Editorial: Arts Integration Allows Students the Opportunity to be Original

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Abstract

This editorial explores the other six articles in this issue 2 of volume 3 of the *Journal of STEM Arts, Crafts, and Constructions* to examine how originality is displayed and supported by art projects. Originality, is a quality or a characteristic of an idea, approach or product. Originality can be defined as newness or novelty. To be classified as original, an idea must be new. It does not have to have a utilitarian value, which is a requirement for an idea to be categorized as creative. Helping students develop originality is important because it allows the freedom to make any connections, even nonsensical ones, which can result in bursts of unusual, and even creative ideas that may have been rejected, had the requirement of a value for a particular field been present. The editorial provides examples of projects from the literature that focused on originality and a diversity of responses. The articles in this issue are examined for originality examples. All articles showed evidence of student originality in the accompanying art projects. The editors suggest that art projects integrated with STEM subjects are an effective way to provide motivating self-affirming opportunities for expression of originality in the classroom.

Key Words

Arts integration, originality, creativity, hands-on projects, STEAM, self-expression

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Introduction

So much of today's classroom study and work is scripted, structured, and formatted with the goal of students producing similar "correct" products (e.g., Timberlake, Thomas, & Barrett, 2017). Where is the opportunity for students to exhibit their personalities, interests, and unique understandings? Self-expression is very motivating because it signals autonomy and a valuing of the self; psychologically healthy students want to feel important, independent, and valued for themselves (Ryan, Deci, & Vansteenkiste, 2016). Teachers who listen to students and help them make connections between their previous knowledge and new concepts are more successful in assisting students in learning concepts (Pehmer, Gröschner, & Seidel, 2015). Integrating art projects with STEM subjects can provide the opportunity for students to manifest their unique personal ideas related to the content. The process of presenting and discussing one's artwork can promote positive social interchange, motivating students, and forming a community of practice (Moon, 2016, p. 5).

In this editorial, we discuss originality and its role in arts-integrated STEM education by first focusing on originality, then moving to how meaningful exercises may be devised for its incorporation into STEAM education. Then we take a brief

look at how originality appears in the practical and research articles of this issue of the *Journal of STEM Arts, Crafts, and Constructions*, closing with a few concluding remarks.

Originality

The concepts of creativity and originality are tightly connected and very context-dependent (Baptista, Frick, Holley, Remmik, Tesch, & Akerlind, 2015). Baptista and colleagues (2015) analyzed multiple definitions of creativity and originality and concluded that the defining characteristics of creativity were relevancy in conjunction with newness, and to be considered original, a product needs to only be novel. Originality is not "tied up" with a certain utilitarian purpose or value; it is more open and "pure" because it is focused on a process, or activity, or knowledge for the sole purpose of discovery or attempting something that has never been done before (Baptista et al., 2015).

One of the purposes of school is producing life-long learners, which requires curiosity for knowledge per se. In other words, students should not limit themselves to learning the information and concepts that they perceive useful to them in some way, but be open-minded and curious about the entire world. Activities that allow the freedom to just have the goal of newness for students can be helpful in developing this passion for discovery of new knowledge for the sole purpose of growth and development. In a sense, asking students to produce creative ideas includes an inherent process of judging the value or usefulness of the ideas. When we are asked to generate ideas that are only original, we are free to build on irrational connections between our preexisting knowledge and include purposeless ideas (Scheffer, Bascompte, Bjordam, Carpenter, Clarke, Folke, Marquet, Mazzeo, Meerhoff, Sala, & Westley, 2015).

A focus on the value of ideas and their applicability to a certain purpose can potentially eliminate ideas that are not only original, but also creative. Broadening the focus to include all new ideas can possibly facilitate generation of cross-disciplinary and unexpected connections. For example, Scheffer et al., (2015) state that informal discussions that occur between specialists from different fields may be productive. Common sense may suggest that scientists should stay within their fields; after all, what can an artist offer to a physicist?! In fact, employing educational techniques from the areas of the Arts in hard sciences can help to improve the originality of ideas and potentially foster new discoveries in these areas (Scheffer et al., 2015). This notion that new ideas emerge from the intersection of fields is called the Medici Effect (Johansson, 2006) because of the explosion of ideas resulting from the place where different fields meet.

Contrary to popular assumption, a majority of people are capable of generating original ideas; another way to foster originality is by encouraging generation of a multitude of ideas with the main focus on quantity because an increase in the number of ideas increases the chances of generating original ideas (Grant, 2016). According to Scheffer et al., (2015), having access to a large body of information, knowledge of facts is required for free associations between these components to occur and result in original ideas. The authors also suggest that including blocks of unstructured time where one is free to reflect and contemplate is conducive to developing originality.

Examples of Creative Activities that Promote Originality

Devising an art activity that encourages students to give unusual responses is not difficult once one has encountered enough examples and understands the important open-ended nature of the activity. An example from the literature is the homework project given to elementary students in a summer class on animal skulls (Klein, Gray, Zhbanova, & Rule, 2015). During class, students examined museum-quality plastic models of animal skulls, making a pop-up book of skull images with labeled parts and information about what might be learned from tooth types, eye positions, and other features. The homework assignment was to create a model of an animal skull from recycled or craft materials found at home. Students returned two days later with very exciting and original artworks, such as a cantaloupe carved like a beaver skull with chisel-shaped teeth in the front, a skull made of aluminum foil, one made with paper clips, and one carved from a piece of Styrofoam.

Other examples occurred at another summer class for primary students called “Elefantastic,” in which students learned all about elephants. On the first day, the teacher set up a shadow theater and showed students how to create shadow puppets out of torn cardstock paper glued to a Popsicle stick with eye hole(s) produced with a paper punch. Students, then, each made an elephant shadow puppet and used the puppet to introduce themselves to the class and tell what they liked about elephants. A homework assignment for this class was to make an original elephant trunk from junk, craft, or recycled materials at home. Elephant trunks that were returned were all unique, ranging in size from six inches to several feet in length and fashioned from garden hose, tissue-stuffed nylon stockings, newspaper-stuffed socks, and paper-covered plastic slinky-type toys, among others. See Rule (2000) for a science fact BINGO game that accompanied this project.

An additional benefit of such creativity and originality-provoking activities is they don’t require expensive materials. A study of middle schoolers by Zhbanova and Rule (2014) included a several weeks-long summer project in which students were using their knowledge of science, mathematics, social studies and English Language Arts to generate spatial constructions from recycled and craft materials.

Each lesson began with the students sharing the knowledge of a topic from middle level curriculum (e.g. Earth and space), followed by reviewing an academic content sheet with important information on the topic to fill possible gaps in student knowledge. Then, the participants were guided to close their eyes and imagine their complete construction for a minute. The next step involved students in productive thinking in which they wrote the ideas generated during productive thinking. Later, the students were given identical sets of 12 items of craft and recycled materials, glue, scissors, and writing supplies to create a spatial construction incorporating as much of the content as possible.

Each set of materials, among items like cardboard juice box top, a plastic straw, a wooden clothes pin, a square piece of fabric, and others, included an object that was particularly challenging, such as a small plastic swan. It is tempting and easy to use a plastic swan as just a swan in a construction. Modifying and repurposing this object, such as snipping off the head, turning it upside-down, blackening it with a marker, or covering it with fabric, requires originality and creativity.

The final stage involved students assessing their creativity and level of enjoyment of the activity. According to the teacher observations and the student surveys, students not only enjoyed the activity greatly, but were able to produce highly-creative, original constructions. For example, despite the challenging objects in every set and a challenge of making content connections, the students generated unusual and creative constructions that included original use of challenge-objects and other materials, and even generating exciting stories to explain what was happening in the constructions. For example, a wooden clothes pin was used to make a head of a dragon that was attached to the body crafted from a foil cupcake liner; the dragon had a chain attached to it because it was left in a cave to guard precious jewels.

How Practical Articles in this Issue Exhibit or Promote Student Originality

Article 1

This practical article, “**Science through art: Making science concepts more meaningful for TAG students**” (Zhbanova, 2018) describes a drawing activity integrated with science or other school content areas in which identified talented and gifted (TAG) students transformed a given squiggle or geometric figure into an image related to school content. This activity supported gifted student needs to be challenged to solve each problem, to express themselves by transforming the figure into something of interest to them related to the given STEM topic, and to build social skills through sharing of their work. These figural transformations were then self-scored for creative traits, allowing students to recognize several creative skills, such as originality, by noticing whether the work of others was similar or different. Examples of students’ original thinking were included in the article, as shown in Figure 1.

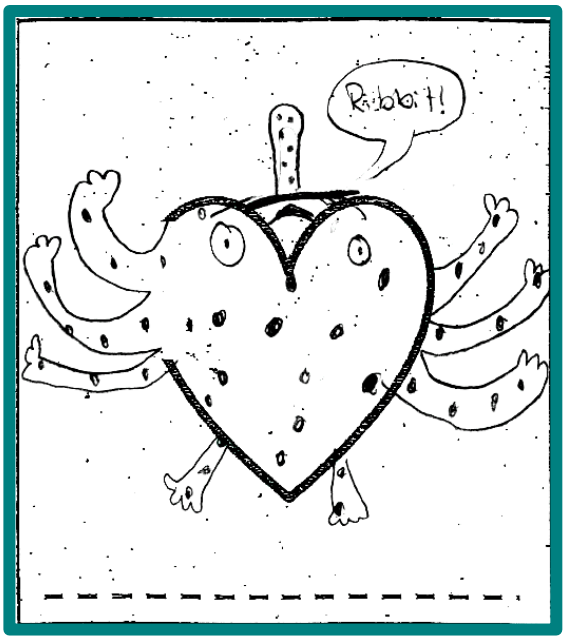

Figure 1. The student transformed this heart-like figure into a future frog with many mutations. This was an unusual idea not seen in the work of other students.

Article 2

The practical article, "**Exploring the physics of sound with STEAM-azing third graders**" (Foss & Borsay, 2018) reports a learning cycle formatted lesson with third grade students who made creative musical instruments from recycled and craft materials during a science unit on sound. The instruments included drum and shaker combinations, animal-shaped instruments, and instruments that mixed three or more instruments. Students exhibited original thinking by making unusual designs such as a puppy-shaped instrument that made sound by shaking the animal, tapping on its drum legs, or jiggling the bell on its collar. See Figure 2. Another of the three-in-one instruments combined a drum, rain stick, and maracas to make a variety of sounds. The opportunity to innovate an instrument that was different than traditional instruments was very motivating for students.

Figure 2. Puppy shake musical instrument

Article 3

The next practical article, "**Ecosystem shake-up: An environmental change adaptation project**" (Morgan, Atwood-Blaine, & Rule, 2018) guides the reader through an exciting animal habitat diorama project in which third grade students worked as partners to create an ecosystem with paper animals and plants, then roll a die to determine an environmental change, making a second scene to document the adaptations of the ecosystem. The teacher noted strong student engagement during the painting and construction project with exceptional creativity shown in the plants students made from soda bottles and other recycled materials. See Figure 3 for an example plant with an original design. Students were given the open-ended task of constructing plants from construction paper and/or recycled materials. Students surprised the teacher with their inventiveness. This indicates the rarity of opportunities for unique self-expression through artwork in a typical classroom.

Figure 3. Ecosystem diorama with a tree made by taping branches onto a soda bottle

How Research Articles in this Issue Exhibit or Promote Student Originality

Article 4

The fourth article in this issue, "**STEAM implementations for elementary school students in Turkey**" (Duban, Aydoğdu, & Kolsuz, 2018), presents both research findings and practical information from implementation of a unit focused on electric circuits. Photographs of the villages that students built from craft materials, legumes, and grains show students' creativity in making each village unique. See Figure 4.

Although most quantitative data results indicated no differences between control and experimental group students, pre-post student scientist drawings showed that students in the experimental group widened their views of the physical characteristics of scientists more than those in the control group. In other words, students experiencing art integration, allowed their scientists to be more diverse and unique. Figure 5 shows the scientist drawing of a student from the experimental group who broadened perspective after experiencing the art-integrated treatment.

Figure 4. Creative village made by student participants. Note the seeds used to make a vegetable garden and the bent-top electric light posts for this electric circuit unit.

Figure 5. Representative student scientist drawing from the experimental group posttest showing female scientists working outdoors.

Article 5

The next research article, "**Second grade students learn about civil engineers and erosion**" (Anderson & Meier, 2018), focused on eight- to nine-year olds learning about erosion and the work of civil engineers. The research aspects of this project focused on a qualitative analysis of student work, observations of students, and student responses during the project to determine the process of 2nd grade students learning about the work of highway engineers during an arts integrated project to determine how the arts play a part in student learning. During one activity, students formed hills of sand and tested different erosional barriers when water was poured onto the hill to determine what works best. Students enjoyed generating erosion-control ideas and modeling them with different materials. Figure 6 shows a sand hill (made by packing damp sand into a paper cup) surrounded by aquarium gravel to simulate boulders protecting the base of a hill. Figure 7 shows a sand hill protected by a retaining wall simulated by a cut paper cup.

Figure 6. Sand hill with boulders at the base.

Figure 7. Sand hill with a retaining wall.

Article 6

The final article in the current issue titled, "**Arts integration into elementary science: Force and motion and natural disasters**" (Ooms, Wu, Kokemuller, Montgomery, & Rule, 2018), engaged third, fourth, and fifth grade students in control and arts-integrated conditions to determine the possible benefits of arts integration into STEM. After two weeks of content on the topic of force and motion, students made a model rollercoaster with or without integrated art, depending upon condition; similarly, after two weeks of instruction on the topic of natural disasters, students made a hurricane shelter with or without integrated art, depending upon condition. Although no significant differences were found in third graders' content learning between conditions, fourth and fifth graders evidenced significant posttest gains

and distal posttest gains regarding content scores in favor of the experimental condition with a large effect size. The results of this counterbalanced design study also indicated that arts integration produced greater creativity, collaboration, and more positive overall perceptions of learning. The roller coaster in Figure 8 shows originality in the use of Olympic athletes to mark mileposts.

Figure 8. Rollercoaster from the arts-integration condition in which students showed originality in labeling parts of the track with celebrity athletes.

Conclusion

Considering the importance of students feeling valued and able to express their thoughts, opportunities need to be available in the curriculum to allow students to present their original ideas. Integrated art activities have many benefits, one of which is self-expression. All of the articles in this issue demonstrated originality of student work, even though the authors of these articles did not know their writing would be scrutinized for this creative trait. This is an indication of how the arts naturally promote creative expression (Rinne, Gregory, Yarmolinskaya, & Hardiman, 2011). The editors of this issue hope that the reader will enjoy these articles and consider incorporating more opportunities for originality and self-expression through art into their teaching.

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