GC Insights: Geoscience students' experience of writing academic poetry as an aid to their science education

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Abstract

A survey was completed by 11 geoscience students in order to explore ~~The study presented here employs thematic analysis to explore geoscience students' experience~~their experience of writing poetry as an aid to their science education. ~~It was~~A thematic analysis found that themes could be categorised as being related to either the 'Task Process' ('Identification of Significant Information', 'Distillation of Information', 'Metamorphosis of Text') or 'Task Meaning' ('Enjoyable', 'Valuable', 'Challenging', which has subthemes 'Frustrating' and 'Restricted'). The results of this study present evidence that writing ~~poetry~~ haiku based on scientific text can aid geoscience students by making newly learned information more digestible~~., and therefore easier to memorise efficiently.~~

1. Introduction

Science and the humanities are often seen to be disparate fields of study, though this has not always been the case throughout history (Higgins, 2019; Roche et al., 2018). ~~However, r~~Recently, there has been a desire to reignite the bond between science and the arts as a way to advance education, pedagogy, and communication between academic disciplines (Brown, 2019; Gurnon et al., 2013; Osbourn, 2006~~; Brown, 2019; Gurnon et al., 2013~~; Watts, 2001). It has also been argued that science journal articles are sometimes too esoteric: ~~, making it difficult for scientists from different areas of study to understand and communicate with each other. C~~therefore, communicating using poetic, creative language could potentially ameliorate this difficulty (Illingworth, 2022; Osbourn, 2006,~~Illingworth, 2022~~).

In a study by Pollack and Korol (2013), undergraduate neuroscience students were challenged to write a haiku based on an excerpt from a textbook, a task that was found to require contemplation and lateral thinking. Inspired by this study, our research presents an introduction to exploring geoscience students' experience of writing academic poetry as an aid to their science education, as there is a history of both poets and scientists writing poetry on geography-related topics (Higgins, 2019)~~.~~

2. Method

A research advertisement (see Appendix A) was posted to social media platforms, including the personal researchers' accounts on Twitter, Facebook, and LinkedIn, and shared by leaders of geography-related modules to students in the UK; and participants were recruited using opportunity sampling. The inclusion criteria stated participants had to be a university student aged 18 or over, enrolled in a bachelor of science or master's degree in a

35   geoscience-related subject, and have a university email address. In total 11 participants took part in this qualitative study.

Ethical approval for this study was given by the Leeds Trinity School of Psychology and Therapeutic Ethics Committee. Aside from preserving anonymity, one of the biggest ethical issues to consider was that writing poetry might trigger emotional effects in the participants, and as such we provided signposting to charities (Safe In Our

40   World and Mind) who could provide support and mental health advice if required.

A link was shared on social media platforms that directed participants to the survey, which was hosted by Jisc Online Surveys. After reading the information sheet and accepting the consent form (see Appendix BA), participants were shown a list of questions to complete concerning the university they attend, the name of the course they were enrolled in, and their university email address. Participants were asked to choose one out of a possible three text

45   passages (labelled anonymously as "1", "2", and "3": The Royal Society, 2020a, para 2.; see Appendix CB; The Royal Society, 2020b, para 3.; see Appendix DC; The Royal Society, 2020c, para 2.; see Appendix ED). Following this selection, they were then invited to read their chosen passage of text and then write a haiku (which we defined here as a three-line poem of 17 syllables) based on the information they had just read. They were then asked four open-ended questions about their experience of writing the haiku:

50   1. How did you find the experience of writing the poem?

2. Did writing the poem affect your engagement with the science in any way?

3. Was a haiku an appropriate form to use?

4. Have you experience of writing poetry before this exercise?

3. Results & Discussion

55   Thematic analysis was used to analyse the data in this study. According to Braun and Clarke (2012), a thematic analysis is a qualitative data analysis that extracts themes across a data set to discover meaningful patterns. Important information in the text that relates to the research question is identified and summarised using a word or short phrase, which are called codes. There may be several codes that are very similar to one another and can collapse to form one subtheme or theme.

60   The themes and subthemes extracted from the data within this study were associated with either the 'Task Process', which we define as focussing on the steps within the process of conducting the task, or the 'Task Meaning', which focuses on the emotions and sense of meaning participants experienced while writing their haiku.

3.1 Task Process

The themes that emerged from Task Process were found to be: 'Identification of significant information', 'Distillation of information', and 'Metamorphosis of text' (see Fig. 1a). After reading the text extract, participants began identifying significant information from the text extract:

> "A haiku is very short so I had to really get the core words out of the text"

Participant 1

Following this, they distilled the information, filtering out the information they deemed as least relevant:

> "It made me think much more about how to distil the essential information"

Participant 1

And then they metamorphized the text from an academic to a poetic style:

> "It is a good use to metamorphize a scientific situation form to monotone (dry) text to a vivid (appealing)"

Participant 8

Writing the haiku was also found to be an iterative process as opposed to a linear one:

> "Even after I finished writing the poem I went back to change it after thinking there was a better piece of information to put in the second line than what I originally put"

Participant 11

3.2 Task Meaning

The themes to emerge from 'Task Meaning' were found to be 'Enjoyable', 'Challenging', and 'Valuable'. Furthermore, 'Challenging' is constructed from two subthemes: 'Frustrating' and 'Restricted' (see Fig. 1b).

The majority of the participants found the task to be enjoyable:

> "It was a great experience! I always get warm fuzzies in my stomach when I'm able to join my creative and scientific brains together"

Participant 4

The meaning and emotional experience of the task is interconnected with the Task Process. In this case, the participant enjoyed transfiguring the text from its original academic style to something more vivacious.

As well as being an enjoyable task, most of the participants found the task to be challenging due to the restrictions given.

90 Many participants found the use of the haiku an appropriate poetry form for this study and that the restrictions were relevant:

"It was challenging to really boil down the concept, it was a great exercise in simplification and summarization".

Participant 4

95 However, some participants found that the directions that had been given, to write a 17-syllable haiku with three lines, were too limiting. This was noticeable as some of the participants went beyond the syllable count. They may have been unaware of their counting error, or the error could have been due to them feeling too constricted in what they could write:

"I found it limiting in terms of the amount of detail I could give".

100 Participant 10

When participants felt too restricted, it also caused them to feel frustrated:

"[I found it] frustrating at times"

Participant 8

Finally, it is important for students to find value in doing the task. Participants identified that it helped them to
105 memorise the information within the larger text extract; instead of having to remember a large paragraph of information, they only needed to recall three short lines of a poem, which contained the most significant and relevant pieces of information:

"I learned science I didn't know from the passage and now won't forget it because I made a fun mnemonic"

Participant 4

a)

b)

110
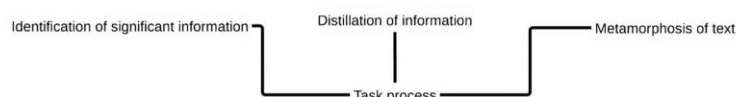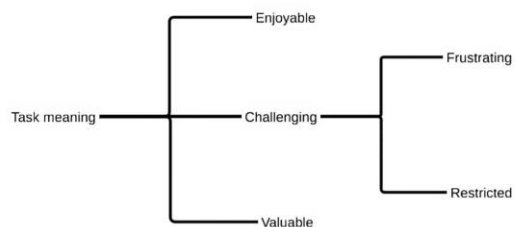
Figure 1. (a) Task Process thematic map. **(b)** Task Meaning thematic map

~~The results of this study support and expand on the findings of Pollack and Korol (2013), in which neuroscience students were asked to write a haiku based on a passage of text. Whereas their study focused on whether haiku can be used to describe and explain neuroscience concepts, this study focused on both the experience of constructing a haiku and the subjective experience of the students of doing it in relation to the geosciences.~~

115

4. Conclusion

~~This study explored whether writing poetry can be used by geoscience students as an aid to their science education. The thematic analysis conducted on the data confirmed that the experience of writing a haiku based on a text extract can be enjoyable, challenging, and valuable. However, t~~Whereas Pollack and Korol's (2013) study focused on whether haiku can be used to describe and explain neuroscience concepts, this study focused on the experience of

120 constructing a haiku and the subjective experience of the students doing it in relation to the geosciences. Tasks involving larger text extracts and alternate forms of poetry may have ~~very~~ different findings and result in a different subjective experience.

Though the questions were open-ended, it was possible for participants to give a simple binary response of 'Yes' or 'No' for three out of the four questions, which may have prevented more in-depth responses from participants. Future research may want to examine the experiences of students ~~studying~~ who study different science ~~geoscience~~ subjects and have different levels of experience writing poetry and pose different questions to explore different aspects of their experience, including if the task ~~has~~ made them consider writing poetry to aid their science education in the future. There was also a limited amount of data due to the small number of participants within this study, with Participant 10 being the only person who did not have prior experience writing poetry. The informative nature and accuracy of the scientific information within the haiku, as well as the task's effect on future academic success, may also be analysed in an objective manner.~~There was also a limited amount of data due to the small number of participants within this study, with Participant 10 being the only person who did not have prior experience writing poetry; we hope to expand this to larger numbers in the future.~~

Data availability

The data of this study, which includes each participants' haiku and responses to the four questions, is available at https://osf.io/a24sz/?view_only=9c0914834c264e8490a5931422992dd6

Author contributions

AW and SI both designed and delivered the survey, with AW conducting the first analysis of the data. AW and SI co-wrote the paper.

Competing interests

Sam Illingworth is the chief executive editor of *Geoscience Communication*.

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Appendices

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Geoscience students' experience of writing academic poetry as an aid to their science education – Consent
180 **form**

If you are 18 years old or over and would like to consent to the use of your data as detailed in the information sheet then click the 'next' button below. You will be asked to fill in details about your university, the name of your course, and your university email address. Following this, you will be shown a text passage about a topic within
185 geoscience and asked to write a poem based on the information within the text. If you do not consent to the information above and would not like to participate in this study then please close the tab to this page.

Understand that you can leave the study at any point by exiting the tab to Jisc Online Surveys. If you do this before completing the four questions at the end of the study then none of your data will be saved. If you would like to
190 withdraw from the study upon completion of the four questions then please email Alice Wardle at 1906082@leedstrinity.ac.uk that you would like to do so. You will also need to send your unique response number, which will be shown to you at the end of the study.

Appendix C̲B̶

195   **Ocean Acidification text passage**

CO2 dissolves in water to form a weak acid, and the oceans have absorbed about a third of the CO2 resulting from human activities, leading to a steady decrease in ocean pH levels. With increasing atmospheric CO2, this chemical balance will change even more during the next century. Laboratory and other experiments show that under high CO2 and in more acidic waters, some marine species have misshapen shells and lower growth rates, although the

200   effect varies among species. Acidification also alters the cycling of nutrients and many other elements and compounds in the ocean, and it is likely to shift the competitive advantage among species, with as-yet-to-be-determined impacts on marine ecosystems and the food web.

Appendix DC

Climate change and weather events text passage

205 A warming climate can contribute to the intensity of heat waves by increasing the chances of very hot days and
nights. Climate warming also increases evaporation on land, which can worsen drought and create conditions more
prone to wildfire and a longer wildfire season. A warming atmosphere is also associated with heavier precipitation
events (rain and snowstorms) through increases in the air's capacity to hold moisture. El Niño events favour drought
in many tropical and subtropical land areas, while La Niña events promote wetter conditions in many places. These
210 short-term and regional variations are expected to become more extreme in a warming climate.

Appendix E̶D̶

Sea ice extent in Arctic and Antarctic sea

Some differences in seasonal sea ice extent between the Arctic and Antarctic are due to basic geography and its influence on atmospheric and oceanic circulation. The Arctic is an ocean basin surrounded largely by mountainous

215 continental land masses, and Antarctica is a continent surrounded by ocean. In the Arctic, sea ice extent is limited by the surrounding land masses. In the Southern Ocean winter, sea ice can expand freely into the surrounding ocean, with its southern boundary set by the coastline of Antarctica. Because Antarctic sea ice forms at latitudes further from the South Pole (and closer to the equator), less ice survives the summer. Sea ice extent in both poles changes seasonally; however, longer-term variability in summer and winter ice extent is different in each hemisphere, due in

220 part to these basic geographical differences.