The Use of Melodic and Rhythmic Mnemonics To Improve Memory and Recall in Elementary Students in the Content Areas

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ABSTRACT

Mnemonic strategies that use imagery and visual cues to facilitate memory recall are commonly used in the classroom. A familiar tune, song or jingle, used as a mnemonic device is another popular memory aid. Studies of the brain and memory reveal that exposure to music not only alters but increases brain function in students. The purpose of this study is to examine the effects of musical and rhythmic mnemonics to facilitate the recall of academic content in the K-5 classroom.

A review of the literature indicates that memory and recall improve when lyric and song are integrated as a learning strategy. The literature also reveals that musical mnemonics are particularly effective as a memory aid for the learning disabled and mildly handicapped student.

Experiments were conducted in three grade school classrooms. Children were taught songs with academic content in the curriculum areas that were current at that time. The students were interviewed and subsequently tested on the retention of subject matter and their experience. A survey of teachers was conducted to investigate their knowledge of the effectiveness of musical mnemonics as a tool in the classroom and the frequency of their use. An elementary school music teacher and fourth grade home room teacher were interviewed about their experiences with musical mnemonic aids in the grade school classroom. Findings indicated that using rhythmic and musical mnemonics in any classroom provides an attractive and innovative alternative instructional and learning strategy.

INTRODUCTION

The Country and Western skip-counting song I taught in first grade every year was always a big hit. With banjos and a slide guitar backing, it chronicles a young cowboy's chores in the early morning- counting the horses legs." 4,8,12,16 -20,24,"it twanged. The students caught on immediately singing the numbers gleefully in perfect sequence and subsequently used it effortlessly in their calculations. It was one of many skip-counting songs I taught to buttress the mathematics curriculum. A few years ago, while supervising my former students now in eighth grade doing a math test, I heard one of the students humming that same catchy tune. As she tapped her number two pencil gently on her desk in perfect time, strains of the 'Skip Count Kid' emanated from behind a sea of plaid Catholic school uniforms. I was amazed that after seven years she still remembered it and used it. After further inquiries it became evident that all of the students in that first grade class remembered the skip-counting songs I had taught them and continued to use them math.

Students appear to learn and retain more when the subject matter is presented through rhythm and/or song. They can also retrieve information if taught the correct cues. Students do not have to be musical scholars or prodigies in order to benefit from the joys of being taught mnemonically. Students who have difficulty retaining information because they cannot read or have not been taught any memory strategies, can often learn effortlessly through rhythmic and musical mnemonics. When textual information is presented as the words of a song or familiar tune, it is better recalled and its memory is more durable. Also, when the lyric and melody are partnered and then rehearsed, the melody is an effective cue for retrieving the lyric. (Chazin & Neuschatz,1990; Gfeller, 1982; Wallace, 1994; Yalch, 1991; Gfeller, 1982).

Statement of Problem

Memory drills for their own sake are laborious to teach and often challenging to learn. Jingles, rhymes and rhythmical patterns, already an intrinsic part of the K-5 learning environment should be utilized more in the core curriculum areas mnemonic memory aids. The instructor may find in them useful tools for disciplines and drills that demand a great deal of memorization.

Purpose Statement

The purpose of this study is to determine the effect of musical and rhythmic mnemonics on the memorization and recall of facts and information in elementary school students. This study focuses on the retrieval of facts in the general education curriculum core content areas such as math, language arts, social studies, English and science.

A mnemonic is defined as a devise designed to aid memory. Mnemonic instruction gives students tools they can use to better encode information so that it is easier to recall later on. Mnemonic instruction is effective when used with students who have learning differences as well as their non-disabled peers. It is a strategy that provides a verbal, rhythmic or musical prompt for students who may have difficulty retaining or retrieving information. The studies in this paper demonstrate how a song, chant or rhythmic pattern used as a mnemonic memory aid can serve as a learning strategy to aid in the retention and retrieval of facts and information in the core content curriculum areas.

Research Questions

How effective are mnemonics, musical or rhythmic in triggering the memory of students in elementary grades K-5? Do students have better retention and recall of subject matter when it is taught through rhythmic or musical mnemonics? Can they subsequently independently recall those memory jogs when needed, in a test or quiz and use them to their advantage? If indeed it is shown that students benefit from learning subject matter in the classroom mnemonically, what is preventing teachers from using them more often in the classroom?

THEORETICAL RATIONALE

Gfeller (1982) studied the effects of using musical mnemonics as a memory tool with a group of 30 learning disabled boys and 30 normal boys. She demonstrated that teacher-directed modeling, repetition of a musical mnemonic and cueing the mnemonic strategy significantly aided retention for her two study groups. The boys ranged in age from 9.0-11.9. Gfeller (1982) emphasized the importance of teaching not only the mnemonic but also the cueing strategy for its use. Gfeller (1982) also used rhythmic patterns with the same group and found it not to be as effective with this population. She used three different rhythms 6/8, 4/4, and 4/4 with syncopation. She theorizes that heightened attention and novelty in musical stimuli contribute to improved recall of text and information. Through her work with kindergarteners Gfeller (1982) maintained that teaching the youngsters how to form a letter while chanting the motions along with them, will result in fewer errors and better letter formation.

According to Anderson (1995), information can only be stored for 18 seconds in the Short Term Memory (STM). For information to be retained any longer it must be transferred to the Long Term Memory (LTM) with repeated revision and repetition. Once it is stored in LTM cues are needed to access it. If melody or images are used to store the information rather than text or words, the information is more easily retrieved because the songs create instant cues in the LTM. This allows immediate access and retrieval.

Mastropieri and Scruggs (2000), conducted many experimental research studies that spanned over a decade and involved over 1,000 students. They have presented many data on the effectiveness of mnemonic instruction in the classroom demonstrating that children, who were taught using mnemonics, were able to retrieve information more efficiently from memory. This contributed to improved grades and promoted more positive classroom interaction between the

teacher and students and among the students themselves. This method of instruction particularly benefited those children who had learning differences and for whom memorizing and recall was difficult.

Wilson (1986) indicated that he is convinced that everyone has some musical ability. Hodges (2000) remarks that individuals have the potential to be musical. Oliver Sacks (2007) emphatically states that "our auditory systems are indeed exquisitely tuned for music (p. xi)."

In summary, through their work with students and patients the aforementioned researchers have shown that the human brain responds positively when exposed to musical rhythms and patterns, and hence, recall is enhanced. Moreover, as we are all born wired for sound both musical and rhythmic, it stands to reason that students of every ability have the capacity to benefit from learning and retrieving information mnemonically.

Assumptions

It has been my experience that children of every age remember and recall facts, lists, data and information more accurately, when learned through song or spoken rhythm. Whether it's phonetic cues in language arts e.g. "when two vowels go a walkin', the first one does the talkin" (Krashen 2004 p. 1), the acronym for the colors of the rainbow- Richard Of York Gave Battle In Vain, or the quadratic formula in algebra; students appear to recall facts learned through musical mnemonics quicker than learning it by rote. Parents marvel at how their children can remember the lyrics verbatim to the latest hit songs on the radio, but these same students often fail to handle simple math. David McCall had that problem with his son and his solution was to link math with contemporary music in the form of the very successful Schoolhouse Rock (1971).

However useful these memory jogs are, they are only as effective as the teacher who utilizes them and who instructs the students how to accurately use them. This is not about having

a perfect voice or exemplary musical talent. It is about imparting memory cues enthusiastically to the students' musically-wired brains and rehearsing the retrieval process with them time and again. It is about seizing that teachable moment and unabashedly breaking out into song in the classroom, engaging the students every step of the way.

My assumption is that many teachers will be uncomfortable doing this. Perhaps they do not feel like their voice is good enough or they cannot carry a tune. Perhaps they think the students will be horrified at their un-American-Idol-like vocals and the teacher hence forth will lose all credibility with the students in the classroom. "A bit pitchy, dawg," as Randy Jackson would say. I hope my teacher survey will prove me wrong. It would be heartbreaking to learn that with such an effective, educational tool at their disposal teachers chose not to embrace it because they are self-conscious.

Background and Need

Through a series of four experiments Wallace (1994) found evidence to support the theory that music is an effective tool in the learning and retrieval of information. When she presented her students with three verses of text put to music, the students had better recall of the text than when it was presented in spoken form, without music. Each of the three verses in this case was sung with the same melody. When the music was already familiar to the students, it worked particularly well. However, when Wallace (1994) introduced a different melody for every verse, the students had better recall of the spoken text. This was also the case when the students were presented with a single verse of text sung only once.

In this study Wallace (1994), repetition and familiarity were key to accurate information retrieval. Wallace states that "Music is a rich structure that chunks words and phrases, identifies line lengths, identifies stress patterns, and adds emphasis as well as focuses listeners on surface

characteristics”(p. 1471). With music, information is retrieved sequentially from memory, with fewer gaps and missing sections in the text. Wallace (1994) found that if the melody was simple and repetitive with a definite rhythm through the verses, it allowed for better recall. Assonance, alliteration and strong-end rhymes are vital factors for the lyrics used mnemonically, making it easier for the student to learn and retain and subsequently retrieve.

REVIEW OF THE LITERATURE

Review of the Previous Research

Historical Context

Yates (1972) chronicles how the Ancient Greeks, who invented many arts, also invented the art of memory. Just like their other arts this was passed onto Rome and subsequently descended in the European tradition. This method of impressing place, image, and music on memory has been called ‘mnemotechnics’ or mnemonics.

The reviewed literature reveals current and past studies on the subject of using musical mnemonics as an effective memory tool in the classroom and beyond. A musical mnemonic is a useful tool for disciplines that require a great deal of memorization. Mnemonics can be teacher created or students created and should not be introduced until the student knows how to use them correctly. The literature reports that in general students, who have been taught through mnemonic instruction, outperform students taught by traditional instruction techniques. Much of the prior research was conducted in the curriculum areas of science, history, geography, English, social studies and foreign language vocabulary. The literature is presented from two complimentary perspectives; medical and educational.

Research from the Medical Perspective

Samson and Zatorre (1991) studied the neurological link between the encoding of text and melody in the brain. Their chosen participants had lesions in the right or left temporal lobes. Samson and Zatorre (1991) found that each lobe plays a different role in text and melody recognition; the left temporal lobe is associated with text recognition but both the left and right temporal lobes show distinct involvement in the recognition of melodies. Because of these dual

memory codes, Samson and Zatorre (1991) uphold that text can cue the melody and melody can cue the text allowing for easier recall.

Sacks (2007) researched the phenomenon of brainworms. Brainworms are overly catchy tunes designed to bore their way into the listener's ear or mind and are not easily forgotten. They were described as "cognitively infectious music agents" by a newsmagazine in 1987 (p.42). Sacks (2007) searches for the qualities that make a tune become almost impossible to delete from memory. Is it timbre? Rhythm? Melody? Repetition? "Or is it arousal of special emotional resonances or associations" (p. 43)? He recounts a song from his youth "Had Gadya" a Hebrew song that was long and repetitive and that became "hammered" (p. 44) into his head. He queries: "Did the qualities of repetition and simplicity…act as neural facilitators, setting up a circuit (for it felt like this) that reexcited itself automatically? Or did the grim humor of the song or its solemn, liturgical context play a significant part too" (p. 44)?

Sacks (2007) reports on how our brains are helplessly sensitive to music, and how the "automatic or compulsive internal repetition of musical phrases is almost universal" (p. 44). The brain treats musical imagery and musical memory in a unique way that has no equivalents in the visual mind. Melody, with its unique tempo, rhythm and pitch "tend to be preserved with remarkable accuracy" (p. 47) whereas visual scenes are often not recalled as accurately. Because of this "defenseless engraving of music on the brain" (p. 47) musical imagery and memory even occur in people who that they are not musical. Neurologically, people tend to find those brainworms or catchy tunes completely irresistible and unforgettable. This comes as no surprise to the advertising world that makes their millions out of flooding our world with such nauseating jingles as "Rice-a-Roni; the San Francisco treat!" or "800-588-2300 Empire, today!"

Hodges (2000) marvels at the new revelations that the latest "neural machinery" has shown us, on the effects of music on the brain. He derives the following premises from neuromusical research.

- The human brain has the ability to respond to and participate in music.
- The musical brain operates at birth and persists throughout life.
- Early and ongoing musical training affects the organization of the musical brain.
- The musical brain consists of extensive neural systems involving widely distributed, but locally specialized regions of the brain:
    - Cognitive components
    - Affective components
    - Motor components
- The musical brain is highly resilient.

In the same article he quotes a neurologist, Frank Wilson (1986) who states that "…all of us have a biologic guarantee of musicianship….we all have the capacity to respond to and participate in the music of our environment" (p.18).

Research from the Classroom and Learning Environment

Gfeller (1986) did extensive research with learning disabled children and how musical mnemonics affect their retention and recall. She chose as subjects for her research both learning disabled and non learning disabled students. The study focused on the memorizing of multiplication facts through repetition either by chanting the numbers and product to a simple tune or standard verbal rehearsal. After the initial trial, the non disabled students reported significantly greater recall of the facts than the learning disabled participants ($p < .05$). By the end of the fifth trial however, both sets of participants who had learned their multiplication facts

musically, remembered significantly more ($p < .001$) than did any of the students using verbal recitation. Gfeller (1986) emphasizes the importance of teaching the students how and when to use a mnemonic. After all, the mnemonic is only effective if the student can access it, retrieve it and subsequently utilize it. She also encourages the use of familiar melodies in creating mnemonics. Students in her trial remarked that "…the facts most easily recalled were those rehearsed to melodies reminiscent of songs they previously knew or liked" (p. 29).

Campbello, De Carlo, O'Neil, and Vacek (2002) chose three elementary schools for their action research project. Their goal was to improve the students' recall of facts and information in the curriculum areas using musical strategies and mnemonics. Not only did Campabello, et al (2002) hope to improve the students' performance in grade level skill areas, but they also wanted to motivate the children to participate and become more involved in class. The research was conducted in a kindergarten, second and fifth grade classroom. All students responded positively to the researchers setting factual information to familiar melodies. The students' participation in class improved and their test scores improved. In kindergarten the songs helped with phonemic training increasing the students' ability to recall their phonetic skills more accurately. Post – intervention data also showed positive results. Teachers reported that the participant's involvement in class improved. The students were motivated and showed improvements academically. The students also found that they were able to use their newly learned mnemonic skills in other areas of the curriculum and also outside the classroom.

The literature shows that kindergarteners already have knowledge of lyrical and melodic structure making it easier to recall information. Kimmel (1994) writes that a song is a mnemonic because its melody, rhythm, rhyme, imagery and other poetic devices provides a structure for the

acquisition of new knowledge, an organization of this knowledge in long-term memory, and cues for retrieval of this knowledge.

Wallace and Rubin (1991) defined rhythmical pattern as the perfect combination of metrical pattern (verse) and the timing constraints of a ballad. Subjects, in one of three experimental conditions listened to a tape of the ballad. In the first condition, the ballad was narrated, like a story. In the second condition, the ballad was rhythmically narrated, the stressed syllables clearly emphasized. In the third condition, not only was the ballad rhythmically narrated as in the second condition, but the beat of the stressed syllable was tapped in the background. There was a definite correlation noticed by the researchers between recall and the metrical agreement measure in both conditions of rhythmic voice. This was not significant in the normal voice condition.

In an experiment to teach mineral colors to a group of eight year olds Chazin and Nueschatz (1990) used a musical mnemonic they created to fit the melody of “Mary had a Little Lamb.”

Subjects were placed in two groups: the musical mnemonic group and the lecture group. Both groups were told at the outset what the ensuing subject matter would be. The song group then listened to a song of the mineral colors and other group listened to the spoken version. When the tapes were played through the second or third time the subjects were asked to sing or talk along. After this, it was time to write down what they could recall. Subjects in the song recall group recalled significantly more minerals than those in the lecture group. However, the results of another recall test a week later did not reveal significant differences between singing or spoken groups.

When lyrics are coupled with an unfamiliar melody, multiple presentations are needed to facilitate the memory and recall. Gfeller's (1982) study using musical mnemonics to master multiplication facts demonstrates that the facts most easily recalled were those sung to tunes that reminded the subjects of songs they previously knew. Jacobs (1984), a cognitive memory researchers claims that new information to be recalled is assimilated more easily if it is associated with already known information. Therefore, using a tune already familiar to the student gives the memory one less thing to process.

Imagery in music mnemonics is a stronger predictor of recall than meaning (Wallace & Rubin, 1988). The "Reconstructive Elaboration Model" devised by Scruggs and Mastropieri (1990, p.275) associates visuals or symbolic pictures with prose to adapt information to mnemonic instruction. If the text to be taught is worked into the lyric of a melody, they found that it facilitated recall more than just the plain text. Furthermore, if the aforementioned musical mnemonic is then presented with visuals e.g. cartoons, photographs or pictures, the effect on recall is even greater.

Summary of Major Themes

Music and rhythmic mnemonics are presented in the research in the following ways:

~ words to rhythmic patterns

~ words constructed to fit an already familiar melody

~ words coupled with an unfamiliar melody

~ words and melody together with imagery

How Present Study Will Extend Literature

This study aims to provide insight into to the effects of learning through musical mnemonics in the elementary school. Teachers welcome new and innovative ways of teaching. If there is extended research that demonstrates that teaching facts and information through musical and/or rhythmic mnemonics triggers accurate recall in students, then teachers can utilize them more in their instruction in the classroom. It will encourage the students to actively participate and add variety (and in some cases humor) to many lackluster lessons.

DISCUSSION

Summary of Major Findings

Kimmel states that a song is probably the best all-around mnemonic device for facilitating a student's recall of facts, definitions and concepts. Wallace and Rubin (1988) conducted many empirical studies in the latter part of the 20th Century. They submit that the recall of a text put to melody has many variables. Musically, the most effective factors are, a simple catchy melody, that's repetitive and a consistent, driving rhythm. The use of alliteration, rhymes, onomatopoeia and imagery are the more important lyrical considerations. Gfeller (1983) demonstrates through her research that in order to remember a song, one must sing it. In the classroom situation, when subject matter is being taught using a musical mnemonic, for the best results, the teacher must sing it with the students.

Limitations/Gaps in the Literature

There is a dearth of recent literature i.e. in the 21st century regarding musical mnemonics for elementary students solely. Much of the research focuses on mnemonics for the learning disabled or special education populations. Moreover, much research has been done incorporating other mnemonic devices such as first letter mnemonics, acronyms, acrostics and the keyword and pegboard strategy. There is also an absence of research about the effects of musical and rhythmic mnemonics instruction on ethnically diverse students. K-8 students, who are not of the same cultural background of the majority of students in the classroom, may not profit from the same mnemonic devices utilized by the teacher. More research needs to be done in this complex area.

Implications for Future Research

Further research into the use of rhythmic and music mnemonics for the K-5 student is recommended. K-5 students love to chant, clap a rhythm, rap and sing. Learning lists, procedures, dates, phonetic rules and math facts can be laborious for the young student and an unwelcoming introduction to the academic world. Musical mnemonics provide a more attractive way to learn and an alternative way to teach. If it can be shown, that learning through musical mnemonics can facilitate memory in students and be a reliable recall strategy, then more K-5 teachers should be instructed how to create musical mnemonics, and incorporate them into their daily curriculum.

Overall Significance of the Literature

Mnemonic strategies rely on verbal and visual components to support recall. The overall significance of the literature is that teaching children mnemonic devices through music and rhythm, gives them alternative tools to use in memory retrieval.

BACKGROUND INFORMATION

Alternative Viewpoints

The use of music as a mnemonic device has long been heralded as a positive and effective way of learning, especially for the elementary student. Teachers use them universally to aid them in their instruction of content area subject matter. However, prior research has provided scant support for this popular belief, as shown by Rainey and Larsen (2002). In their study, "The Effect of Familiar Melodies on Initial Learning and Long–term Memory for Unconnected Text", they chronicle the researchers and their studies and note that none of those studies measured the effect of musical mnemonic instruction on long-term memory. They themselves conducted two separate experiments testing the value of music as a successful mnemonic device. Their first experiment explored the hypothesis that lists of unconnected names would be memorized in fewer trials by the participants (79 students, 36 men and 43 women), when the names were set to a familiar melody than learning the list of names as simple prose. They used the ubiquitous tune "Pop Goes the Weasel" with a simple piano accompaniment. The first hypothesis was not supported. Rainey and Larsen (2002) reported that there was no difference in the recall between the sung and the spoken group; the participants learned the list of names in the same amount of time. The second experiment by Rainey and Larsen (2002) targeted long-term memory. Once again the hypothesis was that when text was learned through music rather than simple prose, it would be retained longer. Participants learned a set of 14 nonsense names. The sung condition used the tune "Yankee Doodle". Participants, who learned the list by song, took fewer trials to relearn the list than the others. Remarkably, twelve participants (6.6%) in the song group recalled the list perfectly after one week. Only five (2.8%) could recall the list from the prose group.

Instructional Application

When the fifth grade students began studying the brain in science, I taught them a musical mnemonic to see if it would make it easier. See Appendix A.

I posted a chart of the brain on the wall. I used a keyboard for accompaniment and chose one student in the class to locate and point out the parts as they were sung. The students were not given the words in written form. All the students were encouraged to join in the chorus and the first run through was slow and deliberate. By the second singing, the class was already chanting the rhyming words at the ends of the lines. As a variation, for the third run through I sectioned the students into groups. Each group sang their own verse, one about the cerebrum, another about the cerebellum and the third chanted about the brain stem. By this time, all students had the chorus and the introductory first verse memorized. The fourth rehearsal had the students singing each verse and pointing to the location of the cerebrum, cerebellum and brain stem in their own heads. This time through they also used hand motions to show the function of each part according to the lyrics of the song. e.g. the brain stem "…governs your heartbeat.." children put flat hand on heart with little palpitations. Minimal prompting of the words was needed from me at this stage. After the fourth rehearsal I arranged the students into their prior sectionals and asked them to write out the words to their particular verse, and the chorus. There were twelve children in each group and they were permitted to work together. The results showed almost 100% perfect recall. The cerebrum group for the final line to their verse wrote "….read, speak and spell" instead of "...speak, read and spell" and that was the sole discrepancy. Afterwards I removed the chart of the brain parts and questioned the students randomly on the various parts of the brain and their functions. Each student asked remembered the name and function of the part of the brain they were questioned on. Uniformly they commented on how

easy it was to learn the parts of the brain this way. One student mentioned how hard it was sometimes to learn scientific terms when she just reads them but this made it so much easier for her. Another student added that it was amazing how a whole chapter could be squeezed into one little song, at which point the teacher interjected saying that there was plenty more to learn on the brain but that this was certainly a great start.

Multiplication can be challenging even for the brightest of third graders. I conducted a trial in a class of thirty. The teacher told me they were having difficulty with the sevens so I chose the mnemonic, “The Slinky Sevens” sung to the tune of “What Can you do with a Drunken Sailor”. See Appendix B. This song is a sea chantey and to make it more appealing to this age group I distributed eye patches, Jolly Roger bandanas and pirate hats and their favorite-a hand hook. Unlike the fifth graders, I distributed the words and had the students highlight in bright yellow the products of the multiplication tables listed in the song. This time I used a CD of the song, but I also sang with it. By the end of the first rehearsal everyone was singing merrily along to the chorus not using the lyrics. The second time through I encouraged the students to sing the numbers out in a pirate voice and they all actively participated. For the third rehearsal I grouped the students. The eye-patches group sang the first three multiplication lines, the Jolly Roger bandanas group sang the next three lines and the last three lines were chanted by the pirate hats group. Captain Hook had a verse all to himself with the products listed one after the other. Each group sang their lines in their pirate voices and many at this stage were not looking at the words or times tables on their paper. The fourth run through was without the CD and finally for the fifth effort at learning those sevens I challenged the children to stand up and sing without the CD and without the words. The outcome was very positive. The third grade students sang confidently and accurately, in a strange pirate accent. When the last matey sat down and the class was calm I

tested ten random students on their sevens. All but two quickly sang the song to get to the correct answer. When asked about learning their multiplication tables this way, the children overwhelmingly responded positively. They said that they had really enjoyed it and that they would like to learn all their multiplication tables this way. A follow up with the teacher a week later showed that the students still knew their sevens and used the song regularly in class to solve math drills.

In science class the first grade were studying the parts of a plant and their functions. Their homeroom teacher allowed me to come in everyday over the course of a week and teach them the parts of the plant using a mnemonic to the tune of "The Muffin Man". See Appendix C. There were five verses and a chorus. Each verse explained the function of a different part of the plant; roots, stems, leaves, flowers, and seeds. There was a chart on the wall, labeled with the parts of a plant and I chose different children to point to the part that we were singing about. I also used the keyboard. With demonstrative hand motions, and four to five rehearsals of each verse every day, the children learned the parts of the plant and their functions effortlessly. By Friday they were singing all five verses and the repetitive chorus with very little prompting from me. The teacher then questioned them on the subject to check the accuracy of their recall. Before they answered, the teacher told them to think back over their song and sing it if necessary to get the answer. Here is a sample of some of the questions she asked:

"Name some parts of the flower."

"Food is soaked up by the roots, correct?"

"What do seeds do?"

"Where are minerals kept in a plant?"

"Why are the leaves important?"

"What holds a plant underground?"

"Give one function of the leaves."

Before the students answered the questions, they sang through the song to make sure they were giving the correct answer. Twelve students were randomly questioned and eleven gave the correct answers.

The teacher reported an increase in tests scores at the end of this particular unit which was held the following Friday. She also shared that the students sang the song willingly at every science class and it instilled great confidence in those students normally reluctant to participate and also in the ESL students.

PROCEDURE FOR INITIAL INTERVIEWS

The fourth grade students at a local suburban K-5 Elementary school learn their facts and information about the California gold rush through song. Every year they perform a musical production called California Bound (Mayer 2007) which chronicles this historical event in California through music. The text book takes a back seat to this informative and splendid show. To understand the impact of learning such a significant part of the fourth grade curriculum through music, I interviewed the fourth grade teacher Mrs. G. for her perspective as an educator. Mrs. M. is the composer of California Bound (Mayer 2007). I set up an interview with her to get her views on teaching through music in the elementary school and the challenges that she as a music teacher and composer may be confronted with in this area.

Sample and Site

I interviewed two teachers who were directly involved with this production. The first teacher I interviewed was the fourth grade teacher who masterfully worked it into her curriculum, Mrs. G. The second interview was with the school's music teacher, Mrs. M, a composer and musician in her own right, who wrote and directed the show.

Access and Permissions

I emailed the teachers and asked permission to interview them at their convenience. They were prompt in their email responses. The fourth grade teacher chose her classroom as the venue for the interview. The music teacher chose a local café. I furnished them with the interview questions ahead. I did not tape either of the interviews.

Data Gathering Strategies

Each teacher received ten interview questions ahead of time. When we met, the interview was informal. I took notes and immediately afterwards wrote a narrative description of their responses.

Mrs. G. has been teaching for 21 years. For the last 11 years she has been teaching fourth grade or a four/five split. She tries to use every available means to bring history alive in the classroom. Seven years ago, the school's music teacher Mrs. M. approached her with an idea for a show, a musical all about the California history that she, Mrs. M. had composed. This show encompasses the entire state mandated curriculum in this area of social studies, including early exploration, missions, immigration, the gold rush, statehood and the transcontinental railroad. Mrs. G. enthusiastically embraced the idea and a partnership was born. Through song, drama and active participation, the students learned dates, facts, history and information. They sang with enthusiasm, they were excited and enthralled by that whole era in California's history. When it came to the test at the end of the unit on the gold rush, the scores far transcended those of other years of the same unit without the musical. Mrs. G. allowed the students to hum the show songs sotto voce in class during the test, enabling them to get to the correct answer. California Bound (Mayer 2007) has now become the highlight of Mrs. G's fourth grade curriculum with the other fourth grade teachers now joining in the show and parents helping with the stage, costumes and sets.

Mrs. G. has always used mnemonic strategies in the classroom and has many that she utilizes for math, science and language arts. She creates her own and also uses resources in books, teacher magazines and on-line. She remembers many songs from her youth that triggered her memory and helped her get good grades on tests and quizzes. A native Spanish speaker, she

said jingles and musical mnemonics were used all the time by the teachers in the small schoolhouse she attended and they made learning for her "musical and happy." She encourages every teacher to have mnemonic resources at their fingertips because "they work!" They work with students who have learning challenges and students who do not. They brighten up the curriculum and energize the children. Coming from a Latin background, she noted that she has no qualms about breaking out into song in class and getting the children to join with her. "I have a terrible voice," she admits. "But the children never notice. They still manage to learn."

Mrs. G. looks forward to teaching California history every year. Though it is hard work and she puts in hours and hours of extra time, she is happy to bring history into the lives of her students and their families through song. Many of her students are first generation immigrants themselves and in most cases their parents learn about California history, for the first time, through this energetic, historically-correct musical.

Mrs. M. a music teacher and composer realized the effective nature of the musical mnemonic when she had children of her own. When they were but two years old she taught both her sons their home phone numbers in the form of a catchy jingle. They picked it up instantly and were able to recall in on cue. She made up a seat-belt song to help ease the harried mornings of a single mom and the boys happily buckled themselves into their car seats singing gleefully. She made everything she could into a song.

Mrs. M. has a theatre background and has been teaching music in the schools for over 10 years. Her mom and sister are teachers, and singing and learning were synonymous when she was growing up. She wanted to bring that environment to the classroom to help the children learn more easily. She was particularly interested in working with the boys as she found that many of the resources available were "too girly." Her aim was to "keep music cool for boys and

get them singing." With California Bound (Mayer 2007), she strove to involve the students in every area of the California gold rush, and keep them interested with a variety of music and rhythms. "Don't sing down to kids," she insists. "They have great ears and love to sing at their age level or beyond."

California Bound (Mayer 2007) has been well received by fourth grade teachers all over the state. The audiences love the catchy tunes, and discover quickly that information is assimilated effortlessly by the students. "It's stealth learning," she said. "That's what makes it fun."

Data Analysis Approach

Both of these interviews were conducted informally. The fourth grade teacher's interview lasted forty five minutes and Mrs. M's was just over an hour. As the teachers responded I took notes and asked follow up questions. During the interview I allowed them to contribute any pertinent information they felt should be included in their interview.

Ethical Standards

This study adheres to Ethical Standards in Human Subjects Research of the American Psychological Association (Publication Manual of the American Psychological Association, 2007). Additionally, the project was reviewed and approved by the Dominican University of California Institutional Review Board, number 7023.

Results or Findings

Teaching subject material through song to students in the elementary school has long been known to enhance learning. Not only is it more easily retrieved from memory but it inserts variety and novelty into a subject that could be sorely lacking in these areas. The teachers I

interviewed recognized the positive impact learning mnemonically has on students. Through the splendid performance of California Bound (Mayer 2007) not only did the children learn about California history from a different perspective, but the parents and school community were intellectually richer for having experienced such a wonderful show.

TEACHER SURVEY

I devised a survey on the subject of the use of musical or rhythmic mnemonics in the classroom for the teachers at the school where I currently teach. This is a private, suburban K-8 school. There was one hundred percent participation which included nine homeroom teachers, plus the resource, science and middle-school math teachers; twelve in all. The purpose of this survey was to investigate whether or not this sampling of teachers use musical mnemonics in the classroom and if so, how often and if not, why not? The teachers were also asked if they had any memories of musical or rhythmic mnemonics from their own youth and if as student- teachers in college, they learned about the effectiveness of this teaching strategy. All teachers are American-born and English is their first language. Five of the teachers have been teaching for less than five years, one between six and ten years and the remainder (six) have been teaching in the classroom for more than fifteen years.

Findings

The teachers surveyed, all recognize the effectiveness of mnemonics as a learning strategy in the classroom. The Kindergarten teacher was the only one who had learned about them as a teaching tool in college and she uses them every day in the classroom. Five teachers responded that they never use them, four said seldom and two, sometimes. Ten teachers were able to recall musical or rhythmic mnemonics from their youth, among them a song about the planets (which is now defunct since Pluto has been demoted), the Fifty Nifty United States, and "Thirty days hath September". The fifth grade teacher wrote that she has never spelled Wednesday incorrectly since she learned the following mnemonic WE Do Not Eat Sandwiches on WEDNESdays. Another teacher shared this mnemonic that he learned in grade school that to this day, helps him remember the heads on Mount Rushmore-We Just Like Rushmore.

Washington, Jefferson, Lincoln, Roosevelt. Question number eight in the survey asked the teachers to comment on why they think teachers may be reluctant to use mnemonic strategies in their classroom. The answers were as follows:

"Not musically talented"

"Feel awkward"

"No time"

"Would feel silly in front of the students"

"Need some training first."

"I can't sing."

"I would be very embarrassed and really uncomfortable singing in front of a class. I don't even sing in the shower."

These answers show a shocking lack of confidence on the part of the teachers to even attempt to use musical or rhythmic mnemonics as a teaching strategy in the classroom. How can this be? How can dedicated, unabashed teachers feel so self conscious about chanting a simple jingle in the classroom to help their students learn?

DISCUSSION

Summary of Major Findings or Results

Children overwhelmingly prefer to learn tedious academic material through music or song. Through this medium they actively listen and participate and effortlessly memorize. If the content is taught through the medium of a tune or melody they already know, and it is taught with explicit strategies for recall, students are able to utilize them when apt during tests, quizzes or simply when asked a question by a teacher.

Comparison of Findings/Results with Existing Studies

Current research shows that when a student with learning disabilities is taught using mnemonic strategies, their ability to retrieve information is greatly enhanced. However, current studies do not address adequately the role that musical mnemonics have on the non-learning disabled population. This study reports that students K-5 who are not learning disabled, internalize and learn material when taught mnemonically, and are subsequently able to retrieve it. This study also addresses a marked lack of confidence in the teachers when it comes to teaching with musical mnemonics. Despite recognizing the positive attributes and results of using this time-tested teaching tool, they submitted that only those who were musically talented could attempt to teach using musical mnemonics.

Limitations of the Study

This study was small and only surveyed teachers from one private, suburban K-8 school. Twelve teachers in all were asked to participate. The school comprises of predominantly Caucasian children and the teachers are all Caucasian also. The study focuses only on musical and rhythmic mnemonics and excludes visual or pictorial mnemonics, which also can be used to

great effect in the classroom. This study did not explore the effects of mnemonic instruction on ethnically diverse students who do not share the culture of the majority of the students in the classroom.

Implications for Future Research

Research for interventions using mnemonic strategies for students with learning disabilities is thorough and accessible. Nonetheless, comprehensive data are lacking demonstrating whether mnemonic procedures if properly utilized, can bridge the gap between the success of students with and without learning differences. Furthermore, teachers and instructors who actively use mnemonic instruction would benefit from research which shows that students who most need mnemonic aids are able to apply the strategies without prompting. This will instill confidence in the student toward her toward independent learning.

Overall Significance of the Study

Though teachers recognize that this is indeed an effective way for the students to memorize laborious facts and information, they are hesitant to use them. Many are self conscious singing. Some do not feel confident enough chanting in time to a rap or a rhythm. Others are unsure of how to introduce mnemonics as part of their instruction. However, they all recognize the value of using mnemonics as an effective learning strategy in the classroom. With proper teaching training in this area, every educator would embrace this alternative teaching method and use it to the delight of their open minded students on a daily basis in the classroom.

REFERENCES

Anderson, J. R. (1995). *Cognitive psychology and its implications* (4th ed.). San Francisco: W.H. Freeman.

Campabello, N., De Carlo, M. J., O'Neil, J., & Vacek, M. J. (2002). Music enhances learning. Retrieved November 23, 2006 from ERIC database.

Chazin, S., & Neuschatz, J. S. (1990). Using a mnemonic aid in the recall of unfamiliar information. *Perceptual and Motor Skills*, (71), 1067-1071.

Gfeller, K. E. (1982). *The use of melodic-rhythmic mnemonics with learning disabled and normal students as an aid to retention*. (Doctoral dissertation, Michigan State University, 1982, University Microfilms International, No. 8303786).

Gfeller, K. E. (1986). Musical mnemonics for learning disabled children. *Teaching Exceptional Children, Fall*, 28-30.

Goldish, M. (2006). *Memory-boosting: Mnemonic songs for content area learning*. New York: Scholastic Inc.

Hodges, D. A. (2000). Implications of music and brain research. *Music Educators Journal, 87*(2, Special Focus: Music and the Brain), 17-22. Retrieved November 17, 2006 from JSTOR database.

Hodges, D. A. (2000). Implications of music and brain research. *Music Educators Journal, 87*(2), 17. Retrieved November 17, 2006 from JSTOR database.

Jacobs, L. (1984). Cognition and learning disabilities. *Teaching Exceptional Children, 16,* 213.

Jensen, E. (1998). *Teaching with the brain in mind*. Alexandria, Va.: Association for Supervision and Curriculum Development. Retrieved December 11, 2006 from WorldCat

Kimmel, K. (1994). *Mnemonics white paper*. Retrieved November 1, 2006 from http://www.defmind.com/pdf/Mnemonics%20White%20Paper.pdf

Krashen, S. (2004). *The phonics debate*. Retrieved April 21, 2009 from http://www.utpa.edu/dept/curr_ins/faculty_folders/gomez_l/docs/reading_4.pdf

Mastropieri, M. A., Sweda, J., & Scruggs, T. E. (2000). Putting mnemonic strategies to work in an inclusive classroom. *Learning Disabilities Research & Practice, 15*(2), 69-74. doi:10.1207/SLDRP1502_2

Mayer, L. (2007). California Bound. *Curriculum Rocks*. Retrieved April 21, 2009 from http://www.curriculumrocks.com/crpages/products.html

Miller, M., & Lee, M. (1998). *Tunes that teach multiplication facts: 12 lively tunes and hands-on activities that teach the times tables*. New York: Scholastic Inc.

Rainey, D., & Larsen, J. (2002). The effect of familiar melodies on initial learning and long-term memory for unconnected text. *Musical Perception, 20* (2), 173-186.

Sacks, O. (2007). *Musicophilia: Tales of music and the brain* (First ed.). New York: Knopf.

Samson, S., & Zatorre, R. J. (1991). Recognition memory for text and melody of songs after unilateral temporal lobe lesion: Evidence for dual encoding. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 17*(4), 793-804. doi:10.1037/0278-7393.17.4.793

Wallace, W. T., & Rubin, D. C. (1991). Characteristics and constraints in ballads and their effect on memory. *Discourse Processes, 14*, 181-202.

Wallace, W. T. (1994). Memory for music: Effect of melody on recall of text. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 20*(6), 1471-1485. doi:10.1037/0278-7393.20.6.1471

Wilson, F. (1986). *Tone deaf and all thumbs?* New York: Viking.

Yalch, R. F. (1991). Memory in a jingle jungle: Music as a mnemonic device in communicating advertising slogans. *Journal of Applied Psychology, 76*(2), 268-275. doi:10.1037/0021-9010.76.2.268

Yates, F. A. (1972). *The art of memory*. Chicago: The University of Chicago Press.

APPENDIX A

Sung to the air of “Home on the Range.”

Parts of the Brain

The whole human brain
Has three parts that contain
Everything that you need for control.
Your brain helps you feel
And to learn a great deal
And to plan and accomplish a goal.

Chorus:
Three parts of the grain,
Every part has a job to attain.
The brain helps you act.
And it’s also a fact,
It allows you to think and explain.

The cerebrum does much,
Sensing temperature and touch,
Sending signals to muscles as well.
It stores information
And promotes education,
By letting you speak, read, and spell.

Chorus

The cerebellum you’ll find
In the back of your mind.
It controls every move that you make.
Your balance is fine.
And your posture’s in line.
The cerebellum guides each step you take.

Chorus
The brain stem is key.
It controls how you breathe.
And it governs your heartbeat all right.
It helps move your eyes
And controls pupil size,
So you’re able to see in all light.

APPENDIX B

The Slinky Sevens

Sung to the air of “The Drunken Sailor”

Chorus:
How can you learn the slinky sevens?
How can you learn the slinky sevens?
Can you learn the slinky sevens?
Sing them every morning!

Sing the sevens and soon you’ll know them,
Sing the sevens and soon you’ll know them,
Sing the sevens and soon you’ll know them,
Sing them very morning

1 x7 is 7, matey!
2 x 7 is 14,
3 x 7 is 21,
Sing them every morning!
4 x is 28
5 x 7 is 35
6 x 7 is 42
Sing them every morning!
7 x 7 is 49,
8 x 7 is 56,
9 x 7 is 63,
Sing them every morning!

Chorus

7, 14, 21,
28 and 35,
How can you learn the slinky sevens?
Sing them every morning!
42adn 49,
56 and 63,
How can you learn the slinky sevens?
Sing them every morning!

That’s how you learn the slinky sevens,
That’s how you learn the slinky sevens,
That’s how you learn the slinky sevens,
Sing them every morning!

APPENDIX C

Parts of a Plant

Sung to the air of "The Muffin Man"

Chorus:
Do you know the different parts,
The different parts, the different parts.
Do you know the different parts
That make up a green plant?

Roots are growing underground.
They hold the plant safe and sound.
Water and minerals in the ground
Are soaked up by the roots.

Chorus

Stems hold leaves up to the light.
They carry water and food all right.
Some stems store food at the site
Where minerals may be kept.

Chorus

Leaves are a plant's food factory.
Chlorophyll gets light energy,
Mixed with water and air, you see.
Leaves make food for plants.

Chorus

Flowers grow the seeds that shoot.
A flower has parts that may include:
Petal, stamen, pistil, anther, fruit,
They help the seeds to grow.

Chorus

Seeds help plants to reproduce.
Seeds first grow and then come loose.
They germinate and introduce
A brand-new, live green plant!