Learning About the Environment I: The Regal Swan Curriculum

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In their extensive review of the literature, a research team discovered that not only have minimal efforts been expended historically for the care and preservation of swans, but, more critically, that significant numbers of swan deaths could be mitigated through use of vaccines. Further, the team’s research showed that little about swans is included in children’s and adolescents’ science and literature textbooks and trade books.

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The purpose of this study was to design and implement a curriculum based upon swan research and preservation and to determine how the curriculum impacted student learning. In 2000 a research team initiated a study of various species of swans and their habitat requirements in captive settings. Applying the knowledge bases found in the physical and natural sciences, as well as the literary and fine arts, the team investigated and documented the history and care of swans. The team’s studies demonstrated that through vaccines and special commitment, it was possible to preserve and stabilize swan populations (Gardner, Funk, Wilson, & Bolin, 2002).

The team recognized that children and adolescents, the wildlife caretakers of the future, must develop that knowledge about the environment required to preserve swan
lives and habitats. The team considered it critically important that swan research become a part of science and reading curricula nationwide. Historically, minimal efforts have been expended for the care and preservation of the elegant swans and little about swans is available in print.

A review of classic (fine, qualitative) literature indicated that children’s and adolescents’ books included few fiction and nonfiction works about swans (Anderson, 1909, Canfield, 1978, Fox, 1996, Geras, 2001, White, and Zwerger, 2002). Interestingly, Geras’ (2001) and Zwerger’s (2002) works are based on Tchaikovsky’s *Swan Lake*, a ballet tribute to swan grace and presence.

The literature review also revealed that textbooks, both literature and science, rarely addressed the issues surrounding these elegant creatures. What little nonfiction printed material about swans does exist is published only in various veterinary journals (Perrins, 2002). Until the authors’ research, there were no attempts to create swan materials and engagements for the edification of children and adolescents.

Understanding of swan life and knowledge of preservation strategies were sorely needed. An accurate, informative, stimulating, and comprehensive reading and science swan curriculum might help ameliorate the cyclical phenomenon of multiple swan deaths due to ignorance and neglect.

Five members of the team, the authors of this article, with an average of 30 years of experience in professional education, writing, research, and curriculum development, collaborated to design and field-test a swan curriculum. The swan curriculum was created to be integrated within already established reading, literature, and science curricula K-12.
The curriculum would provide a model for appreciation, care, and preservation of neglected species and the environments on which they depend.

The curriculum was created with a focus on five essential goals:

1) to develop interdisciplinary reading, literature, and science materials and engagements which build learners’ knowledge of swan research and swan lives;

2) to enhance learners’ *dispositions* toward swan care and preservation specifically, and ecological harmony generally

3) to develop learners’ abilities to critically read and interpret swan literature, art, and music, from oral tradition to modern realism;

4) to broaden learners’ scientific knowledge about the lives of swans and the important roles of swans in the global hierarchy; and,

5) to develop learners’ recognition that the research processes utilized in development of the swan curriculum might be applied to other neglected species and environments.

Theoretical Framework for Development of the Curriculum

The research of prominent investigators in three important educational and psychological areas of learning – interdisciplinary and constructivist learning, brain compatible learning and teaching, and differentiation of instruction - was integrated within the curriculum. The theories, philosophies, and research findings of these investigators provided the framework for the development of the cognitive strategies and materials essential to successful achievement of the five curricular goals.
First, the Regal Swan Reading and Science Curriculum reflects the strong relationship of learning and teaching to interdisciplinary constructivist approaches (Kasten, W., Kristo, J., & McClure, A., 2005; Manzo, A., Manzo, M. & Thomas, M., 2005; Matin, A., Hopkins, J., Johnson, S., LaHart, D., Warner, M., & Wright, J., 1994; McIntyre, J. & Byrd, 2000). Constructivism has enriched classrooms with the powerful view of learning and development emphasizing the active roles of learners in constructing meaning and making sense of their worlds (Piaget, 1969; Vygotsky, 1978).

Within the swan curriculum, the catalytic interrelationship of arts and sciences challenges learners to proactively address the issues surrounding swan life, preservation, and appreciation. Rather than passively receiving information, learners proactively live the experiences and content of the curriculum (Boyer, 1997). Learning becomes a performing art and science (Ehle, 1991). Learners engage in active inquiries, field studies, verbal and written accounts of empirical observations, peer collaborations, aesthetic expressions, and problem solutions in exploring the issues surrounding swan preservation.

Second, the curriculum reflects the research on brain compatible learning and teaching (Breur, 1993; Caine & Caine, 1994; Gardner, 1983; Jensen, 1998). Research on the unlimited capacities of the brain provides multiple definitions of intelligence and numerous approaches to resolving inquiries (Gardner, 1983; Sternberg, 1985). In the swan curriculum, learners’ brain processes are enhanced through multiple strategies, including visualization, inquiry, dramatic expression, movement, dialoguing, novelty, broad thinking, and most importantly, emotion (Jensen, 1998). Emotions and affect drive
attention, meaning, and memory (Caine & Caine 1994; Sousa, 2002). The brain tends to remember those things to which it has an emotional attachment (Jensen, 1998).

In an example from the curriculum, art and emotion are the basis of learners’ dance pantomimes of cobs’ territorial defenses of the pens and cygnets. The swans’ identification and avoidance of predators, expressed by students through dance pantomime, also evoke strong emotional responses. The art of dance pantomime involves students’ analysis and interpretation of swan behaviors, visualization of those behaviors, creative thinking, and dramatic expression of the swan behaviors through movement, leading to broadened knowledge of swan lives. Dance Pantomime is preferably performed to music, e.g., that of Saint Saens (1993) or Willie (2002).

Third, differentiation of instruction within the swan curriculum, through identification and accommodation of learning and teaching styles, cultivates students’ and teachers’ optimal achievement (Barbe & Milone, 1981; Gardner, 1998; Goleman, 1995). For example, in the swan curriculum, engagements were designed to recognize learners’ individual cognitive styles and types of intelligence to facilitate discoveries of the ways animals, plants, and protists interact (Gardner, 1983; Gregorc, 1981). Some learners prefer to use analytic and scientific approaches (e.g., investigations of effects of pond algae on swan health), and some, creative and artistic approaches (e.g., creation of ballets, operettas, and literature about swans) (Gregorc, 1981). Others prefer to pursue solutions of swan habitat issues through linguistic study and expression; some, scientific/mathematical; some, musical/artistic; some, spatial; some naturalistic; others intrapersonal or interpersonal; and various combinations of these (Gardner, 1983).
In another classroom example, students and teachers collaborate to assign studies according to learners’ temperament types, as identified by Kiersey (1994). To illustrate, in a study of effects of pesticides on aquatic life, Rational Temperament Types might carefully prepare a document to present to a government agency. Artisans might create and present an operetta, dramatization, or metaphorical story. Idealists might prepare an illustrated address protesting the ethical use of pesticides in the environment. Guardians might devise a community team plan to provide care to the swans under all threatening situations.

**Curriculum Dimensions**

Although the swan population at the focus of this study is located in Central Florida, the research findings and swan curriculum can be extrapolated to swan populations nationally and globally. The swan reading and science curriculum is aligned with the Interstate New Teacher Assessment and Support Consortium Standards (INTASC), the Florida Sunshine State Standards (FSSS), and the standards of those forty-six states which share certification reciprocity with Florida, including West Virginia, Tennessee, Pennsylvania, Alabama, and Georgia.

The curriculum is designed for four levels - Pre-Kindergarten to Grade Two, Grades Three to Five, Grades Six to Eight, and Grades Nine to Twelve. At each of these levels, the curriculum engagements are constructivist, brain compatible, and differentiated. The engagements meet INTASC Standards One through Ten and FSSS Standards One and Two.

In the Pre-Kindergarten through Second Grade level of the curriculum, learners become actively engaged in performing explorations of phenomena about swans,
addressing the FSSS and INTASC competencies requiring students to understand concepts and express knowledge. Learners constructively observe, tell, categorize, create, dramatize, draw, sing, dance, and write engagements which stimulate affect and emotions and thus motivate brain activity (Caine & Caine, 1994). Those important predictors of learning success in the arts and sciences – phonemic awareness, phonetic knowledge, comprehension, vocabulary, fluency – (National Reading Panel, 2000) are emphasized at this level of the curriculum.

In another constructivist engagement, children take a guided field trip around the swan pond, or, listen to a reading of *The Ugly Duckling* (Anderson, 1909). The children reflect on the trip, or the story, and then create a “Swan Word Wall” of cards representing new swan concepts learned. The words are placed in categories on the wall, e.g., types of swans, nontoxic foods for swans, basic needs of swans. The words are then compiled into sentences and used to create small illustrated books.

In Grades Three through Five, students continue to develop vocabulary, comprehension, inquiry, fluency, and motivation. Their comprehension of written, spoken, and kinesic expressions progresses from literal to interpretive to critical levels (Kasten, Kristo, & McClure, 2005). At this stage, students are gaining facility with narrative and expository forms of reading and writing. According to the studies of Richardson & Morgan (2000), because science learning is significantly dependent on student abilities to read and comprehend expository materials, literature reading and science reading are partners in all curricula. Professional organizations in science and reading support this principle (National Science Teachers Association, 2000; National Reading Panel, 2000; International Reading Association, 2005).
In an exemplification of this principle, “The Swan Word Jar" engagement helps students develop swan science concepts and write about them, thus addressing the FSSS and INTASC competencies requiring students to demonstrate understanding of terminology. Students make collections of the words they are learning about swans (e.g., cogs are male swans; pens are female swans) and place them in their own special jars. On the reverse sides of the words, they record definitions, etymologies, sentences, and illustrations. Similarly, the “Feathers” lesson engages students in identifying technical terms associated with swan and bird feathers. Working as research buddies, students collect swan feathers from the pond area, identify their parts, then draw and label the parts. They examine the functions of feathers, e.g., oil glands for grooming and waterproofing, and plot results on graphs. Reflecting the learning styles research of Barbe and Milone (1981), students are processing information through auditory, kinesthetic, and visual modality styles in these engagements.

The goals of the curriculum for Grades Six, Seven, and Eight include extensive scientific and literary inquiry. Students learn to investigate phenomena to determine veracity, authenticity, and predictability. They continue to refine vocabulary, fluency, and comprehension. Their abilities to infer, generalize, and extrapolate are increasing (Manzo, A., Manzo, U., & Thomas, M., 2005; National Reading Association, 2000; National Science Teachers Association, 2000; Richardson & Morgan, 2000). An emphasis on "Swan Research Projects" at this level heightens students' use of scientific and literary processes of inquiry to investigate information resources and write about swans and their habitats. After a review of the steps in the scientific problem solving process, students identify the possible investigation to be pursued, e.g., "Comparison of
Sexual and Asexual Reproduction in Plants and Animals Found in a Lake or Pond" and "Global Swan Preservation Efforts." On completion of their research (individual or group), the students compose "swan research abstracts" to be collated into a class journal and distributed to all class members and school and community personnel, thereby motivating both sequential/analytic and random/creative mind styles of students (Gregorc, 1981). Thus, the students are engaged in the inquiry, research, critical thinking, and problem solving competencies required by INTASC and FSSS.

An important goal for Grades Nine through Twelve in the established curriculum is a focus on preparation for future careers (Eggen & Kauchak, 2005). At this level, the swan curriculum focuses on independent research of swans and their habitats, providing background for more extensive senior research projects (Maton, Hopkins, Johnson, LaHart, Warner, & Wright, 1994). Students pursue, for e.g., "Production of Toxins from Decaying Matter Found in a Lake or Pond" or "The Life Cycle of Algae and Bacteria" and prepare written descriptions of their findings. These involve extensive empirical research and recording of data. The final copies are featured in the school and local libraries. An important research project at this level, both constructivist and brain compatible, is "Investigating the pH Balance of Several Fluids in the Swan." Students first determine pH levels of common household liquids, e.g., lotion, lemon juice, and detergent. Using the same procedures, they check swan solutions, e.g., tears, saliva, and urine, then record results, thus addressing the FSSS and INTASC competencies requiring students to conduct inquiries and engage in diverse instructional opportunities in both the arts and sciences.
At each level these engagements constitute just a representative sampling of the complete swan curriculum. The engagements inspire constructivist learning, differentiated learning, and brain compatible learning. They enhance reading, literature, and science learning while demonstrating the intricate balance of the environment and the creatures who inhabit it.

Methodology and Implications of the Curriculum Study

Pilot studies of the curriculum were field tested in Florida and West Virginia. The studies are ongoing and data continues to be compiled with resultant refinement of the curriculum. The field tests included five groups:

1. One group was comprised of 45 Middle School Students participating in a four-day program at an Exploration Museum in Central Florida. They were engaged in science, reading, and creative arts components of the curriculum. Results of a survey given to the students at the conclusion of the program showed that 100%

   (1) gained greater knowledge of swan habitats, preservation, and literature
   (2) enjoyed studying and learning about swan live
   (3) wanted to participate in another Exploration program so that they could learn more about swans

2. Another group included 60 secondary school teachers in a day-long Living Science Program at a wildlife sanctuary on a resort in Central Florida. Participants were engaged in science, reading, writing, and creative arts components of the swan curriculum, including swan testing. Respondents were asked: (1) Did the workshop meet your expectations? (2) How valuable was
the workshop to you? (3) What part of the workshop was of greatest value to you? All (100%) of the participants' responses were positive and supportive. Examples of responses were: "Exceeded my expectations; we were given a variety of activities to utilize with our students and learned a great deal as well;" "WOW, Learning IS a Performing Art - a very unique and interesting program;" “Awesome classroom ideas and techniques;” “Information valuable and useful for teachers.”

3. Another full-day workshop involved 50 middle and high school teachers, and administrators. Again the participants were engaged in science, math, reading, and creative arts experiences excerpted from the swan curriculum. Asked the same three questions, all participants stated that the workshop met their expectations. Comments included: “All areas of the academic studies were included today: writing, math, science, history;” “Stresses the importance of man’s role in the conservation and preservation of wildlife;” “The Regal Swan workshop is not just for science and math teachers. Reading teachers also benefit.”

Interesting material and hands on activities are a great way to teach reading strategies. The FCAT for grades 7-12 has 60% informational text on the reading tests;” “This program is a way to show future generations the importance of man in the preservation of the planet.”

4. The fourth group consisted of 80 pre-service teachers, 50 parents, and 100 K-12 students who met weekly for 15 weeks each semester for two hours in a West Virginia library setting. The program was comprised of reading,
science, and creative arts activities drawn from the swan curriculum, as in the previous three field tests, and taught by the pre-service teachers and their professor to parent and child(ren) teams.

Participants were given the same survey. Where readers were emergent, the items were read to them and recorded by one of their family members. Responses were consistently positive and enthusiastic. To the following questions, participants were asked to respond “yes” or “no.” Asked if they would like the programs to continue and if they would like to participate in similar engagements in the future, 100% of the pre-service teachers and families responded “yes.” Participants in both groups (100%) indicated that they had learned new information about swans’ habitats, safe versus toxic foods (plants), diseases and cures for diseases, health care maintenance, territorial behaviors, physical characteristics, and history. Both groups (100%) reported increased scientific knowledge about the lives of swans and the important roles of swans in the global hierarchy. An increase (100%) in knowledge and appreciation of swan literature and reading was indicated by both groups. Participants (99%) in both groups found swan art works and musical selections to be valuable and exciting. Both groups (99%) found connections and associations between the swan curriculum and the schools’ established reading, literature, and science curricula. Dispositions and sensitivities to swans’ lives were reported as increased (100%) by all participants. As a result of their experiences in the swan program, participants (99%) believed they could apply the research processes learned to other neglected species. All participants (100%) lamented the paucity of swan literature and science books. This is a need that must be addressed in the immediate future.
Discussion of Results

The results of the swan curriculum field testing demonstrated the values of including swan research in already established K-12 literature and science curricula. Those who participated in the field testing – teachers, administrators, pre-service teachers, students, parents – benefited from reading and science activities about swans, as indicated on their responses to the survey. The implications of the swan research, curriculum, and field testing for other neglected species are very positive. The swan studies and swan curriculum field testing are pointing the way to research and curriculum field testing about numerous other neglected species. On the basis of the team’s swan research and curriculum design, implemented in student and teacher groups K-12, the knowledge, appreciation, care, and preservation of swan populations is increasing. Participants who are engaged in this curriculum have many rich opportunities to gain knowledge and appreciation of swans, specifically, and other neglected species, globally.

The curriculum engagements described in this article provide a representative selection of those found in the complete Regal Swan Reading and Science Curriculum implemented in the field testing. The curriculum includes a variety of interdisciplinary thematic activities based on a strong body of research on constructivism, brain compatible learning and teaching, and learning styles research. The development of the curriculum and its study are ongoing. The curriculum will be field tested in other venues, again with a diversity of participants. Additional investigation will be conducted to further explore the full role of the swan curriculum in the already established literature, reading, and science curricula of the schools.
References


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