5-2017

21st Century Education: The Importance of the Humanities in Primary Education in the Age of STEM

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21st Century Education: The Importance of the Humanities in

Primary Education in the Age of STEM

By

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A culminating senior thesis submitted to the faculty of

Dominican University of California in partial fulfillment of the requirements

of the Bachelor of Arts in Humanities and Cultural Studies.

San Rafael, CA

May 2017

This thesis, written under the direction of the candidate's thesis advisor and approved by the department chair, has been presented to and accepted by the Department of Humanities and Cultural Studies, Religion, Philosophy, in partial fulfillment of the requirements for the degree of the Bachelor of Arts in Humanities and Cultural Studies. The content and research methodologies presented in this work represent the work of the candidate alone.

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Table of Contents

Abstract

Taking into consideration the global shift towards innovation and technological development, the rapid changes in the global economy, and the United States Department of Education's attempts to find a one-size-fits-all solution for America's education woes, our national focus has shifted towards the STEM subjects—science, technology, engineering, and mathematics. This shift to STEM-focused education has challenged the role of the Humanities in American education, introducing concerns that the overwhelming emphasis on STEM disciplines has pushed the arts, Humanities and human sciences off to the side or even completely out of the picture in American classrooms. In our everchanging technology-focused world, the Humanities are needed in our classrooms now more than ever to provide balance and perspective. The Humanities strengthen our global view, broaden our intellectual foundation, teach us to communicate clearly, help us to develop creative and critical thinking skills, teach us to be problem solvers, create engaged citizens and thinkers, reinforce cultural and ethical responsibilities and values, help us to understand the impact that science, technology, and medicine have had on society, and create well-rounded academics, students and thinkers. It is time for our nation to realize that the Humanities are not just an aesthetic luxury to be served as a side dish in the halls of higher education, but an essential part of a well-rounded education that must begin in the elementary school years and continue throughout a person's life

Introduction

As the great education debate rages on in the United States, the question that remains in the forefront of our collective consciousness is how to best educate the students of tomorrow. As educators, parents, students, and other key stakeholders focus on the state of education across the nation in the 21st century, various visions of how education may evolve, and how to best educate our students to be able to adapt and keep pace, offer a bewildering array of possibilities. What and how we teach our children impacts almost every aspect of society. As the focus of our society shifts, so do the focus and philosophies of our education system. Taking into consideration the global shift towards innovation and technological development, the rapid changes in the global economy, and the United States Department of Education's attempts to find a one-size-fits-all solution for America's education shortcomings, our national focus has shifted towards the STEM subjects— science, technology, engineering, and mathematics. This shift to STEM-focused education has challenged the role of the Humanities in American education, introducing concerns that the overwhelming emphasis on STEM disciplines has pushed the arts, Humanities and human sciences off to the side or even completely out of the picture in American classrooms. In our everchanging technology-focused world, the Humanities are needed in our classrooms now more than ever to provide balance and perspective. The Humanities strengthen our global view, broaden our intellectual foundation, teach us to communicate clearly, help us to develop creative and critical thinking skills, teach us to be problem solvers, create engaged citizens and thinkers, reinforce cultural and ethical responsibilities and values, help us to understand the impact that science, technology, and medicine have had on society, and create well-rounded academics, students and thinkers. It is time for our nation to realize that the Humanities are not just an aesthetic luxury to be served as a side dish in the halls of higher education, but an essential part of a well-rounded education that must begin in the elementary school years and continue throughout a person's life.

What Is STEM?

Simply put, STEM is the acronym for science, technology, engineering, and mathematics. However, once one digs past the surface, defining STEM and its role in our education system is one of the most complex puzzles in education today. STEM is most commonly used to refer to educational programs designed to prepare primary and secondary students for college and graduate study in the fields of science, technology, engineering, and mathematics. In addition, STEM focuses on perceived education quality shortcomings in these fields, with the aim of increasing the supply of qualified high-tech workers (Roos). One definition, offered by Nancy Tsupros of Carnegie Mellon University, describes STEM education as "an interdisciplinary approach to learning where rigorous academic concepts are coupled with real-world contexts that make connections between school, community, work, and the global enterprise…" (4). This definition illustrates the connections where STEM and the Humanities intersect. Without the balance and insight that a Humanities education offers, students are not receiving a truly interdisciplinary education.

There is no denying the important role of STEM education in preparing students for the challenges they will face in our everchanging technology-focused world. However, STEM cannot stand alone, and the assertion that we must choose between science and Humanities is incorrect, shortsighted and counterproductive (Richards). It is only by combining the Humanities and STEM subjects in our classrooms that connections between school, community, work, and the global enterprise are complete. The rhetoric surrounding STEM education, touting it as the "liberal arts education for the 21st century," has fueled a debate in the United States education system where two factions are forming around STEM education and the Humanities. However, this short-sighted vision of STEM education above all will ultimately be limiting to future generations (Radcliffe 52). Humanities study demonstrates that the alleged drastic separation between STEM and Humanities is

false. Radcliffe speculates that "we can think in terms of not one but two STEM clusters that complement each other: <u>S</u>cience, <u>T</u>echnology, <u>E</u>ngineering and <u>M</u>athematics on the one hand, and the <u>S</u>ocial sciences, the ar<u>T</u>s, <u>E</u>ducation, and the Hu<u>M</u>anities on the other." He asserts that there is a significant interdependence between the two and suggests that students and educators "need interdisciplinary, boundary-crossing courses" co-created and co-taught by educators from Humanities and STEM disciplines (Radcliffe 52). It is with this hypothesis in mind that I argue that requiring equal time for the Humanities in elementary education is of the utmost importance.

Humanities: More Than the Arts?

Equally complex is the definition of "The Humanities." Scholar Rens Bod suggests that defining the Humanities is like trying to define "time". The Humanities are often lumped in with the arts and social sciences under the umbrella of Liberal Arts. The Humanities are "part of a web of related subjects, such as philosophy (aesthetics), critical thinking (judgments), history, and literature" (Anstead 86). The Stanford University Humanities Center describes Humanities as "the study of how people process and document the human experience," going on to explain that "since humans have been able, we have used philosophy, literature, religion, art, music, history and language to understand and record our world. Knowledge of these records of human experience gives us the opportunity to feel a sense of connection to those who have come before us, as well as to our contemporaries" (Study the Humanities). Simply put, the Humanities are academic disciplines that study human culture. However, there's much more to studying the arts and Humanities than just academic disciplines that study human culture. The Humanities tell us where we have been and help us envision where we are going. The Humanities help us to "make connections to why things are the way they are, learn to think critically and develop a solid foundation for innovation" (Jones). Studies in the Humanities teach creative and critical thinking and challenge beliefs about oneself and the

world one lives in. Humanities in education offer advice for life. The lessons gleaned from Humanities are many and varied and often challenge one's own established worldview. Humanities education enriches one's moral and value-based beliefs and allows one to imagination situations outside of one's own understanding so that when one is confronted by a choice outside of one's own personal experience, one may have the knowledge and background to better understand and respond.

The Importance of the Humanities in Elementary Education

Now more than ever, as the Humanities are in in peril of being cut back or completely deleted to make room for more STEM content, we need to heighten our efforts to reintegrate the Humanities back into elementary education in the United States. While I was researching the topic of the Humanities in elementary education in the age of STEM, I found a great deal of research and scholarly work written about why the Humanities are important at the university level, yet I found surprising little about the importance of the Humanities at the elementary and middle school levels. The research that I did find emphasized that students actively participating in Humanities education as part of a well-rounded curriculum are more engaged in academics as a whole, and "students in interdisciplinary Humanities classes read better, write better, think more critically, attend school more often, drop out less, and go on to post-secondary education more frequently than their counterparts in traditional classes" (Anstead 85). Experts extol the academic benefits of providing elementary students with a solid education in the Humanities through teaching art, history, philosophy and literature at an early age. The Collaboratives for Humanities and Arts Teaching, or CHART, a nationwide network that "seeks to help at-risk students by providing them with a well-rounded and comprehensive education that focuses on the Humanities," believes that exposing students to high art, quality literature, and deep history has proven benefits to the schools that

include them. CHART insists that in programs that integrate Humanities, "students who don't enjoy school or struggle to find a reason to be involved are given an opportunity to deal with important issues and think critically about complicated questions and think about and discuss relevant source material and topics" (O'Mahen).

In a 2014 article in *Education Teacher Week*, 16-year veteran middle school teacher, community organizer, and STEM proponent Anne Jolly asserts the importance that every person learn about the Humanities and the sciences alike. Jolly explains that "A STEM program is just one part of a child's education, focusing on math and science. But our children need a well-rounded, quality education that enables them to make informed decisions that will impact the world and the way they live." What the world needs is motivated and competent students who are prepared to solve the problems of the 21st century and beyond.

In his 2015 *Harvard Business Review* article titled "Build STEM Skills, But Don't Neglect the Humanities," Johan Roos explains, "STEM aims to foster inquiring minds, logical reasoning, and collaboration skills…STEM focuses on perceived education quality shortcomings in these fields, with the aim of increasing the supply of qualified high-tech workers." Roos goes on to explain the seven standards of practice, or skill sets, educators use for educating science, technology, engineering, and mathematics students. These standards include the ability to learn, apply and integrate content, interpret and communicate information, engage in inquiry and logical reasoning, collaborate as a team, and apply technology appropriately (Roos).

If the goal of STEM educators and proponents is to support the seven standards of practice that Roos is proposing, then the study of the Humanities in elementary school classrooms is the perfect way to lay the foundation on the ground floor of the educational experience by teaching

interpretation, communication, collaboration, and reasoning skills. However, our educational goals should not be instrumentalist, offering students a checklist to mark off. Our education goals must include inspiring the curiosity of students to help them become life-long learners.

In order to engage curiosity and inspire life-long learners, we as educators, parents, and community members must strive to reach each child where they are and offer them a well-rounded education that gives them the tools to succeed in tomorrow's society. This includes reaching our students who do not excel at, connect with, or have interest in the STEM subjects. If the message is that STEM is all-important, is this message also telling students who do not excel or show interest in STEM subjects that they are in some way deficient? How do we engage and keep the interest of all learners? We must keep students engaged. We must expose them to everything. We must help students to form connections between their interests and the subjects that they show no interest in. We accomplish this by engaging students' minds in the studies of the Humanities as well as STEM, and fostering our students' ever-changing interests to instill a love of learning and feeling of success. So why would we want to exclude the Humanities from our classrooms in favor of STEM education when it is clear that the two could coexist and complement each other well in our classrooms, as they have for decades?

STEAM: Science, Technology, Engineering, "the Arts" and Mathematics

Recently, there has been a movement to incorporate the arts into STEM education, producing the new acronym "STEAM," wherein the "A" is added to represent "The Arts." However, this well-intentioned yet misguided attempt to placate opponents has this concept totally backwards. By haphazardly adding the "A" to STEM education, STEAM supporters are completely missing the point and devaluing the arts and, by association, the Humanities, by not recognizing the purpose and importance of these areas of study. First, the arts are not just something to be tacked

on as an afterthought. Adding an art lesson once a week is does not an arts program make. Furthermore, the Humanities are again completely excluded from the STEAM model. In our everchanging technology-focused world, the Humanities are needed in our classrooms now more than ever to provide balance and perspective. In his 2015 journal article "Last Word, A Tale of Two STEMs" in the *American Society for Engineering Education*, David Radcliffe states, "I believe we should foster organic interdisciplinary collaborations between scholars and practitioners across all STEM disciplines and the liberal arts." Educator and community organizer Anne Jolly adds, "When push comes to shove, it's not STEM vs. STEAM—it's about making every student a fully-literate 21st-century citizen."

Global view: Understand the World and its Inhabitants

In our ever-changing global economy, it is important to help our students develop a global perspective by studying cultures throughout the world. As technology expands our borders, we must impart to our students a deeper understanding and appreciation of other cultures and other points of view. Studies in the sciences may teach our students how the human body functions or that for every action there is an equal and opposite reaction. However, the inhabitants of our global community and their reactions aren't always predictable. The Humanities—through literature, poetry, philosophy and history—provide students with the information needed to navigate the human experience. Studies in the Humanities can help students understand both the world and the minds of other individuals by focusing on inquiry-based methods to study world culture. These skills are equally important for STEM students. In order to be truly innovative, scientists must consider how their work will affect the world and its inhabitants (Koporowski). "We live in a multicultural world that calls for knowledge of diverse peoples. The Humanities offer windows into these cultures…they help us appreciate the societies they reflect and promote tolerance for cultural

differences" (Anstead 85). In a discussion at Stanford University, Karl Eikenberry, a fellow at Stanford's Center for International Security and Cooperation, former ambassador to Afghanistan and a retired general, was reported saying that the "knowledge of history, foreign languages and cultures can help America more successfully navigate the increasing number of multinational issues that need multinational solutions" (Richards).

Broaden students' intellectual foundation

By studying the Humanities— philosophy, literature, religion, art, music, history and language— we broaden our intellectual foundation. Deborah K. Fitzgerald, professor of The History of Technology in Massachusetts Institute of Technology's Program in Science, Technology, and Society and dean of the MIT School of Humanities, Arts, and Social Sciences, shares that by studying the Humanities, students learn that "most human situations defy a single correct answer, that life itself is rarely, if ever, as precise as a math problem, as clear as an elegant equation." She goes on to argue that when students study the Humanities, they learn "how individuals, organizations, and nations act on their desires and concerns. They gain historical and cultural perspectives, and critical thinking skills that help them collaborate with people across the globe, as well as communication skills that enable them to listen, explain, and inspire" (Fitzgerald). In her 2014 *Boston Globe* article "At MIT, the Humanities Are Just as Important as STEM," Fitzgerald describes one distinguished MIT engineering graduate and entrepreneur who noted that "The introduction to philosophy and the history of ideas turned out to be the most enduring value and benefit from my education at MIT." Another engineering graduate who has transformed the electronics field says, "A broader education for a young person is more important than a specialty. When you learn about several disciplines, then you can start to connect them. I found my economics and history classes particularly useful" (Fitzgerald).

Studying the Humanities exposes students to creative ideas from great minds outside of science that they can then apply to their own work. Tsvi Tannin, a sophomore computer science major in Cornell University's College of Engineering, wrote, "Humanities courses provide STEM students with a broader perspective — enabling them to create more nuanced, higher-quality solutions to problems. Humanities courses can help engineers succeed in their core classes and potentially open up their minds to other fields" (Swartz).

The study of the sciences is not just physical but also intellectual. Studying the Humanities helps students to connect ideas across curricula through exposure to language, history, culture and ideas from other times and places. Elizabeth Koprowski, an American writer and travel historian who has worked in the higher education system with international students both in Europe and in the United States, reminds us that "Science doesn't happen in a vacuum, and even in the most sterile lab environment outside forces will have a big impact on the direction of your research and your job prospects." Koprowski reminds us that in our imperfect world, funding for scientific and technological advancements are often tied up in politics and can be dependent on societal and cultural forces. Scientific breakthroughs do not occur in a vacuum where everyone involved has the purest of intentions. Research in the fields of pharmaceuticals, infectious disease, energy production and climate science are heavily affected by the political climate in our country and abroad. Navigating the politics of science and technology requires a roadmap that the Humanities can help to provide. By broadening the foundation and experience of our students beginning at the elementary school level, we are preparing them to navigate the delicate balance between science and politics. STEM professionals must not only be able to apply their STEM knowledge in the laboratory but must also must have the foundational skills that the Humanities provide in order to address real-world issues (Koprowski).

By studying philosophy, literature, religion, art, music, history, and language, students begin to see the interconnectedness of all areas of knowledge and how the Humanities and STEM subjects all fit together and complement each other. The challenges that the students of tomorrow will have to face are far greater than those we face today.

> From climate change to poverty to disease, the challenges of our age are unwaveringly human in nature and scale, and engineering and science issues are always embedded in broader human realities, from deeply felt cultural traditions to building codes to political tensions. So, our students also need an in-depth understanding of human complexities — the political, cultural, and economic realities that shape our existence — as well as fluency in the powerful forms of thinking and creativity cultivated by the Humanities, arts, and social sciences. (Fitzgerald)

Communicate Clearly

Communication is an essential skill for all students to master. Humanities study strengthens our students' ability to communicate clearly with others. The Humanities expand students' communication skills by enhancing their ability to express themselves through the ideas deeply rooted in the Humanities. By studying the Humanities, students build skills in critical thinking, research, reading, and writing, which help to create effective oral and written communicators. Education in the Humanities benefits students by helping them to communicate with the non-academic world. Academic, scientific, and technological language can be difficult to understand. An education which includes the Humanities provides students with essential advantages over those who choose a hyper-focused education model. Learning to construct a sound argument and communicate complex ideas and research findings to those not familiar with the language of a particular field of expertise is vital in our rapidly growing technology-based global society.

The study of the Humanities, most especially philosophy, has given us the universal guidelines to get our points across to others. It does not matter how brilliant one's invention is, or how groundbreaking the hypothesis, if one cannot communicate those ideas effectively to others.

> Even the most advanced mathematicians and scientists, your *Beautiful Mind* types, still need to be able to communicate their ideas effectively and absorb the contributions of others. One cannot gain a truly deep understanding of the intricacies of the English language and the nuances of writing a compelling essay or giving a persuasive speech without having read, discussed, and understood the great writers and orators who came before. (O'Mahen)

This illustrates the fact that education in the STEM subjects without education in the Humanities will not prepare students to take their place in the modern workplace. Innovative companies, cutting edge research facilities and government agencies alike agree that good communication is imperative in order to reach their goals and stay ahead in the global marketplace. A panel at the Oxford Biotech Roundtable recommended that "… in the future, a module in communication be a prerequisite for any science undergraduate, to ensure that we can help the public and policy-makers to keep up with our ever-changing understanding of the world" (O'Mahen).

For example, the study of philosophy in early education lays the groundwork for the communication of ideas. Specifically, there are the three appeal methods or persuasion techniques of Aristotle, which are the basis of every successful public speaking book ever written. Ethos is the ethical appeal of character, credibility and reputation; Pathos is the emotional persuasion usually focused on want or fear; and Logos is persuasion by the use of reasoning, facts, and logical evidence. From this example, we can see how studying techniques from 2,400 years ago is still very relevant today. Learning to understand the basic use of these three simple persuasion techniques early in a

student's education will undoubtedly make those students stronger communicators no matter what subject matter they choose to apply them to.

The study and mastery of a foreign language is equally important in our global economy. We cannot truly understand the world and its inhabitants if we cannot speak the language. Elizabeth Koprowski reminds us that "This means that successful STEM professionals will often find themselves working in multi-cultural teams, cooperating with international facilities, or communicating across borders and boundaries. Scientists with foreign-language skills will find this multinational environment a lot easier to navigate." Educators and administrators of both kindergarten through twelfth grade and higher education institutions alike are increasingly beginning to recognize that STEM fields require more than just STEM skills. From kindergarten through fifth grade elementary school students in the Arundel County Public Schools of Maryland to The University of Rhode Island and Northern Arizona University, educators are implementing programs to address the need for foreign languages to be taught in conjunction with STEM studies to enhance communication. Having competency in more than one language opens pathways for collaboration and results in better communication. If the students of tomorrow are to excel in this truly global society, the importance of language instruction must be stressed, especially by supporters of STEM fields.

In her article, Deborah K. Fitzgerald introduces us to a prominent MIT materials sciences graduate, who cites her MIT literature and art history classes as key to expanding her worldview. This former student is now the dean of a college of engineering at MIT, with a frontline perspective on what engineers need to succeed in today's marketplace. She urges us to consider that "employers want students who can lead, work in teams, work across cultures, and especially communicate — and much of that ability comes from studies in literature, the arts, the social science" (Fitzgerald).

Develop Creative and Critical Thinking and Problem-solving Skills

The Humanities fill a great need in our society: the need for creative problem-solvers who also take into consideration the human perspective. In our current political climate, the words of Dr. Martin Luther King, Jr., come back to remind us: "Education must also train one for quick, resolute and effective thinking. To think incisively and to think for one's self is very difficult…A great majority of the so-called educated people do not think logically and scientifically. Education must enable one to sift and weigh evidence, to discern the true from the false, the real from the unreal, and the facts from the fiction" (King).

The Humanities encourage students to think critically and creatively. They teach students to contemplate humanity and to inquire about the complex world around them. The questions raised in literature, philosophy, and religion courses teach students to think critically and listen actively, helping students to make connections naturally between Humanities and STEM subjects. The complicated world we live in will require citizens who have been taught to think logically and objectively about complex ideas to find creative solutions for the challenges of a global society. "…Within the context of Humanities studies, critical thinking and creativity are two sides to a priceless coin… Creativity leads to ideas and innovation. Critical thinking fosters execution and implementation. While both play invaluable roles in moving the world forward, their fusion achieves true synergy. Enter the Humanities-based education" (Hughes).

The study of human behavior can help answer some of the most complicated questions in the matters of science and technology. The Humanities develop students' analytical thinking skills, which are key in helping students to gather information, articulate, visualize, and solve complex problems. Studies within the Humanities teach students to evaluate complex and sometimes

13

imperfect or incomplete information by weighing the evidence skeptically and considering more than one side of every question. By comparing information with different points of view, students are taught to make a subjective assessment. "The new economy requires that we continue to improve and encourage STEM education because mastering existing and new technologies is vital," says Edward Abeyta, director of "K-16 Programs" at the University of California-San Diego Extension. He goes on to explain that this approach will require new curricula and the retraining of teachers on how to capture the full potential of the whole brain while teaching students in creative ways so that students learn to think and not just memorize. " …The future economic cost of not having a whole brain education system that fosters creativity and innovation is immense" (Richards).

Students who participate in a well-rounded education including the Humanities are capable of creative problem-solving. Employers are beginning to recognize what educators have known for a long time, which is how important creative problem-solving is to success in both education and business. Creative people with creative solutions are valuable in the modern world. By exposing students to art, literature, philosophy, and culture, we are teaching students the important nuances of creativity. When students engage in meaningful discussions and learn to appreciate and interpret creative works, they begin to learn to express themselves and their own thinking more creatively. These experiences improve problem-solving and critical thinking skills which are essential 21st century skills for success. "A survey of 1500 CEOs identified creativity as the most important leadership competency for the future. In a world of increasing complexity, being able to think outside the box is crucially important" (O'Mahen).

Knowledge of the Past Creates Good Citizens and Leaders

Why do we educate our society? What is the purpose of education? Many educated, knowledgeable, and well-respected people in history argued that the purpose of education is to create good citizens and leaders who are prepared to fulfill their civic and cultural responsibilities.

In the early 1900s, in a famous speech made by the Archbishop of York to a group of English headmasters, the Archbishop stated that "the true purpose of education is to produce citizens." Thirty years later, politician, diplomat, activist, and soon to be first lady Eleanor Roosevelt quoted the Archbishop of York in her 1930 address "Good Citizenship: The Purpose of Education," and went on to propose that "The purpose of education has always been to every one, in essence, the same—to give the young, the things they need in order to develop in an orderly, sequential way into members of society" (Roosevelt). Almost two decades later, in 1947, in the Morehouse College campus newspaper, in an article titled "The Purpose of Education," Martin Luther King, Jr., reprises this theme, arguing that "… the purpose for education is not solely to transfer content knowledge but to enable the individual's successful entrance into society…It's more about developing whole individuals, whole children, to be ready for the world in which they exist and prepared for the future" (King).

If our students are not educated about where we have been as a society and are not given an opportunity to learn from the past, how are they to become responsible citizens and leaders? Eleanor Roosevelt suggests that these skills are found in the Humanities:

Learning to be a good citizen is learning to live to the maximum of one's abilities and opportunities, and every subject should be taught to every child with this in view… It is not, however, only in the courses bearing directly on history and government that citizenship can be taught… but a study of the life and growth of other nations, in which we follow the general moral, intellectual, and economic development through the ages, noting what brought about the rise and fall of nations and what were the lasting contributions of peoples now passed away to the development of the human family and the world as a whole…The power of concentration and accuracy which these studies develop will later mean a man or

woman able to understand and analyze a difficult situation… Mathematics and humanity are

strangely intertwined, and an ability to understand both is essential to well-balanced

decisions in questions of this kind.

One of the most important elements of a Humanities education is preparing students to

fulfill their civic and cultural responsibilities, transforming students into informed, conscientious,

engaged citizens. An engaged and informed public body is vital to a flourishing and healthy

democracy. Without an understanding of philosophy, history, and classical literature, it is nearly

impossible to truly grasp American politics. In order for our students to be well-rounded, educated,

modern citizens, they must study the background information and context provided by the

Humanities in conjunction with the STEM subjects. "The Humanities teach us habits of critical

thought and the historical perspective necessary for citizenship in a democracy. By applying a critical

approach to history, students learn to analyze propaganda and political speeches. By comparing

carefully reasoned historical arguments with the close logic of the scientific method, students see

that the language of science is only one way of describing the world" (Anstead 85). A Humanities

education is a main component in the foundation that American democracy was built on. The

Humanities develop informed and critical citizens and foster social justice and equality. The

Humanities enrich the individual, who in turn enriches society by adding diversity and creativity,

which creates good citizens, neighbors, workers, and employers (O'Mahen).

Reinforce Cultural and Ethical Responsibility and Values

A strong, well-rounded education, which includes the Humanities, has both a democratic

and a moral function. Studies in the Humanities not only help to create good citizens and leaders,

they also reinforce the importance of cultural and ethical responsibilities in those citizens and leaders

by reinforcing cultural and ethical responsibility and values**.** Martian Luther King, Jr., explained, "It

seems to me that education has a two-fold function to perform in the life of man and in society: the one is utility and the other is culture…education which stops with efficiency may prove the greatest menace to society. The most dangerous criminal may be the man gifted with reason, but with no morals."

Studies in the Humanities reveal how others have made moral, spiritual, and intellectual sense of the world. In his article "Humanities in the 21st Century," educator and author of *Conversations with Great Teachers* Bill Smoot contends that we need the Humanities: "The Humanities' greatest value lies in their lessons for contemporary life. For the world will never change so rapidly as to outpace the issues universal to humanity — war and peace, good and evil, justice and revenge …we should acknowledge that the deepest literary and artistic expressions of the world's cultures, from the ancients to the contemporary, are of interest and value to us" (Smoot).

When the Humanities are given equal time alongside the STEM subjects, students begin to make connections and see the importance of values-based decision-making within science, technology, engineering and mathematics. "Even if the day arrives when every objective fact about the physical and biological universe is known, we will still face questions of equity, the good life, and community—Humanities questions. Students know this deep down, so when given the opportunity to study the Humanities as part of a sciences curriculum, they see more meaningful connections and experience more success than they do in specialized classes" (Anstead 85). The Humanities serve a critical role in expanding our worldview by fostering humanistic thinking and empathy towards others.

> Some of the best testimony about the value of such an education comes from our science
> and engineering alumni. One recent graduate [of MIT] who went on to medical school wrote
> about how her practice as a physician requires not only medical knowledge, but also the
> ability to interpret her patients' accounts and stories — a skill she gained reading literature,

studying the various forms of narrative, the many ways humans share vital information. 'MIT biology prepared me for medicine,' she says. 'Literature prepared me to be a doctor'. (Fitzgerald)

 In times of adversity, we turn to the Humanities for guidance and understanding. It is important in times of uncertainty to be able to distinguish between the meaningless and the meaningful. The Humanities help us to analyze our own beliefs and values by comparing them with thinkers of the past and present, allowing us to make informed, culturally and ethically responsible decisions.

"The Humanities teach us habits of critical thought… and they help us to think about how to use technology to make the world a better home for humanity" (Smoot). Humanities study helps students understand the moral and ethical impact that science, technology, and medicine has had, and will have, on society. As the fields of science and technology progress, both citizens and leaders must constantly reevaluate the ethical, moral, and cultural ramifications of such scientific innovations and creations. Studies in the Humanities provide the necessary historical context and tools to do just that. Scientists, educators, citizens, and leaders must be able to understand the philosophical, cultural, and social influences that impact society. With each new scientific discovery or technological breakthrough, there is also the question of its impact on the world around us. Many of the great thinkers studied in the Humanities, such as Aristotle, Plato, Descartes, and Einstein, who were scientists themselves. These great minds not only made extraordinary contributions to mathematics, physics, and physiology, but were avid philosophers and theorists in the sciences of human nature. These thinkers blended philosophy and science to explore myriad links between humanity and science. As our global society enters into this extraordinary era of understanding of scientific advances and the human condition that the great thinkers of the past could only dream of,

the intellectual challenges and debates scientists and philosophers of our time will face may be able to be answered with a look into the past. As members of modern society ponder the intellectual, moral, and ethical questions surrounding science of mind, brain, genes, evolution, and medicine, the great thinkers of today could benefit from the work done by the pioneers of long ago. Studies in the Humanities give us the powerful tools to explore these questions (Pinker).

Elementary Education Revisited

There are many advantages to integrating the Humanities and STEM subjects in our elementary schools. Examples of the Humanities and STEM combined education model can already be found in a few elementary schools across the country. One such example is at the Imagination School in Palo Alto, California. Imagination School, founded in 2014 by Gigi Carunungan, an author and educator for over 25 years with a passion for creating engaging and hands-on learning environments, offers its families a "progressive program merging the Humanities with hands on immersive math, science, and creativity" (Smyth). The Imagination School's philosophy teaches that in order to succeed in the 21st Century, students must not only be taught facts and information, but also must be taught how to learn. Imagination School aims to educate the whole child through innovative and comprehensive curricula guiding their students "in collaborative, hands-on learning experiences necessary to develop the skills and habits necessary to succeed," such as creativity, critical thinking, problem-solving and effective communication. Imagination School stresses that "students must be culturally and globally aware, technically literate, and have a sense of personal and collective responsibility" that can only be achieved through the blending of Humanities and STEM curricula (Smyth). An Imagination School parent offered examples of how the curriculum combined with the safe and open learning environment benefited her own 4th grade child by using concrete real world examples and visualization to help him to add fractions with different denominators, making

math less intimidating and more accessible. She explained how the whole brain learning approach blends Humanities and STEM by using "history to teach mathematics [and] Egyptian farming to explain pi. The kids are building a garden to learn about microbes and then start a non-profit to donate all the food they grow to shelters" (Smyth).
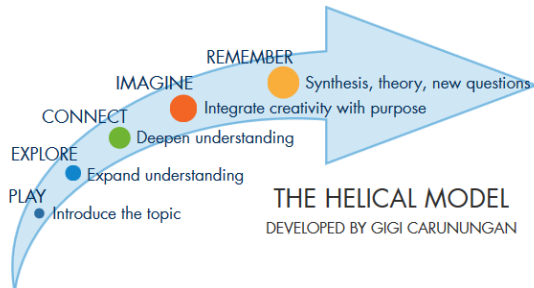
The Humanities and STEM blended curricula of Imagination School is based on the The Helical Model, Common Core, and the Constructivist Learning Theory. The Helical Model, developed by school founder Gigi Carunungan, is a learning process guiding the curriculum along the Constructivist framework comprised of five stages of learning: Play, Explore, Connect, Imagine, and Remember. Using this model, students are guided through a multi-dimensional learning experience that incorporates hands-on activities and interactive projects that engage them in expanding and applying knowledge across multiple subjects. In this Constructivist-based learning environment, where students learn by doing, the students are active participants in their accumulation of knowledge. Students explore questions with a whole brain learning approach that enables them to formulate hypotheses, connect the new with the known, extract concepts and theories from data, and form meaning from engagement with the world around them. Integral to this process is the students' ability to communicate and collaborate with peers and educators while also refining their mastery of socio-emotional skills essential to success in future endeavors.

Inspired by Howard Gardner's *Theory of Multiple Intelligences*, The Helical Model uses multi-sensory and integrated arts activities to allow learners of all styles to actively participate in subject matter exploration, application, and mastery through a progression of learning activities which include kinesthetic, visual, and verbal lesson strategies. Scientific research indicates that learning

through active processes such as the The Helical Model and Constructivist Learning Theory help students' brains to construct understanding by building and refining connections among neurons (Gülpinar), and that when students engage in interactive lessons that focus on learning for meaning, greater retention, recall and application of information and ideas are found (Bransford). Key to this process is a multi-modality curricular design that addresses different learning styles using collective class learning experiences where students are given the skill, experience, and knowledge to extrapolate their own theories and engage in critical conversations.

Conclusion

In order to thrive in the 21st century, the focus must not only be on educating our students, but helping our students to learn how to learn. Students today must develop the capacity for critical thinking, effective communication, creativity, collaboration, and problem-solving. Students must be culturally and globally aware citizens, who are literate in technology and have a developed sense of personal and collective responsibility, all of which can be accomplished through a multi-modality curricular design which integrates Humanities and STEM education as one.

This task may feel daunting in the face of all that educators are being asked to accomplish in today's elementary school classrooms. However, educators do not need to teach in a private or charter school to develop lessons for elementary classrooms that integrate Humanities and STEM curriculum. Educators can start small, one lesson at a time.

Our goal as educators and parents must be to help each student to become a successful lifelong learner, whose accomplishments and sense of self are not measured by achievement tests. Our goal must be to support our students in becoming "knowledgeable, emotionally and physically healthy, civically inspired, engaged in the arts, prepared for work and economic self-sufficiency, and

ready for the world beyond formal schooling" (learning compact). The best way to achieve this goal

is to present well-rounded educational opportunities, rich in a blended Humanities and STEM

curriculum, beginning in the elementary school years and continuing throughout a person's life.

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