determining what tasks and activities would best suit them in order to place them in groups that would foster growth. When grouping by readiness, pre-and post-assessments are common. They are used to determine what a student knows before learning and what they know after learning. When grouping by interest or learner profiles, surveys are used most. These types of surveys tell teachers more about what the students like and how they best learn. Teachers collect and analyze this data to make informed decisions about where to group particular students. Consistent data collection and analysis allows students to move between groups. Having set groups all year does not benefit students as much as flexible grouping. Constantly changing who is in the group and what strengths are combined avoids having high and low groups out of which students cannot move (Curran, 2017; Imbeau). Assessment, formal and informal, are crucial in the classroom, and flexible grouping is one way

that teachers can continually know where their students are at, what they are interested in, and how they learn. A study done in 2011 by Katie Moyer examines the use of all three methods of flexible grouping in a third-grade science classroom and how they affect student achievement. There were twenty-seven students in the class. The results and analysis of the three methods of flexible grouping will be discussed when each method is examined more in-depth.

### **Three Methods of Flexible Grouping**

The first method of flexible grouping is readiness. This method considers what students know before the task or activity. Students can be grouped by same readiness and mixed readiness. Both provided opportunities for English Language Learners (ELL) to practice their English (Maximizing student learning, 2015). For most ELL students school is the only place where they speak English. At home their families will most likely speak their native language, so having plenty of chances to practice speaking English is important for those students. Same readiness is used primarily to re-teach a concept or provide mediation when necessary (Sandoval, 2013). This method is typically frowned upon most likely because when students are grouped by same readiness. This is mostly because teachers leave students in these groups for the long term which isolates and labels students. If teachers use same readiness grouping, they have to make sure the student are in this group only for a short time. If there are a group of students that need extra assistance, there is no problem grouping them together and working with them to bring those students to the level of understanding they at which they need to be.

The teacher in the 2011 study done in a third grade classroom grouped students by same readiness using a pre-assessment. After completing the pre-assessment the students were put into four groups: little or no understanding, some understanding, good understanding, and solid understanding. The lesson was differentiated based on the students' readiness and needs. All the

students were expected to have the same outcome through different means of learning and understanding. Upon completion of the lesson the students were given an exit ticket. After analyzing the data the teacher found that the grouping was effective for this lesson. Three students started the lesson with little to no understanding but by the conclusion of the lesson no students were in the little to no understanding or in the some understanding category. All students that were below solid understanding moved up at least one level. Those in the solid understanding group stayed in the same group (Moyer, 2011). Grouping by same readiness targets instruction to meet students' needs and maximize student engagement, and allows for tiered intervention and scaffold instruction (2015). These elements help students have a better understanding of concepts. They are given direct help and attention that is specifically designed for their needs while given immediate feedback. Continuous and immediate feedback is important in any classroom. It helps students know what they are and are not understanding and what concepts upon which they need to improve. Grouping by same readiness can be very effect for students when it is specific and directed and when it is only for a short period of time.

Mixed readiness is another variation of flexible grouping. In mixed readiness groups, the teacher serves more as a facilitator compared to taking on the teaching role as in same readiness groups (2015). These groups are student led. The students in the groups have varying levels of knowledge going in to the task or activity. This type of grouping encourages peer assistance and teaching, having the students who are more confident and knowledgeable about a concept helping the students who are not as knowledgeable. When students see their peers are succeeding, they too will want to also try and succeed, making this grouping both successful and motivational. A student will be able to understand that they can also be at the same level as his/her peers. This will boost their self-confidence and self-efficacy. Same readiness and mixed



readiness benefit students in different ways. Both focus on taking what students know and designing an educational experience that will engage them and meet their individual needs.

The second method of flexible grouping is by interest. This method takes into account what students enjoy learning, what they do in their free time, and what things in which they show interest. Students typically would be given a survey that would be used to put them in groups. When learning about nonfiction in a language arts classroom students could be placed in groups with others who have similar interests like sports, animals, cars, etc. Gearing a task or activity towards students' interests will make them more interested and engaged. The students who do not like to read will be more motivated to read if they can read about something that interests them. One component of grouping by interest is allowing students to choose what they want to research, read about, or how they want to present what they learned. The students get to apply what they are learning to their life. When students can make connections between school and their life, learning becomes more personal. Students have opportunities to engage in authentic, in-depth inquiry that they can explore from any lens (Imbeau). One way grouping by interest can be implemented in the classroom is through learning centers/stations. Because they are given the choice, the students interact with varying texts and resources while varying ranges of complexity (Imbeau). Through interest grouping teachers are able to differentiate the texts, resources, and activities so that the needs of all students can be met. Students have the chance to become experts on a topic about which they are interested and passionate.

The teacher in the 2011 study gave each student an interest survey that was used to create the groups. The three groups that were made were Pokémon, video games, and helping others. Throughout the lesson the teacher took notes on engagement, participation, interruptions, task completion, and understanding of a new concept. The students were also given a feedback form

that had questions about whether or not they enjoyed working in their group, if their group members were on task, and if their group was considered successful together. All but two students liked working in the groups, all students felt their group members were on task the entire time, and all students stated that they enjoyed the activity. Also, two of the three groups showed mastery of the concept, there were no interruptions, and all but one student participated (Moyer, 2011). One quality of grouping by interest that makes this method flexible is that students can be put in groups and collaborate with one another and have either a shared product or an individual product. Students are able to approach the task or activity how they want and make the final product unique. Teachers want students to engage in content and connect what they are learning to their lives and grouping by interest achieves that goal.

The third method of flexible grouping is by learner profiles. This method focuses primarily on grouping students by learning styles or intelligences. Grouping students this way will result in different approaches to the assignment and different products: varied styles, intelligences, and cultural values (Imbeau). This method encourages students to work in a way that is most comfortable and familiar to them. For example, in a science classroom when students learn about cells one group that is made up of auditory learners can listen to songs or recordings about the parts of cells. While another group made up of visual learners can watch videos and look at three dimensional models of cells. The students in both groups are learning the same content just in different ways. Similar to grouping by interest students are able to create products that are unique to their individual skills and qualities (Imbeau). Students not only can learn the material in different ways but they can present what they learned in different ways. Kinesthetic learners can make a dance or visual learners can make a poster. Students are more

engaged and interested in the material when they are learning it in a way that is best suited for them.

In the 2011 study, the teacher grouped students by learning profiles. The students took a learning style quiz that the teacher used to put them in groups. The three groups were visual, auditory, and kinesthetic. The auditory learner group read an article and discussed their findings. The visual learner group read independently and then watched a video. The kinesthetic learner group read and completed hands on experiments and activities. Throughout the lesson the teacher took notes on engagement, participation, interruptions, task completion, and understanding of new concept. The auditory and visual learners were off task at times. This appeared in the teacher observation and the student feedback. All the students showed mastery understanding of the new concept but the teacher found that the activities were not as effective as anticipated when it came to interruptions and staying on task. The three methods each focused on different aspects of student needs and interests. Each one took careful planning and continuous assessment. Overall the students were engaged, on task, and showed understanding of new concepts (Moyer, 2011).

Knowing what type of learners the students are will help teachers design tasks and activities that are student focused by incorporating students' strengths (Sandoval, 2013). If a student is more of a kinesthetic learner than auditory learner they are more likely to learn and engage in the content when they are given a task or activity that has them moving around and working with their hands. Grouping by learner profiles allows teachers to teach the same content to all students while catering to individual student's needs and preferences which makes learning more personal.

## **Methodology**

Students in a fifth-grade science class will be grouped four different ways: learner profile, mixed readiness, same readiness, and interest. Prior to the research, six students from the class will be randomly selected and interviewed. These students will be known as focus students. They will answer a series of questions about their opinions on group work (Appendix A). After the entire grouping processes, at the end of the research, the same six students will answer the same questions they answered at the beginning. The pre-grouping and post-grouping data will then be compared to see if student opinions about grouping changed. During each lesson with different flexible grouping, the teacher will take observational notes (Appendix E) about student engagement, participation, and questioning. These notes will be compared to observational notes taken when flexible grouping does not occur – random or self-selected grouping. At the end of each grouping method lesson, the focus students in each class will be interviewed after the lesson. They will be asked several questions about their group and the task(s) they did (Appendix D).

When grouping by learner profile, every student in the three classes will take a Learning Style Questionnaire (Appendix B) adapted from Stetson University. Some of the students in my science class are also in my math class. Those students will only take one questionnaire. This questionnaire will tell which students are visual, auditory, or kinesthetic learners. Students will then be grouped based on what type of learner they are – visual learners with visual learners, etc. They will also complete tasks that cater to their learning style. Each group will learn the same concepts but the process or product will vary. The materials for this part of the study are the Learning Style Questionnaire, the observational notes paper, and the list of questions for the focus students.

When grouping students by mixed readiness, every student in the three classes will complete a formative assessment about the content they will be learning in the lesson. The formative assessment for each class will vary. The students in my science class will be tested on science content. Each math class will also receive different formative assessments since they are learning the content at different paces. After the lesson, the focus students in each class will be interviewed. They will be asked several questions about their group and the task(s) they did. The process for grouping students by same readiness will be similar to the process for mixed readiness. The only difference is there will be tiered activities that cater to the readiness levels in each class. Similar to grouping by learner profile, the groups will complete different tasks. Each group will learn the same concepts but the process or product will vary. The materials for the grouping by readiness part of the study are the formative assessments, the observational notes paper, and the list of questions for the focus students.

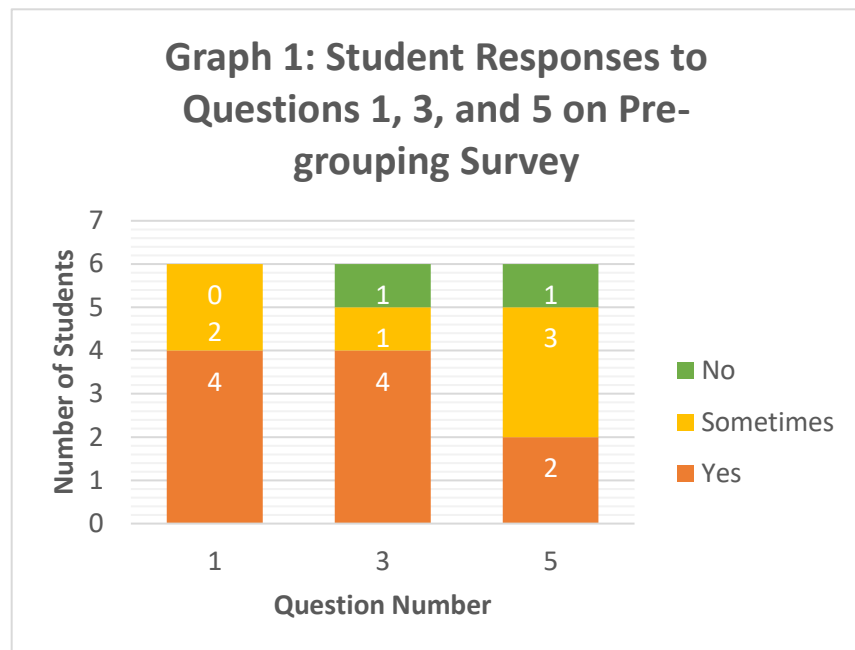
When grouping students by interest, every student in the three classes will take an Interest Survey adapted from San Luis Valley Board of Cooperative Educational Services (Appendix C). The students in my science and math classes will only take one survey. This questionnaire will tell me what subjects students like/dislike, what they do in their free time, and what helps them learn best. Students will then be grouped based on their interests. The tasks the groups do will vary depending on their interests. Each group will learn the same concepts but the process or product will vary. The materials for this part of the study are the Interest Survey, the observational notes paper, and the list of questions for the focus students.

Once this whole process is complete. The data from the interviews and the observational notes will be sorted, compared, and analyzed. Student achievement and understanding will also be monitored throughout this entire process through grades and feedback for various

assignments, projects, and assessments throughout the study. The next few pages contain the survey questions for the focus students, observational notes paper, interest survey, and learner profile survey.

### Data and Analysis

My action research began with six focus students taking a pre-grouping survey. **Graph 1** summarizes the students' responses to question 1, 3, and 5 on the survey. Four of the six students indicated they do enjoy working in groups, while the other two students said they sometimes enjoy working in groups. The original survey did not include "sometimes" as an option for questions 1, 3, and 5 but some students could not decide between



yes or no. I noted on the surveys which students said sometimes by placing an X between yes and no.

A common theme I discovered from question two (Why do you/don't you like working in groups?) on the pre-grouping survey is they value having less work to do. Five of the students stated that when they work in groups they "don't have to do all the work" or the work is distributed. When talking with the students I learned that some of them do not like presenting, so when they are in a group they can talk less. Another student mentioned that the work goes faster. One student stated that they enjoy working in groups because she gets to work with her friends. I

noticed early on that the students are very social. The students who said they sometimes enjoy working in groups stated when completing group projects, they are sometimes grouped with people who do not do much work, which frustrates them. The third question on the survey asked if the students prefer when the teacher assigns the groups. Four students said yes, one student said no, and one student said sometimes.

Question four asked the students to explain why they answered yes, no, or sometimes. The response to question four was very similar for the four students who answered “yes” to question three. They like when the teacher picks the groups because they do not have to worry about picking which friends with whom to work. An additional comment from Student A was that he prefers when the teacher picks the groups because he “might choose a friend that he will mess around with.” Student B does not like when the teacher assigns the groups because she enjoys working with friends and when the teacher assigns the groups, she often does not get to be with her friends. Student C sometimes likes it when the teacher picks the groups. She stated that sometimes she is with “people who don’t do much.” When asked if the students like when they pick their groups, two students said yes, three students said sometimes, and one student said no. Students B and C said yes and their reasoning focuses on the ability to be with friends. Student C also stated that she gets to work with “people on her level.” Based on this statement I predicted that she would enjoy the same readiness grouping task more than the mix readiness grouping task. Later in my analysis I will discuss her survey results for both tasks and how they compare to her statement in the pre-grouping survey. Student D said no and her reasoning was that she does not like to choose which friends she wants to be in a group with. Students A, E, and F chose sometimes for question 5. Student A’s reasoning was that he might pick friends he could mess around with, instead of working on the task. Student E’s reasoning was that he enjoys the

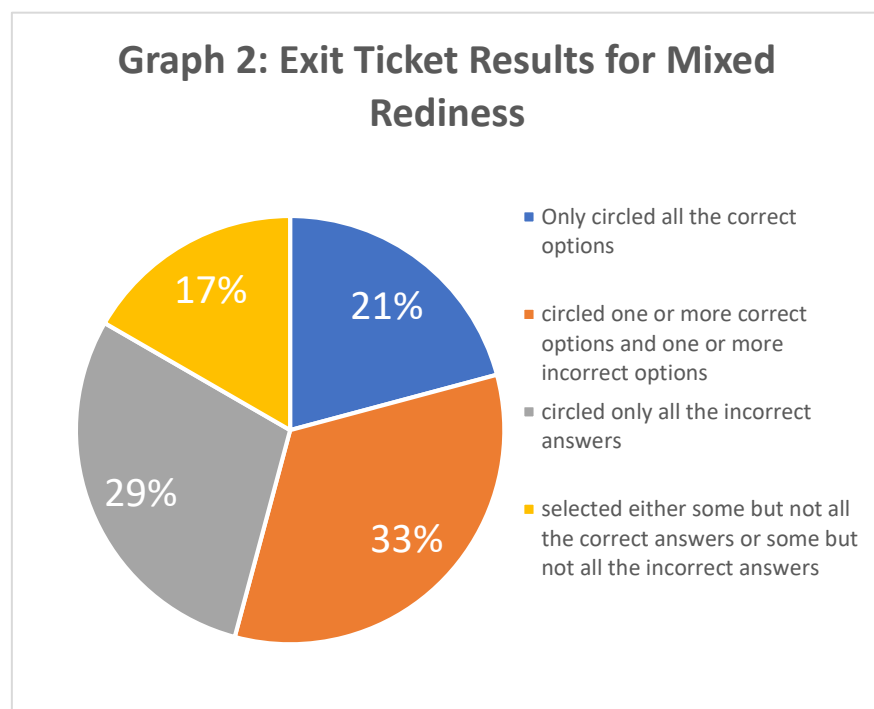
freedom of picking his own group but dislikes having to choose between friends. Student F's reasoning is that he also enjoys being with friends but if he is with friends then most likely he will talk about things not related to the task. Question seven asked if the students prefer if the teacher picks the groups or if they pick their group. Students A, D, E, and F chose "teacher" and students B and C chose "me". The reasoning for the four students who chose "teacher" is similar. They dislike having to pick which friends with whom to work. Students who chose "me" enjoy having the freedom to choose and being with friends.

### *Mixed Readiness*

The first grouping method I used was mixed readiness. The task the students completed was a dissection. The students were learning about owls and their role in the ecosystem and part of this was dissecting an owl pellet. The day before the dissection, each student received an exit ticket. They were given a list of words related to the parts and features of an owl (bones, muscles, tendons, fur, and organs). The students had to circle the things they thought owls digest. The results of the assessment determined how the students would be grouped for the dissection.

There were 24 students in the class. **Graph 2** summarizes the results for the exit ticket.

Six groups were created with these results. The first step of the dissection was to observe the unopened





pellet and discuss what it looked like and what they thought it was. Then the students opened the pellet and recorded their observations. The students used their observations and group discussions to decide what the object they dissected was. We talked as a whole class about what an owl pellet is, what they found when they opened the pellet, and what an owl can and cannot digest. Finally, the students had time to identify the bones inside of the pellet using a chart. During the task, I completed observational notes. For on task behavior and engagement every group received a 5 and the class rating for on task behavior was a 5. Throughout the entire task, students were focused and excited about their discoveries. Every group received a rating of 3 for discussion about content. Most students were able to recognize that the pellet contains what cannot be digested by an owl while others could not. I noticed the students who did understand were sharing their thoughts with those who did not. By the time, we came together as a whole class, everyone understood what the pellet was and why owls regurgitate them. When the students were identifying the bones, they were engaged and discussing their thoughts and decisions. Some of the students were less active in the bone removal process because they were disgusted by it but I did not count that as not being engaged. The most common question I got about the content was “Do you think this bone is a [insert animal] [insert type of bone] or a [insert other animal] [insert type of bone]?” Some of the same bones looked similar in the different animals so students struggled to identify them. Overall, the students only had some questions about the content which is why the class rating was a 2. There were some questions about non-content procedures that focused on which tools to use, if they broke the pellet enough apart to find all the bones, or what to do with the pellet when they were done. After the task, I met with each focus student to debrief the task and discuss their thoughts about their group. All six students said they liked their groups. Students A, C, D, and E mentioned that they were with

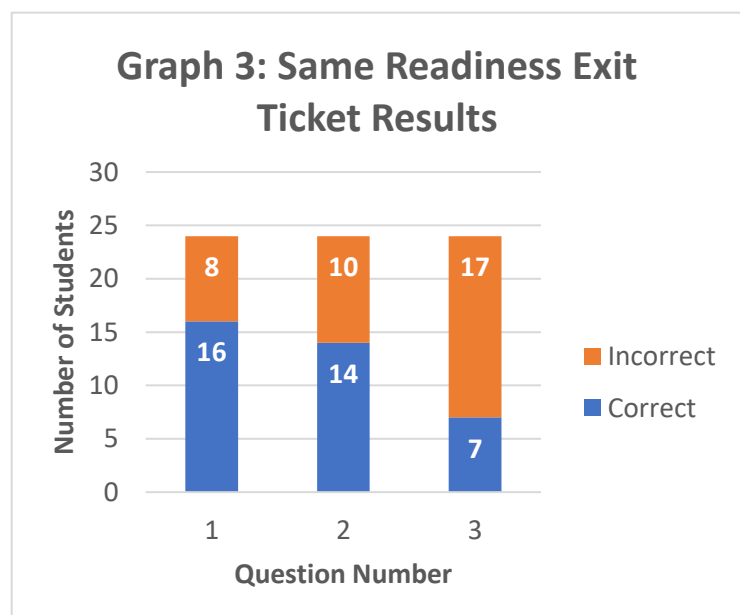
at least one friend. Student B said that “We all got along,” and student F said that he found the people in his group to be very helpful. Student B said that working in a group did not help them learn the information. When I asked why, Student B said that they already knew what an owl pellet was and that they were able to “identify the bones easily” on their own. Students A, B, C, D, and F said that working in a group made it easier to identify the bones. Specifically, student D said, “Identifying some of the bones was difficult. If one group member could not figure out the bone, someone else could.” Every student said they would work with their group again. When the students were asked if they liked the activity, all but two students said yes. Students C and F said they sort of enjoyed it but they did not like touching the fur in the pellet. Many of the students were apprehensive about the pellet at first. They were hesitant to touch it and dissect it but eventually they became more comfortable with it. Student F said that he liked identifying the bones, but did not like digging through the pellet and removing them so he let the group members that did not mind it do it instead. The students that liked the activity said it was “fun and interesting” or “very cool”. None of the students said they wanted to do a different activity. The students had a series of questions to answer during the task. These questions and discussions were used to determine the students understanding of what owl pellets are and where owls fit in a food chain and food web. This was the last activity for the ecosystems unit so the students followed up the dissection with a summative assessment. In the assessment, the students had to explain a barn owl’s role in a food web and explain how sudden extinction of the barn owl would affect other organisms in the food web. Eighteen of the twenty-four students were able to correctly answer the question and provide accurate details about what the barn owl eats (using what they learned from the pellet dissection) and how those organisms would be affected. The

six students who did not receive full credit, did received partial credit. Their responses were not detailed enough.

One benefit of this method of grouping is that the students had opportunities to learn from one another. The students who were more confident in the material can assisted those who were not. This helped build teamwork and communication skills between the students. I noticed some students were helping their group members when they had to identify the bones. On the other hand, some students may not want to help their partner or group members or those who do not understand might sit back and let the others do most of the work. During the dissection, the students who did not want to touch the pellet were able to let their group members dig through it while they watched. They were approved to do this for this specific task, but in other situations I most likely would not let the students sit back while others did the work.

### *Same Readiness*

The second grouping strategy I used was same readiness. The topic of the lesson was high and low pitch. The students completed an exit ticket that focused on defining and explaining what pitch is, how it relates to frequency, and how to produce high and low pitches with various object and instruments. Up to this point the students were introduced to pitch, frequency, and wavelength but they had not yet explored the topics in depth. The exit ticket was three questions: What is pitch? What is frequency? What is the relationship between pitch and frequency? **Graph 3** shows the



number of students who answered each question correctly. There were seven students who answered all three questions correctly, so they were put in a group together. Eleven students answered questions one and two correctly but answered question three incorrectly. These students were split into two groups. Six students answered question one or two correctly and answered question three incorrectly, and these students were placed in a group together. The results were used to design tiered activities targeted for each group of students.

The seven students who showed mastery of the content were instructed to build an instrument that could give off high and low pitch sounds, and they had a handout with questions to answer about their instrument before and after creating it. They were given the option to work with a partner or individually. The students who showed partial mastery of the content worked through various stations that demonstrated the relationship between pitch and frequency. At each station, the students had to first read the procedure and then predict what they thought would happen. Then after each station, the students discussed whether or not their predictions were correct. The first station had students observing how tuning forks with different pitches create waves in water. The second station was similar to the first, but the students placed the tuning forks next to ping pong ball and observed the motion of the ping pong ball. The third station had a speaker inside of a bowl and a piece of plastic wrap over the top of the bowl. Pepper was sprinkled on top of the plastic wrap and sounds with various pitches were played. Students had to observe the pepper when the different sounds played. At each station, the students had to answer a series of questions about what they did and observed. The questions focused on helping them make connections between pitch and frequency since this is what the students struggled with on the exit ticket. The students who showed (no mastery of the content) watched a short video about pitch and frequency and then answered questions. Next, they explored high and low pitch with

an “instrument” made of a Styrofoam cup, a ruler, tape, and a rubber band. Finally, the group met with me to do the tuning fork in water experiment. I prompted them with questions to get a discussion going about the different pitches of the tuning forks and how the pitch related to the amount of water that splashed. We then looked at various graphs of sound waves and discussed what the pitch would be based on the frequency. The tasks for this group of students focused more on developing an understanding of what pitch and frequency are and then making explicit connections between the two concepts with an experiment, discussion, and visuals.

Observing all the groups was difficult since there was a group of students who needed instruction and guidance when completing their tasks. Two of the four groups received 5’s for on task on the observational notes sheet. The other two groups, the two who went through the stations, received 4’s. I noticed that they would follow the procedures and then play with the tuning forks. Overall, I gave the class a four. Every group received a five for engagement. Even though some of the groups were off task, there was still science talk and they were engaged with the materials at the stations. One group received a 2 for discussions about the content and the other three groups received 3’s. The class rating for discussion about content was a 3. Overall the groups did a good job of discussing the content. Periodically I overheard some groups talking about things that were not relevant to the tasks they were doing, but this is expected in the classroom. I noticed the students worked well together in all of the groups. Some of the students prefer to work alone when they have the option but during this lesson, those students were working with their peers. The students making the instruments were sharing their ideas and designs with one another, and then they tested each other’s instruments when they finished making them. There were very few questions about non-content procedures. Most of those types of questions came from the students making the instruments. I gave the class a 2 for asking

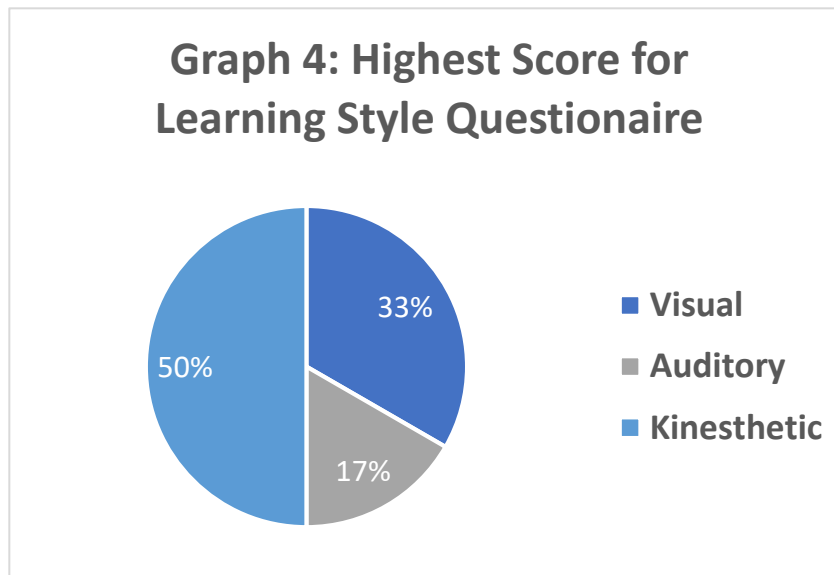
questions about the content. I demonstrated how each station and task worked before class so I had few questions about procedures during the lesson. Students A, B, D, and E were in the group that made the instruments (mastery of content). They all said they liked the activity they did. Student A said, "I like building things and I like music so this was an activity I really enjoyed." Student B said he, "Liked being able to do [his] own thing." All four students liked their group. Student E mentioned that he thought it was helpful talking with other people when designing his instrument. When I asked Student B if she thought working in a group helped her learn the information, she said no but she mentioned she played an instrument, so she already had a strong foundation for this task. Student F was in the low readiness group (no mastery of the content) and he said being in a group did help him learn the content because he could talk with his classmates when he was confused or unsure about something. This student liked the activities he did, but he did want to make an instrument. I noticed several of the students were curious about the instruments. Some even asked me when they would get to make their own. One thing I have observed in other classes that I teach, when I give the students different tasks, many will ask when they get to do what another group is doing. They will also be concerned because they noticed they are doing something different from their neighbor. This occurred a lot when I grouped the students by same readiness, learner profile, and interest because each group was doing something different and the students noticed it. Student C liked her group and the activities she did. She mentioned that she liked being able to work at her own pace but had to wait a few times for people to finish the station she was going to next. This student prefers working with others who can work at her same speed, so I think more materials would have been beneficial for her and other students like her.

Sound was taught in the same unit as light but before we moved on the light, I gave the students ten question quiz about sound. The students were asked to explain the relationship between pitch and frequency. 20 out of the 24 students answered the question correctly. Having the visuals, such as the water splashing rapidly, to see how the pitch affects the number of waves in a certain time. Two of the four students that missed the question were in the low readiness group and the other two students were in the middle readiness group. The students in the low readiness group had more guided questions and discussions that focused on what pitch and frequency are as two separate concepts so they were all able to define each term on the quiz. The graphs of high and low pitches helped the students make connections between the definitions and how the concepts are related. They also helped when discussing the effects of the different tuning forks when placed in water. The significant increase in the number of students that could explain the relationship between pitch and frequency is evidence that the tasks they did were appropriate. When I reviewed the students' responses to the questions they answered during the lesson, most showed a solid understanding of the content.

This method for grouping can be very effective in my classroom, especially when certain students need targeted instruction. Differentiation, a benefit of this grouping method, occurred through the tiered activities, which allowed each student to get the help they needed. There were a few students that could have been placed in other groups based on how quickly they moved through the tasks, their discussions, and/or responses to questions. This is a method I will continue to use in my classroom. It was effective for teaching the students the content and the students were engaged, on task, and demonstrated understanding of the content through class hand outs and assessments. One drawback to this method is students tend to focus on what their peers are doing, concerned that they are not doing the same things.

### *Learner Profile*

The third method of grouping I used was learner profile. Each student completed the Learning Style Questionnaire and the results from the questionnaire were used to create tasks specific to the learning styles. I used the preference (visual, auditory, or kinesthetic) with the highest score and classified the student only with that score. For example, a student got a 12 for auditory, 22 for visual, and 25 for kinesthetic, and since kinesthetic was her highest score she was put in the kinesthetic group. I incorporated each of the three preferences in the tasks for the different groups but more emphasis on each group's strength. Six students received the same highest score for two categories. I could not decide how to group the students so I flipped a coin to decide which preference group to put them in. **Graph 4** summarizes the groups based on the high scores. The graph includes only the final groupings for the students, so the six students who



had two preferences are put only in one group. I noticed that many students who were classified as kinesthetic learners, also had high scores for visual. Out of the twelve students in the kinesthetic group, 9 had a score within 3-

5 of their kinesthetic score. Eight students were classified as visual learners, 4 auditory learners, and twelve kinesthetic learners.

The focus of the lesson that this method of group was used for was the phases of the moon and solar and lunar eclipses. The kinesthetic learners learned about the phases of the



moon with sorting cards. They were first provided a short reading about the meanings of waxing and waning. Once they read and sorted the cards, they shaded each phase in the proper order on a handout that was eventually turned in at the end of class. The students then explored the relationship between the size and distance of the sun compared to Earth to better understand solar eclipses through a partner activity involving a basketball and penny. They also watched two short videos about solar and lunar eclipses. The focus was the card sorting and basketball/penny activity. These activities required the students to engage in hands-on exploration of the concepts. The visual learners organized the phases of the moon in two different charts. One chart was a basic visual of the phases, but the second chart showed the moon in relation to the sun and Earth at each phase. They also watched an animation of the moon revolving around the Earth. Then, the students watched a video about solar and lunar eclipses. They had to draw diagrams for each type of eclipse and label the moon, Earth, and sun. The students also watched animations of solar and lunar eclipses. This group of students completed a similar activity to the one with the basketball and penny but it involved a large yoga ball and a baseball. It was important that they saw the relationship with distance and size but they did not need to complete as in depth of an exploration with the activity as the kinesthetic learners. The focus for this group of learners was multiple representation of each idea. These students learn best with visual representations, so I made sure they could observe multiple charts, animations, and videos, as well as the model with the balls. The auditory learners sat through a mini lecture I gave about the phases of the moon. They then completed the card sort for the phases and they shaded each phase in the proper order on a handout that was eventually turned in at the end of class. The students then listened to a podcast from KID Newsradio that focused on total solar eclipses. The last activity was watching an animation and creating diagrams for solar and lunar eclipses. The lecture and the podcast were

the focus of the activities for the auditory learners since these students prefer listening rather than hands on tasks.

The class received a 4 for on task behavior since most of the groups were on task during the lesson. Some of the students in the kinesthetic group played with the materials when they finished the basketball and penny activity. The kinesthetic and visual groups were more engaged than the auditory learners. When I was giving my mini lecture on the phases of the moon I noticed some of the students watching the others as they explored the relationship between the size and distance of the sun with the penny and basketball and yoga ball and baseball. They even asked me why they did not get to do what the other groups were doing. I gave the class engagement a 4. The auditory group received a 3 while the other two groups received 5s. There was a lot of collaboration among the students in each group. Along with each activity, the students had to answer question and they worked together to answer them as well as working together to complete the activities. There were several questions about the basketball and penny activity. The students had to hold the penny to one eye and record how much of the basketball they could see at different distances. I had them rate the amount they could see on a scale from zero to five – zero means they could not see any of the basketball and five means they saw almost all the basketball. They were confused about how the rating scale worked. Also some students were not consistent with how close they held the penny to their eye which caused their data to get mixed up. Most of the non-content questions came from the kinesthetic group since they had to complete part of their assignment through a Google Slides template I created. I gave the class a 2 for this section since there were only a few questions. The visual group received a three for questions about the content. One student asked me why there was not a solar eclipse when there is a new moon each month. This prompted discussion about the plane of the moon's

orbit around the Earth, compared to the plane of Earth's orbit around the sun. They had a hard time understanding the concept. I found a visual of the tilts of each plane which seemed to help a little.

Students D, E, and F were in the kinesthetic group. All three students stated that they enjoyed the activities but not all of them liked their groups. Student E said some of his group members did not do much work and they were distracting sometimes. Student F said being in a group helped him learn the information because he could work with other people and do more hands-on activities. Students A and C were in the auditory group. Student A preferred being in one of the other groups so he could work with the penny and basketball or yoga ball and baseball. He did enjoy the podcast though. He said it was very interesting. Student C said the mini lecture was boring but she enjoyed her group because she was able to work with one of her friends. All four students in the auditory group wanted to do something other than listen to a mini lecture which surprised me. Even though the students identified as auditory learners, their interests were more in the kinesthetic tasks. The learning style survey is intended to determine how a student learns best. One question that came from this method for grouping was: does a student's interest in the activity have a greater effect on their learning than their learning style. For example, even though a student is classified as an auditory learner, could they still learn just as much or more from a kinesthetic focused activity? This is a question I plan to further research. Student B was in the visual group. She stated that she enjoyed the activities and her group, and she said the podcast was interesting. The students were assessed with an exit ticket that day that had two questions and two diagrams. The students had to answer the questions and properly label the diagrams. Majority of the students were able to correctly label the diagrams for solar and lunar eclipses. Nineteen of the students were able to put the phases of the moon in the correct

order. The students that could not, were confused between waxing and waning. Most of the students demonstrated mastery of the content on the unit test. This method for grouping was more difficult to design lessons around. It was also difficult to make the lessons engaging, especially for the auditory learners. I think it would have been easier to differentiate the product by learning style rather than the activities for this specific topic. If the topic was different then maybe it would have been easier to implement this method for grouping.

### ***Interest***

The fourth and final method for flexible grouping is by interest. Each student completed the interest. Many of the students play sports, enjoy listening to music, and playing video games. This was difficult method to implement. I found it easiest to relate examples to students' interests. For example, the focus of the lesson was force and motion so, when I talked about Newton's third law of motion (every action has an opposite and equal reaction) I used sports situations to help the students relate to the content. I also asked the students to give me situations in movies or TV shows they have watched that demonstrate any of Newton's laws. One student described a scene from the movie Tarzan, where Jane and her father are leaving in a row boat. They described the oars moving in the opposite direction of the boat which demonstrates Newton's third law. From what I observed, making connections between the student's interests helped them understand Newton's three laws of motion. Since I did not design activities for this method of grouping, like I did the other three methods, I follow the same procedure for recording observational notes or recording responses to questions I asked after each method of grouping. Abstract topics in science can be very difficult to understand, so having relatable examples for the students is beneficial. On the unit test, the students were required to give examples of the three laws of motion and describe how they demonstrate the appropriate law. Most of the

students used examples from class. These examples stuck with them most likely because they could relate to them.

I met with each focus student after implementing the last grouping method. I asked them the same questions I asked in the pre-grouping interviews. Students' opinions about grouping did not change. Overall the students still enjoyed working in groups. I expected more students to change their opinions about teachers picking the groups. I thought more students would say they prefer when the teacher does not pick the groups since so many students were interested in other groups' activities during the same readiness grouping.

### **Limitations, Implications, and Conclusions**

Implementing the four types of flexible grouping in my science classroom allowed me to design targeted instruction, differentiate, and provide students opportunities to communicate and collaborate with one another. I found flexible grouping to be very beneficial for the students, specifically grouping by same readiness. I used my formative assessment results to determine what concepts each student did and/or did not understand so I could then design activities to meet their individual needs. Likewise, grouping by learner profile focused on creating activities that cater to the students' learning styles. While most enjoyed the activities they were assigned, some did not. This led me to the question of whether a student who is classified as one type of learner can still learn just as much or more from an activity that is geared towards another learning style. Many of the students were interested in the hands-on activities. This would be the next step in my research.

Since completing this research, I have continued to use flexible grouping in science and math. When students have opportunities to collaborate with their peers they learn more and are exposed to new ideas. They also learn how to communicate with other people. No two classes

are the same. While the tools and strategies might be the same, the implementation of them will vary. Students learn at different paces and they have different needs so one activity that was successful in my research, may not be successful with a different class or subject down. This is something I need to keep in mind when using flexible grouping in the future. It would be interesting to implement these four methods of grouping with the same students but in a different subject area. I am curious about how much of a role the content plays in the students engagement and the effectiveness of the grouping method. A second limitation to my research is missed observations during the same readiness and learner profile methods. I worked with small groups and giving mini lectures, so I was not able to give my full attention to observing other groups in the room. I missed certain behaviors and actions that would have made this research stronger.

Each form of flexible grouping has positives and negatives. I would not say one method is better than others but it is important to consider what I want the students to get out the learning experience. If targeted instruction is needed then same readiness is the best method to choose. If I want my students to learn from one another mixed readiness is the best method. Grouping by interest was difficult to achieve with the concepts I was teaching. Another next step in my research would be focusing more on designing a lesson around interest and assessing student engagement and understanding of the concepts. I believe the students would have to complete a project based assignment for me to implement this method. I would like to further explore this idea and possibilities. Continuous flexible grouping is important in this science classroom. The needs of each student vary from concept to concept, so changing who is in each group and what the students are doing is the best strategy for student success in my classroom. Students have opportunities to collaborate with all their peers and learn about new ideas and perspectives.

### References

(2015, Oct.). Maximizing student learning with flexible grouping practices. *Teachers' Desk Reference: Practical Information for Pennsylvania's Teachers*, 2(7). Retrieved from [http://pattan.net-website.s3.amazonaws.com/images/2017/09/05/TDR\\_FlexibleGroup0717.pdf](http://pattan.net-website.s3.amazonaws.com/images/2017/09/05/TDR_FlexibleGroup0717.pdf)

This author of this journal article released by Pennsylvania Department of Education discusses different flexible grouping strategies that teachers can use in the classroom. Advantages, instructional purposes, and group information are given for whole group, same readiness small group, mixed readiness small group, pairs/partners, and one-to-one (student-to-teacher). Examples of expected behaviors for working in a group. Such as asking clarifying questions, elaborating on comments, and using indoor voices.

Curran, S. (2017). *The effects of flexible ability grouping on mathematics improvement and self-concepts in the intermediate grades*. Retrieved from ProQuest Digital Dissertations. (10257085)

Curran elaborates on a study that was done in fourth and fifth grade math classrooms. The paper outlined important terms such as zone of proximal development, homogenous flexible grouping, and heterogeneous flexible grouping. The study compared how students performed on STAR tests before and after the use of flexible grouping.

Graham, G., Holt/Hale, S. A., & Parker, M. (2013). *Children moving: A reflective approach to teaching physical education* (7<sup>th</sup> Ed.). New York, NY: McGraw-Hill.

Graham, Holt/Hale, and Parker discuss the processes for fostering growth in a physical education classroom. Lesson planning, skill development, and differentiation are talked about throughout the book. They focus on how to cater to all learners needs through different tasks that have the

same end goal. Through careful planning and consideration teachers can create an environment for students that will allow them to progress and learn skills they can use for the rest of their lives.

Imbeau, M. *Instructional grouping in a differentiated classroom* [PDF document]. Retrieved from <http://wctp.olemiss.edu/wp-content/uploads/sites/6/2015/11/Instructional-Grouping.pdf>

Imbeau elaborated on examples of content, process, and product for grouping by interest and learning profiles. The author connects flexible grouping to differentiation and how it can be used in any content classroom. Analyzing data and moving students between different groups is important in the classroom. Constant assessment will help teachers determine where students are and how they can be better helped.

Moyer, K. (2011, Mar.). *The impact on student achievement within small groups based on learning, styles, interests, and student readiness*. Retrieved from <https://files.eric.ed.gov/fulltext/ED523517.pdf>

Moyer provides details about a study done in a third-grade science classroom that focuses on how the three methods of flexible grouping (readiness, interest, and learner profiles) affected student achievement. The flexible grouping methods were used for different lessons. Readiness was measured with a pre and post-test along with teacher observations. Interest was measured with an interest quiz, teacher observations, and a student feedback form. Learner profiles were measured with a learner profile quiz, teacher observations, and a student feedback form. The study found that overall the students benefited from the flexible grouping.

Sandoval, C. (2013, July). *Matching student and instruction: The dilemma of grouping students*. Retrieved from <http://smhp.psych.ucla.edu/pdfdocs/grouping.pdf>



Sandoval focuses the article on the connection between differentiated instruction and grouping. Personalization, making smaller units in a big class, and individual learning supports are the important elements to consider when using flexible grouping. The three types of flexible grouping enhance communication and collaboration among students. Students need to be grouped and regrouped flexibly and regularly so that the needs of all learners are met.

Williams, V. (2015 July). *4 reasons why flexible grouping is a powerful forces for learning*.

Retrieved from <https://www.nwea.org/blog/2015/4-reasons-why-flexible-grouping-powerful-force-learning/>

Williams elaborates on why flexible grouping is beneficial for students. The four reasons are exposure to multiple perspectives, it promotes communication, it promotes building background knowledge, and it is practice for what could happen in the work place when the students get older. When students collaborate with one another they learn to analyze and apply information in ways that they may have never thought of before.

Wormeli, R (2010). *Flexible grouping in the classroom*. Retrieved from

<https://www.amle.org/BrowsebyTopic/WhatsNew/WNDet/TabId/270/ArtMID/888/ArticleID/193/Flexible-Grouping-in-the-Classroom.aspx>

Wormeli summarizes what teachers need to consider when using flexible grouping. Creating a classroom culture that supports all learners and building on each students' strengths is the key. Each student learns at different rates and in different ways and tasks need to support those differences. The tasks must also be developmentally appropriate yet challenging.

Appendix A

**Pre- and post- grouping questions for focus students**

Student: \_\_\_\_\_

1. Do you like working in groups?

Yes

No

If answered yes:

Really Like

Kind of Like

If answered no:

Really Dislike

Kind of Dislike

2. Why do you/don't you like working groups?

3. Do you like when the teacher assigns the groups?

Yes

No

4. Why do you/ don't you like when the teacher assigns the groups?

5. Do you like when you get to pick your group?

Yes

No

6. Why do you/ don't you like when you get to pick your group?

7. Would you rather the teacher pick the group or you pick your groups?

Teacher

Me

## Appendix B

**Leaner Profile Survey:**

Name: \_\_\_\_\_

**Learning Style Questionnaire**

On the line in front of each statement, indicate how often the sentence applies to you, according to the chart below. Please respond to all questions.

| 1                    | 2                        | 3                    |
|----------------------|--------------------------|----------------------|
| Never applies to me. | Sometimes applies to me. | Often applies to me. |

**SECTION ONE:**

1. \_\_\_\_\_ I enjoy doodling and even my notes have lots of pictures and arrows in them.
2. \_\_\_\_\_ I remember something better if I write it down.
3. \_\_\_\_\_ I get lost or am late if someone tells me how to get to a new place, and I don't write down the directions.
4. \_\_\_\_\_ When trying to remember someone's telephone number, or something new like that, it helps me to get a picture of it in my mind.
5. \_\_\_\_\_ If I am taking a test, I can "see" the textbook page and where the answer is located.
6. \_\_\_\_\_ It helps me to look at the person while listening; it keeps me focused.
7. \_\_\_\_\_ Using flashcards helps me to retain material for tests.
8. \_\_\_\_\_ It's hard for me to understand what a person is saying when there are people talking or music playing.
9. \_\_\_\_\_ It's hard for me to understand a joke when someone tells me.
10. \_\_\_\_\_ It is better for me to get work done in a quiet place.

**Total** \_\_\_\_\_

**SECTION TWO:**

1. \_\_\_\_\_ My written work doesn't look neat to me. My papers have crossed-out words and erasures.
2. \_\_\_\_\_ It helps to use my finger as a pointer when reading to keep my place.
3. \_\_\_\_\_ Papers with very small print, blotchy dittos or poor copies are tough on me.
4. \_\_\_\_\_ I understand how to do something if someone tells me, rather than having to read the same thing to myself.
5. \_\_\_\_\_ I remember things that I hear, rather than things that I see or read.
6. \_\_\_\_\_ Writing is tiring. I press down too hard with my pen or pencil.
7. \_\_\_\_\_ My eyes get tired fast, even though the eye doctor says that my eyes are ok.
8. \_\_\_\_\_ When I read, I mix up words that look alike, such as "them" and "then," "bad" and "dad."
9. \_\_\_\_\_ It's hard for me to read other people's handwriting.
10. \_\_\_\_\_ If I had the choice to learn new information through a lecture or textbook, I would choose to hear it rather than read it.

**Total** \_\_\_\_\_

**SECTION THREE:**

1. \_\_\_\_\_ I don't like to read directions; I'd rather just start doing.
2. \_\_\_\_\_ I learn best when I am shown how to do something, and I have the opportunity to do it.
3. \_\_\_\_\_ Studying at a desk is not for me.
4. \_\_\_\_\_ I tend to solve problems through a more trial-and-error approach, rather than from a step-by-step method.
5. \_\_\_\_\_ Before I follow directions, it helps me to see someone else do it first.
6. \_\_\_\_\_ I find myself needing frequent breaks while studying.
7. \_\_\_\_\_ I am not skilled in giving verbal explanations or directions.
8. \_\_\_\_\_ I do not become easily lost, even in strange surroundings.
9. \_\_\_\_\_ I think better when I have the freedom to move around.
10. \_\_\_\_\_ When I can't think of a specific word, I'll use my hands a lot and call something a "what-cha-ma-call-it" or a "thing-a-ma-jig."

**Total** \_\_\_\_\_

**SCORING:**

Now, add up the scores for each of the three sections and record below. The maximum score in any section is 30 and the minimum score is 10. Note the preference next to each section.

Section One score: \_\_\_\_\_(Visual)

Section Two score: \_\_\_\_\_(Auditory)

Section Three score: \_\_\_\_\_(Kinesthetic)

Websites:

<https://www.stetson.edu/home/>

<https://www.stetson.edu/administration/.../Learning%20Style%20Questionnaire.docx>

## Appendix C

**Interest Survey:****Name:** \_\_\_\_\_

1. What is your favorite subject in school? Why?

2. What is your least favorite subject in school? Why?

3. Rate the following topics according to your interests.  
(1 = very interested, 2 = somewhat interested, 3 = not interested)

\_\_\_ Dance

\_\_\_ Music

\_\_\_ Theater

\_\_\_ Sports

\_\_\_ Writing

\_\_\_ Math

\_\_\_ Computers

\_\_\_ Science

\_\_\_ Social Studies

\_\_\_ Traveling

\_\_\_ World Languages

\_\_\_ Reading

4. What is something you know a lot about?

5. If you could interview an expert on any subject, what subject would you like to talk to someone about?

6. If you could learn about anything you wanted to, what would you choose to learn about?

7. What are your favorite sports if you have any?

8. What are your favorite games if you have any?

9. What are your favorite movies and TV shows if you have any?

10. What do you do in your free time (besides spending time with friends)?

11. What clubs, groups, teams, or organizations do you belong to **IN** and **OUTSIDE** of school?

**Website:** <http://www.slvboces.org/view/135.pdf>

Appendix D

**Question for focus students after each grouping method:**

**Student:** \_\_\_\_\_

1. Did you like working with your group?
2. Why did you/didn't you like working with your group?
3. Do you think working in a group helped you learn the information?
4. Would you work with your group again?
5. Did you like the activity you did?
6. Why did you/didn't you like the activity you did?

7. Would you rather do a different activity?

8. Why would you/wouldn't you rather do a different activity?



Appendix E

**Observational Notes:**

| <b>Observation</b>  | <b>Rating</b>  | <b>Notes</b> |
|---|--|--------------|
| <p>On task</p> <p>Rating 1-5</p> <p>1 = not on task at all</p> <p>2 = not on task most of the time</p> <p>3 = half on task, half not on task</p> <p>4 = on task most of the time</p> <p>5 = on task all of the time</p> | <p>Each group:</p> <p>1 2 3 4 5</p> <p>1 2 3 4 5</p> <p>1 2 3 4 5</p> <p>1 2 3 4 5</p> <p>1 2 3 4 5</p> <p>1 2 3 4 5</p> <p>As a class:</p> <p>1 2 3 4 5</p> |              |
| <p>Engaged</p> <p>Rating 1-5</p> <p>1 = not engaged at all</p> <p>2 = not engaged most of the time</p> <p>3 = half engaged, half not engaged</p> <p>4 = engaged most of the time</p> <p>5 = engaged all of the time</p> | <p>Each group:</p> <p>1 2 3 4 5</p> <p>1 2 3 4 5</p> <p>1 2 3 4 5</p> <p>1 2 3 4 5</p> <p>1 2 3 4 5</p> <p>1 2 3 4 5</p> <p>As a class:</p>                  |              |

|   | 1 2 3 4 5   |  |
|---|---|--|
| <p>Discussions about content</p> <p>1 = no discussion about content</p> <p>2 = some discussion about content</p> <p>3 = a lot of discussion about content</p>   | <p>Each group:</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>As a class:</p> <p>1 2 3</p> |  |
| <p>Asking questions about content (how to do solve something, "I don't get it")</p> <p>1 = no questions about content</p> <p>2 = some questions about content</p> <p>3 = a lot of questions about content</p> | <p>Each group:</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>As a class:</p> <p>1 2 3</p> |  |

|   |   |  |
|---|---|--|
| <p>Asking questions about non-content procedures (computer issues, directions, etc.)</p> <p>1 = no questions about non-content procedures<br/>                 2 = some questions about non-content procedures<br/>                 3 = a lot of questions about non-content procedures</p> | <p>Each group:</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>1 2 3</p> <p>As a class:</p> <p>1 2 3</p> |  |
|---|---|--|