Moving Beyond the Socratic Method to Aesop Teaching

Abstract

STEM (science, technology, engineering, and mathematics) lessons can be a transformative educational experience for adult incarcerated individuals, adult software engineers, and high school and elementary school students. Although STEM courses have been around for almost 40 years in the U.S., they have traditionally been associated with the Socratic method of teaching to the left brain. This paper describes how current research suggests that STEM courses work better if they are taught in a transformative way. The author characterizes Aesop teaching as feeding the whole person and therefore including the right brain. Examples of 'STEM fables' are given to show that students perform measurable tasks better if care is given to the human need for personal growth and belief in oneself.

Introduction

Father and Sons
A certain man had several sons who were always quarreling with one another, and, try as he might, he could not get them to live together in harmony. So he determined to convince them of their folly by the following means. Bidding them fetch a bundle of sticks, he invited each in turn to break it across his knee. All tried and all failed. And then he undid the bundle, and handed them the sticks one by one, when they had no difficulty at all in breaking them. "There, my boys," said he, "united you will be more than a match for your enemies. But if you quarrel and separate, your weakness will put you at the mercy of those who attack you."
UNION IS STRENGTH.
(Aesop, Jones, & Rackham, 2013, p. 69)

The following excerpts from lessons come from work with adult incarcerated individuals, adult software engineers, and high school and elementary school students in mainstream and alternative schools. They were successful, I believe, because they reached the whole person, not just the head. In terms of some the latest research (Gopnik, 2012; Quale, 2011), these lessons were whole brain lessons; they spoke the language of the head and heart, the left and right brain. In addition to focusing on trends of globalization and the re-examination of educational origins, these lessons draw on indigenous methods of learning in their application to today's students. Therefore they form a basis for a comparative and contrasting discussion of learning theories that employ transformative (Mezirow, 1996, 1997), socio-cultural (Apple, 2004; Asante, 1991; Freire, 1998a, 1998b, 2000; Freire & Freire, 1994; Giroux, 1988; King & American Educational Research Association. Commission on Research in Black, 2005; Woodson, 1968, 2005), and social contextual methodologies (Bandura, 1971; Gardner, 1993, 2008; Goleman & Boutsikaris, 2006; Goleman & Senge, 2007; Goleman & Whitener, 2005; Palmer, 1993, 1998, 2004; Palmer, Zajonc, & Scribner, 2010; Vygotsky, 1962, 1966, 1966/2002, 1979; Vygotsky & Cole, 1978).

For this paper, the focus will be on how these lessons used the Socratic method of teaching in concert with what I will call the *Aesop method of teaching*. What do I call Aesop teaching? Detailed research on the man called Aesop is veiled in obscurity, but historical accounts corroborate that he lived sometime around 600 BCE. He was a storyteller who was once a slave. Once he was given liberty from slavery, it was the custom in ancient Greece to allow former slaves to participate in public affairs, and this is precisely what Aesop did. He was known as a wise keeper of fables that were most likely passed down from even further antiquity. Fables, like parables have a moral. The fables credited to Aesop are known for their pattern of having a moral to the story. Both fables and parables tend to keep the meaning hidden - but unlike the parable, the fable tends to outwardly have the purpose of teaching a lesson or instructing a person toward self-improvement. The premise of this paper is based on a recommendation to revive the process of instruction through morals as Aesop did.

Though it is not common to study a learning and instruction method associated with Aesop's form of instruction, many studies have been done on the dialectic or Socratic method of teaching (Bruner, 1986). In the 1990s, I remember teaching one form of the Socratic method to the Marine software engineers at their headquarters in Quantico, VA. The class and I were exploring ways to build software prototypes. I was demonstrating that one way to miscommunicate on an expensive project was to try to conceive of all aspects of a software system using Socratic questioning and building word definitions instead of building several prototypes to decide on the design of the final product. We made the analogy that the Socratic method recommends asking questions of the people who need the software built. The problem with this method is that it is only half of the solution. People do not have a completed, left-brain picture of exactly what they need. Further, when they think they do, they cannot always articulate it. In the class, I used the Socratic method of continually asking questions until a contradiction was exposed, as a way to show a fallacy of the initial assumption. My point was that we also needed to supplement the left-brain analysis with a prototype that could be used in real time by real people with both sides of the brain working to evaluate it. I used this same line of reasoning at the headquarters of American Airlines in Dallas-Fort worth, TX and at GE in Rockville, VA.

An original demonstration of this method is in Plato's reference to Socrates showing a slave boy how to calculate the length of the diagonal of a square by asking questions that the boy knew, thus arriving at something the boy did not know (Plato, Ferrari, & Griffith, 2000). If you recall, Socrates was not ostensibly demonstrating his method of how to ask questions - he was proving that we all have the basis of all knowledge - that learning is actually remembering. I used a similar demonstration for the seventh graders in the Uplook School in Greenfield, MA and the eighth graders in the Waldorf School in Peewaukie, WI as was used with the adult software engineers in the Marines, AA, and GE. The demonstration went like this. I drew a freehand circle on the board in front of the class large enough for all to see. Then I asked if the circle was perfectly round. As students pointed out imperfections, I made corrections. At a certain point, I would stop all discussion and ask how the students knew the shape of an actual circle. I would point out that it was very likely that no human has ever seen a perfect circle, yet we all have a very clear idea of it. Thus, I would conclude, we partly learn by dialectical reasoning, and partly by accessing knowledge that seems to already be available intuitively. At this point I tell the class that we might do best to use both analytical reasoning and intuitive notions - in other words, the left and right brain activities in concert. Both studies and common sense tells us that there are ideas we intuit from the depths of our consciousness and other conclusions that we deduce by putting parts of ideas together (Arnheim, 1986a, 1986b; Bandura, 1971; Bruner, 1960, 1983, 1986, 2004; Vygotsky, 1966/2002, 1979; Vygotsky & Cole, 1978).

Clearly, I have manufactured the idea of Aesop teaching as a companion to Socratic teaching. In this paper I use the Socratic method to represent cases where we tend more toward conclusions by logical deduction and induction, analysis and reasoning. In like manner, I use Aesop teaching to represent ideas that we arrive at more from holistic knowing, sensing of relationships and the wisdom to recognize the interconnectedness of things. In this paper, Socratic teaching stands more for left-brain activities and Aesop teaching for right-brain. But the world is not so simple. Current research points increasingly at the interdependence of the two sides of the brain (Gardner, 1993, 2008; Goleman & Boutsikaris, 2006; Goleman & Whitener, 2005; Pink, 2006; Sercombe, 2010). Early work by Arnheim (Eisner & National Society for the Study of Education, 1985) suggests, that every thought enters the mind intuitively in a whole, undivided state, then ends analytically in a clear, conscious judgment of the idea that arrived. Arnheim claims that during this analytic stage, the mind sees what it received intuitively and tests each idea against experience and reason. So, for the purposes of this paper, Aesop teaching is the part of a realization that awakens deep intuitive ideas and Socratic teaching questions those notions for reasonableness. Using both together then, should open the student to use more intelligence from an increase in the volume and breadth of what the mind receives. See Figure 1. below, for a contrast between Aesop and Socratic teaching.

Aesop Teaching in concert with Socratic Teaching	
Aesop	**Socratic**
predominantly right-brain	predominantly left-brain
holistic, undivided	separated in parts
collaborative, group thinking	isolated, individual accomplishment
animated	inanimate
circle thinking in holistic concepts	linear thought in abstract concepts
descriptive, lateral language	articulate, didactic language
relationships, complexity	positivistic, fixed hierarchy
BEAUTY, qualities	MEASUREMENTS, quantifiable
hard to assess, hard to communicate, poetic	more easily tested meanings
necessary for: unanimity, union, solidarity, harmony, meditation	necessary for: reading, writing, building, categorizing, judging
remaining in a state of wonder and awe	naming, labeling, then moving on

Figure 1.

Elements of a STEM Lesson for both the Left & Right Brain

Aesop teaching, as portrayed in this paper as the thinking of ancient peoples that stretch all of the way back to pre-recorded history, is inclusive of Eastern and Western thought. According to fables, ancients could think logically, but they could also entertain paradoxical contradictions. Nisbett (2003) discusses Eastern principles of dialectism where he demonstrates that in the East, both in ancient times and in the present, there is the belief in a principle of constant change. Nisbett asserts that according to this Eastern tradition, learning must therefore be ready for contradiction. “Change produces contradiction and contradiction causes change; constant change and contradiction imply that it is meaningless to discuss the individual part without considering its relationships with other parts and prior states” (Nisbett, 2003, p. 200). By this precept, then, certain concepts may need a linear process of thinking, as in the Socratic method, and simultaneously need circular reasoning, as in Aesop's Fables. Quantum mechanical concepts such as *entanglement* and *complementarity* require such thinking.

Consider how to introduce students in a STEM lesson on the basic idea of quantum physics called entanglement. Entanglement is a physical phenomenon where two or more particles react to a stimulation that is given to only one of the particles. For instance, consider making a measurement on a particle such that the measurement changes the particle. Now consider changing one of an entangled pair of particles. Entanglement occurs if the second particle reacts as if it is the first particle that received the act of being measured. Quantum theory explains such things by suggesting that the second particle may 'know' that the first has been changed, or the two are in some unknown communication, or the two particles are simultaneously separate and yet connected. As you can see, the descriptions quickly get into areas where left-brain logic must give way to at least a temporary acceptance of paradoxical ideas. This is where it is useful to bring out the right-brain thinking that can embrace paradox. Intuitive thinking can entertain that the whole system of entangled particles are both inseparable and yet somehow separate. The notions of connection, relationships, oneness, and wholeness present no problem to our right-brain, intuitive, creative mind (Goleman & Boutsikaris, 2006; Goleman & Senge, 2007; Goleman & Whitener, 2005). In fact, the child who is less than 7 years old can often entertain the stuff of fables while simultaneously reasoning with left-brain in symbolic forms of thought. The problem that this paper wishes to highlight is that education favors left-brain over right-brain.

Piaget, a major influence in the development of learning and instruction theory in the U.S., implied that analytical reasoning was the final destination to be desired and intuitive leaps were to be left behind. Although there is voluminous evidence in research studies showing that children naturally develop from early use of intuitive, right-brain functions to eventual use of analytical, left-brain (Bandura, 1971; Bruner, 1983, 2004; Vygotsky, 1966/2002; Vygotsky & Cole, 1978), the question this paper poses is whether it is therefore good to leave the intuitive behind. The example of teaching about the quantum physics of entanglement, suggests that a STEM lesson needs to appeal to students as they were when they were children, when they could easily use both sides of the brain. Unfortunately, that is not always done. The U.S. educational system sometimes operates in a way that reinforces Socratic, analytic thought and assumes that Aesop, intuitive portions of thought are only phases of childhood, mere stepping stones toward formal reasoning. It is as if these phases should be discarded as they are passed.

This paper contends that through fable and allegory we must bring the adult back to the thinking of the child, as with Eastern dialectism, to help the human mind handle issues like contradiction and paradox. But there is also the issue of handling whole ideas. The principle of wholeness is at the heart of intuitive thought. After all, is not the definition of intuition the apprehension of an idea *before* knowing the parts? The child who hears a fable and believes that it makes sense, without ever taking it apart and analyzing it, is acting intuitively from the right brain. And this is once again a necessary skill in apprehending some of the ideas of quantum physics (Einstein, 1920/2010, 1950/2011; Schrodinger, 1944/1992). Specifically, issues of wholeness are directly related to one of the most basic tenets of quantum physic, *complementarity*. Complementarity can most simply be expressed when light shows up in some experiments as a wave and others as a particle. Engineers and scientists take the 'whole road' and simply say, light is both a wave and a particle - the complementary parts are both part of a whole truth, apparently. Complementarity was first defined by Bohr in discussion with Einstein:

> In fact, it is only the mutual exclusion of any two experimental procedures, permitting the unambiguous definition of complementary physical quantities, which provides room for new physical laws, the coexistence of which might at first sight appear irreconcilable with the basic principles of science. It is just this entirely new situation as regards the description of physical phenomena that the notion of complementarity aims at characterizing. (Bohr, 1949)

One can compare Bohr's notion of complementarity with the Eastern principle of dialectism. Further, complementarity and dialectism line up directly with the child's holistic ideas that allow for opposites to be true at the same time. *Entanglement* is described by Schrodinger (1944/1992) as a tenet of quantum physics whereby one might know the whole without knowing much about the parts. This is exactly what the child does in listening to an Aesop fable. This confounds logic, but supports certain aspects of the mechanics of quantum effects.

Aesop teaching has implications for a good STEM lesson. It implies that former science and math teachers must go beyond the incorporation of engineering and technology references in a perfunctory way. We must teach in a way that integrates an awareness of larger ideas - of whole ideas to the specifics. This means teaching about the connectedness of all peoples and all of nature. This will go beyond giving a student a way to appreciate concepts like entanglement and complementarity; it will give the student the feeling of how humans are embedded in a larger context that involves relationships with other societies and other species. In this very real sense, we must go beyond Socratic methods of intellectually understanding ideas to Aesop methods of perceiving our effect on each other. It is good that our education curriculum continues to increase awareness of sustainability issues and care of the natural environment of our earth. But how much more effective can our lessons be if students could experience the mindset of the right brain where a sense of wholeness and caring resides. When a teacher is explaining how to appreciate the opposite natures of light as a wave and a particle, there is a perfect chance to reference how humankind is faced every day with chances to appreciate diverse cultural differences. In quantum physics we must suspend judgment and accept experimental evidence, even though it does not make sense to our left brain in a logical way. Similarly, in order to work well with people of various cultures, we must try to accept behavior that does not make sense to us according to our upbringing. Although this is simplistic and contains moralization - perhaps it is time to ask an important question. Why should education remain in left-brain mode as a Socratic-only method of keeping morals out of the classroom? Said another way one might ask, is there a way that would not get into the differences of religion, that education can also discuss the morals of common human decency while discussing STEM topics?

STEM Fables

What if we taught science and technology and engineering and mathematics as if we were not just human heads? What if we taught with our heads and hearts? Here is a STEM fable that exhibits such Aesop teaching. I have used this method with high school and grammar school children for 39 years, but I recently used this method with adult incarcerated individuals. I feel that it was the Aesop teaching that liberated them to believe in themselves. The course I taught raised the algebra scores of 16 students from 54% of them in college range on the TABE test, to 100% in range in less than two months. This paper is a call for research into the effectiveness of teaching to the right brain as vigorously as the left brain.

The Beaver and the Bee

A beaver and a bee were watching a boy as he tried to build a boat. "Look at that silly boy," the beaver remarked, addressing the bee, "his attempts to make a boat that will float are in vain. He fails repeatedly and yet he persists. When I attempt to make a dam, I am usually quite successful on the first try." The bee answered, "As am I with my honeycomb. Yet observe how the boy will eventually build his boat, then learn to build a dam and a home."

MORE TALENT NECESITATES MORE TRIES

I told a story like this - that humans fall and fail spectacularly - several times per week in a course with incarcerated students. I celebrated the human ability to get back up, which presumes that we must initially fall. I honored those who fall the most as some of humankind's best examples of overcoming difficult odds in order to prevail. When students consider this, their respect for humankind grows. A good STEM lesson should turn to scientific fact to put 'teeth' into inspirational points. For example, as the STEM fable above suggests, biological observations bear out that the human species is perhaps among the least specialized, yet it has perhaps the most diverse set of abilities. When these observations are set in a moral context, one can draw the conclusion that those among us who make repeated mistakes are therefore exhibiting one of the greatest assets that we humans own. Teaching this way is like Aesop, but in a STEM context. It causes students to feel good about themselves, psychologically, while calling for closer attention to engineering occupations that take repeated trials to discover new ways to bring electricity to the auto industry or technological companies to bring a new product to market. The idea of failure as a necessary step needs to be reinforced. A person who has gotten into trouble in his or her life might easily fall into the trap of believing that he or she is a failure.

This self-sentence can keep a person down. Instead of making a fresh start, this person could be stopped. Students long to hear that repeated revisions in life are both the way to more success in STEM ventures and to successful relationships with other people.

The Robin and the Girl
A mother robin flew onto the shoulder of a young girl and exclaimed that her nest was ready for spring. "We robins build nests in the way it has been done for generations as far back as anyone remembers. But alas, it will come apart in winter as all things eventually come apart in time and must start over at the beginning." "Not all things," said the girl. "Although nests and objects fall apart, if we learn from our mistakes, our ways of being do not have to go back to the beginning."
IDEAS COME TOGETHER WHILE MATTER FALLS APART

When teaching about the Laws of Thermodynamics, it is crucial to tell students not to be defeated by the concept that all things are going from higher to lower states of energy and therefore entropy dictates that all order in the universe is becoming chaos. This is only true of physical matter. Consciousness can build ordered systems of thought that become increasingly complex as they are passed from one conscious entity to another. This means that groups can be smarter than individuals and successive generations can profit from earlier ones. If one is teaching a population of individuals at risk because they are incarcerated and fear going back to prison, this distinction can mean life in prison or not. One needs to hear that not ALL things are moving toward a chaotic extreme. Here is an important time to use Aesop teaching. The moral to the lesson on thermodynamics and entropy is that a person is not simply a physical object. Life, relationships, and the quality of interpersonal interactions can improve as we learn from our mistakes.

The Wolf and her Young
A mother wolf was instructing her young by the side of a stream. "This is how to use the rocks to step across without fear of being carried away," she exhorted as she carefully chose her way and looked back at the pups. "But mother," cried one young pup, "our father was not careful, and did we not inherit his carelessness?"

The she-wolf turned slowly and deliberately, "What your father gave and what you decide are two different things."
INTENTION CAN OVERCOME INHERITANCE

There is new research in the microbiology of cells called epigenetics. It studies cellular responses to gene-based instructions. The old belief was that a cell is pretty much told what to do by its genes. And since genes are largely handed down from one generation to the next, that can mean to some people that your parents give you - through the gene chemistry of your body - a set of traits and tendencies that you are largely helpless to resist. Bruce Lipton has been doing research into this (B. H. Lipton, 2005, 2006; B. H. Lipton, Bhaerman, S., 2009) and claims that the gene instructions are only a blueprint. He asserts that your consciousness can override those instructions by causing alternate copies of the DNA to be made. These copies can be made to vary from the genetic blueprint during the cellular reproductive cycle. The signals from the consciousness to the gene within the cell represent control coming from outside the gene, thus the term epigenetics. This means, according to Lipton, that human beings do not have to be like their parents. Lipton argues that we can have more control over who and what we become than we formerly believed. In a STEM class that uses Aesop teaching, this is a chance to encourage students to become what they believe they can become - not what they think they have been programmed to become. Another moral to this story might be, 'you are not a victim of your genes'.

The Two Frogs
Two frogs sat at the edge of a pond gazing into the water. A bird alighted overhead and out of sight. The bird dangled a spider so that it cast a reflection directly into the pond in front of the frogs. "Look at that tasty spider," said the first frog. Before the second frog could answer that "Perhaps it was just a reflection," the first frog leaped into the water and was instantly devoured by a large fish waiting just beneath the surface.
DO NOT JUMP TO CONCLUSIONS

The scientific method is currently applied to all forms of research, be it scientific, technological, engineering or mathematical. It is well known as a process of making any and all conclusions based on repeated evidence. Therefore it is paramount to teach the importance of careful observation before leaping to unwarranted conclusions in any STEM course. In Aesop teaching, the moral to this story can save a person's life, not unlike the frog in the story. Current research in neuroplasticity is revealing that we adapt to situations much more fluidly than we thought before. By contrast however, studies of the activity in the amygdala where the individual is under prolonged stress show that a person can switch from smoothly adapting to a new situation to a classic fight or flight response (Bickart, Sauder, Kim, & Putnam, 2009). In normal English this means that incarcerated individuals - prime examples of people under prolonged stress - must consciously move out of stress as they reenter society or else their inner response to almost any changing conditions would be to be to fight that change or fly to some escape mechanism (Goleman & Senge, 2007). I used Aesop teaching of STEM topics here again to give 'teeth' to a recommendation of the emotionally / socially intelligent thing to do. In order for the students to practice conscious control of one's behavioral response to a situation, some engineering demonstrations that required a high level of observation without jumping to conclusions served quite well. One demonstration used a small glass beaker submerged in a large beaker of corn oil, making the small beaker almost invisible. I dropped marbles into the corn oil directly over the small beaker. The marbles piled up instead of all spreading out on the bottom of the large beaker, creating an enigmatic demonstration. Unless the students observed quite carefully, they only saw a yellow liquid in a large beaker and marbles that miraculously stayed together. If they jumped to conclusions as they made comments, I cautioned them to observe more before forming any analysis. On very close inspection, a few students started to see evidence of the small beaker. By then, it was appropriate to form the conclusion that the small beaker was holding the marbles, because it was based on evidence that took patient observation. Other physical and chemical demonstrations were used to practice the act of suspending analysis and continuing objective observation. Although this training may sound simplistic or even unrelated, the point was well taken by the students. They learned that when a situation seems indeterminate, rather than jump, fight, or fly, it is probably best to calm down and continue to observe before making a hasty move.

Historical Treatment of Intuition and Analysis from Ancient to Post Modern

Socratic teaching is first mentioned in *The Republic* where Socrates gives the slave boy a series of well-placed stepping stone questions to learn how to calculate the length of the diameter of a square. As seen through the eyes of Vygotsky, "It is the 'loan of consciousness' that gets the child through the zone of proximal development. The model is Socrates guiding the slave boy through geometry in the Meno" (Bruner, 1986, p. 132). These stepping stones are the building blocks of analytic, logical, left-brain reasoning. This paper is a call to supplement this thinking with its opposite. The complement to this thinking is the intuitive, whole (not stepped), right-brain thinking. One way to consider an historical treatment of intuition is for one to look at intuition as the first stage of every thought and at analysis as the second, final stage (Arnheim, 1986b). And further, since the first stages of humankind are like the first stages of a child’s life, we can invoke a phylogenetic perspective and consider ancient history to be a similar study to that of a growing child. Early humans - like children - were more intuitive and less analytic (Wynter, 2001). Similarly, invoking an ontogenetic perspective, early childhood becomes a rich vein of research of the intuitive stage (Piaget, 1959; Piaget & Valsiner, 1927/2001). This is why Aesop's fables appeal to the child, and unfortunately, it is why we lose the ability to appreciate their depth and value as we get older. But this was not always the case, historically. Evidence exists of flourishing ancient civilizations where the great majority of people could not read, write, or perform any form of sophisticated mathematical operations (Diop, 1974; Houston, 2007; Stone, 1976; Teresi, 2003; Wynter, 2001). Yet, these people had a strong command of language. The children learned to speak quite well. This fact alone casts a long shadow on modern learning theory. If we could regain our use of the fable and the intuitive apprehension of whole ideas, perhaps we can save the modern human who is currently dominated by analysis and only gets to see intuitive thinking as a fleeting first portion of each thought and a fleeting stage of childhood (Bruner, 1986).

Vygotsky concludes that Piagetian studies that looked upon early forms of thinking as stepping stones toward formal thinking which, at a later time can be discarded, impact our learning theory, and thus our educational system negatively. They hold us back from teaching and using the necessary stages of thought that arise spontaneously as a necessary part of each thought process. He concludes that,

> We believe that two processes – the development of spontaneous and of nonspontaneous concepts – are related and constantly influence each other. They are parts of a single process: the development of concept formation, which is affected by varying external and internal conditions but is essentially a unitary process, not a conflict of antagonistic, mutually exclusive forms of thinking. Instruction is one of the principal sources of the schoolchild's concepts and is also a powerful force in directing their evolution; it determines the fate of his total mental development. If so, the result of the psychological study of children's concepts can be applied to the problems of teaching in a manner very different from that envisioned by Piaget. (Vygotsky, 1962, p. 157)

The historical role of intuition may be viewed as a necessary half to every thought – the other half being analysis. This would suggest that creating a theory of learning and then an entire educational system that reinforces formal, logical thinking, without recognizing the intuitive, paradoxical, whole ideas that inform each of our analyses is like teaching someone with two legs to walk only using one.

Summary

For 39 years I have taught STEM lessons. I initiated the first course in a private Waldorf school in the 70s. It combined science and math with engineering and technology examples from practical life. I evolved my teaching method over the years to include more and more of the Aesop teaching because both adults and children learned better when I addressed both sides of the brain. They appreciated when I pointed out how a STEM lesson had everything to do with the personal growth of the individual. I found that almost every student is preoccupied with his or her own life - relationships, connections, personality traits. Students of all ages and types crave the right-brain, intuitive side of every lesson - they crave the moral to the story. Education in the U.S. has historically had a positivistic bias toward left-brain rationality. We have left out the *interconnectedness* of the physical world. This is why it is hard to understand the quantum effect of *entanglement* where physical entities are separate in one sense and connected in another. This is also why we have a low ability to believe both sides of *paradoxical* ideas that many Eastern and indigenous cultures have historically embraced as in the example of the quantum principle of *complementarity*.

Often, we limit Aesop teaching and intuitive thinking to a mere stepping stone to more formal reasoning. We imply that they are of no use to adults and must be distanced in favor of logical thought. The pedagogical practices across the United States, which followed on the behaviorist heels of Skinner (1953) and Thorndike (1913/2010), used this logical, positivist bias toward a mechanized view of teaching. This caused rational, analytical reasoning to be favored over intuitive epistemic beliefs. This imbalance obstructed the more efficient, whole brain form of learning (Bruner, 1960, 1983, 1986). The consequences of continuing to pass over the intuitive discourse of fables are many. They cause multicultural biases that limit us to paradigms of thinking from our past (Kuhn, 2004), losing appreciation of indigenous thought (Whorf & Carroll, 1964), and the inability to embrace Eastern/African forms of learning (Nisbett, 2003). Leaving fables out of STEM courses also affect issues of social diversity because it limits our awareness of the 'other' in education (Dewey, 1910; Freire, 2000), our appreciation of sustainability of the environment (Senge & Barker, 2008), and our indebtedness to family and community (Bruner, 1960; Foucault, 1971).

The intuitive act of listening to a fable without constantly forming final opinions of the context can help bridge the communication gap between one self and the other. Take this powerful example into consideration. Indigenous peoples are often assumed to be unintelligent because the translator projects his or her own culture onto that of the indigenous speaker. Donaldson tells a story in her book, *Children's Minds* "of the Indian who said that he could not translate 'The white man shot six bears today' because no white could do so" (1989, pp. 57-58). If we project left-brain thinking only onto this situation, we might think that this Native American was unintelligent. Whorf (1964) writes of miscommunications with the Hopi because the interviewer required a subject and predicate to sentence structure in order to translate meaning – but the Hopi do not always separate whole concepts into parts. To the predominantly analytical mind, this could make the Hopi seem less capable than the Eurocentric thinking that was in vogue at the time of the interviews. Nevertheless, Whorf describes how the Hopi are quite intelligent. Like the children in the intuitive stage, the Hopi use a non-linear set of epistemic beliefs to learn and communicate in a way that speaks in wholes that are outside of the temporal use of verb tenses, and outside of the spatial separation of a subject and predicate:

> The thoughts of a Hopi about events always include *both* space and time, for neither is found alone in his world view. Thus his language gets along adequately without tenses for its verbs, and permits him to think habitually in terms of space-time. Properly to understand Einstein's relativity a Westerner must abandon his spoken tongue and take to the language of calculus. But a Hopi, Whorf implies, has a sort of calculus built into him. (Whorf & Carroll, 1964, p. viii)

One can find a similar respect for an intuitive intelligence in indigenous peoples of ancient cultures in the historical writings of Stone (1976), Diop (1974), and Wynter (2001). Teresi (2003) tells a story of the earliest known discovery of rubber by Aztecs that predates the Western discovery of the vulcanization of rubber by Charles Goodyear by a thousand years. Teresi spent his life uncovering lost STEM discoveries such as the true origin of such things as: steel, robotics, the printing press, and antibiotics. What is noteworthy to this discussion is that many of the discoveries that we normally attribute to the analytic mind of the post Greco-Roman era actually were made by ancient, intuitive cultures that more closely map to the Aesop thinking of children, than the formal reasoning of modern Western cultures. The famous quantum physicist Erwin Schrodinger (1944/1992) lamented that the science of his time in the mid-1900s could not rid itself of dilemmas from formal reasoning that could not accept contradiction and paradox. Aesop teaching has elements of the intuitive thinking of the indigenous, the ancient, the East, the Afrocentric thinker, South American epistemic beliefs, many current third world ideologies, and the child. Even though the modern Eastern cultures are in many ways surpassing Western technology and engineering, for the most part, they can still access the ancient intuitive modes of thought (Goleman & Senge, 2007; Senge, 2008). Both ancient and modern fables still imply the tenet of the middle way; that there is a choice between two opposite views that includes and transcends both. Therefore, context is important to Aesop teaching and the analytic part of each one of us needs the intuitive part in order to complete itself. Remember the moral to the story of the Aesop fable of the Father and Sons, *UNION IS STRENGTH*.

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