

# Second-Graders Beautify for Butterflies

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## Abstract

This practical article presents activities that support previous research suggesting the integration of art with science is beneficial to the learning and cooperative processes of children. The project showcased here highlights the ability of elementary school children to collaborate with their peers for problem solving and critical thinking through the artistic use of observation and sketching. This article discusses effective lesson activities in which students combined art and science by creating and cultivating a butterfly garden on the school's property.

## Key Words

STEM Education, STEAM Education, Learning Cycle, 5E's Lesson Format, gardens, butterflies.

## Introduction

Research related to the No Child Left Behind Act suggests the lack of a shared, common vision of what characterizes good teaching may lead educators to adopt a narrow approach emphasizing standardized tests and high scores (Delandeshere & Arens, 2001). As educational settings continue to model the rigor of standardized testing, aspects that may be more difficult to measure (motivation, enjoyment, creativity), but that are still crucial to the learning process, can be overlooked in curriculum implementation.

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The educational practice of integrating art into other subjects of the curriculum, the STEM (Science Technology Engineering Mathematics) curriculum in particular, can be a way in which educators provide students with a motivating and enjoyable learning experience.

The following literature review provides a brief introduction pertaining to the social and academic benefits to elementary school students of science learning through arts integration. This practical article then describes an exciting hands-on arts-integrated science project in which students planned and created a butterfly garden at their school.

## Literature Review

Traditionally, schools have focused their curriculum on outward applications such as high scores on standardized test scores aligned with the No Child Left Behind Act. In contrast, recent legislation of 'Every Child Succeeds' encourages educators to integrate art into the curriculum through the creative arts expression. This approach encourages learning from an intrinsic perspective allowing feelings and personal interpretation to guide the learning process. Arts integration provides students with an opportunity to refine their thoughts and ideas through the use

of creativity, a skill area that is often overlooked in the general education curriculum as creativity is not typically measured by the standardized tests used to evaluate subject-area learning.

### **Creativity Supported through Arts Integration**

Arts integration can be a resource for youth to express their ideas through visual works, such as drawing and sketching, as another form of learning and communicating. "Creating an external representation of an internal mental image, the child is able to explore, critique, and revise the representation," (Brouillette, 2010, p. 16). Therefore, the use of arts integration can provide multiple perspectives to address a specific project.

Research findings on arts integration for youth in academic settings have repeatedly been associated with improved emotional and social skills affecting children's abilities to persist in goal-oriented activities, to seek help when needed, and to participate in and benefit from relationships (Brouillette, 2010). An increase in student creativity may be attributed to improvement in social settings and cooperative activities (Fischer, Giaccardi, Eden, Sugimoto, & Ye, 2005).

Students may engage in creativity as they are encouraged to discuss their ideas with one another through cooperative learning. Many researchers have highlighted the technique of cooperative learning from the perspective of Think-Pair-Share (Azlina & Nik 2010; Kothiyal, Majumdar, Murthy, & Iyer, 2013; Landers, 2013). This pedagogical technique is meant to encourage communication and collaboration amongst students. First, students generate ideas on their own and then expand upon their shared ideas after working in with a partner. As Landers (2013) highlights, the process of allowing students time to think and discuss multiple perspectives to a common question provides opportunities to engage students in more meaningful ways. As students participate in this technique of cooperative learning, they engage in deeper thinking by being provided with time to think about the answer to a question, as well as time to discuss their ideas. Arts integration scholarship from Rinne, Gregory, Yarmolinskaya, and Hardiman (2011) makes a case for arts integration supporting cooperative learning. Students' participation in creative activities may be a more effective way to motivate students, as opposed to tradition

teaching techniques in which students simply copy teacher-presented information. As cooperative learning encourages multiple perspectives to learning, so does arts integration through meaningful participation.

As students interact with one another and stimulate each other's thinking with shared knowledge they may encourage one another to engage in creative thinking processes. "Individual creativity comes from the unique perspective that the individual brings to bear in the current problem or situation" (Fischer et al., 2005, p. 484). Allowing elementary students to participate in the process of designing and repurposing a school garden is one way to promote their social involvement. This garden project provides students with a unique experience to learn about the beauty in nature outside the walls of their classroom.

### **Benefits of Visual Communication Arts**

Paints and markers are media that often assist young students in expressing their thoughts and ideas. By engaging in arts-integrated science, students practice science observations skills as they sketch or draw; these activities also improve their fine motor and spatial skills. A summary of a broad range of study findings confirmed the relationship between science and art, particularly the improvement of a variety of skills, including motor, spatial, observational, pattern recognition, motivation, and persistence (Downs & DeSouza, 2006).

Visual communication arts, such as drawing and sketching, are important media for children to communicate their creativity (Steffani & Selvester, 2009). Children may express their ideas through drawings when their written communication skills may not be fully matured enough to convey their true meaning. The following instructional unit describes a successful project in which sketching and observational abilities of elementary school children were applied to reconfiguring and repurposing a space for natural beauty.

### **National Science and Art Standards Addressed**

This butterfly garden project implemented two engineering standards from the Next Generation Science Standards (NGSS; NGSS Lead States, 2013) for second

grade learners. Standard K-2-ETS1-1 states “ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.” This standard was enacted as the students made plans to create a butterfly garden to beautify a neglected area of the school’s landscaping. Standard K-2-ETS1-2 states “develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps its function as needed to solve a problem.” As students made plans, they sketched their ideas for the concrete pavers. Additionally, some of the drawings made on the concrete paving blocks explained insect relationships, anatomy, or life cycles in the butterfly garden.

This instructional project supported the National Core Art Standards (National Coalition for Core Arts Standards, 2014). Anchor Standard #1 states “generate and conceptualize artistic ideas and work.” Students enacted this standard by researching information about local butterflies, insects, birds, and the plants they visit for food. Before painting their concrete paving blocks, they made sketches of their ideas and discussed them with classmates and the teacher.

## Method

In this lesson set, second-graders participated in a community engagement activity over the course of several days during which they brainstormed, collaboratively problem solved, and implemented a new plan to beautify an unsightly outdoor space at their school. Students also decorated ordinary brick-sized cement paving blocks with educational information and drawings as a creative way to decorate and organize the garden space.

## Setting

The school at which the lesson took place is a K-4 elementary school in the Midwestern United States. Approximately 220 students of varying ethnic backgrounds, with the majority being Caucasian, attend this small-city school. In addition to the academic subjects, the elementary school offers art, physical education, general music, a

guidance program, a gifted/talented program, special education, and remedial reading support. The school has very strong connections with the community and families of the students. The participating classroom was composed of 23 second grade students, 14 boys and 9 girls of ages 7 or 8 years old. The class occupies a large classroom that allows for free movement and group workspace. The primary group of students participating in this activity was second grade students; additionally, two third grade classes within the same school, also participated in the project; a total of 75 students participated on this project.

## Materials

The following materials list provides materials used during this project. Materials may vary or be altered dependent upon number of participants and the geographical location of the garden.

Materials for obtaining ideas:

- Gardening books or magazines and resources giving information about garden plants and shrubs.

Equipment:

- Rakes and shovels (adult and youth sized);
- Garden gloves (adult and youth sized); and
- Paint brushes (enough for all participants).

Garden materials:

- Mulch (amount varies depending upon amount of space needed to cover);
- Seeds or Seedlings and/ or Bushes that appeal to butterflies and bees and are able to thrive in the garden’s climate; and
- Peat pots and potting soil.

Materials for the garden paths and bed borders:

- Concrete paving blocks (The garden paths and outlines of beds were created with concrete paving blocks available at most large building-hardware stores);
- Sketching materials such as white paper and pencils or electronic tablets;

- White Gesso Undercoat Paint (available at art supply stores (Concrete paving blocks were first painted with a white basecoat of gesso);
- Permanent markers (After the basecoat was dry, students decorated the blocks using permanent markers); and
- Concrete sealer (Blocks were painted with concrete sealer after the marker work).

### The Lesson

To create and beautify the butterfly garden described here, teachers and high school students

volunteered their time on a weekend to prepare the ground for the elementary students to manipulate and to plant seedlings. Seeds were planted inside ahead of time to allow them to sprout, thus, expediting grow-time so the students could have a better visual of what they were planting outside in the garden. The high school teachers tied this butterfly garden lesson to another unit being taught regarding interdependence of plants and bees/pollinators. The butterfly garden activity built upon previous lessons regarding the environment and community involvement, thus, students were able to make connections and collectively generate the idea to beautify the garden space by developing it into a butterfly/pollinator sanctuary. See Figure 1.



*Figure 1.* Different views of the area at the beginning of the project. The top left image shows high school students clearing the some of the leaves and branches. The top right shows the pile of brush removed from the area. The bottom images show the garden at the beginning stages. Due to it being early spring, many of the plants and flowers are just beginning to sprout.



### Engagement Activity

The teacher began the unit with reading the book, *Butterfly Park* (McKay, 2015) as a way to engage students. The story of *Butterfly Park* follows a little girl as she moves to a new town and discovers a place known as Butterfly Park, which is lacking actual butterflies. The book details the journey of the little girl as she inspires her entire town to help bring real butterflies to the park. With the combined efforts of the little girl and her community, butterflies soon find a new home in the park. Following the reading of *Butterfly Park*, the teacher and students went on a walk around the school grounds, students were asked to pay close attention to nature and the environment around them as they would discuss their garden ideas after returning to the classroom.

### Exploration Phase

Following the nature walk around school grounds, students returned to their classroom to compile a list of their observations. Students were then engaged in Think-Pair-Share (Simon, 2013) to generate and discuss ideas they had of how improvements might be made to the outdoor environment they had just visited. The process of Think-Pair-Share as examined by Landers (2013) involves posing a complex question to students, providing them with several minutes to generate their own ideas, and then partnering each student with a peer to discuss perspectives of the issue at hand.

Following small group discussion, students shared their ideas with the class as a whole. Through encouragement and direction from the teacher, students' discussion was narrowed to planning a garden with the specific goal of cultivating pollinators. In addition to beautifying the garden area, students considered the question: "How can we let visitors know about this garden and why we created it?" Again, the second grade students participated in Think-Pair-Share and shared their ideas with one another as well as being partnered with third grade students who were following a similar curriculum. Working together in groups, students from second and third grades problem-solved the type of garden materials that would endure outside in their

Midwestern climate through the varying seasons. With the assistance of their teacher, students were encouraged to think creatively. They planned to incorporate decorated cement garden pavers as an artistic way to decorate the garden and educate visitors. The collaboration of students from two grades working toward a common goal, a butterfly garden, aided in the feelings of community involvement as the students formed a cohesiveness between the differing grades.

### Explanation Phase

Once students had agreed upon the type of materials used for their butterfly garden, they were given the option of proceeding on this activity in a group, partners, or individually. Students who decided to work in pairs collaborated with one another to determine the information they wanted to share with potential visitors to the butterfly garden. The materials (as listed earlier in this article) were available to the students: poetry books, butterfly books, butterfly garden books, iPads, paper (the same size as the pavers), and garden-related posters with quotes on them. It was from these sources of information from which students decided how best to creatively incorporate educational knowledge about the garden in an artistic manner.

Students were encouraged by their teacher to view the books provided to them as resources to discover what pollinators are prevalent in Midwestern gardens. Next, students used pencils and paper to sketch diagrams of pollinators, or to illustrate identified plants from the garden. Students then created a rough draft of what they wanted to draw on their cement pavers and their rationales for their ideas. Students submitted their rough drafts for teacher approval, after their ideas were accepted; students collaborated within their small groups and partnerships to divide the workload. Using pencils, students carefully sketched their artistic ideas onto their gesso-coated cement pavers. While some teacher-led direction and mediation was needed, students expressed their creativity and engaged in teamwork, cooperation, and problem-solving with one another as they moved forward with their artistic contributions to the garden. See Figure 2 for images of students working.



Figure 2. Students working on designing their paving stones.

### Expansion Phase

The expansion phase of the activity occurred in two parts. The first part of the activity focused on the creation of the butterfly garden, and the second part of the activity focused on the artistic creation of cement pavers to place within the garden.

The creation of butterfly garden began with a meeting between second and third grade teachers (without students) to divide the tasks that needed to be done and to create a schedule of when each class would work in the

garden. Once a schedule was set and activities determined, students signed up for the task for which they wanted to be accountable; this also determined the group with which they would work. Some examples of the tasks were: hole diggers, hole fillers, planters, mulchers, waterers, path sweepers, and brick layers. Students were also assigned to a section of the garden as well. Students worked together with their peers and teachers to create their school garden. Planning and predetermining the tasks needed to create a garden allowed for a structured outdoor activity.



Following the completion of the butterfly garden, students participated in the artistic activity of creating cement pavers to place within the garden. Several steps were involved in the creation of the cement pavers. First, the tops of the pavers were coated with gesso to create a smooth, clean canvas for the students. Once the basecoat was completely dry, students used their teacher-approved design (drawn to scale) and redrew it on the cement paver. Students used permanent markers to trace over their pencil-drawn sketch; students were also encouraged to color and decorate their cement paver. This part of the activity addressed students' fine motor skills. Students could easily hold and manipulate their markers, produce detail, write words,

resulting in a vibrant, colorful product. Figure 3 provides images of the completed paving stones.

The last part of the cement paver activity was completed after school without students present. Following the student completion of decorating their cement pavers, the resulting artwork was sealed with a cement sealer and left to dry. Sealing was done outside and after school was dismissed for the day so that students would not smell the fumes or disturb the drying work. Once the decorated cement pavers were thoroughly dry, they were ready to be placed in the garden. Upon returning to school, students who signed up for this final task laid the cement pavers down once the plantings, mulch, and other work had been completed. See Figure 4.



Figure 3. Completed paving stones made by students



Figure 4. Pavers in place in the butterfly garden.

### Evaluation

Following the creation of a butterfly garden, and the creation of artistic cement pavers, students viewed pictures that were taken before and after the activity. Students, then, reflected on their work by writing responses to the following questions:

- “What do you think is the biggest difference in the garden space now that the changes have been made?”
- “What do you think is the biggest difference in your thinking since we started this project? How did you grow as a learner?”
- “What do you want the visitors of the garden to know about this space?”
- “How did you and your group members work together? 1) What went well? 2) What didn’t go well? 3) What was the best part?”

For this part of the activity, the teacher was not concerned with giving the students a grade; instead the teacher’s goal was to provide students with an opportunity in which they could process the meaningful work in which they had participated. See Figure 5 for a paver that reflects the importance of the work.





## Conclusion

The results of this project support teachers integrating drawing into their curriculum as an aid for children to expand their communication skills. Following opportunities to share knowledge, students expanded upon their ideas and expressed them creatively through drawing on concrete paver blocks. Participation in this lesson provided students with an opportunity to collaborate with peers in a joint effort to plan a beautiful garden, additionally; students added an artistic flair by designing and creating concrete blocks to add to the garden display.

## Motivation to Help the Environment

Through the course of the lesson, students expressed a desire to participate in making their school garden beautiful as they learned about the importance of bees, butterflies, and other insects and birds in the environment. Building upon their knowledge base, students learned the role of pollinators and how their habitat is affected by pollution, thus, resulting in lower populations of important pollinators. Students voiced a desire to assume responsibility for their environment (their school garden) by providing a safe sanctuary for pollinators. Lastly, students communicated their joy and motivation at being able to play in the garden and get their hands dirty!

Students collectively worked with their teachers, peers, and older students as they cleaned an outdoor area and transformed it into a space for pollinators to flourish. Students increased their community involvement as they used their combined efforts toward a mutual goal.

## Potential Extended Project Impact

Adding another layer of depth and meaning to this activity is the lasting impact it has on the students and teachers within the school. Time is needed for the bushes and seedlings in the garden to grow and reach their full potential, similar to the young minds within the school. As the students progress through the next few years at this school they have the opportunity to see the lasting impact their contributions have made. The students will see the garden grow and change throughout multiple seasons, thereby,

engaging in a learning experience with lasting benefits. Future activities allow teachers opportunities to create lesson plans centered on the upkeep and maintenance of the school butterfly garden.

## Tips and Suggestions for Implementation

Future attempts to recreate this activity would benefit greatly from a well-organized plan to divide the multiple tasks that are involved in creating a garden. When planning a garden project like this, it is important to be well-organized and to be flexible with changes in the weather or school calendar, with particular attention paid to the type of plants that thrive in certain environments. Additionally, the materials needed for this activity may be expensive and it would be beneficial to plan in advance with time to apply for financial assistance or grants that may be available in the community. The school principal and several local businesses sponsored this project. This project received seed donations from a local pollinator activist, as well as donated cement pavers from another teacher.

## Final Remarks

Overall, this activity incorporated multiple lessons from which the students learned. Because the organisms in the butterfly garden transition from season to season, students were able to see the lasting impact their participation has made in changing the environment for the better. Through the act of improving a public space at their school, students engaged in a collaborative, proactive approach to science and art. The students' participation in the butterfly garden opened a dialogue amongst the students regarding their self-awareness of their role in the environment. Following the completion of the activity, students wrote about their experiences as participants in building a butterfly garden as well as a continued desire to maintain the beauty of the garden. These writings exhibited student self-awareness regarding the importance of protecting one's environment. Additionally, students reported a desire to plant pollinators at home in their own yards and gardens. The hope of the students involved in this study inspires the authors to be optimistic about future outdoor environmental endeavors with students.

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