The More We Change, the More We Remain the Same

The Electracy Model of Teaching and Learning

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Abstract

Throughout time, humans have utilized different technological tools to enhance both basic communication and learning. For instance, humans have gone from cave drawings to web sites; from petroglyphics to blogging; from conversations to instant messaging; and from story telling to e-books. As such, technology has played a key role in shaping how humans communicate and understand one another. While technology has cycled through novel methods of teaching and learning, so too does the learning process cycle through on an individual level. It is important to note the coinciding patterns of cycles, a larger global pattern within a reoccurring internal cycle of teaching and learning, which includes many of the philosophical orientations to learning. Therefore we should be aware of the cycles and more effectively communicate to an audience that resembles a moving target.

Keywords: Electracy, Technology, Teaching and Learning, Dialectivism

Introduction

Background/History

Historically, as well as today, appropriate pedagogy continues to be an elusive, ever-changing bedfellow. We identify cyclical parallels to teaching, learning and technology. In this paper, we will provide a review of fundamental ways in which humans have taught and learned. From storytelling to print to PowerPoint presentations, these three different, yet interwoven methods of communication will be described. We label these three methods the oral mode, or orality, the literate mode or literacy, and electracy. This newest mode involves the use of computer or electronic forms of text and images.

Technology and Human Values as Cyclical Parallels

Cyclical models are popular in the natural science and are an excellent model for understanding teaching and learning systems. A cycle is a recurring sequence of events. In this context, an example of a cyclical parallel is what has occurred in historical teaching and learning methods and what is currently happening with those practices today. A spring is a visual model of a cyclical parallel. As one moves down the path of the spring, there is a continuance of patterns, or cycles located at adjacent positions. The distance between any two positions on the spring is variable and the direction should be towards greater understanding. Many cycles have been identified in the area of teaching, such as the learning cycle, self-regulation and assessment. Martin, et. al. (2002) describe the traditional learning cycle uses the five E model, which includes engagement, exploration, explanation, extension and evaluation. Each of these steps can lead to the next step and upon completion they should begin again for another concept or further application of the current concept. Zimmerman, Bonner and Kovach (1996) described a self-regulation model as cyclical because self-monitoring on each learning trial provides information that can change subsequent goals, strategies or performance efforts. An important part of this model is initial self-evaluation, because this typically initiates the learner’s attitude toward belief in his or her own competence, or self-efficacy. Assessment, especially formative assessment capitalizes on a cyclic pattern for success. Gathering performance data and providing frequent feedback in an on-going pattern is the key to meaningful formative assessment. The cycle of performance, review, feedback, readressing concepts and resubmittal is more powerful than the traditional didactic mode of instruction and test. Oral, literate and electronic modes of teaching and the technology that drove the transition from one to the next follow a similar cyclical pattern.

Communication/Language Development

While researchers are divided over its exact timing and nature, most agree that the acquisition of language ability among hominids occurred sometime between 2 million and 45 thousand years ago (Harris 1997; Lewin and Foley 2004). The emergence of language fundamentally impacted humans’ ability to teach to and learn from each
other. Modern language ability seems to have provided the mechanism for what Harris has termed “cultural take-off” (Harris 1987, 1997). Language, especially human language, allows for an extremely efficient and creative method of teaching or information communication. As culture—our traditions, ideas, mores, rules of behaviour, instructions for doing things, and all other behavioural aspects of ourselves—is primarily learned through language, the availability of such a powerful teaching tool allows for human cultures to change and develop at an explosive pace. It is the ability to transmit information through language that allows cycles of teaching and learning to occur. These cycles of information transmission through language is exactly what is evident in the five “E” model.

We can observe this process, this radical change in the technique of information transmission—that is the teaching and learning process—and its results, within the archaeological record. The preliterate period dating from approximately 40 to 10 thousand years ago is a revolutionary period in human history. This revolution was the result of new ideas and thoughts being developed and taught by some individuals to others. For example, art, in the form of cave painting, petroglyphs, carved figurines, and decorative jewelry appears in great profusion (Gamble 1986; Lewin 2004). There is a tremendous diversification and increase in the number of different types of man-made stone tools. The analogy can be made that this diversification of tool types is similar to moving from having only a hammer in a toolbox to having the full range of wrenches, screwdrivers, pliers, saws, and tape measures. And perhaps most importantly, this period witnessed the first human burials involving funerary rites, and presumably beliefs about the afterworld. In each of these examples, the spread and proliferation of the ideas and developments was profoundly dependent upon a teaching-learning model that incorporated the newly developed linguistic ability of individuals. One can easily imagine the impact on thought and culture of the development of the storyteller and the audience; the teacher and the student. No longer was it necessary for an individual to develop new tools or ideas by themselves. They could learn the techniques and thoughts of others; they could build upon what they had learned.

Why did the development of fully modern language ability have such a profound affect on human culture? To answer that question it is important to understand how human communication differs from the communication of other animals. Humans are not unique in their ability to communicate. Most animals have ways of transmitting information to their fellows. Prairie dogs and baboons will warn their communities of approaching danger via calls and other verbal signals. Ants and bees have various ways, be they dances or pheromones, to indicate the direction and distance to available food sources. Anthropologists who study primates and linguists have even succeeded in teaching American sign language to gorillas and chimpanzees. However, while each of these creatures is able to use a vocalization or behaviour as a sign or representation of a thought or idea, none of them has the ability to express novel ideas that are not already included in their symbolic repertoire.

This is precisely why the development of human language ability had such a profound affect on the culture of Paleolithic humans. Human language is “open” or “productive”; that is to say, new, original, ideas can be expressed by humans that have never been expressed before. Thus the creative and innovative power of human language is infinite. Ultimately, human teachers are able to communicate not simply old ideas in old ways, but old ideas in new ways, or even new ideas in new ways. Thus the entire process of teaching and learning among humans is impregnated with a dynamism and vitality unknown in other species.

We are all familiar with terms that were unheard of a generation ago; in English these include the “internet”, “fuel cells”, “retrovirus”, and “laptop”. It is no mere coincidence that many of our new terms and words are related to technological or scientific innovations—just as they no doubt were for our stone age predecessors. An “open” language was the innovation that allowed the communication of new ideas, and further, to communicate them in new ways.

A similar revolution in teaching and learning occurred in Europe during the 15th century. At the beginning of the 1400s, books were a valuable commodity, if for no other reason than that they were exceedingly rare. Because they were rare, few people had access to them. The rarity of books was not due to the paper or ink required, these were in high supply. The difficulty in the production of a manuscript lay in the high cost and limited supply of scribes and script-copiers. As Burke (1978) describes, the need was for a cheap and easy way to make many copies of the same text. The solution, arrived at by Johannes Gutenberg sometime between 1440 and 1455, was a system of movable type for the printing press. The revolution was in the type and the flexible nature of the Gutenberg system. Printing and presses were being used prior to 1440. However, most presses were printing using a single block of wood carved to produce one single page of a manuscript. These blocks were expensive and wore down quickly. Gutenberg’s success was in developing a way of producing metallic type of individual letters that was of uniform size and could be arranged in an infinite number of different sequences. It was thus possible to quickly, easily,
and cheaply produce an entirely new page of text and reproduce it precisely.

The impact on learning processes as a result of printing via the Gutenberg method was immediate and tremendous. In less than twenty-five years, printing presses were established in 110 towns across Europe (Burke 1978). Within fifty years, eight million books were produced (Burke 1985). There were multiple effects of printing (Burke 1978, 1985). Printed works increased the speed and ease with which people could interact and learn from each other, often even without personal contact. Printing made texts consistent and increased the accuracy (from an information theory standpoint, the fidelity) of the information transmitted. Consistency encouraged agreement on subjects and helped in the development of the various disciplines. As disciplines developed, and the sheer amount of information available on a topic increased, specialization of individual effort likewise increased. Specialists became recognized as important teachers in these disciplines. As individuals were able to disseminate their ideas in a concrete, immutable form the concepts of authorship and ownership of ideas developed and from this sprang the idea of authoritative knowledge. Teachers – who wrote the books had that information, and students – who wanted that information could read it in their texts. Anyone could now pick up a book and learn what someone else knew, and indeed, many of the newly printed books were instructional manuals. And finally, cheap, easily available printed matter allowed for individuals to build upon and test the ideas and experiments of others, thus ultimately leading to the development of modern scientific inquiry.

The revolution on thinking and teaching and learning brought about by Gutenberg’s technological innovation were in a sense the final crystallization of a process that began with the transition from oral to literate or from prehistoric to historic society. Jack Goody has studied this transition in depth (Goody 1986, 1987, 2000; Goody and Watt 1968). And while Goody is especially interested in the context of religious or ritual transmission of information, the distinction is equally valid for teaching and learning processes. The distinction between the oral mode of information transmission (or orality) and the literate mode (literacy) can be made on a variety of levels. Written works have an ascribed author, while many storytelling or oral works are un-authored. Oral teaching is immediate, fluid, and every changing, while the written word is distant, fixed, and permanent. Teaching orally can involve a dialogue, reading a book is inherently a one-way method of information transmission. The oral mode is ephemeral and fleeting, while the literate mode is concrete and immutable. In this way, teaching processes that make use of the literate mode of transmission are archivable, while those that use the oral mode are not. Because storytelling is fluid it is eminently variable in contrast to the written word, which is invariant once written.

Much of modern pedagogy has been built upon the twin foundations of the oral and literate modes of teaching and learning. The oral mode extends back to the Socratic method, while the literate mode has been in use since the first teacher assigned a textbook reading or a theme paper writing assignment. Into this framework has danced a new mode of teaching and learning. The appearance of this new mode is most aptly demarcated by the inception of the Project Gutenberg electronic library on the World Wide Web. As Gutenberg’s movable type was a revolution in the transmission of information, so too has the internet been a revolution in the way information is exchanged between persons. For this new method, this new mode, of learning and teaching we use the term “electracy.”

Electracy is in many ways a fusion of the oral and literate modes of teaching and learning. In other ways, it has its own unique qualities that make it distinct from the other two modes. Transmission of information via electronic means, be it a webpage, a blog, an e-mail, or even an instant message has a profound affect on the structure and content of that information. The electracy mode has the potential to be both anonymous, and yet also assert the authority of authorship. It can be, and often is, linear and hierarchical, but it also has the potential to be fluid. It is at once immediate, and yet distant; ephemeral and concrete. Because of its electronic nature it is eminently variable, and yet, it can be archived, and thereby achieve permanency.

Literature Review

Vygotsky Dialectivism

Vygotsky generated the idea of dialectivism, or the examination of opinions or ideas logically by question and answer (Bodrova, 1996). He developed another cyclical parallel in his three step dialectical process, which included a thesis, or main idea; an antithesis, or the opposing idea and the synthesis or a resolution, which produces a higher-level response to address both the thesis and the antithesis. Using this socially meaningful activity, students can build collaboration skills through communicating or social interaction designed to enhance their abilities in reasoning. It may be apparent how this approach can be applied to oral and literate modes, however, Vygotskism can also be directly applied to today’s technology-oriented electracy-teaching techniques. Dialect is commonly found in at least two different types of electracy on the web. One type is real time (synchronous) and the other a delayed, asynchronous format. Examples of synchronous dialogue are instant messaging and chat rooms, whereas asynchronous forms are web
logs and discussion boards; which are described below.

**Synchronous**

**Instant Messaging**
Instant messaging (IM) is a communications service that enables you to create a private connection with someone to have a dialog in real time over the Internet. This is analogous to a telephone conversation but using text-based, not voice-based, communication. Typically, the instant messaging system alerts you whenever somebody on your private list is online. You can then initiate an ongoing session with that person. It could last a few minutes, or it could be on going throughout the day.

**Chat rooms**
Technically, a chat room is really a channel, but the term room is used to promote the chat metaphor. An online chat is a real time communication between two people using a computer connected to the Internet. Once a chat has been initiated, either user can enter text and it will appear on the other user’s monitor. One of the best educator-based chat rooms is called TappedIn (http://ti2.sri.com/tappedin/) and is funded by NSF and maintained by Stanford University. This site presents a virtual world of building schematics and more importantly twenty-four hour assistance for teachers who gather to chat or listen to one of the many professional development programs offered. Teachers can also secure their own office, where they can meet virtually with colleagues around the world or host virtual office hours for students.

**Asynchronous**

**Blogs**
Web logs or blogs are quick electronic retrospective entries on the web in journaling form. Traditionally, educators have encouraged the use of reflective journaling for students to process information. Varner and Peck (2003) indicate that journaling can provide practice in management skills, facilitate comprehension and retention, and can act as an assessment tool. The purposes of blogs vary greatly from links and commentary about other websites, to news, diaries, photos, research, teaching, etc. Some blogs are collaborative efforts based on a specific topic or area of mutual interest. They can assist groups communicate in a way that is simpler and easier to follow than email or discussion forums. Oravec (2002) suggests that educators can use web logs to encourage students to access the Internet for useful information; web logs can also help students organize the resources they locate. Professors are keeping research blogs, requiring students to blog, or creating course web logs. To gain understanding of blogging, one might access http://www.weblogs.com/ to view many examples and then one of the better general blogging sites is Live Journal (http://www.livejournal.com/). Also, Harvard has built a blog for scholars at http://blogs.law.harvard.edu/about with a higher education interest.

**Discussion Boards**
A discussion board is a general term for any online “bulletin board” where you can leave and expect to see responses to messages you have left. It is a place where a group of people, get together on-line to discuss specific topics and engage in frequent non-real time interaction. This is very popular continuing out-of-class conversations on topics from class and/or soliciting and monitoring learning on a concept presented in class. Online course management systems contain powerful discussion boards that are used widely in the United States.

**Information Processing**
The generic state of the information-processing (IP) model is referred to as the two-store (dual-memory), originally proposed by Atkinson and Shiffrin (1971). The IP theory views learning as the coding of information in long term memory by creating schema produced by relating new knowledge to existing information in the short term or working memory. Short-term memory, or working memory, is the information that you are focusing on at a given moment. A part of the working memory, the sensory memory is a system of receptors holding sensory information very briefly. Long-term memory is where knowledge is permanently stored.

**Learning through Technology**
Although the quality of information available on the Internet has been questioned, cyberspace has truly opened an information highway. Technology has gained attention in education today because of its prevalence; its promise to provide low cost education; and it may help some people to participate more easily, to learn more effectively, and to enjoy learning more (Palmieri, 1997). Given adequate access to technology, it can provide both teachers and students with a dynamic, engaging environment. However, at least three possible issues to educators emerge in using technology. The first concern relates to information overload and lack of useful instructional format; the second concern relates to identifying the necessary skills and attitudes to enable users to critically evaluate and use the resources; and the third is to effectively design and assess technology-oriented learning formats.
New Tools for Learning
There are many new technology tools available every day, which ultimately find their ways into an evaluation forum for applicability into educational environments. Some technology tools, which have already found their way into schools are computers, printers, scanners, digital cameras and projectors. Others, which are in the process of being integrated are Smartboards®, document cameras, tablet PC’s and video integration. Possible future teaching tools may include wireless handheld computers with adaptable devices to collect data, assistive technology devices, online course management systems and other nanotechnology supported tools.

How Does Electracy Connect to Teaching and Learning?

Inquiry
“I have no special talents. I am only passionately curious.” Albert Einstein

Inquiry is an instance of intentional questioning and a systematic method of investigation. It is a process of asking higher level, open-ended questions that encourage one to continue asking subsequent questions. The inquiry cycle includes question-asking, planning, gathering and comparing data, determining correlations, communicating and assessing progress. Electracy in an inquiry environment allows the teacher and student to use many of the synchronous and asynchronous tools mentioned in this paper. In this sense, electracy is a return to the oral mode because these communication tools provide a mechanism for teachers and learners to engage in open-ended discussions.

Active Learning
Active learning is learning in which the learner constructs meaning, often working in collaboration with other students. It tends to de-emphasize received knowledge of facts presented in teacher-centered formats such as the lecture and to emphasize active investigation and reflection, such as in hands-on lessons. Simply stated, active learning is when students are active rather than passive. This means having students ‘doing’ things. Some examples of active learning include Think/Pair/Share, the one-minute paper, small group presentations, student demonstrations, role-playing, case studies and interactive discussion groups. All of these methods can be employed in the realm of electracy. While the move from oral to literate was a shift that placed authority firmly in the hands of the author, the shift from literacy to electracy in concert with active learning techniques renegotiates authority, just as it does authorship. Discussions, presentations, collaborations and other various forms of sharing and doing using technology can add to a teaching and learning environment.

Further Work
There are several educational challenges that are faced when using technology to enhance teaching and learning. Identifying the parallels and their expectancy cycles of prior models will help us navigate the challenges in using new technology tools. Since teaching and learning require appropriate modes of communication and we have observed how technology can enhance this approach, understanding electracy and how to capitalize on its strengths is a primary challenge. Also, there will always be a philosophical difference of opinion between early and late adopters of technology, as well as those who select not to adopt at all. Meaningful, useful functionality will need to be clearly demonstrated as well as a connection and alignment to educational standards, foundational learning theories and proven pedagogical methodologies.

References


**About the Authors**

**Dr. Hargis** is the Director for the Office of Faculty Enhancement. He has been at the UNF for several years teaching science, technology and assessment courses. Jace worked as an environmental consulting chemist for over ten years. Dr. Hargis began his career as a secondary science teacher, teaching chemistry, biology, environmental science, algebra and geometry.

**Dr. Rakita’s** areas of expertise include bioarchaeology, physical anthropology, anthropological approaches to mortuary and other ritual behaviour, emergent social inequality and complexity, and scientific research design. He has participated in variety of field and laboratory research including projects in Chihuahua, Peru, Spain, Barbados, the Virgin Islands, Arizona, New Mexico, Utah, Illinois, and North Carolina. His analytical experience includes work with human osteological remains, ceramic and lithic artefacts, radiocarbon date calibration and analysis, human paleodietary reconstruction utilizing isotopic and elemental analyses, and the interpretation of prehistoric mortuary behaviour. He has received several professional grants including one from the U.S. National Science Foundation.