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**Introduction**

“Creativity as an objective might well be achieved by students’ writing poetry directly related to facts, concepts, and generalizations achieved in an ongoing science unit.” Marlow Ediger made this comment in a 2001 book entitled *Creativity and Science*. This directly correlates with an interest in applying a creative approach to the geologic sciences. Researching the effect of a creatively based learning process to increase comprehension piqued our interest. Both being musicians, we believe that incorporating one’s knowledge through a creative outlet (like a poem) will increase comprehension. The effect of creativity on learning has been touched upon in past research; however, none has been specified for the geologic sciences. We then decided to take on this area of research by developing our own scheme of approach and then analyzing the data, while taking observational notes of the students’ reactions during the exercise.

**Background**

Marlow Ediger, (1992) a proclaimed educator and author, paid a lot of attention to the relationship between creativity and science comprehension. In his journal article, *Creativity and Science*, he discusses the how different types of creative engagement can influence a better understanding of scientific concepts. He mentions the benefits that writing poetry on related topics can have for students, “Creativity as an objective might well be achieved by students’ writing poetry directly related to facts, concepts, and generalizations achieved in an ongoing science unit.” It is not solely the
act of writing poetry that is helpful but the use of facts and information in a creative fashion.

Leslie Safran relates creativity to mindfulness in the book *Creativity in Education* (2001). In her words, mindfulness is “implicit awareness,” meaning looking around and asking questions about what one finds. She explains that creativity is a part of mindfulness. As one takes a creative approach to learning a difficult concept, they might try to understand it in pieces first and from as many different angles as possible. In a learning setting, mindfulness is almost like an implicit interest in the being presented.

**Hypothesis**

We propose that the activity of writing poems based on Bowen’s Reaction Series will enhance their comprehension and familiarity with the material. The idea is to encourage the students to approach the topic in a creative manner and to try and understand it thoroughly. Through writing poems, the students are encouraged to dissect the topic and develop their own.

**Method**

Subjects

Our workshop groups consist of students at all stages in their college careers with a broad variety of interests and majors. There are also students with more experience than other students. How many, what are their ages, say they are EES 101 students in workshop...These factors sometimes make it difficult to appeal to the masses. Because everyone has unique learning habits, it is often difficult to guide a whole group through a
set of examples or even a quick explanation of a concept. We wanted to implement a
learning tool that would appeal to students of all kinds, no matter their experience or
personal interest. We decided that creative expression based on a topic would be good
practice and possibly interest the likes of our students.

Procedure

The procedure was relatively simple for our experiment. We would have the
students draw and explain the geologic concept of Bowen’s Reaction Series and then
compose a poem about the series, using one’s notes, and then answering a series of post-
poem questions. The reason we decided to use Bowen’s Reaction Series is because it is a
concept that represents a higher order of geology understanding. It is also something that
has been presented to students in the past that requires memorization to know. The three
questions that we asked of the students were:

1) Did you understand Bowen’s reaction series more after writing the poem?
2) Did you enjoy this exercise?
3) Would you consider yourself artistic?

We asked these questions as a means to assess the students’ reactions to the
experiment. It was also a fast way to collect data on comprehension without doing tests
for retention over multiple weeks. If we were given more time, we would’ve like to quiz
the students over a few weeks to see if they use the poem they created as a means to
remember the concept.

In our experiment, we were able to obtain eight data points based on a self-
proclamation of how artistic one is, enjoyment of the exercise, and another self-
assessment of further comprehension after the exercise. Our eight data points would then be:

1) Those who felt greater comprehension and considered themselves artistic
2) Those who felt greater comprehension and did not consider themselves artistic
3) Those who did not feel any further comprehension and considered themselves artistic
4) Those who did not feel any further comprehension and did not consider themselves artistic
5) Those who enjoyed the exercise and considered themselves artistic
6) Those who enjoyed the exercise and did not consider themselves artistic
7) Those who did not enjoy the exercise and considered themselves artistic
8) Those who did not enjoy the exercise and did not consider themselves artistic.

**Results and Discussion**

The data obtained for the first two questions matches with our hypothesis. Our sample size for the two groups is 18 students. Out of those 18 students, eleven said composing the poem aided in comprehension of the topic, and seven claimed it did not help. Eleven students also answered that they enjoyed writing the poem, while five students did not enjoy it, and two students were indifferent to the question. Although the data for the “yes” responses to the questions matches up perfectly, they were not all directly correlated. However, it was a general trend among answers that those who responded “yes” to the first would respond “yes” to the second, and vice versa for the “no” answers. The two indifferent responses to the second question both answered “no” to the question about comprehension. When we attempted to find a correlation between
all the numbers dependent on a students’ artistic leniency, our percentages were far too small to come to any conclusions.

At the beginning of the experiment, the students were skeptical of their competence. When they were asked first to draw Bowen’s Reaction Series from memory or explain it in their own words, they felt they didn’t know where to begin. Most of the students’ preliminary sketches of the diagram were minimalistic and bare. It seemed as though they understood the idea but did not know specifics, or what it all meant. Then they were told that they were going to have to write a poem about Bowen’s Reaction Series and they were encouraged to use their notes. In the Thursday group, many students looked at the opportunity as a means to become more familiar with the rocks and minerals that make up the series and walked right over to the exhibit table where a diagram with samples of Bowen’s Reaction Series has been laid out all year. Other students dwelled on the fact that they are not poets and did not put an effort into taking a creative approach to the assignment. The people that put the effort in to write a short verse about whatever they learned agreed that they felt more comfortable with some of the material afterwards. They only had about 10 minutes after lab, so it was a bit rushed. But the students that initially went over to the laid out diagram with samples finished before the rest. And the ones who focused on the poetry aspect of the exercise were struggling to finish. In the Wednesday lab, the most startling observation was the student’s initial reaction to the exercise. Some looked up like it was a joke, while some chuckled and were eager to start.
Conclusions

In combining the numerical data with our observational data, we noticed that the composition of a poem indeed aided in comprehension of the concept in question. Since our sample size is relatively small, it is hard to say if this result is valid. Using the two articles discussed above as guidelines, we put together an experiment that would test the relationship between creative thinking and science comprehension, more specifically, of a geologic concept. As mentioned in, Creativity and Science, we had students use their knowledge (and notes) to write a poem about Bowen’s Reaction Series. The goal was to see if the creative use of the facts would help them understand or make them more comfortable with the information. We also noticed that those who took the opportunity to get more comfortable with the information, an example of Leslie Safran’s “implicit awareness,” had a more enjoyable time with the exercise and generally felt they learned something from the experience. With this in mind, our results could definitely be considered productive and certainly raises more interest in the connection between creativity and learning.
Charts and Graphs:

Correlation Between Creativity and Comprehension

- Comprehends & Artistic: 33%
- Comprehends & Not Artistic: 27%
- Does Not Comprehend & Artistic: 20%
- Does Not Comprehend & Not Artistic: 20%

Correlation Between Creativity and Enjoyment

- enjoys & Artistic: 14%
- enjoys & Not Artistic: 29%
- No Enjoyment & Artistic: 36%
- No Enjoyment & Not Artistic: 21%

Raw Data From Student Self-Assessments

- Artistic
- Comprehension
- Enjoyment

- YES
- NO
- INDIFFERENT
Works Cited
