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## Building a Self-Supporting Web of Knowledge - What is Interdisciplinary Education?

by Katherine Ciesla

(Education 1100)

When students study material they often are given nothing tangible to connect that material to in the real world, or even in academia! An interdisciplinary approach to education attempts to remedy this sad situation by weaving information together into a cohesive body of knowledge the student can assimilate from multiple sources on multiple levels. There are several different levels of application for this approach, ranging from merely supplementing textbooks with commercial publications (novels, magazines, journals) to arranging an entire schedule of classes to teach complimentary to each other on the same general theme.

### Reading Skill Enhancement

“Most children are familiar with narrative texts: storybooks, chapter book series, magazines, and pop-up books. It is the transition to context texts that most often leads to the genuine difficulties children experience with reading.” (Duerr, 2008, p. 174) Textbooks are designed to represent the core of information in the most concise and direct manner for students to read, but such reading is completely foreign to their experience when they are introduced. This can result in students being turned off reading altogether because of how daunting and discouraging it can be to make this transition, “cold turkey.” An interdisciplinary strategy to counteract this would be to pair text book learning with commercial materials the students are more familiar with. This not only helps the students to learn to read textbooks effectively, but also gives greater depth to the subject material as “few textbooks tread subject matter with the breath and depth necessary to develop ideas and concepts fully” (Duerr, 2008, p. 175). The fiction or non-fiction trade books used in concert with the text also expose students to more genres and modes of writing than traditional text books and can act as a “magnifying glass” of sorts on the material being covered in class. For example: in a history class, while studying slavery in the United States students might also read (in part or whole) *Narrative of the Life of Frederick Douglass, an American Slave* to take a much closer look at what life as a slave was like during the time and how people felt and thought during that period about slavery.

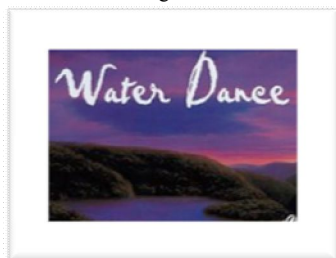
Another benefit of this interdisciplinary application is that students’ retention of material is heightened. “It has been repeatedly evidenced that students are more likely to remember personally meaningful material” (Duerr, p. 176) A discussion about a story that is laden with content related to the curriculum is going to increase student’s assimilation of that curriculum more potently if they are allowed the opportunity to absorb more than the cold facts of the textbook by coupling it with what they read additionally which is likely to be much more appealing to the students emotionally; “it’s apparent that using modern literature in tandem with textbooks overcomes many of the limitations – comprehension, vocabulary, and application to real-world scenarios – that students face when reading. The best trade books provide depth, accurate information, varied reading levels, and motivation of learning.” (Duerr, citing Vacca and Vacca 2005, p. 176)

### Bringing Different Ends of the Spectrum Together

Interdisciplinary education can be utilized to bring subjects from different ends of the academic spectrum, like science and language arts, together as well – giving students something to connect to while learning concepts from both subjects at the same time. Joanne Toft and Kathy

Scoggin present a curriculum in this spirit based on the book *Water Dance* by Thomas Locker in their article for *Science and Children*. The idea they base their curriculum on is that students will be more interested in the scientific workings of natural water systems (evaporation, precipitation, condensation) if they can connect it meaningfully to what they have themselves observed all their lives. They use the book to combine science, art, and literary standards into one comprehensive learning unit the students will have an easier time assimilating as a whole than they would have if it were presented in parts.

Figure 1



Locker's book is a unique configuration of his watercolor paintings of water phenomenon coupled with poetic text describing the painting and what it shows of water's dance (see fig. 1). Using this art base, they asked students to tell them what they thought they were looking at, and what – based on the cover art – they thought the book would be about. "Students speculated that water was dancing or people were dancing with water. They also wondered if the book might be connected to the woods because of the trees on the cover illustration." (Scoffin & Toft, 2007, p. 21) During a subsequent matching game they passed out words on slips of paper to students in small groups and asked them to match them to taglines of poems pulled from the book based on what they already knew about water systems. Students were then asked to defend or represent their combination choices. This allowed them to assess what students already knew about water systems, by listening in to the group conversations, and gave them a better idea of what material they needed to cover most in the coming unit to build on that previous knowledge (or correct erroneous knowledge/supplement incomplete knowledge). "When we heard, "It would help if we knew what a thunder head was," we realized we needed to focus more on vocabulary...I heard one student say, "Well a front comes before something so a storm front must come before the storm." This quick formative assessment helped us see where students had misconceptions and how they were using vocabulary words" (Scoffin & Toft, p. 22).

This lesson plan goes on to cover poetry, science vocabulary, and students presenting their new knowledge. Taking it together in a unit allowed the students to build a real comprehension of water systems, poetry based on nature, and even some appreciation of art related to nature. This is the ultimate goal of interdisciplinary studies: that students acquire multiple systems of information simultaneously, building one off the others as they learn them in concert.

#### Putting the Independent Back in Independent Study

Sometimes interdisciplinary education is simplified to just allowing students to do their own work and their own learning – in their own way. Susan Socha, a high-school mathematics teacher, on the last day before spring break allowed her students to do just that in their study of exponential decay by incorporating a science experiment. The experiment was simple: fill a plastic bag with water, poke through a pencil piercing both sides of the bag, and move the pencil back to allow water to spill out into a measuring device. There was no worksheet, no written instructions, she merely allowed the students to perform the experiment and record their results in their own devised manner in small groups. "They were to release water into a cylinder, use the stopwatch to clock the release

time, measure the amount of water in the cylinder after release, and then empty the cylinder and repeat the process until the bag was almost empty.” (Socha, 2001, p. 450) Once they had completed this task, some groups keeping continuous time while others were very haphazard with their methods, she presented four different graphs and asked the students to discuss which graph would best model the information they had been asked to collect. She led them through how to produce these graphs on their calculators, a programming exercise usually read from the text book and often misunderstood, and they were able to match their results to the graph their calculators produced to determine success or failure of the programming they’d used. They were also able to observe by trying different graphs that the best matching graph was quadratic, which led to an informative lesson of the quadratic formula. “During this lesson, the students learned more mathematics than I had originally planned to teach. They learned how to set up an experiment, collect and organize data, use their calculators to interpret the data, and then relate the data to the real experiment. They did not use a worksheet, written directions, or direct instruction.”

By combining mathematics with science and allowing one to flow from and back into the other subject’s areas Socha was able to cover amazing amounts of ground in a single class session (and the day before spring break too! Usually a wasted day turned productive is nearly an educational miracle) and the students are far more likely to retain this information, having a personal experience to connect it to that was built in the classroom primarily by themselves.

#### Interdisciplinary Learning and Multiple Intelligences

One of the strongest advantages for interdisciplinary learning is that the activities and discussions that must take place to combine and overlap different subject’s approaches to the same theme of material open the door to using different teaching techniques to appeal to students various intelligences. In “The Human Story, From Hominids to Homo Intelligens, A curriculum Map for 5th Grade” Jerry E. Fluellen Jr. presents several projects which encompass the multiple intelligences of learning pioneered by Howard Gardner. This yearlong lesson plan is subsumed under the Harvard Project Zero teaching for understanding. The curriculum suggestions include a study of human cells and a science fair to exhibit the growth stages of things observed under controlled conditions, a literary study of character or idea changes during the span of the story, a study of a city (New Orleans is given as example) to see how it evolved due to human migration, musical studies of changes in tone, melody, and phrase during songs or the development of style of great musicians and composers over the course of their careers and other studies of change to better comprehend the changes that occurred during and shaped the course of human evolution.

Instead of restricting this learning to a strict study of evolution, this curriculum seeks to encompass the larger study of change as a concept, and then narrow to the subject matter only after that understanding is achieved through studies in almost every field of Gardner’s multiple intelligences. By incorporating knowledge in all these fields, students are not only achieving an understanding of human evolution that will have more depth and retention potential, but also acquiring knowledge in a number of fields outside of strict science that they can choose to pursue later or apply to concepts presented in the future. This type of curriculum also helps make the study of evolution appealing to students who may not already be predisposed to logical/mathematical thinking that is so crucial in science, because they can explore that concept from a musical-rhythmic approach with an understanding of change from that sector to apply to the science of evolution.

#### Connecting Information

Interdisciplinary learning is all about creating connections between one knowledge and another when those connections have to come through lecture it can be challenging; some subjects require a large amount of lecture to impart information to students before anything more can be done with it. In this instance it is possible for teachers to work with each other by combining their

classrooms for short periods. A study done by Rebecca Norwacek of such an endeavor, “A Discoursed Based Theory of Interdisciplinary Connections,” observed such an exchange involving a literary professor whose class was studying *The Merchant of Venice* and the importance of contracts in it and a religious studies professor whose class was studying Hobbes and contracts. The discourse that took place between the two instructors while their students looked on was thought provoking and allowed students to see two perspectives on the same material where normally they would only be exposed to one. There is one significant downside to this approach, however, in classroom atmosphere being disrupted by the presence of another instructor changing the dynamic. Students who are used to having a certain interaction with their teacher in a certain class sometimes react negatively to another instructor coming in and “intruding” with their own takes on the subject matter or offers another perspective. Repetition and discussion with the students about the objective of such cooperation go a long way towards lessening these negative feelings, but they are not dispelled completely in any case when classroom dynamics are altered only occasionally.

#### Glen Westlake Middle School Experience

To this I would like to add a personal account of the benefits of interdisciplinary studies. During my years at Glen Westlake Middle School in Lombard Illinois I experienced a curriculum that was themed and incorporated different studies into one unified lesson plan between classes. The theme was Ancient Egypt and to cover this massive topic our teachers each took a portion, uniting them in a culminating activity of an Egyptian Fair at the end of the quarter. In mathematics we studied the construction of the pyramids based on the triangle, geometry lessons about angles and the structural soundness of the pyramids formation that resulted from the use of angles. In language arts we studied hieroglyphics and wrote about our own lives to decorate the walls of the pyramids we build in art class. In science class we mummified an apple, to represent a real mummy, using Epsom salts and sand, and learned about the natural mummification qualities of dry deserts on the human body by absorbing the moisture within it. These united efforts produced an enthusiastic and deep learning environment where we gained large amounts of knowledge about ancient Egypt and the culture that embraced such practices which in turn made our history class vastly more interesting than looking at sides would have been. This themed study of Egypt is a classic and full-bodied example of interdisciplinary education working to serve students with a varied and accessible learning experience, which I remember to this day because it was very hands-on and inter-connected.

#### Putting it All Together

Interdisciplinary study can bring knowledge together for students into an easier to assimilate package. Like a meal instead of random foods put on a plate together, it takes effort to blend information and package it in a way that brings it together correctly. This requires additional effort on the teacher’s part and careful curriculum planning, sometimes with other teachers and classes involved. The increased work and planning have a big pay off for students though, as the research supports, because through blending knowledges together they receive a more well rounded and deeper understanding of any given concept or knowledge.

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