

Imagination in Adolescents' Collaborative Multimodal Science Fictions

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Abstract: Understanding how to cultivate students' imagination has been a challenge in STEM learning. We developed a program that engages adolescents in gaining STEM knowledge and digital literacies while collaboratively composing multimodal science fiction narratives. In this study, we identified instances in student products that signify imagination from a critical aspect: devising details. Through the examples described, an emergent framework for examining imagination is introduced as an outset for future work.

Introduction

During the past decade, studies readdressing the importance of imagination in learning have increased considerably, partly because many of the complex problems in the 21st Century require unique and creative solutions (Glăveanu, Gillespie, & Valsiner, 2015). However, there has been little research on how imagination can be cultivated and evaluated in a multimodal learning environment. Emphasizing imagination, we have created an educational program to assist students in generating science fiction narratives. In this study, we analyzed student-generated artifacts in terms of imagination. The driving question of this study was: *How can imaginative capacity be identified and evaluated in students' collaboratively generated multimodal artifacts?*

Theoretical framework

Vygotsky (2004) explained that imagination develops in an increasingly progressive and complex way through certain cultural tools such as language. Egan (1998) suggested some imaginative cognitive tools, which led Fettes (2010) to propose eight imaginative capacities. Among these capacities, grasping details is the focus of this study. Grasping details refers to "holding in one's imagination the individual richness of particular cases, situations, events, that makes them unique" (Fettes, 2010, p3). During the creative multimodal process, adolescents draw details from their experiences and popular media to devise characters, events, and plots, in unique combinations.

Methods

The data for this study come from an informal educational program designed to engage adolescents (age 10-13; 3-5 students per team) in collaboratively producing multimodal science fictions while learning STEM and digital literacies. The program consisted of a five-day summer camp, a fall extension, and a final presentation in a local film festival. Each student adopted one or more specific roles (writer, designer, or scientist) and close collaboration was expected during the entire process. Students gained experience with a range of digital tools to create a variety of multimodal elements (e.g., comics, animation, sound, movie) to extend their narratives.

There were 42 students participated in the summer program and 21 of them continued with the fall extension. As a result, a total of 12 multimodal science fictions were generated. Multiple sources of data were collected, including pre-, mid-, and post-surveys, video records, group-based semi-structured interviews, and multimodal artifacts. To understand how imagination was incorporated in students' work, in this study we first examined their artifacts for three aspects: *characters* (i.e., people, such as protagonists and antagonists portrayed in the narrative), *events* (independent unit of action that, in sequence with other events, comprises the plot of the narrative), and *science* (scientific knowledge or facts incorporated in the fiction). For each aspect, we conducted a two-level coding. In the first level, we identified the instances that we considered as 'details'; in the second level, we analyzed these details into finer categories using a ground-up approach.

Findings

Four themes emerged in our analysis and we illustrate them with concrete examples in the following.

Theme 1: Creating deep characters in a fictitious world

Narratives with high imagination are those with sophisticated character-building schemes. The narrative, "Haluki Star" highlights several aspects that were also found in other strong examples: (a) *Descriptive details* (b) *Relationship with others*. (c) *Connection with the environment*. (d) *Expression of emotion*. For instance, a

character in the narrative is an alien species called Halukinumananluka, who was portrayed as having their own language (“they use different sounds connected with hand movement”, “they take long pauses between syllables”) and walking patterns (“go in zig zags”). They are “short and round, like barrels... have a face, like us humans, and long pointy, fingers and toes.... However, their eyes are as dark as night”.

Theme 2: Crafting rich experiences in unfamiliar events

Another feature that is common in narratives with high imagination is that their events, especially unfamiliar ones, are filled with rich experiences and surprising twists. The narrative “What Would Happen If The World Stopped Spinning”, is an example of how different kinds of devising details give believability to the imaginative events. In the narrative, three friends struggle to survive after the Earth is hit by an asteroid, stops spinning, and is full of radiation and mutated former animals. Events of the story plot are enriched with devised details, many of which are from students’ everyday experiences. The key features include the following: (a) *Enumerating variety*. For example, when Luke builds a shelter, a variety of details that are not all directly associated with the actual building give depth to the event: Shelter is built underground to protect from radiation; a machine that extracts oxygen from water is used; wood, steel, and stone were found; and supplies were consumed. (b) *Opposing binaries with transitional inbetweenness*. For instance, in the narrative creatures are portrayed as “animals that we usually know and love evolved to vicious monsters”.

Theme 3: Incorporating science details in creative ways

Narratives with high imagination tend to incorporate many science details in creative ways. These science details are used to support portraying the characters or explain why or how events happen. For instance, in the narrative “Haluki Star”, Lucy’s traveling through time and space is described with incredible details about personal feeling: “...I am being squeezed until there is nothing left of me. Then emptiness becomes black. It feels as if I am flying. An odd coolness passes over me. My whole body feels on fire....” (from narrative “Haluki Star”).

Theme 4: Composing multimodal artifacts as a coherent a whole

Narratives in high level of imagination are often equipped with complementary and creative multimodal artifacts. For instance, Figure 1 shows a snapshot of a product that integrates three different modalities to create an ambiance and connect to settings in the plot.

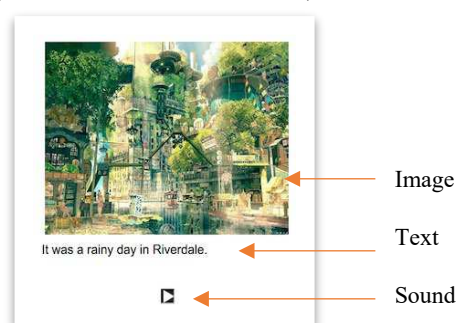


Figure 1. Sample page in “Tsunami Terror”.

Discussion and implications

Our preliminary analysis shows the importance of devising details in creating highly imaginative multimodal science fictions. An emergent framework to identify and evaluate imagination in students’ multimodal artifacts can serve as a step for further exploration. What we have found at this stage includes the following. First, details can be devised in different ways to support character building, events unfolding, science incorporation, and multimedia integration. Writing techniques (e.g., inclusion of opposing binaries, metaphors) may equip students with ways to devising details that are more nuanced and humanized. Multimodal representations (e.g., comic/animation software) may provide a new cultural tool for young students to exercise and expand imagination. Future research will examine how students discuss, use, and externalize imagination when composing in a collaborative learning environment.

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