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Abstract:
This article explores the use of lyric writing in elementary science. It details an exploratory project in which elementary students and a professional musician collaborated to write and record lyrics at the conclusion of an inquiry-based science unit. What we found was that lyric writing when used as a summary reflection activity in science offers students a unique opportunity to uncover and refine learning. The collaboration among students, classroom teachers, professional musician, and sound technician greatly contributed to the creation of a unique and engaging opportunity for students to express their learning through the arts in science. Further controlled studies are recommended to determine the degree of impact on learning and long-term retention of science and music concepts.

Introduction

A tidal wave of sound washed off the stage as 45 fifth graders sang out the last notes of their song about sound. It was the end of their recording session, and one could see the excitement and energy pouring out of every student as they jumped around cheering and clapping. This session was the conclusion of an exploratory project that sought to examine how lyric writing could be used to express student learning in science. What we found was that lyric writing when used at the conclusion of an inquiry-based science unit offers students a unique and motivating way to share their learning. Additionally, the use of recording technology can assist in creating a memorable experience and allow for students to share their experience with others outside of the school building.

Project Overview

In recent years, approximately half of the nation's elementary school districts have significantly decreased class time for subjects such as art, drama, history and science. According to the Center on Education Policy (2008), this change is due in part to the federal No Child Left Behind Law's focus on reading and math. This lack of access to the arts and other subject areas, such as science, for elementary school children is troubling, because it limits the ways in which they will come to know, understand, and communicate about a variety of content areas and also offers an extremely

narrow learning environment. Reports such as the one previously mentioned have prompted concern about the direction in which many elementary schools are headed.

In response to this situation, schools have begun to look for innovative ways to integrate the arts, science and other subject areas with language arts and math. One is creating multi-modal events that grant students the opportunity to take what they know in one mode (e.g. language) and cast it in another (e.g. art). The process of moving from one sign system and recasting that knowledge into another sign system is called transmediation (Suhor, 1992, Harste, 2000). This process can be challenging for elementary school students. However, this process offers learners an opportunity to see something that they may have missed before. Or as Harste (2001) states, "It is like turning an artifact so that we suddenly have a new facet that was previously hidden from view" (p.3).

Project Framework

The framework for this qualitative study is the epistemology of constructionism. According to Crotty (1998), constructionism is the "view that all knowledge, and therefore all meaningful reality as such is contingent upon human practices, being constructed in and out of interactions between human beings and their world . . ." (p.42).

This project focuses on designing opportunities for students to construct knowledge through interactions and experiences, or, more specifically, on constructing and refining science knowledge through group lyric writing and collaborative recording. The following research questions guided our data collection.

1. How does the process of summative group lyric writing in science reveal and impact student learning?
2. What benefits to students are shown through the use of collaborative mult-modal learning events?

Participants

Given the nature of the study, it was decided that teachers familiar with us would be approached about participating in the project with the thought that an established relationship might allow for a more equal exchange of ideas among all involved. Additionally, teachers from the same district were chosen, because each used the same approach to teach science. Prior to the beginning of the school year, two kindergarten and two fifth grade teachers were approached and invited to participate. They were intrigued and excited about the idea and agreed to take part in this exploratory project. Each team of teachers then chose a science unit to use for the project. The kindergarten classrooms chose to use their unit on trees while the fifth grade chose a unit on sound.

Data Collection

To assist in answering the research questions, the data collected included field notes, artifacts (e.g. student writing, pictures, emails), interview transcripts, and video. All data collected was discussed and analyzed for patterns and connections throughout the data sources. A summary of implementation details and the data collected is provided in the following table.

Activity Sequence	Data Collected
Invitation to participate	Permission forms, field notes
Collaborative designing of procedures for implementation of lyric writing activity	Field notes, artifacts (e.g. units plans)
Group lyric writing at conclusion of science unit	Artifacts (e.g. rough draft of lyrics), video, pictures
Practice and recording of lyrics with musician	Artifacts (e.g. emails), audio file of song, pictures, field notes
Reflections by students, parents, and teachers	Artifacts (e.g. personal communication), interview transcripts

Figure 1: Activity Sequence Table

Implementation

In the fall students were asked to take what they had learned about specific science content and then recast that knowledge as song lyrics. For example, at the conclusion of an inquiry based unit on sound, fifth grade

students gathered in small groups to discuss what they had learned and to begin the process of writing lyrics. After this initial small group writing, students gathered as a large group to finish collaborating and created a rough draft, which was then sent by email to the musician. Following a series of emails, the students and musician approved of the final draft of the lyrics shown in figure 2. Examination of the lyrics show that the students were able to recast the "big idea" or main science concept that all sound is made by vibration.

Sound Surfin'!

Chorus:
It's sound and it's all around
It's sound and it's all around
Sound wave surfin', 'cross the town
Everywhere you turn a sound is found

Verse 1:
Sound waves make vibrations
We hear great sensations
Through all matter a sound can pass
Solids, liquids, even gas

Verse 2:
Waves vibrate from you to me
Fast ones are high frequency
Then my ear drums tell my brain
Trains and ghosts don't sound the same

Verse 3:
Strings that are short and tight
Make high sounds, outta sight
Loose and long sound real low
This is pitch I'll have you know.

Figure 2: Lyrics by Mrs. Anderson's Fifth Grade Class & Eric Franzen

The students' ability to recast their science knowledge in lyric form is exciting. Often in elementary classrooms, students are offered very limited

ways to showcase their learning. However, as meaning is made through a variety of signs, music, movement, drawing, and other representational modes need to be given a serious place in the curriculum. Similar results were seen in the kindergarten classrooms that participated. Here students were offered more writing support by the musician, but all core ideas originated from them. Their class lyrics, shown in figure 3, written at the conclusion of a unit on trees, again highlight their understanding of the main science concept that trees are a needed part of our lives.

Everybody Loves a Tree!

Chorus:
T-R-E-E, tree – e –e –e
Everybody loves a tree.
Animals and you and me –e –e,
We all need trees!

Verse 1:
Apples, pears… coconuts,
trees give yummy food to us.
Beehives hanging in the air,
bees make honey for the bears!

Verse 2:
Wood is used to build my house,
trees give us wood, without a doubt.
Monkeys, birds and people too,
We all live in trees, how bout that dude?!

Verse 3:
Trees help us in many ways,
that's what we share with you today.
Eating, breathing, climbing high,
just thank a tree, when you have the time!

Figure 3: Lyrics by Mrs. Smith's Kindergarten Class & Eric Franzen

Responses and Impact

> Each child was thrilled to bring home their own CD of our "Tree Song" which they still sing often. Someone will start it and they all join in. A copy of the lyrics went home with an explanation of how this correlated with our tree unit. This is excellent school-home communication and great PR. I have had parents comment on the CD and what a great idea it was.
>
> *Kindergarten teacher, reflection at end of project, 2007*

The responses shared by students, teachers, and students were overwhelmingly positive. In fact, one recording on the CD was a portion of the teaching session led by the musician. In it the kindergarten class is laughing so hard that it makes the listener laugh along. Key to the success of the project were the student centered opportunities to interact and wrestle with core concepts. Opportunities that asked students to not only articulate what they had learned but to also fit into a new form.

After collecting and analyzing the data, the following themes emerged in relation to our research questions. The first is that the experience appears to leave a memory mark that may have the potential to assist students in recalling both the experience and content of the song. Second, working with a professional musician and/or artist lifts the experience to a very unique level and offers students exposure to the arts. Last, the use of

recording technology assisted students in sharing their learning with family and friends. Each theme presented previously is further broken down and will be discussed in more detail in the following sections.

Memory Mark

> My daughter participated in the sound unit in fifth grade. She was involved in the song Sound Surfin'. She told me she had a test in science the day of the test. I asked why she didn't study? Her response, "Mom, I don't need to study. I know the song." She got 100% on the test!
>
> *Parent, personal communication, 2007*

In the project, we chose to utilize lyric writing with science for two main reasons. The first is that most elementary school students enjoy music. Second, engagement with music has the potential to leave a memory mark that could help students recall or uncover their learning. For example, in a study conducted with four and five year olds, students were taught the names of body parts with a variety of teaching methods. One group was taught verbally without music; the second verbally with acting out movements; the third were taught the names of body parts in song form; while the fourth group had new terms acted out in the form of dance to

music. After 28 days, the three latter groups exhibited higher scores than the first (Hejmadi & Mohanty, 1994).

One of the elements that helps make music so powerful for young children is the way in which it can mark specific learning events. In part, memory strength is a function of how much we care about the experience. "Neurochemical tags associated with memories mark them for importance, and we tend to code as important those things that carry with them a lot of emotion, either positive or negative" (Levitin, 2006, p.193). Brewer (1995) discusses how we all have music triggers that lead us to re-experiencing particular moments in time and how this memory phenomenon can be used in the classroom to help students retain more information and provide them with ways to retrieve that information.

Benefits of Collaboration

> Having [the musician] come into the classroom and help us create a song with what we learned in our unit titled, "We Need Trees", motivated my students to participate, and was an excellent extension activity to challenge their thinking. A CD was created that day with a recording of my students' voices singing their song, and it is now a favorite classroom CD. The students beg me to play this CD all throughout the school day, and ALL students have the words

> memorized. A girls' birthday party took place two weekends ago, and they were excited to tell me that they sang and danced together listening to this CD. This CD was distributed last fall! Making this music has done more than enhance learning; it has made connections, memories, and increased enjoyment!
>
> *Kindergarten teacher, personal communication, 2007*

In addition to leaving a memory mark, music can offer students a unique way to experience the world and to express themselves. However, this experience could not have happened without the expertise and talent of the collaborating musician. Without his expertise, we would not have been able to accomplish what we did. He was an essential component of the entire experience. A few additional examples of how the collaboration impacted project design follow.

The day of the recording, the musician shared with students how he began the process of composing the songs they were to learn. He shared how their lyrics and the song worked together to express meaning. It was a great opportunity for students to hear about the process of music composition and gain some exposure to the arts. Whenever possible, the musician used student ideas as the basis for any changes made that day to the song. For example, students in one fifth grade classroom wanted to use

some rhyming verses (e.g. "hound in a pound") they had written, which had not been worked into the original song. However, the musician said, "How about I just vamp here and you can say your other lyrics in small groups?" They were pretty excited once they learned what the word "vamp" meant and offered up a few ideas of their own, such as the use of sound effects, for further addition. This small collaboration showed us that a good next step would be for the students to take part in more of the music composition process.

The musician requested that the teaching and practicing of the song be done in the regular classroom rather than in the music classroom. As an example, he described how moving music outside of the regular music room would show students that music can be made anywhere. His expertise as an artist assisted in creating an opportunity that was unique and had impact.

Learning Leaves the Building

> I have two daughters 8 and 3. They LOVE the song and sing to it with Jenny (5th grader) in her room. My eight year old goes around the house singing "It's sound and it's all around." Great unit!
>
> *Parent of 5th grader, personal communication, 2007*

The use of technology to record and distribute impacted student learning in a variety of ways. First, due to the location of the recording equipment, students had the opportunity to leave the school building and travel to a local university. This could be seen in both a positive and a negative light. A positive was that the new environment added a novelty factor that assisted in strongly imprinting the memory of the event. It also gave the students access to some unique and expensive equipment and a chance to interact with the staff who managed them. A negative with leaving the school may be that the bus ride and recording fees may be cost prohibitive for some districts. However, there may be ways to lower the final price tag for example by having the sound technician come to the school, or using district recording equipment.

This technology also impacted student learning by offering students the opportunity to share their learning with family and friends. By giving each student a CD to take home, students were able to play their song and to hear their own singing. We had reports of the songs being sung at slumber parties and by families just for fun. The recording and distributing of their songs was a key component to the project and lifted it to a new level. Follow-up interviews with students, teachers, and parents point to the importance of this component to the project.

Andrea**:** I remember all the words!

Researcher: You remember all of the words!

Andrea: Uh-huh.

Researcher: Did you play the CD at home? Was that fun?

Andrea: Yes.

Researcher: Did you have anyone else at home that listened to the song with you?

Andrea: My friend Sue, my mom and my sister, and my brother too.

Transcript from interview with kindergarten participant, 2007

Conclusion

> The result was more than I expected, emphasizing to me the power of creativity and collaboration. … As to what I observed of the students, I can't say enough. I think what they experienced was a true learning experience, and will be something they will always remember. I feel that kids, and many adults for that matter, need to be reminded of the creative power that they possess. This project really engaged the kids in that process and they created something of their own that they could feel proud of, and will have forever.
>
> Musician reflection, personal communication, 2007

This reflection, and previous ones listed, offer powerful testimony for the use of collaboration among various professionals and the integration of music, science, language, and technology. However, it is the student comments that we still get a year later describing how much they enjoyed and remembered the project that provide the most meaningful reasons for engaging in these kinds of collaboration. The pairing of lyric writing with developing science knowledge points to the creative power of students and how important it is to offer multiple ways of expression. Multi-modal learning events offer students a way to uncover and share their learning in a vital way.

Siegel states that it is time to put music, movement, and other representational modes on equal footing with language in schools or run the risk of creating a narrow and constrictive vision of what it means to create and share meaning, for "meaning is made through signs of all kinds—pictures, gestures, music—not just words" (Siegel, 2006, p.65). By promoting the use of multiple sign systems, schools can offer students the opportunity not only to create and share meaning, but also generate new understandings.

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