Music Notation: Effective Strategies to Teach Notation to Beginner Orchestra Students

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Abstract

Statement of Purpose

The purpose of this applied research study is to discover the most effective approach to teaching music notation to fourth grade orchestra students based on their stage of cognitive development, the process of learning, and effective strategies of learning.

Rationale

Just as it is necessary to be able to read and comprehend letters, words, and text in order to be successful in the world around us, it is also important to learn music notation in order to have a comprehensive instrumental music experience. In my seven years of teaching, the most challenging aspect for my orchestra students has been reading and understanding music notation. In most cases, the ability (or lack thereof) to read music determines the students' motivation and success in orchestra. Through researching the stage of cognitive development of nine-year-olds (the age at which I teach note reading), the process of learning, and effective strategies of learning, I hope to develop a new teaching approach that is developmentally appropriate, meaningful, and more effective for my students so they can be successful with reading music notation.

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Chapter One: Introduction

Succeeding in the world around us often depends on our ability to read. Whether it is reading directions, street signs, recipes, or warning labels - reading is an important skill to acquire in order to get through day-to-day life. In relation to music, especially orchestra or other instrumental performing ensembles, learning to read music notation is an inevitable and crucial skill to develop. If anyone hopes to participate successfully in orchestra throughout their academic years and beyond, reading music is a necessity. Unfortunately, reading music does not always come easily to everyone. Personally, I learned to read music at age five, when I started piano lessons. I remember the challenge of memorizing my lines and spaces, using flashcards and mnemonic devices. Mastering the music language requires patience and perseverance. In my seven years of teaching orchestra, the most challenging aspect for my students has been reading and understanding music notation. Learning how to read music notation is like learning a new language - a language of symbols. In most cases, the ability to read music (or lack thereof) determines the students' motivation and success in the orchestra setting.

There are various approaches to teaching music notation to students. One common method is through simple memorization, using flashcards and repetition. Using this method, I have found that some students get overwhelmed and find themselves at a roadblock. Some teach notation through creative mnemonic devices such as "Every, Good, Boy, Does, Fine" for the treble clef lines. In my first two years of teaching, I simply followed the sequence in our method book, which teaches notation at the same time as introducing playing position and finger placements. Introducing note reading at the same time as the physical technique was completely overwhelming for my students. After seeing their frustration, I did some research and discovered the philosophy of Japanese pedagogue, Shinichi Suzuki. He believed that music should be

learned just as the mother-tongue language is learned. When learning to speak our native tongue, we listen first, followed then by speaking and reading. Translating this process to violin, Suzuki had students listen to music first and build a solid playing foundation while learning by ear. After students were confident with their aural skills and violin technique, he had them learn notation (Kendall 43). Inspired by Suzuki's method, I abandoned the method book sequencing and took notation out of the equation for the first couple months of instruction. I currently only introduce note reading after my students are comfortable with their playing technique. When ready, I teach notation using my own "home base" method. I have students memorize one home-base note, their open D pitch. From there, they use their knowledge of the D Scale (D, E, F#, G, A, B, C#, D) to count up the lines and spaces on the staff. Using this method, I have essentially eliminated the challenge of memorizing for students who struggle with that skill. Instead, every student has the tools to figure out any note on the musical staff. While I have had more success with this method, I still have students who are left behind feeling frustrated and discouraged. I find when some students are faced with a new skill that requires more than a couple of tries in order to reach mastery, they get frustrated and give up.

The goal of this study is to discover the ultimate approach to teaching music notation to beginner orchestra students. Through researching the stage of cognitive development and mindsets of nine-year-olds (the age at which I teach note reading), the process of learning, and effective strategies of learning, I hope to develop new approaches that are developmentally appropriate, meaningful, and more effective for my students. Using new activities, methods, and projects, I hope to empower my students to be successful music readers.

Chapter 2: Child Development and Effective Learning Strategies

As a teacher, I am fascinated by the different levels of development in my students. "Development is the pattern of change that begins at conception and continues through the life span" (Santrock 5). This change is a comprehensive, complex, and relatively predictable process that affects the cognitive, social, physical, and emotional aspects of children. While "stages of growth and development follow a reasonably predictable pattern," the rate and growth of development in children is different from person to person (Wood 7). When I look at my students, I see certain students who are more emotionally mature than others. Some are able to observe and process at a high level, while others struggle to follow directions. With string instruments, I find a huge difference in physical development in terms of fine motor skills. Some students have great dexterity, while others have great difficulty with finger independence. Child development is influenced by many different factors. The most fundamental factor is the physical and chemical maturation of the brain. If one child's frontal lobe develops faster than another's, there is going to be a difference in their abilities to self-regulate and make good decisions. If a child has experienced trauma or stress, then she will typically show signs of slower development compared to a child who has had a safe and comfortable life.

As students age, we see them develop their executive function, which is the ability to plan and have insight and foresight, along with self-control, working memory, and mental flexibility ("Executive Function"; Nolte 567). Children are not actually born with these skills, however. Through their life and school experiences and interactions, kids develop these skills - some more so than others depending on their environment ("Executive Function"). The different areas of the executive function allow students to focus on learning tasks. That self-regulation helps them to "resist the impulse to do something now that they would regret later" (Santrock

212). For example, a student that has greater development in self-regulation will have the will-power and discipline to practice his violin when he would rather be outside playing. He will also be able to make the decision to face the challenges with greater purpose, while a child with less self-regulation skills would be more likely to quit due to the frustration of the moment. In regards to note reading, a student with high self-control will be more likely to persevere and focus on a task, instead of becoming overwhelmed and giving up.

Another aspect of the executive function that develops during adolescence is attention, which is the ability to focus. There are two different types of attention - sustained and executive. If a student exhibits sustained attention, she is able to stay focused on a single task for a longer period of time. Some of my fourth graders have decent sustained attention, but many of them need redirection or a frequent change of pace. Executive attention requires a deeper level of thinking, as students are "planning actions, allocating attention to goals, detecting and compensating for errors, monitoring progress on tasks, and dealing with novel or difficult circumstances" (Santrock 203). Executive attention utilizes self-regulation and reflective skills. The majority of my students are only now starting to come into this stage of development.

Working memory is another important facet of the executive function. It is "a mental 'workbench' where individuals manipulate and assemble information when making decisions, solving problems, and comprehending written and spoken language" (Santrock 203). Musicians use working memory when learning note reading. Seeing and interpreting the symbols, being able to identify and process patterns, and combining the symbol with the physical response (finger placement) are all processes that take place in the working memory. Flexibility in thinking goes hand-in-hand with the working memory. Problem-solving and finding solutions requires the ability to "consider different strategies and perspectives" (Santrock 212).

The more developed the executive function is, the deeper a student can think. The act of thinking is "transforming and manipulating information in memory. Individuals think in order to reason, reflect, evaluate ideas, solve problems, and make decisions" (Santrock 210). There are different depths of thinking: convergent, divergent, and critical thinking. When a student uses convergent thinking, she is finding a single solution to a single problem. My beginner students use convergent thinking when they identify note names. Divergent thinking is thinking outside of the box to come up with multiple solutions for one problem. This level of thinking takes more creativity. For example, when my students compose a short song with the notes they have learned, they use divergent thinking. Composing a song is the goal, but they are able to explore different combinations of notes until they discover a melody that they enjoy. Critical thinking goes even deeper - it incorporates reflecting, evaluating, reasoning, and creating. When a student generates an idea, evaluates his own work, or reflects on his progress, he is engaging in critical thinking. While this skill develops as students develop physically and cognitively, it is important that students gain foundational skills at a young age in order for their critical thinking skills to fully develop. As students age, the processing speed, capacity, and automaticity increases. This allows students more processing power in their brain for a deeper level of thinking (Santrock 218).

Most of my beginner string students are nine years old. Because child development is reasonably predictable, I see similar levels of development in most of my students, along with a few outliers in each direction. At age nine, kids become better coordinated, yet can be quite restless. They also need opportunities to practice their fine motor skills - actions that require the use and coordination of smaller muscle groupings. Playing a string instrument is a great way to get this needed practice. Socially and emotionally, age nine can be a volatile year as they start

getting quite anxious, moody, and "easily frustrated" (Wood 99). They need more validation and tools to cope with that frustration. Frustration is something that I see frequently, especially when learning a new skill. They are curious and competitive in nature, but when a skill does not come easily, many get frustrated and shut down. Cognitively, nine-year-olds have trouble grasping abstract ideas (Wood 100). I believe that this struggle with the abstract, along with their quick frustration, plays a role in their note-reading experience. Note reading can be an abstract idea for many children, as it is a language of symbols. I find that students who are not as developed cognitively compared to others (who also struggle in other subject areas in school) seem to have more trouble understanding that the symbols have meaning and correlate to pitches on their instrument.

The act of learning is an incredibly complex process, which contrary to popular belief, does not require "using the brain" as much as it does "changing the brain" (Dubinsky et al. 318). Anatomically, the brain is comprised of two hemispheres that are separated into four lobes: frontal, occipital, parietal, and temporal. Each lobe houses certain skills or processes. The frontal lobe is responsible for movement, thinking, personality, and intentionality; the occipital lobe controls vision; the parietal lobe is responsible for spatial awareness, direct attention, and motor control; and the temporal lobe houses hearing, language processing, and memory. While each lobe has specific jobs, a single skill could require the involvement of multiple lobes. The two hemispheres of the brain are connected by fibers called the corpus callosum. During development, the corpus callosum thickens, allowing for an increase in processing information (Santrock 116). The brain is made of neurons that process information. Each person is born with approximately ten billion neurons (Brown 166). The neurons throughout the brain are connected by pathways called axons that send electrical signals to other neurons. Each axon is coated in a

myelin sheath - an insulation of fat cells (Santrock 111). The thicker the myelin sheath, the faster the signals will travel through the axon, which leads to faster processing (Santrock 112). This thickening of the myelin sheath, a process called myelination, is a crucial part of learning.

When a child is presented with new information, "the brain converts [the] perceptions into chemical and electrical changes that form a mental representation of the patterns [that are] observed" (Brown 72). This first stage of learning is called encoding, a stage that requires a lot of thought and activity in the prefrontal cortex (Morris 177). Since so much thought and activity is required from the prefrontal cortex, this stage of learning can actually be quite uncomfortable for students. Students need to exhibit willpower and self-control to move into the next phase of learning (Goodhart). The second stage is consolidation - the strengthening of the representation and transition into long-term memory. It is during this phase of learning that myelination occurs, eventually leading to less prefrontal cortex activity (Morris 177). "The thickness of the myelin coating correlates with ability, and research strongly suggests that increased practice builds greater myelin along the related pathways, improving the strength and speed of the electrical signals and, as a result, performance" (Brown 171). Each repetition during practice creates another coat of myelin surrounding the axon, leading to faster processing and better performance. Through this consolidation process, the learner is forming habits - information that transitions into the implicit memory. "The actions we take by habit are directed from a region located deeper in the brain, the basal ganglia" (Brown 171) The basal ganglia is an area deep in the brain that is responsible for motor control and executive function (Lanciego et al.). Once information is stored in the basal ganglia, "the brain is thought to chunk motor and cognitive action sequences together so that they can be performed as a single unit … " (Brown 171). This last phase is the ultimate goal of note reading. During phase one, a young musician is presented

with music notation, and her brain creates a mental representation by creating electrical signals (encoding). As the student studies and practices, the repetition leads to myelination on those related pathways, strengthening that skill (consolidation). Eventually, with enough exposure and practice, the information will transition into long-term memory in the basal ganglia, at which point it becomes habit, to the extent where the violinist can see a F# in notation and automatically play the correct pitch on the instrument (the chunking of motor and cognitive actions).

This ability to learn efficiently is a skill that is developed over time. It is important to build foundational knowledge before going deeper and transferring knowledge into the memory (Brown 2, 5). Foundational skills and knowledge are the building blocks for deeper learning. I have heard it said that the most valuable learning is deep, creative learning. Brown argues that both basic knowledge and creative thinking are equally important, stating, "What we really ought to ask is how to do better at building knowledge and creativity, for without knowledge you don't have the foundation for the higher-level skills of analysis, synthesis, and creative problem solving" (18). Based on his studies, he concludes that it is important to have students memorize facts and knowledge and store them in their long-term memory, so that they have the foundation to use that information for problem-solving and creative thinking.

Every child has a certain level of intelligence, the ability to problem-solve, and think with flexibility. There are many differing opinions on what intelligence actually is. Is it only the ability to problem-solve? Or does intelligence also incorporate creativity? There is no definite answer to those questions at this point. However, neuroscientists and psychologists alike have concluded that intelligence is adaptable and flexible. "Many people believe that their intellectual ability is hardwired from birth, and that failure to meet a learning challenge is an indictment of

their native ability. But every time you learn something new, you change the brain - the residue of your experiences is stored" (Brown 7).

Due to students' misconceptions of their own intellect, I find that some students are afraid of taking risks and actually fear failure. Contrary to a popular belief - failure is a good thing. Often, students are so afraid to fail, that it actually hinders their learning. Fear of failure actually takes up some of your working memory that could instead be used to find a solution to a problem. In my professional development training, I have been told to never tell students that a skill is challenging. It will immediately overwhelm them, and they will be starting from a mental state of failure. Brown suggests that teachers be transparent with students about difficult tasks, while approaching it from a positive mindset. We should tell our students that "learning is deeper and more durable when it's effortful" (Brown 3). Contrary to my former training, it is important for students to know that their brain is flexible and capable of growth. If students understand this, they will be "more willing to struggle to learn difficult content" (Dubinsky et al. 319). The more effort that is evoked to learn a new skill, the greater the myelination in the brain, which equates to faster processing. A student's state of mind will determine the outcome of learning. If a new skill is approached from the state of fear and negativity, the student will be less likely to succeed, compared to the student who views the challenge as positive, deep learning. "What you tell yourself about your ability plays a part in shaping the ways you learn and perform - how hard you apply yourself, for example, or your tolerance for risk-taking and your willingness to persevere in the face of difficulty" (Brown 140).

Over the last several years, many studies and experiments have been conducted in order to find the most effective learning strategies. One of these strategies is called retrieval practice. Retrieval practice is the act of recalling facts or concepts that were previously learned. The act of

retrieval (bringing up knowledge from your memory) actually leads to increased myelination along the related axons. Having to recall information and answer questions on a test or quiz is a form of retrieval practice. Studies show that students who are tested and quizzed more often retain more knowledge compared to those who only reread text or notes. Other forms of retrieval practice are reviewing with a set of flashcards and self-quizzing. "Massed studying (cramming) leads to higher scores on an immediate test but results in faster forgetting compared to practicing retrieval" (Brown 31).

Often, teachers spend a long amount of time on one concept before moving on to another skill. As an instrumental teacher, I have always stressed that students practice at least twenty minutes each week-day to develop confidence with a new skill. In lessons, I have spent a lot of time on repetition. Brown explains that spacing out practicing, "spaced practice," actually interrupts the process of forgetting, making the retrieval process more effective. The more effort a student uses to retrieve a piece of information, the stronger the connections become (Brown 48).

A great way to create spaced practice opportunities is to interleave skills. Interleaving is varying activities on a regular basis, which allows for some forgetting time. This tactic often feels slow and counterproductive due spending less time on a skill before moving on to another concept. Moving between multiple skills or concepts before each is fully mastered may seem counterintuitive, but this method of learning is quite effective. While interleaving is a slower process on the front end of learning, it eventually leads to deeper learning and a greater retention of information in the long-term memory (Brown 49).

Asking students to elaborate on a main idea or a concept is a great way to have them retrieve information. "Elaboration is the process of giving new material meaning by expressing it

in your own words and connecting it with what you already know" (Brown 5). In relation to our note reading process, elaboration would be having students explain how the movement of notes works on the musical staff based on their previous knowledge of their instrument pitches. My beginners already know their D Scale pitches, so they can elaborate on how the notation moves up and down the "ladder" of the staff.

Another effective learning strategy is generation. Generation is the act of trying to figure out a solution to a problem before receiving instruction or directions on how to solve it. This task forces students to recall and use previously learned information to figure out a brand new concept before it is officially introduced. Students have to venture out and take a risk in order to generate solutions. Getting a wrong answer at first is not a bad thing. "Unsuccessful attempts to solve a problem encourage deep processing of the answer when it is later supplied, creating fertile ground for its encoding, in a way that simply reading the answer cannot" (Brown 88).

Reflection is also a great and meaningful learning tool. Not only does reflecting require retrieval of information, but it also engages students in self-awareness. Students can ask questions such as: What just happened? What did I learn? How did that go? What would I do differently next time? Answering these questions forces students to retrieve information and elaborate on their own success or challenges with a specific concept. Did the student persevere and eventually reach understanding? Or did she shut down her own learning? When kids evaluate their experience, it holds them accountable for their own success in learning. It is also a great gauge of a student's actual skill level versus the student's perception of their own success. Sometimes, a student believes he is at a mastery level, when there is still growth to be had.

In summary, learning is influenced by many different factors. The stage of development - cognitive, physical, and emotional - plays a huge role in a child's learning. The strategies used to

learn also dictate how deeply the knowledge is stored in the brain. If information is not recalled, then it will be forgotten. Most importantly, a student's mindset determines his success. If a student is determined to succeed at a task, he will eventually do so! "Our success is also determined by focus and self-discipline, which are the offspring of motivation and one's sense of personal empowerment" (Brown 163). Intelligence is not a set number, so it is crucial that we encourage students to reach for greatness. All children are built for learning and succeeding.

Chapter 3: New Teaching Strategies and Findings

Child development and the process of learning are both incredibly complex processes that change the brain - cognitively and physically. When teaching note reading, it is important to maintain the perspective of where each student is at developmentally. Through my research on development and effective learning strategies, I developed many different activities that incorporate idea generation, information retrieval, elaboration, and reflection. I also incorporated the interleaving of activities and did not spend too much time on each task. To test the effectiveness of this new method, I split my beginner students into two groups: A (control group, comprised of fourteen students) and B (experiment group, comprised of seventeen students). Each group was introduced to note reading using my "home-base" method as previously described. With Group A, I presented the information to the students - introducing the staff, home-base D, and the workings of the staff. With Group B, I showed them the music staff and had them write down everything they knew about the staff. If they did not know anything, I asked them to make a guess based on their knowledge of how their instrument pitches worked. This act was a combination of elaboration and generation, making them think deeply before even being introduced to the actual concept. Throughout the lesson, I was very transparent with my Group B students that this will be hard work, but "hard work is great work!" At the conclusion of Group B's first note-reading lesson, I had them take a note-identification quiz where they had to identify each note of their D Scale and draw their home-base D. Both groups were given the same note reading assignment to practice at home.

Outside of the introductory lesson, the two groups were presented with different lessons. In the following few weeks, Group A spent their lessons playing songs and exercises out of our method book. They used what I call the "Think, Say, Play" strategy of thinking the letter names,

saying them out loud, and playing them together as a group. Typically, we worked one measure at a time, until we could play the entire song fluently. Group A's lessons always had a similar structure: warm-up (open string echo patterns, D Scale, or D Scale echo patterns), an informal playing assessment on last week's assignment, and working through another book exercise or two. While Group B had different lessons and activities, I always assigned each group the same exercise or song to practice at home throughout the next week.

The layout of Group B's lessons had much more variety. We always started with a warm-up and ended with logging their assignment for the next week. Throughout the bulk of the lesson, I changed activities more frequently and also interleaved the note reading activities with technique practice. Knowing their developmental level and their quick frustration, I was incredibly transparent with them, encouraged them, and praised them for their hard work. I constantly reminded them that hard work was good work. The note reading activities that I used approached note reading from many different angles using the previously researched learning strategies. Below is a list of activities that I used to practice note reading with Group B.

Writing Activity: At the beginning of the second note reading lesson, students wrote down everything that they remembered from the previous lesson - where their home-base D was located and how they figured out the rest of their D Scale notes. After they completed writing, they shared their answers with each other. This was an act of recall and elaboration that also incorporated their social nature of conversation.

Flashcards: The students made their own set of flashcards, drawing the note on the front and the letter name on the back. At the beginning of several lessons, they had two minutes to quiz themselves with their flashcards. As they quizzed themselves, they practiced retrieving the information, which interrupted their forgetting period.

Up or Down?: This is a game I developed to work on the contour of notes. I drew a series of notes on the whiteboard staff, and the students stood up if the note went up (from the previous note), sat down if the note went down, or clapped if the note stayed the same. Developmentally, these students are very active and competitive, so I presented the knowledge as an active game. They had to observe the motion of the notes and make comparisons based on their previous knowledge.

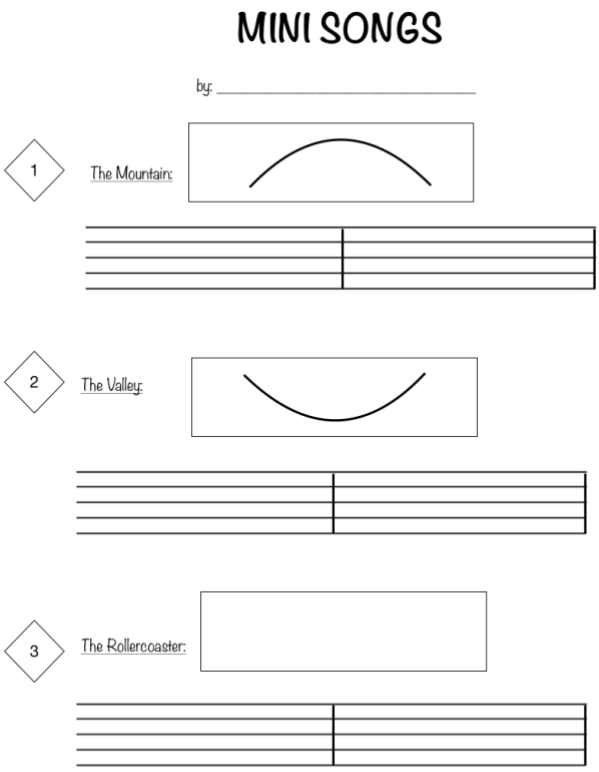
Skip vs. Step: The purpose of this activity was to expand on the concept of contour. Another game (similar to Up or Down), I drew a series of notes on the whiteboard staff. The students jumped in place if I drew a skip and stomped if I drew a step. Again, the students were practicing their knowledge of the staff, making comparisons, and drawing conclusions.

Drawing Notes: I gave each student a blank staff. One by one, I listed off letter names and students drew the note on the correct line or space. This was a different form of retrieval - instead of looking at a note, they were responsible for recalling where the note was located and drawing it on the staff themselves.

Contour Hand Motions: For this activity, we used an exercise from the method book. Instead of solely "thinking-saying-playing" the song, we started by looking at the contour. While speaking the rhythms, the students showed the motion of the contour with their hands, moving them up and down with the movement of the notes. Step two was speaking the note names and showing the contour with their hands. Step three was playing the song on their instruments. This activity engaged their physical nature and prompted them to observe changes in the melody.

Mini Songs: Students were given a worksheet of blank staves (included below). They composed a short, two-measure song that depicted the contour of the title. For example, for "The Mountain," students could use steps or skips to compose a two-measure song that depicted the

contour of a mountain. This activity allowed them to be creative and create their own short melody, while also giving them parameters to guide them. They used their prior knowledge (note location and contour) to create their own song. The following lesson, they were able to choose their favorite mini-song to perform for the lesson group. This gave them more ownership of their learning, along with engaging them on a deeper level.



Mini Songs Worksheet given to students.

Note Reading Competition: Engaging the students' love of games and their competitive nature, we had a note reading competition. Each student was given a small music staff whiteboard and a marker. I would give the letter, and the first student to correctly draw the note and put their board in the air received a point. At the end of the activity, we tallied up the points and the winner received a "Millionaire Buck" (a reward currency used in our School Wide Positive Behavior program).

"Simon Says": Students were each given a blank staff and a pencil. I gave a series of directions, and using their knowledge of the staff, they had to draw the correct order of notes. For example, I said, "Draw a home-base D. Next, go up one step. Skip one note up. Step one note down… etc." After all the directions were given, we used "think, say, play" to check for correctness. In a later lesson, we did the opposite. Students drew their own four-note patterns and gave me directions to draw out on the board. Each student gave their four notes, and together they made a short song. We ended the activity with playing through the series of notes together.

Reflection: At the end of most lessons, I had students reflect on their progress in their orchestra journals. I prompted them with different questions such as: "How did I do with note reading today? What is some encouragement I can give myself? Which strategies am I using to figure out notes? Am I practicing this enough outside of school? Which notes are most challenging for me and how can I overcome that challenge?" The goal of this exercise was for students to recall the processes they were going through and strategies they were using (an act of retrieval). In addition to practicing awareness, it enabled them to become more aware of their own progress and what they needed to work on.

Quizzes: Quizzes are a great form of retrieval practice. Throughout the note reading unit, students were given six short quizzes. The first quiz, given immediately after the notation introduction, consisted of eight note identifications and three replications of home-base D. The purpose of this untimed quiz was for the students to recall what they had just learned. Quiz 2 consisted of twelve note identifications. While there was no time constraint, I did time them to observe their fluency levels. Quiz 3 was comprised of twenty-four note identifications and was a timed quiz. Students were to correctly identify as many notes as possible in one minute. My students are already accustomed to taking timed quizzes for their multiplication and division

skills in math class (our district uses "Otter Creek"). After discovering their enjoyment of this activity, I decided to present these quizzes as "Otter Creek Note Reading Quizzes." This has been a fun activity for my kids that has engaged their competitive nature. They always tried to beat the clock and get more correct each time. The next three quizzes (#4-6) were comprised of thirty note identifications and also had a one-minute time limit. The goal of the timed quizzes was to 1.) add a level of competition 2.) help students grow in note reading fluency and accuracy, since note reading eventually needs to be an instantaneous process.

Shown below is a chart depicting the quiz score data for Group B (quizzes 1-6 shown).

	Quiz 1	Quiz 2	Quiz 3	Quiz 4	Quiz 5	Quiz 6
Quiz Format	11 Questions, Untimed	12 Questions, Timed but no constraint	24 Questions, One-minute time limit	30 Questions, One-minute time limit	30 Questions, One-minute time limit	30 Questions, One-minute time limit
Student 1	54%	75% - 1m 38s	58%	ABSENT	ABSENT	ABSENT
Student 2	27%	50% - 2m 30s	41%	63%	66%	ABSENT
Student 3	100%	75% - 4m 10s	28%	43%	33%	ABSENT
Student 4	63%	ABSENT	75%	ABSENT	90%	56%
Student 5	63%	33% - 1m 48s	28%	53%	40%	66%
Student 6	100%	100% - 1m 0s	75%	80%	86%	73%
Student 7	81%	91% - 0m 56s	100%	100%	85%	100%
Student 8	81%	100% - 3m 20s	54%	53%	80%	70%
Student 9	100%	100% - 1m 5s	87%	ABSENT	43%	50%
Student 10	100%	91% - 1m 7s	62%	76%	50%	53%
Student 11	100%	91% - 1m 6s	50%	26%	36%	40%
Student 12	100%	100% - 1m 15s	87%	66%	46%	50%
Student 13	9%	75% - 1m 45s	66%	ABSENT	73%	96%
Student 14	100%	100% - 2m 15s	62%	46%	63%	86%
Student 15	81%	100% - 2m 0s	87%	83%	83%	100%
Student 16	36%	100% - 0m 56s	100%	63%	100%	100%
Student 17	100%	100% - 3m 3s	29%	43%	0%	56%
AVERAGES	76%	86%	59%	58%	60%	71%

= Increase from previous quiz

= Decrease from previous quiz

For Quiz 1, eleven out of seventeen students scored 81% or higher, with eight students scoring 100%. Six out of seventeen students scored 63% or lower. The average score for Quiz 1 was 76%. The high level of success on this quiz is most likely due to the fact that it was completed immediately after learning the concept. There was not time for forgetting to take place. The students who scored lower on the test exhibited struggles with grasping the abstract, symbolic nature of the notation (as to be expected by their current developmental stage).

Quiz 2 (no time constraint) saw a lot of growth. Fourteen out of sixteen students (one student absent) scored 75% or higher, and two out of sixteen students scored 50% or lower. The average score of Quiz 2 was 86%. Seventy-five percent of students showed growth from their Quiz 1 score.

Quiz 3 (twenty-four questions, one-minute time limit) had a major dip in growth. Only seven out of seventeen students scored 75% or higher, while ten out of seventeen students scored 66% or lower. The average score of Quiz 3 was 59%, and only 17% of the students showed growth from their Quiz 2 score. I believe the time limit was the cause for these lower scores. There was an element of speed and fluency introduced that was new to the students. In my opinion, the Quiz 3 scores were more indicative of the students' level of speed and fluency than of their knowledge and accuracy.

Quiz 4 (thirty questions, one-minute time limit) saw a jump in growth. Four out of thirteen students (four students absent) scored 75% or higher, and nine out of thirteen students scored 66% or lower. While the average score was only 59%, seven out of thirteen students showed growth from their Quiz 3 scores. At this point, I believe that more students were starting to exhibit signs of both increased accuracy and fluency.

Quiz 5 (thirty questions, one-minute time limit) saw even more growth. Six out of sixteen students (one student absent) scored a 75% or higher while ten out of sixteen scored a 74% or lower. Fifty-six percent of the students showed growth from their Quiz 4 scores. The average score for Quiz 5 was 60%.

Quiz 6 (thirty questions, one-minute time limit) showed another jump in growth. Five out of fourteen students (three students absent) scored a 75% or higher, with three students scoring 100%. While nine out of fourteen students scored a 74% or lower, eleven out of sixteen students

showed growth from their Quiz 5 scores. The average score was 71% (a significant increase from Quiz 5).

At the conclusion of the note reading unit, I gave a timed (one minute), thirty-question quiz to all of my fourth grade students - both Groups A and B. While Group B was frequently quizzed as part of the retrieval learning method, Group A had never been formally assessed on their note reading knowledge. All students were given one minute to complete the quiz, testing not only their recall, but also their fluency. The score data for this final quiz is listed below.

Group A Students	**Final Quiz Scores**		**Group B Students**	**Final Quiz Scores**
Control Group	30 Questions, One-minute time limit		Experiment Group	30 Questions, One-minute time limit
Student 1	26%		Student 1	26%
Student 2	30%		Student 2	73%
Student 3	40%		Student 3	70%
Student 4	60%		Student 4	100%
Student 5	36%		Student 5	100%
Student 6	20%		Student 6	83%
Student 7	36%		Student 7	ABSENT
Student 8	43%		Student 8	63%
Student 9	46%		Student 9	80%
Student 10	26%		Student 10	66%
Student 11	60%		Student 11	50%
Student 12	16%		Student 12	63%
Student 13	40%		Student 13	66%
Student 14	ABSENT		Student 14	66%
			Student 15	86%
			Student 16	100%
			Student 17	63%
Average Score	**30%**		**Average Score**	**69%**
High Score	**60%**		**High Score**	**100%**
Low Score	**16%**		**Low Score**	**26%**

While I did not necessarily observe a huge difference in performance during lessons between the two groups, there was a difference in their success on the final quiz. Group A scored an average of 30%, while Group B scored an average of 69%. Based on both groups' performance on this quiz compared to their performance in lessons, I conclude that since Group B had more opportunity to practice this quiz format, they had better success and possibly better speed and fluency. If I were to do this experiment again, I might give both groups a timed test

after the introductory lesson. However, since quizzing was a part of my new strategy, I chose not to give an initial test to Group A.

In summary, throughout my note reading unit, I used two different teaching approaches: my original method, using only the lesson book, and a new method, incorporating effective learning strategies and knowledge of the students' developmental levels. Throughout the unit, I observed little difference in the students' reading performance, but did see a difference in their final quiz scores.

Chapter 4: Reflections

Looking at the quiz scores alone, one could possibly conclude that my new teaching strategy was effective, however, I believe that the scores only show a snapshot of my students' note reading experience. For example, if you look at Group B's scores horizontally in the first chart, you will notice that each individual's growth fluctuates from one test to the next. I believe this is due to a number of different factors - most outside of my control. First, the frequency of their lessons was very inconsistent. Besides student absences, we missed lessons due to snow days, delays, early dismissals, and schedule changes for testing and my substitute teaching obligations. These schedule inconsistencies meant that some students had a lesson each week, while others went two to three weeks without a lesson. This allowed for more forgetting to happen. This natural period of forgetting was then compounded by lack of practice at home.

Practicing also played a big role in their success. Those students who were practicing consistently at home were retrieving and recalling information more frequently, deepening their understanding. Those who did not practice regularly had even longer forgetting periods and did not go through the myelination process as quickly or as deeply. In both groups, I had students who excelled and students who struggled. Those who excelled were very committed to practicing, and those who struggled barely practiced at all. This pattern was not unique to one group or the other. This leads me to believe that home-practicing is one of the most important keys to success (most musicians already know this!).

In terms of quiz scores, I found that some students who scored lower on the quizzes actually performed better throughout the note reading lessons than what their quiz scores might have indicated. This leads me to believe that some students might have quiz anxiety and might not have performed to their full potential.

In addition to inconsistent schedules, different levels of practicing, and quiz anxiety, students bring all of their personal stressors (home life, trauma, etc.) into their lessons, which definitely influences their level of focus. Some of their working memory is focused on their home situations, which means it is not fully being utilized in the classroom.

Throughout the note reading unit, I did not observe a huge difference in note reading and playing between Group A and Group B. I did, however, observe a difference in the engagement level of my students and the atmosphere of the lessons. While Group A did more reading and playing, their lessons seemed more monotonous and bogged-down. If students were struggling, they got fairly frustrated or discouraged (most likely due to the fact that there was little variety in activities). It took more effort and energy from me to keep them motivated and moving forward. With Group B, we did less actual playing, but changed activities more frequently. The atmosphere of Group B lessons was much more positive and fun. The students showed far more interest and engagement.

From a data standpoint, I cannot say with certainty that my new teaching strategy directly led to higher quiz scores - there were too many outlying factors that affected the study that were out of my control. I can, however, say that my new strategy led to increased excitement, positivity, and engagement in my students. A concept that had been monotonous and bogged-down, became a fun game for my students. My transparency with the kids about their learning, how “hard learning is good learning,” seemed to motivate them to keep trying. In addition, I now have a better perspective of my kids at a developmental level and can better meet their cognitive and emotional needs moving forward. Not only did this study positively impact my students, but it also gave me a greater perspective and understanding of how to better empower my students and guide them toward success in the future.

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