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Imagining Insects: Integrating the Fine Arts into Writing, Literature, and Science through Project-based Learning Activities

MICHAEL LETTS AND KIA JANE RICHMOND

Whether working with college students in English, Art, or Science Education or young people in K-12 classrooms, educators should recognize visual literacy as an important component of communication in all subject areas. From birth we begin to view and respond to visual information. This is as basic to early development as verbal learning. Through vision we learn spatial concepts and affective responses to our world. Images contain an immediacy and richness of information that can be read quickly but considered in depth, yielding opportunities for interpretation and constructed responses. Color induces real physical and emotional responses.

Creating images catalyzes synthesis of new concepts via direct application, without the barrier of the more abstract symbol system of written language. Brill, Kim, and Branch (2007) argue, “Visual messages are fundamental to complex mental processing because they provide information and opportunities for analysis that text alone cannot provide” (p. 51). Implementing integrated cross-curricular content in the classroom facilitates the process of synthesizing ideas from disparate sources, which is a key component in the development of creative thought. This article is focused on ways for teacher educators and classroom teachers to use the fine arts to help students develop visual literacy and to make connections between concepts in reading, writing, science, and art.

As a teacher certified in Art and English, Michael spent a number of years teaching both subjects in middle and high school. This made obvious the differences in student engagement in the two areas. In art, the great majority of students would happily engage in a wide variety of projects, having fun and learning at the same time. In English classes, Michael was able to engage the whole class most of the time on days when he would use project-based learning to explore content in reading. Project-based learning is “a systematic teaching method that engages students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks” (Buck Institute for Education, 2012). This process helps students learn key academic content, practice 21st Century Skills (such as collaboration, communication, and critical thinking), and create high-quality, authentic products and presentations. Current practice in the arts focuses on theme-based learning, with an emphasis on “personal connection” to engage the students. Kia designed a number of projects and used methodology that had students naturally working with literary concepts, so that terms and understanding of these concepts were acquired naturally.

One such project offers a number of possible variations for learning level and depth. The project was developed as an elementary level art project in a class on teaching visual arts for pre-service elementary generalist teachers in the elementary education program at Northern Michigan University. These students tend to have minimal training or skills in visual art. For many, this is their first art class since their own elementary art experiences. This project has also been field tested successfully in a 5th grade elementary class by an art education major during her student teaching experience.

Through this project, students work with connections between research and fiction, with strong cross-curricular content in science and art. Students also gain insights and experience in creative thought processes, a skill that is enormously important, but often overlooked in the classroom. Young writers build characters, settings, and action while engaged in a fun and imaginative project with a personal connection in current events and concerns for the natural environment. They practice and learn visual literacy as well as research and writing, in an authentic, holistic project. This visual literacy, the making of meaningful forms, is not so different (in conceptual processes developed) from reading and writing. In fact, the Common Core State Standards (2012) require students in English Language Arts in grades K-12 to “…integrate information from oral, visual, quantitative,
and media sources, evaluate what they hear, use media and visual displays strategically to help achieve communicative purposes, and adapt speech to context and task” (pp. 8, 60). What’s more, students must “integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words” (Common Core Standards, 2012, pp. 8, 60).

Visual literacy, unlike written language, allows students to understand and create meaning based on visual experiences with culture and everyday encounters, unmediated by prior translation into verbal form. This mirrors the authentic experiences of our lives, which are permeated by visuals seen on computers, billboards, on buses and in supermarkets. And all these subjects are united by the potential to facilitate and express creativity, the highest level thinking skills on Bloom’s Revised Taxonomy (Overbaugh & Schultz, n.d.).

A constructivist approach (Educational Broadcasting, 2004) allows higher-order thinking to be put into practice, where students recall, share, discover and create their own knowledge. This project combines reading, writing, science and visual art in an authentic investigation. There is also the potential to integrate physical education, social studies, and more. The writing portion in the present example is fiction based on research and imagination, which is the typical process of science fiction writing.

Readers should know, however, that many other projects are possible. One educational resource recommended for connecting art to other subjects (such as Social Studies) through writing is Ehrenworth’s Looking to Write (2003), which offers teachers chapters focused on connecting the work of Picasso and poetry; American landscape paintings and historical writing; short story writing and flexible cultural viewpoints; and mythology and sculpture. Using the project described in this essay, middle school teachers might extend an examination of Manifest Destiny in American History by having students consider what open spaces looked like before settlers moved westward and displaced indigenous peoples. Students could create visual representations of those concepts and compare/contrast those with the work of Hudson River School artists such as Thomas Cole and asked to write historical narratives from multiple perspectives. The engagement of students’ imagination—whether in consideration of historical concepts or in understanding insects and the environment—is key to project-based learning.

Artists

The project is first presented as a problem to be solved, with a question to be answered. The question can be formulated to fit the desired outcomes for any given class. For example, “how do we find new ideas, based on nature, to solve environmental problems?” Or, “how are artists and writers inspired to create systems based on nature?” These authentic questions are important parts of project based learning, to focus assessable objectives and outcomes, and to assure authenticity.

Students are then introduced to examples of artists in order to validate the conceptual process and authenticity of the insect image as an artistic practice. Any number of artists’ works can be used, found in children’s books and scientific illustrations, or even visuals from cinema. The validation of wildly imaginative ideation, without regard for the constraints of reality or what may seem to be possible, is achieved by using images from the sketches of Leonardo da Vinci available on the web (www.leonardoda-vinci.org). The class views his drawings of flying machines and point out that nothing becomes possible until we have the idea, no matter how impossible it may seem. This is an excellent example of an artist/scientist basing concepts on nature while not being constrained by concerns of existing technology of the time to dictate possibilities. Michael likes to point out that the Wright Brothers had no proof that human flight was possible either.

Alfred Keller (1902-1955) is the second artist that the class views. Although he is not as well known as da Vinci, his work exemplifies the use of insects as sculpture. Students are fascinated by the sculptures he created for the Berlin Museum of Natural History. His works are an authentic model for the forms of a museum display. Keller made his insects from papier-mâché, which is inexpensive and easy to use in the classroom. This validates the medium as an authentic professional process in art making. Keller’s model of the Brazilian treehopper, Bocydium Globulare, is one example of a particularly unusual insect to inspire imaginative use of shape and form in student creations.

Knowledge Building

To extend the project, Michael uses a language activity to activate prior knowledge. This can be done as a whole class in a word web on a whiteboard or in smaller breakout groups,
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using colorful markers on large paper to create a variety of webs or charts which can be shared and displayed around the classroom. The use of color in this activity adds an aspect of creative decision-making that engages students in purposeful play. The objective is to create a chart of as many different kinds of pollution and environmental problems as students can think of. The group constructs learning through a sharing of knowledge, in a process that triggers recall, creating an inventory of what students already know.

Including and discussing news reports on a current environmental problem that may not be so well known by your students can expand this. Unfortunately, there is no shortage of current events to draw upon. The after effects of the 2011 earthquake in Japan are a recent example. Michael’s students have invariably been aware of and concerned by issues in the environment, so the personal connection to the issue has resulted in a high level of engagement.

A deeper understanding of cause-and-effect relationships can be constructed through a two-step approach to building knowledge. The first step is the listing activity of the problems. Then, each student or small group can move to a research phase, devoting a block of time to researching the cause and many possible effects of an issue of their choice. Students researching their topic may be assigned to make a graphic organizer showing the cause and ten possible effects of the issue. Using web-based research, upper level students can also practice documentation of sources, even if they are not producing a traditional research paper. Graphic organizers can become the basis of more formal and colorful charts and visuals that can be developed to create museum-like displays of the final products.

As a way to build visual awareness, students are introduced to a wide variety of examples of photographs of insects. I use a slide presentation of photos found on the web. Simple search terms such as “weird insects” will yield many colorful and interesting images. Teachers may also include information on behaviors, environments, diet, predators and more, for one or more of your examples. The “creepy” factor that this includes will be intriguing to your students. It will help to choose insects with very distinctive visual features and colors that can be pointed out and discussed, in order to build visual knowledge. It is important when using visual examples to choose a wide variety so that student projects will display the same diversity. I frequently use examples of helmeted insects and of colorful wings to show the wide variety of odd and beautiful forms that are possible.

Michael also uses a list of amazing bug facts that are fascinating and build knowledge of the wide variety of behaviors and functions of insects. This opens students up to devising very creative solutions to how their own insects can function. The fact that crickets have ears on their legs, or that the preying mantis is the only creature on earth that has one ear and can turn it’s head 360 degrees, will open up visual possibilities. A search for “weird and amazing facts about bugs” will give you more strange and disturbing facts to fascinate and engage students. One of the more complex and interesting topics for upper level students is mind control in the insect world. Insects use and control the behavior of other species; this is a particularly strange and unusual aspect of science. Students are actively engaged when told each year the average person will eat several insects while she is sleeping. During the average lifetime, a person consumes about 70 insects and 10 spiders during sleep.

Honeybees are also a species that engage students. These bees exhibit a complex set of interactions and functions in the environment. Students reading about or researching bees find environmental issues and benefits and even communication among these creatures. Honeybees communicate with each other through a dance “language.” Karl von Frisch (Breed, n.d.) received the Nobel Prize in 1973 for deciphering the language, which consists of two basic dances: a dance in a circle for indicating a source of nectar, without giving information about distance or direction, and a tail-wagging dance to indicate the exact distance to the nectar source. This suggests an opportunity to incorporate a kinesthetic activity into a language lesson by written description and performance of dance movements as communication codes for students’ species.

Creating the Concepts

Following this phase of knowledge building using visual information, students begin a short writing exercise to create the basis of their own fictional insect character. Students write short answers to a set of questions that describe the form and function of the insect. Questions can be as simple or as detailed as is appropriate for the age level and abilities of the students. An example Michael has used for upper grade levels takes the form of a fictional memo from a museum:
MEMO: PISMO MUSEUM OF NATURAL MYSTERY BUREAU OF ENVIRONMENTAL MISDIRECTION OFFICE OF SAVING THE PLANET
RE: NEW SPECIES PROJECT

Your job, should you choose to accept it, is to create a new species of insect to aid in our efforts to promote a healthy planetary environment. The new species may bow to no one in doing what is necessary in its mission. Yes, it may even leap tall buildings in a single bound. To begin, investigate and answer the following questions:

1. Where will your species live?
2. What will your species eat? How will this affect its physical attributes?
3. How will your species move (consider unlikely choices)?
4. How will your species communicate and relate to other family or tribe members?
5. What predators might attack your species? How does it escape or protect itself?
6. How does your species function to promote a healthy environment?
7. What is the name of your species?
8. What color or colors is the species, and why?

Students are encouraged to be as crazy and inventive as they want. Ideally, they produce a wide variety of insect forms and solutions. Discussing the roles of color in nature can help students use color reactively and reasonably. Any number of examples can be incorporated to discuss: why tigers and zebras have stripes, why skunks have their stripes, the function of color in flowers, etc. The answers to the eight questions are building the outline that will allow students to create meaningful texts in both visual and written forms.

Once they have used the questions to determine a set of characteristics, they are ready to begin the project. Student examples from past classes are shown. Best practice is to show a number of widely varied examples; too narrow a range or few examples will tend to limit creativity, as students will be influenced by the examples. It is better to show no examples than to show too few variations on solutions. It is certainly fine to omit showing examples, in order to encourage creative and original solutions.

Students are then introduced to the available sculpture materials. This varies, depending on grade level and what the teacher can obtain and work with. The simple process is papier-maché, and a variety of tutorials for the medium are available on the web or from a school art teacher. Students use wire to create the basic “skeleton” of the structure. This can be elaborate or very basic. An elaborate wire model would require only the papier-maché to cover it, as a skin. A simpler model can be a minimal armature, with the body mass created by crumpling and forming tinfoil around the wire. Masking tape can be used to make a first layer of skin before the papier-maché but is not necessary. A wide variety of found objects can also be used to create insect bodies. These included toilet paper tubes, egg carton segments, old light bulbs, popsicle sticks, and anything else that can be assembled and covered with papier-maché. Other craft items can be used as desired. Students are encouraged to bring in their own items. Pipe cleaners, feathers, beads, colored cel-lophane and colored wire have all been used. A variety of fasteners or glue can be used. A station with a few hot glue guns is helpful, but glue is not really necessary for the project.

Once the insect is covered in two or three layers of papier-maché, it is ready for color. Students use inexpensive liquid tempera to paint the insects. Markers and paint pens can be used to create details, and other items can be glued on to finish off the models with antennas, wings, eyes, etc.

This is the challenging and creative part! The teacher will need to make a prototype to determine and learn the process, but after that it will become an easy and very engaging project for students. Each time it is taught, more tricks and skills will be learned. To keep the activity very simple and easy, colored clay can be used to create insects. There are a wide variety of materials that could be used, including air-dry clay; however, they may be more costly and offer less opportunity for creative problem solving than working with a wider variety of sculptural materials.

Student Artists

Many of my students have very low levels of confidence in their ability to be “artistic.” This is usually based on drawing ability, or lack thereof. It is important to demystify the concept that talent in art is a gift that one either has or does not, by identifying the fact that many have had no formal training or practice in art since elementary school. Often, there will be one or more students who play musical instruments at a proficient level. There are also students involved
in sports at the university level. Kia asks these students what their ability in these areas would be if they had stopped all involvement with them in fourth grade. She also points out that our ability to use language is modeled, taught, and practiced every day of our lives, and that we all are able to function at high levels in reading, and writing and communicating.

Students need to realize that they can construct artistic forms, that this is not a rare gift that cannot be developed. Skills used in constructing art forms include trial and error, planning, problem solving, interpretation, invention, synthesis of ideas and more. These skills are not the exclusive domain of drawing, so lack of mechanical ability to draw should never be perceived as lack of ability to be creative in using visual communication. We can choose any number of media to facilitate visual experimentation. Collage is one of the best, allowing immediate access to visual communication with minimal barriers of skill to be acquired. Constructing maps or graphs to show location, environment, and climate also invites synthesis and requires prior knowledge typically already taught in social studies and science.

If we ask students to write poetry, we can concentrate on teaching a form of poetry that fits the learning level. Students do not need to also double their vocabulary to write poetry. Even if that would be good, it would create a barrier to some very expressive potential in their existing vocabulary. So it is with visual creativity. The received erroneous idea that drawing skill is the single measure of artistic ability is damaging to our student’s development of visual conceptualization. So, it helps to convey to students that drawing is only one type of visual art, and that it is not necessary to draw realistically to communicate visually. We survey the wide variety of art forms, such as fashion design, interior design, found-object sculpture, collage, comic book art (including comic strips and graphic novels—Charles Shultz’s Peanuts is ideal for a very simple but richly meaningful drawing method), culinary arts, and more, in order to show that the key concepts in art are not dependent on drawing ability. Rather, it is visual literacy, the ability we all have to understand and use visual communication.

One of the easiest introductions to understanding and applying the elements and principles of art, using collage as a medium, is Molly Bang’s (2000) book, Picture This. This is a quick, easy and fun way to begin to understand basic visual literacy, useful for both teachers and students. Figure 1 is an example of one student’s solution to this assignment. She wrote:

The name of my bug is Zebraarselladecesso, which is an Italian rooted name (zebra meaning “zebra,” arsella meaning “mussel,” and decesso meaning “death”). As gathered from the meaning of its name, the insect’s purpose is to kill the zebra mussels that are infesting the great lakes.

The appendage on the insect’s backside is used to crack the shells of the zebra mussels and the wedge-like feature upon its head is used to open their shells. Once the shells are opened, the insect will then smash the innards of the zebra mussel with its rear appendage, killing it.
The long, narrow shape of the insect's body allows for its ease of movement underwater, where it is primarily found. The insect will spend most of its life underwater, but its fins double as wings. Thus, when it has killed the zebra mussels within one body of water, it is capable of flying to the next.

The insect feeds off of small algae particles within the water, so once all the zebra mussels die off, it will still be able to survive. However, it will use its abilities for other less ecological reasons like wedging oysters open (without killing them) to obtain their pearls.

The outer shell of the insect has adapted to the environment in which it is commonly found. Since zebra mussels are often found upon rocks at the bottom of lakes, the color of the Zebraarselladecess reflects that of an algae covered rock. Also, the insect has stripes so that it may blend in with the zebra mussels, which will prevent the fish of the lakes from eating them. The light color of the insect's body permits it to take on the color of the water and its fins/wings are transparent bluish-green, allowing for their quick movement to be virtually invisible underwater.

After the Zebraarselladecess is introduced to a lake, zebra mussels will become an obsolete species of that lake and will no longer cause harm to its ecosystem.

Many of this student's classmates chose to write the explanation in story form. One narrated the story of his chance sighting and discovery of an unusual new species. Others have written narratives from the point of view of the insect. There are a variety of ways to relate the life and characteristics of the new insects.

Sharing students' products through a display created in the classroom or in a showcase in a common public space is key. Such a display would be similar to a natural science museum, where a model of a species is shown along with engaging signage giving relevant and interesting “facts” about the species. Each student could use a box to create a kiosk style display, either inside the box as a diorama, or around the outside as a pedestal style display. The insect model could also be introduced to students as a model for a special effects science fiction film. Excerpts from films could be viewed as examples. A story-based scenario could take the form of a comic strip or graphic short story. There is endless potential for a variety of formats and authentic exhibition opportunities.

The focal point of this structure is not limited to insects. The project could center on any number of subjects. Plants, flowers, animals, and other living things can yield very similar opportunities. Almost any subject which students can easily build using basic sculpture and drawing skills could be implemented. In Social Studies, war memorials are particularly rich topic, relevant and filled with compelling drama in cases like Maya Lin's Vietnam War Memorial. The best topics will be those that can yield a wide range of diverse visual examples. Too narrow a range of examples will limit students' perceived choices, and therefore their creative ideas. Topics should also yield stories and anecdotes that will be fun, compelling, and relevant to the age group, in order to make a strong personal connection and engage students in authentic investigations.

Whether the final written product takes the shape of a story or a report, the fact is that through the process of researching, creating, and developing visual and written responses to the questions posed in the beginning of the project, students cultivate an understanding of visual literacy and environmental issues that will last long beyond their time in the classroom.

Expanding the Scope

This essay was intended to help teachers discover ways to use the fine arts to help students develop visual literacy and connect ideas across the curriculum. Teachers of English Language Arts and other subjects should consider how engaging students through projects such as the one described could help them to meet the standards in reading and writing while also giving students the opportunity for hands-on experiences with the arts. The benefits of doing so include helping students to develop confidence in themselves as makers of meaning, improved understanding of research in writing, and enhanced ability to synthesize information from various sources, and increased creativity in art and language.

We both invite teachers to take the risk to try project-based learning lessons, which connect the arts and other content areas while focusing on common themes, personal connections (Walker 2001), and creativity and analysis. The activities described here can help students to show what the
Common Core State Standards (2012) call for in terms of “increase[ed] sophistication in all aspects of language use, from vocabulary and syntax to the development and organization of ideas” (p. 42). What’s more, projects such as the “imagining insects” sequence can boost students’ interest in and appreciation of the visual arts as part of a broader liberal arts education.

References


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