

Spring 2015

Educating for the Twenty-First Century: A Pragmatist's View on the Dichotomy of STEM and Liberal Arts

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**Educating for the Twenty-First Century:
A Pragmatist's View on the Dichotomy of
STEM and Liberal Arts**

*A Project Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Liberal Studies*

by

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May, 2015

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Introduction

Liberal education fosters the development of intellectual curiosity, critical intelligence, autonomy, the ability to initiate cultural and political change, and theoretical, analytical, and conceptual capabilities. It seeks to place students in the stream of history, to acquaint them with the methods of science, to enrich understanding of the human condition, and to expose them to the power of the arts. The way in which material is presented to students in liberal education programs is frequently cross-disciplinary, as one of its main concerns is to enable students to make connections between branches of knowledge. The Association of American Colleges and Universities defines liberal education as:

An approach to learning that empowers individuals and prepares them to deal with complexity, diversity, and change. It provides students with broad knowledge of the wider world (e.g., science, culture, and society) as in-depth study in a specific area of interest. A liberal education helps students develop a sense of social responsibility, as well as strong and transferable intellectual and practical skills such as communication, analytical and problem-solving skills, and a demonstrated ability to apply knowledge and skills in real-world settings.¹

The increased focus of education for learning technical skills, regurgitation, heteronomy, and basic reading and writing skills threatens the existence of liberal arts education. The public's misperception about the goals and benefits of liberal arts education and career skills confronts the liberal arts, leading to a society that looks to education as described by Jane Addams in the early 1900s as "[t]he business college man, or even the man who goes through an academic course in order to prepare for a profession, comes to look on learning too much as an investment from which he will later reap the benefits in earning money."² Current U.S. rhetoric labels liberal

¹ C. J. King, "Restructuring Engineering Education: Why, how and when?" *Journal of Engineering Education* 101, no. 1 (January 2012): 1-5.

² Condliffe Lagemann, ed., *Jane Addams on Education* (New York: Teachers College, Columbia U, 1985), 106-107.

arts education as time-wasting, elitist, devoid of content, unmeasurable, unfocused, unmarketable, and even un-American. Recent arguments against a liberal arts education, however, prove similar to the political cries for efficiency that began during the rise of the modern academy. Societies focused on creating producers and consumers will always demonstrate skepticism of liberal education, particularly if its citizens perceive the purpose of higher education as merely job preparation. For higher education to fulfill its role as an intellectual and experiential journey, educational leaders and policymakers must not reduce the breadth of a liberal arts curriculum.

In the twenty-first century, the purpose of a liberal arts education intensifies and becomes increasingly important as our technology and forms of global communication advance even more rapidly. In a fast-changing environment, our society cannot afford to lose sight of the human condition, while preparing future practitioners. The mechanical forms of teaching the rote knowledge required for vocational education cannot overcome the practice of inquiry and analysis that students need to develop an understanding of the world. With the inquiry provided by liberal arts education, students will be better equipped to discover innovative methods of coping with or being agents of change, rather than fighting the current.

Our culture needs the liberal arts to take disparate scientific observations and weave together a framework of the inter-workings of the universe. Yet, the enrollment in liberal arts disciplines is down, which means colleges are graduating students and sending them out into the workforce with the capability for performing basic tasks for a current job, but without the ability to learn on the job and adapt to new times and technologies. Without a liberal arts component, students also graduate without the intellectual, theoretical, and conceptual capacity to engage in an analysis of society, without the ability to function as a productive citizen in a democracy, and

without the tools of empowerment to recognize and overcome injustice or intellectual oppression.

Students' experiences and comprehension of others' points of view and the world around them is at stake. Education that limits meaning of the human condition in favor of the drilling and regurgitation of information silences the voices and experiences of others, which constructs an undemocratic discourse and instills an ethically imbalanced citizenry. A liberal arts education prepares students for the moral challenges and tough choices faced in the twenty-first century. While science and new dual-purpose technologies define this century, the infusion of science and technology, with the breadth of knowledge provided by a liberal arts education, becomes increasingly imperative.

Current American rhetoric pushes a purely STEM (Science, Technology, Engineering, and Mathematics) curriculum under societal pressure to pull funds from liberal arts programs and train workers as cheaply and quickly as possible. When this happens, higher education is no longer a means of learning and acquiring the tools for adaptability, ethic responsibility, and civic courage, but a commodity, bought and sold for immediate employment. While advocates for STEM-focused education aim to boost the nation's economic productivity and global competitiveness, many worry that neglecting the arts and humanities will lead to a one-sided education that fails our culture and society by creating replaceable drones, rather than developing minds, robbing a generation of innovators.

In the absence of an apparent notion of education's role in publicly shared benefits, learning institutions pander to individual benefits. The following thesis research demonstrates that STEM-only curricular models eliminate critical evaluation of the human condition, and with

it, the ability to clearly define ethical considerations as new technology continues to challenge our existing moral boundaries. A STEAHM-focused (Science, Technology, Engineering, Arts, Humanities, and Math) approach to higher education, or the “pragmatic liberal arts,” which integrates the liberal arts with the STEM disciplines to a holistic diversified curriculum, will more effectively serve the public interest. The false dichotomization of the liberal arts and STEM programs will lead to increased privatization of higher education.

To support this claim, I analyze the history and recent trends of privatizing American higher education by demonstrating the transition of education’s role in economics and politics. The rhetoric of the STEM-focused model of education discusses the importance of our nation’s immediate economic needs and the individual’s training for a well-paying job, while ignoring the facets of STEM education that develop the mind. While it is important to train graduates for job preparation, a purely STEM education will not suffice. In considering the kind of students, colleges, and society Americans wish to develop, I make the case that one useful solution to the present-day context and stalemated debates is to revive an idea dear to the classical American pragmatists: education as an essential public good for a robust democracy. In order to make this case, I turn to the following theorists: John Dewey, Jane Addams, John Andrew Rice, John Stuart Mill, and Ralph Waldo Emerson. This is a call for integration of disciplines and perceived interests: this should not be an either/or debate between STEM or liberal arts, and it should not be an either/or debate between private and public interests. With a pragmatic and diverse education in a democratic setting, students receive the private benefits of job readiness and adaptability because they will be equipped with critical thinking and problem solving abilities, and they will contribute to the public benefit by acting as competent, ethical, and innovative citizens with both the theory and practice of democracy.

I. The Dawn of the Modern Academy

The debate over the role of the college curriculum traces back to the origins of the modern academy. The role of education intends to further the needs of society which oscillates between vocational training and a liberal arts education. As a result, the American college curriculum has continued to change with the whims of the social, economic, and political needs of the time. The economic climate, in particular, manifests the tension in defining and meeting the evolving needs of society. During the last two centuries, colleges have been pressured to train students to meet the conflicting demands of a capitalistic and idealistic society: the capitalistic group pushes society toward vocational and job training to create workers, and the idealistic group pushes society toward liberal arts education to develop the minds of students. This fight is complicated by economics, resulting in students and their families seeking higher education to fulfill their aspirations for economic success and social mobility. Thus, the value placed on education by the populace has largely been a function of the economic and political contexts.³

During the colonial period, a liberal arts education was viewed as cultivating breadth, rather than specialized skills, and was therefore perceived as imminently useful for serving the needs of the colonies. In his 1783 *Notes on the State of Virginia*, for example, Thomas Jefferson made clear his belief that an Amendment of the Constitution should provide aid to public education, so that the entirety of society acquires the skillset necessary to share competent and efficient influence over government. He writes: “If every individual which composes their mass participates of the ultimate authority, the government will be safe; because the corrupting the whole mass will exceed any private resources of wealth; and public ones cannot be provided but

³ Ernest T. Pascarella, *Liberal Arts Colleges and Liberal Arts Education: New Evidence on Impacts*, Vol. 31 (Hoboken: Wiley Periodicals, Inc., 2005), 6-7.

by levies on the people.”⁴ By the early 1800s, citizens embraced these same broad skills resulting from a liberal arts education. Critics of liberal arts education found the curriculum provided inadequately for the emerging needs of society. Yet these first cries for a new curriculum met sharp criticism. The Yale Report, a bold statement defending the traditional curriculum, repeatedly stressed that the purpose of a college education was to build a foundation that serves the vast and ever-changing needs of society. The report concluded that the traditional liberal arts curriculum best served the business character of the nation.⁵ With the ebb and flow of the economy and the rise of industrialization, the voices pleading for a general, liberal arts education began to fade into the background.

During the nineteenth century, the standard of living rose steadily, and manufactured goods became more widely and readily available. As outlined by Herbert M. Kliebard, with the fall of food prices, workers could afford more manufactured products until a depression hit in 1873 and lasted until 1878. Even though in 1883, many banks failed and railroads declared bankruptcy, an economic boom arose in the late 1880s. This flow of economic prosperity did not last long, however, for in 1893, depression hit again and continued until 1897, causing wage cuts and layoffs. Threats of unemployment and the growth of urbanization transformed society, causing tremendous anxiety for manufacturers and average Americans.⁶ While innovations in transportation and technological changes in communication created mass markets, entrepreneurs developed new techniques of production that required major changes in the process of work in

⁴ James W. Fraser, ed., *The School in the United States: A Documentary History* (New York and London: Routledge, 2010), 25.

⁵ Pascarella, *Liberal Arts Colleges and Liberal Arts Education*, 7.

⁶ Herbert M. Kliebard, *Schooled to Work: Vocationalism and the American Curriculum; 1876-1946* (New York: Teachers College Press, 1999), 2.

manufacturing plants and the conception of work itself. The course of this transformation was brought about by the steady industrial and economic growth which increasingly depended on specialized skills and division of labor. This mutable understanding of work sparked confusion about the value system in place before American preindustrial capitalism. The new industrialism introduced a renovation in America's economic arrangements and in its social institutions.⁷

During the beginning of the nineteenth century, America's manufacturing production occurred in artisan shops throughout the country, where a few highly-skilled workers crafted goods from start to finish. By the mid-nineteenth century, the factory emerged alongside these artisan shops, which still constituted most of the country's manufacturing production. In contrast to skilled-working shops, the factory employed a larger number of lower-skilled workers who performed separate tasks, often with machinery. Factories differed from specialized shops because factories introduced higher labor productivity as well as more advanced and abundant technology than small workshops. For the remaining years of the nineteenth century, manufacturing production continued moving towards factories and away from artisan shops.⁸ Consequently, the process of manufacturing became increasingly detached from design and management. Labor and management became specialized, dividing the corporate structure and creating new patterns of corporate governance. The new methods of controlling the production process shaped varying expectations about what kind of work should be deemed valuable, resulting in new relationships between labor and management. In *Schooled to Work*, Kliebard

⁷ Ibid., 2-3.

⁸ Jeremy Atack, Michael Haines, and Robert A. Margo, "Railroads and the Rise of the Factory: Evidence for the United States, 1850-1870," in *Economic Evolution and Revolution in Historical Time*, ed. Paul W. Rhode, Joshua L. Rosenbloom, and David F. Weiman (Stanford: Stanford University Press, 2011), 162.

provides an example from 1885 when “[m]anagers and unionized workers at the McCormick plant were at odds, [so] management installed new molding machines and dismissed the entire workforce, hiring unskilled workers in their place.”⁹ Kliebard’s example of the McCormick plant demonstrates how the new industrial economy redefined American perceptions of labor and management. This new definition of a worker rippled throughout society and affected the role of public institutions, such as education.

In response to the transformation of working relationships and the nature of work, schools responded by reforming the curricula to reflect manual training which was formally introduced at the Philadelphia Centennial Exposition of 1876.¹⁰ Manual training provided the American public with a compelling way to address the radical changes in the economy and workforce by proposing a measure of encouragement for the future. The pressures of industrialization downgraded the worth and value of the highly-skilled artisan by delegating specialized low-skilled tasks to a larger labor force with the aid of machinery in factories. The argument for manual training reform claimed to bolster the worth and value of unskilled work and prepare students for such positions. Regardless of whether manual training actually fulfilled these promises, the notion that schools could stay ahead of the trends and train students accordingly comforted Americans, who believed that schools could alleviate the problems associated with the workplace transformation.¹¹

⁹ Kliebard, *Schooled to Work*, 3.

¹⁰ *Ibid.*

¹¹ *Ibid.*, 23.

While educational leaders and American citizens respected manual training as a curricular reform for its association with moral restoration and pedagogical renewal, the economic message never abated. Vocational education promised commitment to economic benefits both to the individual and to the nation, reshaping the school curriculum in line with the needs and interests of the growing school population due to increasing urbanization.¹² Ultimately, the economic message attracted the support of politically powerful interest groups, including the American Vocational Association (AVA). A coalition of political interest groups introduced programs of study and recruited local, state, and federal support to serve the needs of manual training. Shortly after the implementation of manual labor training in the school system, the value of education transformed from a moral curative to a pedagogical reform that provided practical skills.¹³ During this economic climate, many Americans felt that their industrial society needed education for practical purposes. As educators steered manual training toward the role of economy booster, the special interest groups assisted transforming the fundamental purpose of American schools to society.

While schools steered general education towards manual training, educational leaders and Americans demanded that higher education focus more predominantly on agriculture and engineering. The Industrial Revolution not only reshaped the manufacturing industry, but also agricultural work. Many leaders in agriculture anticipated a need for technically trained workers to develop the agricultural recourse. The passage of the Morrill Land-Grant Act of 1862 met this need by providing each state 30,000 acres of public land for the construction of colleges: “Without excluding other scientific and classical studies and including Military tactics, to teach

¹² Ibid., 24-25.

¹³ Ibid., 25.

such branches of learning as are related to agriculture and mechanic arts, in such manner as the legislature of the states may prescribe in order to provide the liberal and practical education of the industrial classes in the several pursuits and professions of life.”¹⁴ As a result of the federal grant, every state established a land-grant college with some states founding separate colleges and others combining the land-grant college with existing state colleges and universities. Due to the underdevelopment of teaching agriculture, home economics, and engineering, the land-grant institutions advanced slowly after the introduction of the Morrill Act.

With the increasing importance of bridges, roads, canals, dams, and buildings during the rapid growth of industrialization, the value of systematic training in civil engineering became evident. In 1890, a second Morrill Act provided an additional \$15,000 annually for each of the land-grant colleges.¹⁵ By 1882-1892 the largest share of students—46 and 39 percent—attending land-grant universities studied engineering.¹⁶ As land-grant colleges expanded, many developed into state universities in order to provide rudimentary preparation in the arts, languages, mathematics, and sciences required in advanced studies in vocational and technical education offered at these institutions to serve Americans’ needs.¹⁷ Developments in higher education in the years following the Civil War addressed the growing industrial economy and the rise of the professions. As manufacturing plants grew larger and more complex, managers with a deeper scientific understanding began challenging foreman-controlled factory production lines. As the

¹⁴ Roy W. Roberts, ed., *Vocational and Practical Arts Education* (New York: Harper & Row, Publishers, 1971), 34.

¹⁵ *Ibid.*

¹⁶ Karen Clay, “Natural Resources and Economic Outcomes,” in *Economic Evolution and Revolutions in Historical Time*, ed. Paul Rhode (Stanford: Stanford University Press, 2010), 34.

¹⁷ Roberts, *Vocational and Practical Arts Education*, 34.

professional status of engineers expanded, this movement away from the foreman-controlled production line moved toward engineering managers. Engineering managers proved more engaged in applying a system of improving production than in overseeing technical matters on the job.¹⁸ As engineers began redefining their profession, schools began considering curriculum changes that would effectively prepare engineers for these new roles. Science, now entrenched in the minds of educational leaders, became the top priority in curriculum creation. The traditional liberal arts curriculum continued to suffer the effects from the notion that colleges should train citizens to participate in the nation's economic and commercial life by offering career-oriented programs supported by general education electives.

The considerations applied to constructing an efficient factory became the basis on which schools were managed and the foundation of the curriculum was generated. The new factory system required a consistent stream of workers, and curriculum-creators presumed technical training provided this need. As vocational education moved to the forefront of the curriculum, Americans began reconceiving schools as factories, starting a "pedagogical revolution."¹⁹ A number of legislative bills concerned with some aspects of vocational education were introduced in the National Congress before the official passage of the Smith-Hughes Vocational Education Law signed on February 23, 1917.²⁰ In 1901, the first bill regarding vocational education focused on providing federal aid to industrial institutes with state charters. In 1909, the term "vocational education" appeared for the first time in these bills.²¹ The passage of these bills symbolized the

¹⁸ Kliebard, *Schooled to Work*, 46.

¹⁹ *Ibid.*, 54.

²⁰ *Ibid.*, 132.

²¹ *Ibid.*

varying perceptions regarding the organization of vocational education. The bills' development in Congress and final disposition demonstrate the obstacles encountered in reconciling the varying perceptions of those leading the movement of federal aid for vocational education.²² With the passage of the Smith-Hughes Act, vocational education began to dominate competing educational ideals.

Upon the initiation of the Act, the National Society for the Promotion of Industrial Education changed its name to the National Society for Vocational Education, suggesting that vocational education no longer required "promotion."²³ The Smith-Hughes Act provided support in the form of federal matching funds for the salaries of teachers of agriculture, trade, industrial education, and home economics and appropriated \$1 million for training in vocational education.²⁴ The Smith-Hughes Act implemented strict guidelines on states in order to receive funds. To attain such support, schools had to prove that instructional time was devoted to vocational training and that the content delivered aligned with vocational education needs rather than general education purposes. States submitted plans following such guidelines to federal governments as legally binding contracts, allowing local officials to maintain their basic educational structure.²⁵

As vocational education became the dominant reform, schools adopted the language of the workplace. The workplace lingo found relevance not only in school subjects, but also in the conception of schooling: raw material and finished products, gains and losses, inputs and

²² Roberts, *Vocational and Practical Arts Education*, 103-104.

²³ Kliebard, *Schooled to Work*, 132.

²⁴ *Ibid.*

²⁵ *Ibid.*, 133-134.

outputs, productive and unproductive labor, elimination of waste, and return on investment. Administrators applied these terms to handling the budget and managing schools. The more vocationalism became the controlling purpose of school, vocational limits increasingly governed the prevailing sentiment of what established pedagogical successes and failures.²⁶ At the same time that vocational programs fought for installation in the public schools, the conceptual apparatus for understanding the nature and purposes of schooling was being quietly overhauled.

Curriculum critic David Snedden, for example, suggested that liberal education should follow terms of its relationship to vocational education “in the same way that production and consumption (or utilization) are contrasted in social and economic life ... vocational education may be designed to make of a person an efficient producer; liberal education may be designed to make him an effective consumer or user.”²⁷ Snedden argued that liberal education needed to be administered in the same manner as, and independently of, vocational education.²⁸ During the second decade of the twentieth century, Snedden’s views proved the norm as the governing structures of general and vocational education continued to separate. Snedden’s proposals for a separation of administrative structures for vocational and general education generated a heated debate with pragmatist John Dewey. Dewey joined this debate by bringing attention to the Commission on National Aid to Vocational Education and its lack of professional educators. With this insight, Dewey, a highly-regarded educator, claimed that the responsibility for generating and applying educational policy transferred to interest groups outside of education. He witnessed the transition these interest groups were creating: educational ideals that prepped

²⁶ Ibid., 121.

²⁷ Ibid., 124-125.

²⁸ Ibid.

students solely for the workplace and not their place within society at large. Fearing the split between vocational and general education, Dewey outlined his belief that industrial education should be in the interest of developing “industrial intelligence” rather than “technical trade efficiency.”²⁹

In the second decade of the twentieth century, vocational education became mostly programs of study in comprehensive schools. Rather than a system of specialized schools, the comprehensive school became the dominant form of secondary education in the United States, yet it would appear as if Snedden won the larger debate, for the expanding curricular rift within these comprehensive schools separated vocational and general education. Under the provisions of the Smith-Hughes Act, for instance, control at the federal level over vocational education now belonged to a separate agency, the Federal Board for Vocational Education, administratively autonomous of the U.S. Office of Education. Predicted social fates now largely determined students’ programs of study. Americans agreed with Snedden that students should attend the same institution but follow separate curricular paths in the interest of social and occupational regulation, rather than agreeing with Dewey that an educational system should seek to address social injustice by crafting an idealized social community in school and employing a curriculum designed to promote critical intelligence.³⁰

The majority of college students participated in vocational education, including such fields as agriculture, business, or the mechanical arts. Even in vocationally centered programs, a desire to develop a curriculum that would provide an educational base on which students could

²⁹ Ibid., 126.

³⁰ Ibid., 146-147.

continue to learn remained apparent. Merely acquiring skills for the next job would not suffice during the growth of the sciences. Innovations in physics, chemistry, and biology seemed not to depend on the moral, political, or cultural views of the researchers, and these innovations proved to initiate an influential impact on industry. The process behind these scientific fields, education for developing the mind, demonstrated underlying traditional ideas of liberal, general education within their foundation, sparking a renewed interest in liberal education's role within science's impact on industry.³¹ In the 1920s, the necessities of business and manufacturing progressed closer to the forefront of American's concerns as science propelled the status of industry to new heights. A new level of prosperity, however, brought adoration for the new corporate economy and celebration of its perceived benefits, keeping individual benefits at the forefront of American consciousness. This is understandable considering that the income of workers remained static from 1890 to 1918 until the 1920s, when it rose dramatically.³² The general prosperity introduced by this increase in productivity was unprecedented. Numerous technological innovations formed a foundation of this prosperity, which Henry Ford presented in 1914, including the continuous assembly line and the electric motor.³³ Scientific research now focused on new systems of industrialization which produced large gains in efficiency and output, without substantial increase in the labor force. Now prominent throughout the American landscape, business redefined America's social institutions, including schools, through canons and codes of business. Even though general education existed alongside vocational education, vocationalism remained one of American's top priorities because of its promise to ensure that students met the

³¹ Michael S. Roth, *Beyond the University: Why Liberal Education Matters* (New Haven: Yale University Press, 2014), 125.

³² *Ibid.*

³³ Kliebard, *Schooled to Work*, 148-149.

job requirements that accompanied industrialization; however, the function of vocational education now reached far beyond trade training, judging subjects by the degree to which they met the demands of the workplace and mirrored the prevalent business culture.³⁴ By the 1920s, education transformed into an instrument for serving the needs of the workplace by redefining the principles that govern all of education, mirroring those that governed vocational education.

With the economic crisis of the depression, vocational educators more fervently fought for their place in providing job training to Americans, even though the crisis rendered employability uncertain. The Great Depression went mostly ignored by the AVA who looked to use families' economic woes as an even further push for their role in job training. In 1930 and 1931, the AVA lobbied for increased federal support, which became known as the Capper-Reed Bill, to address the crisis.³⁵ The new Bill would expand vocational education by extending its benefits to already employed workers, but the Bill never passed. This did not stop vocationalists from championing their supposed role in alleviating some devastating effects of the depression.

The turmoil of World War II also proved an opportunity for vocationalists. With Roosevelt's attention aimed toward military preparation and foreign policy and away from domestic policies, the disputes with professional educators took the back seat. With the war in full affect, defense industries took part in ameliorating the nationwide underemployment problem and even alleviated segregation in the workforce, employing women in industrial work in numbers never before experienced in the United States. In July 1944, female employment rose

³⁴ Ibid., 150.

³⁵ Ibid., 179.

47 percent since March 1940 to 19 million.³⁶ The state of employment, from the days of the depression, reversed. The issue changed from finding work for a large number of unemployed to training a mass of men and women for ample and moderately high-paying jobs, raising the demand for vocational education. Following World War II, the G.I. Bill enabled such a large number of returning soldiers to enroll in colleges that the pursuit of undergraduate degrees tripled between 1940 and 1970.³⁷ As more students enrolled in college, graduate programs and community colleges expanded, leading to the growth of large public institutions, while private universities became both more selective in admissions and more dedicated to supporting faculty research. After the Russian *Sputnik* launch in 1957, the federal government became the major investor in faculty research and this included support for facilities and for graduate students.³⁸

As research universities became more professionalized, the focus of many prestigious institutions steered away from educating graduates and looked more toward research. America's commitment to technological change as the sole driver of economic development made liberal and general education's defense even more difficult in the context of the rising professionalized research college and technological advances. The expansion of American higher education in the 1940s, 1950s, and 1960s altered the role of liberal arts education by introducing more money to public universities in order to graduate more technical workers.³⁹

The 1947 *Report of the President's Commission on Higher Education* defined the role of higher education as a common good, creating a better nation and a better world for all citizens.

³⁶ Ibid.

³⁷ Ibid., 209.

³⁸ Roth, *Beyond the University*, 135.

³⁹ Ibid., 162.

The vocationally oriented curriculum provided many first-generation college students, pursuing postsecondary education through the G.I. Bill, career opportunities and social mobility. During the 1950s and 1960s, discussion of the curriculum yielded to economics, as financial concerns became more pressing.⁴⁰ Gauging from course choice, students no longer perceived a liberal arts education as preparation for occupational skills.⁴¹

In a 2011 survey sponsored by the Association of American Colleges and Universities, U.S. business executives said they want future hires to possess effective oral and written communication skills and to demonstrate innovation and creativity. “Companies are demanding more employees. They really want them to have a broad set of skills,” said Debra Humphreys, a vice president of the association.⁴² Ironically, the type of education—one grounded in the liberal arts and sciences—that vocationalists fought to abolish one hundred years ago is precisely what postindustrial America needed. Through study of occupations, Dewey recognized that having vocational training separate from a general, liberal arts education would not reflect the “urgent realities of contemporary life.”⁴³ Dewey believed that by engaging students in projects and in manual activities that more closely reflected their daily lives, they could be drawn into a study of the traditional academic disciplines, yet he adamantly opposed a dual system of education, with one curriculum for the college-bound and another for everyone else. He feared that a narrow vocationalism in the service industry would serve to strengthen class divisions in American

⁴⁰ David W. Breneman, *Liberal Arts Colleges: Thriving, Surviving, or Endangered?* (Washington, D.C.: The Brookings Institution, 1994), 23-24.

⁴¹ Ibid.

⁴² David S. Awbrey, *A Journalist’s Education in the Classroom: The Challenge of School Reform* (Lanham: Rowman & Littlefield Publishers, Inc., 2011), 89.

⁴³ John Dewey, *Philosophy of Education: Problems of Men* (Totowa: Littlefield, Adams & Co., 1958), 45.

society. Students considered unfit for broader forms of learning would be relegated into courses that taught them only how to perform a task currently demanded by industry. He recognized that education should prepare Americans for meaningful employment: “The world in which most of us live is a world in which everyone has a calling and occupation, something to do. Some are managers and others are subordinates. But the great thing for one as for the other is that each shall have had the education which enables him to see within his daily work all there is in it of large and human significance.”⁴⁴ Dewey insisted that education should aim to enrich students’ capacities for finding “large and human significance” in what they do in order to avoid being reduced to mere tools of an industrial system.⁴⁵ “The problem of the educator,” Dewey wrote, “is to engage pupils in [vocational] activities in such ways that while manual skill and technical efficiency are gained and immediate satisfaction found in the work together with preparation for later usefulness, these things shall be subordinated to education—that is, to intellectual results and the forming of a socialized disposition.”⁴⁶ Educational leaders and policymakers, however, greatly ignored Dewey’s insights.

In the great debate about the purposes of public schooling, the vocationalists won decisively when Congress passed the Smith-Hughes Act, which provided the first federal funds to states for the promotion of vocational education. Now with the appropriate funds, vocational education acquired the means to overhaul the purpose of education. The Act encouraged the growing separation between academic and vocational instruction in American schools by establishing a separate funding stream for the latter, geared toward skills training for specific

⁴⁴ Ibid.

⁴⁵ Roth, *Beyond the University*, 164-165.

⁴⁶ Ibid.

industries.⁴⁷ The concern today about the conflict between the liberal arts and professional education focuses on the fear that American citizens will come to value knowledge primarily for what it pays rather than for how it satisfies intellectually. Professional education is concerned with the technique of how to use one's talents and knowledge in making a living; it is technical training versus education.

With technical training alone, students rarely obtain the critical thinking and higher order reasoning valued for professional competency. In order to identify as a successful practitioner, graduates must demonstrate a combination of technical knowledge and skills with an understanding of social and human affairs. America's educators must teach students ways to approach complex problems directly and indirectly related to their professional activity. The person with the ability to think theoretically and broadly will provide insights into the nature and potential of a profession or occupation that those limited to daily practices will be unable to offer. The following dynamic factors should determine the curriculum taught in postsecondary education: the needs of the current society, the character of the individuals receiving education, and the knowledge of educational theory and practice available. Society consistently undergoes the process of development, the character of the postsecondary-school population experiences modification, and the sciences on which educational theory and practice depend constantly furnishes new information. Higher education, like any other established agency of society, tends to resist modification. Failure to make adjustments when the need arises, leads to the necessity for extensive reorganization at irregular intervals; the resistance is amplified when conservative

⁴⁷ Lynn Olsen, *The School to Work Revolution: How Employers and Educators are Joining Forces to Prepare Tomorrow's Skilled Workforce*. 1st ed. (Cambridge: Da Capo P, 1997), 40.

state legislatures hold educational responsibilities. The broad skillset, developed by a liberal arts foundation, helps prepare working professionals for emerging markets in the Information Age.⁴⁸

If growth is no longer an attribute of all sectors of the economy, then higher education must invest in programs consistent with existing “growth sectors,” whatever they may be, and disinvest in others. This puts higher education, liberal arts programs in particular, at whim of wherever the market happens to be at any one time. Social investment in higher education is then dependent upon the ability of institutions to adjust to current economic trends as measured by rates of return. Similarly, the rights and responsibilities of students, faculty, and administrators become defined in terms of enhancing the “marketability” and “productivity” of student “investors.”⁴⁹ Reviewing public opinion surveys of more than 1,200 people, Immerwahr and Harvey found 79 percent of respondents associated college with better jobs but were unclear as to the specific goals of higher education and particularly liberal arts education.⁵⁰ Although many respondents could not communicate the goals of liberal arts education, community leaders joined the higher education community in recognizing a need for a synthesized curriculum, citing the importance of gaining the broad contextual understanding provided by the liberal arts with proficiency in technical and professional skills.⁵¹

⁴⁸ Ibid.

⁴⁹ Michael Engel, “Ideology and the Politics of Public Higher Education,” in *The Liberal Arts in a Time of Crisis*, ed. Barbara A. Scott (Westport: Praeger, 1991), 36.

⁵⁰ Pascarella, *Liberal Arts Colleges and Liberal Arts Education*, 9.

⁵¹ Ibid.

In 1997, Hersh reported a similar lack of understanding regarding the goals of a liberal arts education.⁵² Hersh's study surveyed five stakeholder groups about their feelings concerning important aspects of higher education and familiarity with liberal arts education's role in teaching students how to think about problems in new ways and reinvent them. Each group—college-bound juniors and seniors, parents of college-bound students, CEOs and human resource managers, university and liberal arts college graduates, and high school and college faculty and administrators—reported that developing career skills was the most important aspect of higher education. These stakeholders also rated problem solving, critical thinking, written and oral skills, strong work habits, self-discipline, and a respect for others as the most important goals of higher education. Hersh also found that 44 percent of college-bound high school students and 27 percent of their parents responded that they were unfamiliar with the goals of liberal arts education.⁵³ This finding suggests that students and parents tend to lack understanding regarding the connection between the goals of a liberal arts education and career skills. The Carnegie Commission report, *Liberal Arts Education for a Global Society*, states that liberal arts educators must recognize that the benefits of a liberal arts education are not self-evident.⁵⁴ Likewise, the claim “learning for the sake of learning” is not particularly salient for consumers who are concerned with the increased debt burden of college and focused on the degree to which a liberal arts education contributes to career opportunities. These findings suggest that students are left to make this connection between liberal arts and career skills on their own.

⁵² Ibid.

⁵³ Ibid.

⁵⁴ Ibid., 10.

Legislators seeking to make informed decisions about educational policy and funding increased pressure to quantify school performance. Since the passage of No Child Left Behind (NCLB) in January 2002 by George W. Bush, the daily life and preoccupations of teachers and school leaders in the United States changed as the stakes of standardized tests skyrocketed.⁵⁵ The NCLB law highlighted testing and test preparation more than ever by demanding annual testing of all students in the third to eighth grade and using the test results to measure whether individual schools and districts generate “adequate yearly progress,” or AYP.⁵⁶ In contrast to the liberal arts courses that provide a solid grounding in language and subject matter that provides students with the intellectual faculty to ask relevant questions and recognize defensible answers on a variety of issues, today’s educators insist that critical and creative thinking can be taught as a distinct skill which can be determined by standardized testing. Yet, according to Daniel Willingham, a professor of cognitive psychology at the University of Virginia, “thinking is not that sort of skill. The processes of thinking are intertwined with the content of thought; that is, domain knowledge.”⁵⁷ School reformer Diane Ravitch concurred: “We have neglected to teach [students] that one cannot think critically without quite a lot of knowledge to think about. Thinking critically involves comparing and contrasting and synthesizing what one has learned. And a great deal of knowledge is necessary before one can begin to reflect on its meaning and look for alternative explanations.”⁵⁸ Not all problems have single, correct answers. One of the liberal arts’ enduring messages is that solutions to problems can take many forms, generating new ideas and

⁵⁵ Fraser, *The School in the United States*, 370.

⁵⁶ Ibid.

⁵⁷ Awbrey, *A Journalist’s Education in the Classroom*, 93.

⁵⁸ Ibid.

implementing them. This lesson from the liberal arts would not be so important if schools were not currently teaching the opposite lesson and do not consider the words of Robert M. Hutchins in *The Learning Society* that “the mind is not a receptacle; information is not education. Education is what remains after the information that has been taught has been forgotten.”⁵⁹ Facts are easy to learn. It takes knowing how to evaluate the facts and applying them to societal issues that proves meaningful.

While liberal arts education advocates emphatically do not want to apply less than the best business practices to college administration, such practices must accommodate the learning atmosphere. Colleges and universities may produce graduates faster, if less capable. A college is not a production line. To hear the voices of critics, it would seem that the nature of the educational process is nowhere as important as “efficient” production. They would not, however, want their children to attend an institution where this was true. Americans must consider how efficient a college or university should become. Certainly education should not be administered by numbers. Educators seek the most fulfilling line between two points, not necessarily the shortest, and colleges must provide the time to work and think. An important role of college administrators is to weigh fiscal responsibility and efficiency. One challenge is that the criteria should be different for evaluating performance and establishing what is efficient on a campus versus a manufacturing plant. Nowhere is it written that if a university can get by more cheaply and survive, it is serving society better to do so, or that higher expenditures must be inefficiencies.

⁵⁹ Robert M. Hutchins, *The Learning Society* (New York: Frederick A. Praeger, Pub., 1968), 38.

State educational policy, however, has grown increasingly politicized as governors seek to use education as a cure for economic problems. The ongoing and heated controversy around specific educational strategies revolves around rhetoric generating a strong consensus about the primary purpose of public schools. The rhetoric used by conservatives has become gradually aligned with political goals.⁶⁰ Schools are expected not only to commend the merits of capitalism, but also to produce workers and consumers. They deem that the primary purpose of education is to prepare students for the workforce and for participation in a competitive and consumer economy. So ingrained are these ideas that no one even bothers to defend them, suggesting that each of these traits is simply a self-evident good. Education is promoted as a means to acquire a well-paying job and its material satisfactions—a commodity deemed “useful,” rather than a life-long process.⁶¹

When legislators and educators began incorporating the language of business culture with the formulation and implementation of school policies, terms such as competition, accountability, rankings, effectiveness, and marketability have corrupted the public school system.⁶² These concepts do have their place in education, but they should not be the dominating presence in public schooling. Highly selective colleges and universities experience these infiltrating concepts and language, where many undergraduates now behave like consumers, determined to build resumes and accumulate credentials that will be desirable to future employers. Parents also look to schools that will develop specific skills in their children that will

⁶⁰ Patricia H. Hinchey, *Becoming a Critical Educator: Defining a Classroom Identity, Designing a Critical Pedagogy* (New York: Peter Lang, 2004), 68.

⁶¹ Ibid.

⁶² Nel Noddings, *Education and Democracy in the 21st Century* (New York and London: Teachers College Press, 2013), 154-155.

justify the immense financial investment. Declining state support has led to overcrowding, reduced pay for professors, and lack of preparation for students entering college-level courses, placing professors in the tricky predicament of having to balance maintaining standards and meeting the needs of students lacking highly-developed reading and math skills.⁶³ Considering this educational context, a broad and liberal education that instills methods of life-long learning can appear idealistic. Parents and their college-aged children seek a college education that will be immediately useful. In a declining job market, students are more apt to follow the path they imagine will lead to a job than pursue courses that provide the opportunity to explore oneself and the world.⁶⁴

Politicians know these goals all too well and use the economic climate to their advantage when discussing education during a campaign. No matter the political office, many politicians tout the title of “education politician.” The attempt to prove this label sparks many lofty and unsuccessful reforms, many calling for more homework and testing.⁶⁵ The current emphasis on accountability afflicts American schools with an astronomical amount of standardized testing. With such a stress on testing, teachers now must spend a significant amount of their time in the classroom drilling for a test, often at the expense of developing abstract and creative thinking.⁶⁶ The skills necessary for critical intelligence cannot, however, be measured by a Scantron and thus indicate accountability. Therefore, subjects in the humanities, social sciences, and art are

⁶³ Roth, *Beyond the University*, 1-2.

⁶⁴ *Ibid.*, 2.

⁶⁵ Bruce M Mitchell, “Eight Considerations in the Battle for Public Schools,” in *Public Education, Democracy, and the Common Good*, ed. Donovan R. Walling (Bloomington, Indiana: Phi Delta Kappa Educational Foundation, 2004), 56.

⁶⁶ *Ibid.*, 56-57.

eliminated from the curriculum because they do not necessarily produce the rote knowledge standardized tests examine. Testing and more homework are part of what Bruce M. Mitchell, in “Eight Considerations in the Battle for Public Schools,” suggests dominates politicians’ concepts of school reform which they “never ... quote any research that would provide validity for their ‘reforms.’ Nor do these politicians argue for the enabling legislation that would provide funding for their reforms.”⁶⁷ This last point is important because of the declining level of state funding by conservative legislatures for schools generally and public higher education in particular.

During the early 2000s, as legislators were cutting funds, tuition costs and fees began to exceed the borrowing limits of college students under the federal loan programs. Government loans consisted of 47 percent of all financial aid in 2005, but interest rates increased under the Bush Administration to offset deficit spending.⁶⁸ Banks, in turn, took advantage of these trends by expanding their student loan applications, and students were doomed with the burden of debt, as these interest rates averaged 9 to 10 percent.⁶⁹ American society became so accustomed with debt that this increase in interest rates almost flew under the radar as a perceived norm. Under the Obama Administration, the 2009 stimulus package attempted to combat these burdens with provisions to help students enroll in higher education. At the time, the “Hope Tax Credit,” that provides students with tax relief, already existed in U.S. law. The credit, however, was only offered to students in their first two years of college. The “American Opportunity Credit” briefly replaced the Hope Tax Credit, and it could be claimed for eligible educational expenses acquired

⁶⁷ Ibid.

⁶⁸ Ibid.

⁶⁹ Allan Ornstein, *Class Counts: Education, Inequality, and the Shrinking Middle Class* (Lanham: Rowman & Littlefield Publishers, Inc., 2007), 312-313.

in 2009 and 2010.⁷⁰ The American Opportunity Credit covered educational expenses for four years of college. Like other aspects of the stimulus package, however, the American Opportunity Credit was only temporary until the reinstatement of the Hope Tax Credit in 2010.⁷¹ The American Opportunity Credit targeted Americans investing in higher education in order to receive temporary tax concessions, becoming one of many provisions in the stimulus package aimed at increasing American's investments in education. One portion of spending came from Congress, which funded a major expansion of government grants to low-income students, so they could pay for college. The number of full-time, wage-earning jobs in the United States plummeted by about 8.7 million between December 2007 and December 2009.⁷² During that time, the number of the unemployed searching for a job increased by more than 7.5 million.⁷³ With the rough job market, it seemed rational that unemployed workers would stop pursuing a new job and start investing in higher education to further their skillset, making them more attractive to future employers. The tax assistance and direct grants for college and university students enabled more of the unemployed to take this path.⁷⁴ While the tax concessions may have instilled a societal shift back to higher education, the goals of higher education mostly remained the same—attain a job. Placing money in the hands of students or “consumers” to enroll in school may place people back in school, but the funding that goes directly to higher educational institutions was and is still lacking.

⁷⁰ Ibid.

⁷¹ Gary Burtless and Tracy Gordon, “The Federal Stimulus Programs and Their Effects,” in *The Great Recession*, ed. David B. Grusky, Bruce Western, and Christopher Wimer (New York: Russell Sage Foundation, 2011), 271.

⁷² Ibid.

⁷³ Ibid.

⁷⁴ Ibid., 271-272.

During economic downturns, which coincide with high unemployment, parents and their college-aged children tend to think more about “whether or not college is worth it.” As the cost of higher education and level of student loan debt continues to rise, prospective students continue to query the education system for its inefficiencies: high cost of tuition, marketing strategies, production of elaborate infrastructure, and operating costs for areas irrelevant to instruction and research. These behaviors spark questions regarding the “return on investment” students believe they should receive from their degrees.⁷⁵ This, in turn, raises questions about what classifies liberal education and whether or not the broad skillset instilled by a liberal education is entirely necessary. Director at the Center for College Affordability and Productivity, Richard Vedder, outlines these concerns when he suggests that “the biggest problem is that we are turning out vastly more college graduates than there are jobs in the relatively high-paying managerial, technical and professional occupations to which most college graduates traditionally have gravitated. Do you really need a chemistry degree to make a good martini? Roughly one of three college graduates is in jobs the Labor Department says require less than a bachelor’s degree.”⁷⁶ Vedder assumes that if college graduates find themselves in jobs that do not meet the description of their specific degrees that, in the future, prospective college students will deem college entirely irrelevant. In *Beyond the University*, Michael S. Roth responds to Vedder’s critique by making the comparison between “the bartender with a chemistry degree [as] the contemporary version of the farmer who reads the classics with pleasure and insight, or of the industrial worker who can quote Shakespeare.”⁷⁷ Roth continues with this discussion by insisting that

⁷⁵ Roth, *Beyond the University*, 146-147.

⁷⁶ *Ibid.*, 147.

⁷⁷ *Ibid.*, 147-149.

contemporary society tends to view these “incongruities” as a waste of time and money. This is no longer the age of the Renaissance man, where possessing both abilities marks a scholar as a well-rounded individual among other well-rounded individuals, creating a healthy society. Roth believes that the current debates over “whether or not college is worth it” stems from the high cost of college tuition and higher levels of debt.⁷⁸ The immediate results of spending money on education warrant the incessant push for degrees that will “return on investments.” Tracing historical debates on the role of education in society, public perception oscillates between intended individual or societal benefits. The language has evolved to keep with the current changes of the time, yet the argument reads the same.

As long as states continue to provide less support for public institutions, tuition will rise, colleges will employ more part-time faculty and graduate student instructors rather than full-time tenured professors, the liberal arts and humanities programs will continue to deplete in favor of more practical and professional programs, and the loan debt burden will increase. These negative changes from cutbacks will eventually result in the resource gap and faculty quality gap between the public and private institutions, rendering private education and a public education two entirely different products.⁷⁹ The various questions raised about either defending, reconstructing, or eliminating part of the curriculum in higher education can only be understood within a broader range of political and theoretical considerations that bear directly on the issue of whether a liberal arts education in this country should be considered a privilege for the few or a right for the vast majority of citizens. This is not merely a matter of deciding who is eligible or can

⁷⁸ Ibid., 149.

⁷⁹ Michael J. Rizzo, “State Preferences for Higher Education Spending: A Panel Data Analysis, 1977-2001,” in *What’s Happening to Public Higher Education: The Shifting Financial Burden*, ed. Ronald G. Ehrenberg (Baltimore: The Johns Hopkins University Press, 2007), 29-30.

financially afford a liberal arts education; it is part of a wider discourse that has increasingly challenged the American public to rethink the role of higher education and its relationship to democratic public life. Moreover, this debate raises important questions regarding the social and political implications about the role of curriculum and pedagogy in permitting students to understand their experiences and role in history as agents who can advance the possibility of democratic public life.⁸⁰

Dewey conceived of the educational process as democratic in itself. He thought education could prepare people for life in a democracy, only if the educational experiences were also democratic and only if learning mimicked the processes of living socially in a democracy:

It is obvious that the relation between democracy and education is a reciprocal one, a mutual one, and vitally so. Democracy is itself an educational principle, an educational measure and policy. There is nothing novel in saying that even an election campaign has a greater value in educating the citizens of the country who take any part in it than it has in its immediate external results. Our campaigns are certainly not always as educational as they might be, but by and large they certainly do serve the purpose of making the citizens of the country aware of what is going on in society, what the problems are and the various measures and policies that are proposed to deal with the issues of the day.⁸¹

Dewey's understanding of the crucial role education plays in preparing students for citizenship, and his insistence on the importance of maintaining access to the whole spectrum of educational opportunity, are essential in any discussion of American higher education as it has evolved since Dewey's time.

⁸⁰ Henry A. Giroux and Susan Searls Giroux, "Take Back Public Education: A Task for Intellectuals in a Time of Crisis," in *Public Education, Democracy, and the Common Good*, ed. Donovan R. Walling (Bloomington, Indiana: Phi Delta Kappa Educational Foundation, 2004), 119-120.

⁸¹ Dewey, *Philosophy of Education*, 34.

The practice of general education transformed as the nation's view of democracy changed. Where democracy had once been deemed a process, after World War II, it became viewed more as an institution.⁸² Instead of seeing democracy as a process that people perform, the public perception began to see democracy as performing institutional tasks such as voting. The way in which schools educate students depends on the perceived role of democracy. If democracy is perceived as merely voting, then it remains a private good; if democracy is viewed as enfranchisement, then educational institutions need to teach students how to be democratic citizens, and this education should be subsidized because it is a public good. This tended to confuse the direction of general education curriculum since the means of its educational methodology, with an emphasis on process, no longer matched its educational ends. When the public's view of American democracy shifted, so did its embrace of general education.

⁸² Gary E. Miller, "The Meaning of General Education," in *The Liberal Arts in Higher Education: Challenging Assumptions Exploring Possibilities*, ed. Diana Glyer and David L. Weeks (Lanham: University Press of America Inc., 1998), 26.

II. Education as a Public Good versus Private Good

The educational experience can produce results applicable to the entirety of society and to individuals as personal gains, inherently serving both public and private interests. The public interest of education includes the preparation of youth to assume adult roles in which they can tackle civic responsibilities, embrace a common set of values, and effectively participate in a democratic society. The private interest of education provides the individual with variable forms of development that will augment individual income, societal placement, cultural endeavors, and political benefits.⁸³ When educational results for the individual contribute to social benefits, these public and private interests intersect. If education instills productivity in an individual, the economy also boosts, yet in other areas, there remains conflict between public and private benefits. The public benefits of education, for instance, require that students learn to take into account different points of view that are presented and debated, yet the private values of families may conflict with the introduced opposing viewpoints, infringing upon the family's wishes for their child not to be exposed to such viewpoints. One issue surrounding the debates on education appears at the juncture between the rights of individuals and families and the rights of society.⁸⁴

This bifurcated value system regarding economics pits the autonomy of the individual, such as holding economic self-reliance as a major virtue, against the economic good in terms of its impact on right relations among individuals, such as proposing that property rights exist to serve the human community at large as well as serving the owner.⁸⁵ Nineteenth-century

⁸³ Harry M. Levin, "The Public-Private Nexus in Education," in *Public-Private Policy Partnerships*, ed. Pauline Vaillancourt Rosenau (Cambridge: The MIT Press, 2000), 130.

⁸⁴ *Ibid.*

⁸⁵ Donald E. Frey, *America's Economic Moralists: A History of Rival Ethics and Economics* (Albany: State University of New York Press, 2009), 1.

Enlightenment ideas of individual autonomy elaborated upon the individualism already present in colonial religion, stressing work, success, and private property as well as viewing government as an infringement of individual rights. While colonial Puritans were individualistic, they remained in constant mistrust of the unrestrained passion of individuals. Their belief in original sin led them to assume that individuals would always be tempted to laud the self, excluding God and others. Contrasting the Puritan ethic presumption that self and neighbor lived constantly at odds with one another, the Enlightenment economist Adam Smith attempted to fuse optimistically self-interest and the public good. These opposing viewpoints continued and skyrocketed in the debate over slavery prior to the Civil War. On one hand, abolitionists steadily advanced a Protestant mindset that feared the slave owners would abuse their power by attempting to satiate their ego; on the other hand, anti-abolitionists described the slave owner as rationally pursuing economic interests and individual rights.⁸⁶

In *America's Economic Moralists*, Donald Frey discusses this set of opposing viewpoints in terms of moral concepts: relational and autonomous. A relational moralist views the individual in existence among others within a network of relationships, who possess the ability to comprehend each other and conduct meaningful moral discourse. By contrast, autonomy moralists uphold the freedom to improve their personal interests as an ethical cornerstone. With the maturation of autonomy morality, the importance of individual differences heightened to the point where moral dialogue and consensus were represented as practically impossible; therefore, the intensification of individual freedom appeared as their only feasible choice. Economic theories favoring autonomy morality highlighted how individuals maximize their welfare by their choices in market contexts, yet any economic morality eventually must resolve how the

⁸⁶ Ibid., 4.

individual should relate to the community and collaborate for the common good.⁸⁷ By defining and enforcing rights and obligations, the government acts as a major mediator for collaboration. Autonomy moralists struggle between their contradicting views of the government as concurrently an essential protector of individual economic rights and potential infringer of those rights, initiating the proposal that the market is an alternative system for reconstructing society. Viewed through the lens of autonomy ethics, income inequalities do not appear as economic market deficiencies but as the crucial incentive that incites individual effort and thus social progress. Conversely, relational economic moralists understand economic obligations and rights through human interconnectivity.⁸⁸ Individual freedom, although an important social value, is not always ethically justified, and educational institutions need to decide when society should place constraints on individual freedom and uphold alternative values. In democratic societies, the tension between democratic politics—public rights—and capitalistic markets—private rights—proves the ultimate source of pressure on public institutions.

During the United States' formative years, the political idealist Thomas Jefferson and the economic realist Alexander Hamilton defined the divergence of these opposing ideologies. The strain between these ideas ensues when unregulated economic freedom leads to an extremely unequal wealth and power distribution, which in turn weakens the possibility for democratic control; limiting such economic freedom for the sake of equality oversteps individual liberty, without which, democracy could become the dictatorship of the majority. Throughout America's educational reform history, in the face of Hamiltonian reality of economic inequality, reformers

⁸⁷ Ibid., 4-5.

⁸⁸ Ibid., 5.

attempted to grapple with ways in which to preserve the Jeffersonian ideal of political equality.⁸⁹ Hamilton, much like Plato, lacked faith in common peoples' values and capabilities in making sound decisions about their own lives or for their communities. This suspicion of the majority sparked Hamilton's belief that America should be governed by elites on behalf of the people. Jefferson insisted that democracy would fail if American citizens were not informed and enlightened.⁹⁰ His dreams for democracy depended entirely on the quality and implementation of the education provided to each citizen, introducing public education's central role in the national discourse. If Americans prove capable of self-governance, then schools do in fact serve a greater purpose than just instilling specialized skills.⁹¹ This quandary has endured all efforts at reform, despite the various innovative attempts to amend the situation. Americans have not yet found a way to cope with political equality in an atmosphere of social inequality, and public institutions reflect this continuing strain.

The fight for public school traces back to Horace Mann, secretary of the State Board of Education in 1837.⁹² While a member of the Board, he wrote twelve annual reports illustrating the philosophy and morality of free public education. He outlined the fight between no-government individualism and republican mutual obligation in his education writings, maintaining that the common heritage of humanity belonged to children by right, and that

⁸⁹ David F. Labaree, "Public Goods, Private Goods: The American Struggle over Educational Goals," *American Educational Research Journal*, 34, no. 1 (Spring 1997): 39-81, 41.

⁹⁰ J. Merrell Hansen, "The American Tradition of Education," in *Public Education, Democracy, and the Common Good*, ed. Donovan R. Walling (Bloomington, Indiana: Phi Delta Kappa Educational Foundation, 2004), 50-51.

⁹¹ *Ibid.*, 51.

⁹² Frey, *America's Economic Moralists*, 55.

American citizens were obligated to transfer that heritage. In 1846, Mann's Tenth Annual Report concluded with three ethical propositions: "The successive generations of men, taken collectively, constitute one great Commonwealth. The property of this Commonwealth is pledged for the education of all its youth, and the successive holders of this property are trustees."⁹³ To Mann, children possessed a natural right to intellectual nourishment as well as physical nourishment, and the preceding generation was responsible for fulfilling this right. He believed education had a lien on property because the function of property was ultimately social. Having received resistance to education taxes on the grounds that they infringed property rights, Mann devoted his Tenth Annual Report to rebutting that proposition. Mann did not understand how property could exist apart from society and human history. He argued that people who owned property, merely acquired this property from those who came before them, and in return, they have the obligation to bestow this property on those to come. Mann's concept of relationship implied an ethical duty by humans to fellow members of their community because they are bound by history and experience, and therefore have obligations to one another.⁹⁴ When considering the economic climate of the time, Mann insisted that Americans should in no way endure "those hideous evils which are always engendered between Capital and Labor, when all capital is in the hands of one class and all the labor is thrown upon another."⁹⁵ Mann believed that universal education could assure that such a division between classes would never occur because it would diffuse property ownership. If citizens collectively fulfilled their duty to educate their children, greater equality could be achieved and further class strife avoided. In the

⁹³ Ibid.

⁹⁴ Ibid., 55-56.

⁹⁵ Ibid., 56.

1840s, on the brink of Marxism, Mann wrote that education was the key to avoiding class divisions. He argued that citizens must act collectively because the interdependence of individuals requires the older generation to help the younger generation develop fully within their society.⁹⁶

Democracy is endangered when individuals have no outlet to translate their private problems into collectively shared public concerns. When the remaining public spaces become privatized, civic engagement appears ineffective, rendering public values obscure.⁹⁷ Rather than increasing the scope of freedoms and rights in order to increase the processes of a functional democracy, our current views of citizenship lean toward buying and selling commodities. Politics limits the development of a language imperative to defending social institutions' role as a public good. As public memory loses shared concepts of equity, social policies concerned with self-interests become a top domestic priority. Americans' have increasingly distanced their notions of the public's role as a democratic space in which engaged public intellectuals and social agents gather to galvanize political sensibilities and define the meaning of critical citizenship.⁹⁸

In the 1980s, another factor that steered these notions further toward the terms of marketability, self-interest, and commodities, which manifested in education as a more predominant move toward occupational training, was the development in economics of the "human capital" model of higher education as investment. It received its most thorough investigation in the publication of Gary Becker's *Human Capital*. This concept justified student

⁹⁶ Ibid.

⁹⁷ Giroux and Giroux, "Take Back Public Education," 69.

⁹⁸ Ibid., 69-70.

borrowing to finance higher education and contributed to the questioning of the size and scope of higher education's "public benefits."⁹⁹ These benefits to the public were a rationale for increased tuition subsidies through state support for public colleges and universities. In the ongoing debate over the proper share of college costs to be borne by students versus society, the human capital metaphor has weighed heavily on the side of those who argue that most benefits from college are private and captured by the student in the form of higher wages. This argument implies that the student, rather than society, should bear the larger share of costs. Current debates over how colleges and students should be financed, and which courses belong in the curriculum, reflect the ramifications of the human capital concept.¹⁰⁰

This "private economic benefit" viewpoint maintains that the role of higher education is to provide opportunities for individuals to obtain higher-level and higher-paying jobs and, in general, to live a more comfortable and affluent lifestyle. This is close to the viewpoint that focuses on employment, upward economic mobility, and the development of "human capital." One might also call this the "consumer" viewpoint, in the sense that it sees individual students as consumers who invest time and money in higher education in order to receive greater economic benefits later. This idea of a trade-off, an investment for a later return, is what economists do when they calculate the rate of return for higher education. Proponents of higher education who advertise the increased earnings associated with higher education are also operating from this same belief system.¹⁰¹ Even if the argument that private economic benefits provide the main

⁹⁹ Breneman, *Liberal Art Colleges*, 23.

¹⁰⁰ *Ibid.*

justification for higher education is accepted, this particular belief system is extremely limited because it says little about how the society as a whole is served by such an approach. This is privatization in action, and from this viewpoint, the fundamental purpose is to reproduce and continue the existing conditions of a capitalist society. In this context, the principal function of the school is to produce the sorts of future workers which the economy needs—its “human capital.” Colleges and universities cannot accept this model of education because it is a direct cause in curriculum change from teaching for education to teaching for basic technical skills, without an emphasis on continuing the learning process. Strictly vocational training is not as well poised to prepare students for the changing requirements of the workforce and self-guided learning.

During the 1990s, college freshmen considered the ability to make more money and get a better job the most important reasons in their decision to attend college. Coupled with long-term trends of increasing direct costs of attending four-year institutions, students’ decisions for an education that accompanies labor market rewards make them acutely aware of the relationship between their college education, resulting skills, and job opportunities. Considering that tuition is increasing at a staggering rate, one can assume the concern regarding return on educational investment will only continue at the current pace, if not increase.¹⁰² To a great extent, the future of liberal arts education depends on its supporters’ ability to articulate cogently the connection between the skills developed and valued by employers, which happen to be those skills attained in a liberal arts education: respect for different viewpoints, critical thinking, as well as oral and

¹⁰¹ Alexander W. Astin, “Liberal Education and Democracy: The Case for Pragmatism,” in *Education and Democracy Re-Imagining Liberal Learning in America*, ed. Robert Orrill (New York: College Entrance Examination Board, 1997), 210.

¹⁰² *Ibid.*, 10.

written communication. If higher education must communicate its legacy in terms of investment, then it must be made clear that the goal of higher education provides a “public investment.”

Although the goals and efforts to establish the purposes and functions of education differ, they each prove to be political aims. One goal arises from the citizen, expressing the politics of citizenship. This goal is the most thoroughly political as reflected in their aspiration to prepare students as engaged participants in politics—in a democracy. Another goal stems from the taxpayer and employer, articulating the politics of human capital. The last, most pressing goal that rises from the educational consumer is individual opportunity. The latter two goals diverge from the first citizenship-inspired goal in that they represent education as an instrument for adapting students to the market. The way in which each goal locates education in the public-private domain, embodies another major differentiating factor. The citizen-oriented goal views education as purely a public good. The taxpayer-and-employer-initiated goal suggests education is a public good in service to the private sector. The goal of the educational consumer sees education as a private good for personal consumption.¹⁰³ The rationality that education can promote economic growth, by supplying future skilled and productive workers, permits educational leaders to argue that support for education is also an issue of good economic sense. From this viewpoint, education seems a practical mechanism for promoting America’s economic future, an investment in human capital for the community as well as the individual taxpayer. Those who hold this viewpoint, those seeking education for personal consumption, determine a school’s effectiveness by its ability to create productive workers. This point of view also backs public officials needing to approve an annual budget for education, finding the personal

¹⁰³ Labaree, “Public Goods, Private Goods,” 42-43.

consumer approach to education helpful as support for their expenditure of public money.¹⁰⁴

Efforts to balance the role of individual freedom with the responsibility of individuals to contribute to society frame the foundation of education in the United States. In the twentieth century, American pragmatists strived to build on this tradition by developing ideas of experience and inquiry that assist personal and civic life without being restricted to utility. Throughout the history of higher education, pragmatic education has been and remains crucial for a society that honors innovation, an economy that depends on that innovation, and for a society that desires to live in a democracy.

In 1837, Ralph Waldo Emerson foreshadowed pragmatic sentiments toward education during his speech to the Phi Beta Kappa Society at Cambridge, Massachusetts titled “The American Scholar.” Emerson explained the repercussions of applying the language of self-interest and production to education:

Man is metamorphosed into a thing, into many things. The planter, who is Man sent out into the field to gather food, is seldom cheered by any idea of the true dignity of his ministry. He sees his bushel and his cart and nothing beyond, and sinks into the farmer, instead of Man on the farm. The tradesman scarcely ever gives an ideal worth to his work, but is ridden by the routine of his craft, and the soul is subject to dollars...The priest becomes a form; the attorney, a statute book; the mechanic, a machine; the sailor, a rope of the ship.¹⁰⁵

College should provide students with the opportunity to create and not merely the instrumentation of drilling rote knowledge. Emerson writes, “Thought and knowledge are

¹⁰⁴ Ibid., 48-49.

¹⁰⁵ Ralph Waldo Emerson, “The American Scholar,” in *The Best of Ralph Waldo Emerson: Essays, Poems, and Addresses*, ed. Gordon S. Haight (New York: D. Van Nostrand Company, Inc., 1941), 4-5.

natures in which apparatus and pretension avail nothing.”¹⁰⁶ He believed that when colleges steered away from this goal, while they may become richer, education would regress in public importance. In the 1920s, John Dewey observed that a “public that is organized in and through those officers who act in behalf of its interests,” proves crucial for a robust democracy.¹⁰⁷ Dewey believed policymakers betrayed public schools by failing to act in the public’s interests. Dewey’s philosophy aligns with Emerson’s ideas regarding a link between creative individuality and collaborative social relations.

In 1930, Dewey wrote *Individualism, Old, and New* citing Emerson’s philosophy on the interrelated, dynamic background of individuality and democracy. Both Dewey and Emerson understood the complexity involved with the role of individuals in society and believed that inherent continuous change could be a positive influence on both the individual and society. While Emerson’s ideas can be viewed as idealistic, they express Dewey’s method, which places emphasis on dialogue and continuous practice.¹⁰⁸ The current method for instilling students with deliberative participation in a democracy is to drudge up outdated material and teach it in didactic form, so that this information can then be regurgitated on a test.¹⁰⁹

Most educational leaders, policymakers, and citizens tend to agree with the rhetoric that insists it is important for students to cultivate capacities for effective democratic citizenship. Agreement diminishes once the conversation gets to the specifics of what democracy entails and

¹⁰⁶ Ibid., 10.

¹⁰⁷ Tom Barone, “Making Educational History: Qualitative Inquiry, Artistry, and the Public Interest,” in *Education Research in the Public Interest: Social Justice, Action, and Policy*, ed. Gloria Ladson-Billings and William F. Tate (New York: Teachers College, 2006), 215.

¹⁰⁸ Noddings, *Education and Democracy in the 21st Century*, 21.

¹⁰⁹ Ibid., 22.

how school curricula should best support it. The views of democracy differentiate between those who believe democracy promises to protect liberal notions of freedom (civil society is key) and those who believe that democracy denotes the equality of opportunity (free markets are key). Some define a good democratic citizen as someone who volunteers in their community, while others insist that a true democratic citizen takes a more active role in the political process as a whole by voting, protesting, and working on political campaigns.¹¹⁰

Due to the conflicting beliefs in what constitutes a democratic citizen, educational programs differ greatly across separate curricula in their attempt to nurture good citizens. Democratic educational programs across the country embody a varying range of ideas about which actions determine good citizens. The conservative conception of citizenship, entrenched in many current education programs that teach for democracy, reveals political choices with political consequences. In 1985, Bill Bennett, Ronald Reagan's Secretary of Education, wrote: "A democracy depends on schools that help to foster a kind of character which respects the law and...respects the value of the individual."¹¹¹ Also, in 1985, Paulo Freire stated in *The Politics of Education: Culture, Power and Liberation* that "[d]emocracy requires oppressed groups to develop political determination, that is, to organize and mobilize in order to achieve their own objectives. Education can make possible such a democracy."¹¹² In 1986, then president of the American Federation of Teachers, Albert Shanker, remarked in his speech "Education and Democratic Citizenship" on the construction of a world where people's rights are esteemed: "In

¹¹⁰ Joel Westheimer and Joseph Kahne, "Educating the 'Good' Citizen: Political Choices and Pedagogical Goals," in *Public Education, Democracy, and the Common Good*, ed. Donovan R. Walling (Bloomington, Indiana: Phi Delta Kappa Educational Foundation, 2004), 29-30.

¹¹¹ *Ibid.*, 30.

¹¹² *Ibid.*

order to build this world...we must [have schools] teach democracy.”¹¹³ In the early 2000s, President George W. Bush established the National Veterans Awareness week and launched a new school program with the purpose of restoring democracy. In 2001, he titled the program “Lessons of Liberty” in which he outlines how this new school program will fulfill this purpose: “Veterans will visit elementary and high school classrooms to teach the ideals of democracy and freedom that American servicemen have defended for over two centuries.”¹¹⁴ Each politician quoted here considers seriously the belief that education is crucial for democracy, yet Bennett, Freire, Shanker, and Bush each offer personal and varying concepts of what democracy entails and how education should function in realizing their visions of a democratic society. The variable paths taken by educators, policymakers, politicians, and citizens to pursue democracy lead toward varying results.¹¹⁵

In “Educating the ‘Good’ Citizen: Political Choices and Pedagogical Goals,” Joel Westheimer and Joseph Kahne sought to understand what kind of citizen is necessary for an effective democracy. In so doing, they examined ten programs engaged in the Surdna Foundation’s Democratic Values Initiative, as part of a multi-year study of school-based programs that aim to teach democratic citizenship. By studying democratic theory and program goals and practices, Westheimer and Kahne defined three visions of “citizenship”: the personally responsible citizen, the participatory citizen, and the justice-oriented citizen.¹¹⁶

¹¹³ Ibid.

¹¹⁴ Ibid.

¹¹⁵ Ibid., 31.

¹¹⁶ Ibid., 32.

The personally responsible citizen, as described by Westheimer and Kahne, acts responsibly within the community by performing basic tasks such as picking up litter, recycling, volunteering, and demonstrating fiscal responsibility. The personally responsible citizen works, pays taxes, obeys laws, and helps those in need during natural disasters. The personally responsible citizen might contribute time, money, or both to charitable causes. Personally responsible citizens follow that individualistic vision of good citizenship. Programs that seek to develop personally responsible citizens hope to instill honesty, integrity, self-discipline, hard work, and sometimes, volunteerism.¹¹⁷

Westheimer and Kahne define the citizens who actively participate in the civic affairs and the social life of the community at local, state, and national levels as participatory citizens. In order to develop participatory citizens, educational programs focus on teaching students about how government and other institutions work and about the importance of planning and participating in organizing volunteer activities and school policies. The participatory citizen runs the food drive, whereas a personally responsible citizen donates canned items. Advocates of participatory citizenship argue that civic participation transcends specific community problems and develops relationships, common understandings, trust, and collective commitments.¹¹⁸

Westheimer and Kahne refer to the third category of good citizen as the justice-oriented citizen, one that calls explicit attention to matters of injustice and to the importance of pursuing social justice goals. Justice-oriented citizens critically assess social, political, and economic structures and consider collective strategies for change that challenge injustice and, when possible, address root causes of problems. While the justice-oriented citizen and the participatory

¹¹⁷ Ibid., 32-33.

¹¹⁸ Ibid., 33.

citizen share the same emphasis on collective work related to the life and issues of the community, justice-oriented programs emphasize preparing students to improve society by critically analyzing and addressing social issues and injustices. These programs are more likely to teach about social movements and systematic change, rather than stress the need for charity and volunteerism as ends in themselves. While participatory citizens organize food drives and personally responsible citizens donate food, justice-oriented citizens question why people are hungry and act on what they discover. Educators for justice-oriented citizenship insist that truly effective citizens need opportunities to analyze and understand the relationship of social, economic, and political forces and to participate in projects where they must work collectively to improve society.¹¹⁹

In both rhetoric and practice, citizenship training continues to maintain an important role in the ideology of American education. Each call for education reform references the dire consequences of schooling for the salvation of democracy, a concern that American schools attempt to address in the curriculum. To achieve this goal, some colleges and universities require specific courses such as social studies, civics, government, and American history, which are designed to help develop students' commitment to the American political system. Another way schools attempt to uphold this ideology is by emphasizing the liberal arts over narrowly specialized education. The logic behind preserving liberal arts is that citizens of a free society need familiarity with the extent of that society's culture in order to participate competently in the process that molds their society. Resulting from this emphasis, the United States promotes liberal education in postsecondary schools as well.¹²⁰ When applying these efforts to the three

¹¹⁹ Ibid., 35.

¹²⁰ Labaree, "Public Goods, Private Goods," 44.

previously named definitions of what constitutes a good citizen, educational leaders need to consider how they intend to define what kind of citizenship they refer to in their mission statements. Totalitarian leaders, for example, would be delighted if their citizens learned the lessons advocated by proponents of personally responsible citizenship: do not do drugs, show up to school, show up to work, help others in your community, pick up litter, and mind authority. Any leader would argue that these are desirable traits for people living together within a community; however, they should not be linked to democratic citizenship.¹²¹ In order to serve as a public good, public education in a democracy must mimic and teach democratic values. The worth of an individual can be defined by those values, and when individual worth is collected, it becomes a publically shared good.

Currently, higher education emphasizes buzz words deemed crucial for instilling individual worth and democratic values such as inquiry and critical thinking, acquiring knowledge through research and learning to develop as an autonomous individual by shedding illusions. While this aspect of higher education is extremely useful in a well-rounded education, they remain only one characteristic of what is needed, and an overemphasis of such buzz words can lead to sterility rather than creativity—especially when schools begin testing for it. A liberal arts framework in contemporary higher educational institutions helps students understand their connections with others in their local, state, and national communities and with canonical works in religion, art, literature, science, and music, which is essential for democracy.¹²² To reclaim public education as a democratic public sphere, educational leaders must clarify the complex relation between education, politics, and participants as well as the connection between politics

¹²¹ Westheimer and Kahne, “Educating the ‘Good’ Citizen,” 37.

¹²² Roth, *Beyond the University*, 5.

and pedagogy. Recognizing the political aspects of pedagogy does not imply that it is dogmatic or uncritical of its own authority; critical pedagogy maintains a difference between critical pedagogical practices and propaganda. A critical pedagogy entails inquiry that promotes, rather than mandates, critical modes of individual and social agency through the theoretical tools essential for comprehending how culture influences education and how identity, citizenship, and agency are organized through pedagogical practices. Pedagogy should be communicated as a moral and political practice rather than a technical method or procedure. By relating pedagogy to these practices, it should foster the appropriate environment that provides the knowledge, skills, and culture of questioning and critical dialogue necessary to prepare students as active citizens in interrelated public spheres.¹²³

The political and ideological struggle between conservatives and progressives often is fought over the issues of tracking, guidance, and vocationalism. Conservatives wish to guide students into tracks teaching specialized vocational skills for an array of existing career paths. Progressives view vocationalism as a self-fulfilling prophecy mechanism that restricts individual chances for social mobility and political equality, predicting a working-class job role for a working-class student and then catering to those preconceived notions by channeling the student toward the more likely perceived outcome.¹²⁴ Currently, if conservatives' public education reforms continue unchallenged, the results will show a bifurcated civic society. This society will consist of highly trained, largely white elite in command of the new technological information revolution while a low-skilled majority of poor and minority workers will be relegated to filling fleeting jobs, which neither group will be equipped to make ethical judgments about their

¹²³ Giroux and Giroux, "Take Back Public Education," 76-77.

¹²⁴ Labaree, "Public Goods, Private Goods," 63.

situation or the world around them. If educators are to stop public opinion from confusing education with training, then they need to challenge the corporatization of public schools to preserve our democratic future.¹²⁵

The role of education will influence students' ideas of citizenship and democracy and how to exercise that citizenship within a democracy. To develop democratic citizens, educators should create an environment conducive for experiencing the complex realities of our time and genuine opportunities for active participation. A democratic classroom is inclusive in its care ethics and acceptance for differences and opposing viewpoints. To form this classroom atmosphere, educators can teach democratic concepts and provide opportunities for teamwork, which encourages in-depth discussion of relevant social issues. When students get beneath the surface of an issue during discussion, they begin to view knowledge as open for critique and analysis. In this environment, educators share democratic values in the classroom, yet they can also do this with outside members of the community, and so too will their students, which places the educator's primary value on protecting personal worth and the common good.

¹²⁵ Giroux and Giroux, "Take Back Public Education," 79.

III. STEM Debate: Creating Working Drones

In the absence of an apparent notion of education's role in publicly shared benefits, the educational institutions pander to individual benefits; the current science, technology, engineering, and mathematics (STEM) curricular models are part of this trend, and have the negative effect of commodifying education as an end "product" to be bought and sold, rather than a lifelong process to be navigated by the student and thereby "owned" in a different way than a commodity model. The shift directing the purpose of U.S. higher education toward securing jobs and technical skills manipulates the language promoting the powerful push toward STEM-focused models of education. Supporters for STEM-centered curricula preach the private benefits of high-paying jobs, attaining jobs, U.S. job creation, practical skills, and the intended public benefits of maintaining America's superpower status within the global competition of technology and innovation as determined by standardized assessments. In defining their purpose, the STEM Education Coalition demonstrates this when advocating that STEM education should play a crucial role in "enabling the U.S. to remain the economic and technological leader of the global marketplace of the 21st century."¹²⁶ Within the context of our current "global marketplace," the major goals and concerns for promoters of STEM-centered education consist of graduating students who will acquire well-paying jobs, creating U.S. jobs, enriching economic growth, and racing America to the top of technological and scientific progress.

The arguments hooraying the economic and national need for technology and science traces back to the Sputnik scare, which drove Congress to pass the National Defense Education Act of 1958. The Hart-Rudman Commission's caution that "the inadequacies of our systems of

¹²⁶ Jodi Peterson, "Our Purpose," *STEM Education Coalition*.
<http://www.stemedcoalition.org/contact-us-2/>

research and education pose a greater threat to U.S. national security over the next quarter century than any potential conventional war that we might imagine,”¹²⁷ gained a renewed focus after the September 11 attacks. As a result, the explicit link between education and national security became the forefront of policy initiatives, as seen in former House Speaker Newt Gingrich’s sentiments. He claimed that “investing in science (including math and science education) is the most important strategic investment we make in continued American leadership economically and militarily.”¹²⁸ Though the STEM movement originated during the Eisenhower Administration and the formation of NASA and the National Science Foundation (NSF) in 1958, assistant director of the Education and Human Resources Directorate, Dr. Judith Ramaley coined the well-known, contemporary acronym STEM at an NSF conference in 2001.¹²⁹ This generic label has been used for any event, policy, program, or practice that involves one or more of the STEM disciplines ever since. Dr. Ramaley defines STEM as education that fosters learning placed in context, where students solve real world problems and pursue innovation. A 2010 survey on the “perception of STEM,” however, determined that most professionals and practitioners in STEM-oriented disciplines lacked comprehension of the acronym STEM, some assuming a link to stem cell research.¹³⁰ Educational leaders and politicians embraced the STEM mantra without clarification of how the term should be applied beyond its general label. Without

¹²⁷ Mariano-Florentino Cuellar and Connor Raso, “The Arms of Democracy,” in *Shared Responsibility, Shared Risk: Government, Markets, and Social Policy in the Twenty-First Century*, ed. Jacob S. Hacker and Ann O’Leary (New York: Oxford University Press, 2012), 61.

¹²⁸ Ibid.

¹²⁹ Michael K. Daugherty, “The Prospect of an ‘A’ in STEM Education,” *Journal of STEM Education: Innovations and Research* 14, no.2 (2013): 10-15.

¹³⁰ Roger W. Bybee, “Advancing STEM Education: A 2020 Vision,” *Technology and Engineering Teacher* (September 2010): 30-35, 30.

any shared explanation of STEM, the term is left open for manipulation by policymakers and curriculum creators. A popular perception of STEM is that degrees in such disciplines will provide the long fought for vocational education, which will produce efficient and skilled workers.

In 2011, Erin Sparks and Mary Jo Waits composed a report titled “Degrees for What Jobs? Raising Expectations for Universities and Colleges in a Global Economy” in order to announce the woes of America’s economy and higher education’s role in helping drive economic growth by insuring that students get jobs and maximizing America’s valuable educated workforce to the entire economy. To this effect, Sparks and Waits propose that governors and state policymakers should be asking specific questions about higher education: “How do we know that the degrees and certificates students are pursuing are the ones they will be able to use in new jobs? And, are we producing degrees that provide the greatest chance of yielding the most benefit—for individuals, industry, and the state economy?”¹³¹ Sparks and Waits insist that educational institutions should track labor markets scrupulously, respond to market changes fast, and focus predominantly on outcomes such as employment success and regional economic competitiveness. Their report outlines what they believe governors could be doing to align more clearly higher educational institutions’ priorities with the needs of students, industries, and states competing in the knowledge-based economy.¹³² One major focus of the STEM debate for policymakers and consumers, or prospective students, lies at this intersection of education and jobs in a dynamic marketplace. The number of unfilled positions in the job markets raises this

¹³¹ Erin Sparks and Mary Jo Waits, “Degrees for What Jobs? Raising Expectations for Universities and Colleges in a Global Economy,” *Economic, Human Services & Workforce Division: NGA Center for Best Practices* (March 2011): 5.

¹³² Ibid.

concern; companies maintain about 3 million open positions because they cannot find workers with basic technical skills.¹³³ In “What STEM is—and Why We Care: What is STEM and why does it matter?,” Brian Kelly argues that because of these unfilled technical positions, a two-year degree in a STEM field is worth more than a four-year liberal arts degree, suggesting that educational leaders need to make the connection between employer needs and education skills more clear for students.¹³⁴

A popular topic addressed by STEM-focused proponents of higher education emphasizes the amount of money made in STEM careers. In the *US News and World Report*, John Engler highlights the difference in pay between STEM and non-STEM majors upon graduation. He cites a report from the Georgetown University Center on Education and the Workforce which found that “65 percent of those with Bachelors' degrees in STEM fields earn more than Master's degrees in non-STEM occupations. In fact, 47 percent of Bachelor's degrees in STEM occupations earn more than PhDs in non-STEM occupations.”¹³⁵ According to Eric Nastasi, the director of advancement for the Smithsonian Science Education Center, ever-changing scientific discoveries and technologies directly affect American lives and necessitate our contribution as citizens. He stresses that the increasing dependence of our economy on these revolutionary

¹³³ Ibid.

¹³⁴ Brian Kelly, “What STEM is—and Why We Care: What is STEM and why does it matter?” *U.S. News and World Report*, web entry posted April 27, 2012, <http://www.usnews.com/news/blogs/stem-education/2012/04/27/what-stem-is--and-why-we-care>.

¹³⁵ John Engler, “STEM Education is the Key to the U.S.’s Economic Future: We need to encourage more students to pursue science, technology, engineering, and math,” *US News World Report*, web entry posted June 15, 2012, <http://www.usnews.com/opinion/articles/2012/06/15/stem-education-is-the-key-to-the-uss-economic-future>.

developments will spark job growth in STEM fields, and that “if we are to stay competitive as a nation, then we need to build a scientifically literate citizenry and a bank of highly skilled, STEM-literate employees.”¹³⁶ Nastasi’s article focuses on the betterment of society, insisting that our main goal in education needs to focus on scientific literacy, so that educators may address the scientific and technological issues that dominate our national discourse with new advances in areas such as medicine, genetics, communications, environmental issues, and energy. The importance of scientific literacy is apparent, but it remains arguable as to whether or not it is the only kind of literacy necessary to address these issues.

Engler explains that STEM occupations pay so well because of the importance STEM talent carries for the United States in becoming a global innovation leader. He equates the strength of STEM education with the strength of our country and insists that improving STEM education will ensure America’s preparation to “compete globally, create jobs, and achieve the level of economic growth” that will enhance American culture and society.¹³⁷ This concern that America cannot compete globally without a greater push for a stronger STEM curricula derives from America’s placement in the standardized assessment of math and science skills. As of July 2014, the United States ranks behind 25 countries in math and 12 countries in science.¹³⁸ These assessments indicate to policymakers and educational leaders that the United States is losing the competition with other countries in student performance and interest in STEM disciplines. This

¹³⁶ Eric Nastasi, “Why Invest in STEM Education?” *Smithsonian Science Education Center*, web entry posted August 5, 2013, <http://www.ssec.si.edu/blog/why-invest-in-stem-education#.VRyTaeEYGHc>.

¹³⁷ *Ibid.*

¹³⁸ “STEM Education Key to Innovation and Economic Growth,” *The Hispanic Outlook in Higher Education* 31 (July 25, 2014).

argument for STEM education follows that America's children need twenty-first-century labor force skills in STEM fields in order to bolster the United States' position in the competition against other nations. The assumption is that if STEM lacks investment, it will render grim consequences for the United States' economic and political power.¹³⁹ These assessments spark fear that America will not remain a superpower as long as the United States maintains slow growth in STEM literacy while other countries' science and math aptitudes excel. This concern for the entirety of American society initiated discourse about the role of American scientists, engineers, and mathematicians in the perceived national crisis regarding global technological competitiveness.

A white paper submitted to the 2007-2013 Purdue University Strategic Planning Steering Committee highlights the role of engineering graduates in this global competition. Many associations have pleaded for change in engineering such as the American Society for Engineering Education (ASEE), Engineering Deans Council and the Corporate Roundtable (1994), the National Research Council (1995), the National Academy of Engineering (2002 and following), and the NSF. These arguments share the idea that our future graduates will be competing in an emerging global economy powered by rapidly increasing technological innovations. They outline a few of the obstacles our STEM graduates will face such as "a shifting societal framework enhanced by technologies that lengthen life spans; enable yet-to-be imagined means of communication; create wealth and economic growth through accelerated product development cycles; require multidisciplinary efforts in emerging areas; and link virtual teams from global locations."¹⁴⁰ Among these challenges, the STEM practice will also be shaped

¹³⁹ Daugherty, "The Prospect of an 'A' in STEM Education," 10-15.

by political and economic relations between nations, the global marketplace, and national security issues.¹⁴¹ In 1957, when the Russians launched the Sputnik satellite into space, taking the lead in global technology, Americans were stunned and reacted by pushing to advance mathematics and science education.¹⁴² As Kelly sees it, our current problem with our position in global technology is no less urgent because America's interest has weakened while the rest of the world's has strengthened. To defend this claim, recent surveys have ranked the United States between third and eighth in innovation, whereas the U.S. previously was ranked first.¹⁴³ To reverse this trend, policymakers and educational leaders insist that the STEM curriculum needs to be emphasized as the basis of the country's competitiveness.

These concerns for graduates attaining high-paying jobs as well as America creating jobs and maintaining superiority in the global marketplace and technological achievements have guided the conversation about the increased importance of STEM higher education teaching. In this discussion, it is being widely decided that certain changes should be made to take more "resource-intensive actions," such as offering more faculty incentives and promotions. In "Encouraging STEM Students Is in the National Interest," S. James Gates Jr. and Chad Mirkin

¹⁴⁰ Gabriela C. Weaver, Kamyar Haghighi, Douglas D. Cook, Christian J. Foster, Sidney M. Moon, Pamela J. Phegley, and Roger L. Tormoehlen, "Attracting Students to STEM Careers: A White Paper Submitted to the 2007 -2013 Purdue University Strategic Planning Steering Committee," web, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&ved=0CDEQFjAD&url=http%3A%2F%2Fwww.planning.salford.ac.uk%2F__data%2Fassets%2Fpdf_file%2F0016%2F20716%2FStrategic-Planning-and-Budgeting-Membership.pdf&ei=bpQcVcOWEsywgT6poLwCg&usg=AFQjCNGK9RdtVKiA0x5a3fIut-u9I7PJUQ&bvm=bv.89744112,d.eXY.

¹⁴¹ Ibid.

¹⁴² Kelly, "What STEM is—and Why We Care"

¹⁴³ Daugherty, "The Prospect of an 'A' in STEM Education," 10-15.

also suggest that administrators should consider focusing more on fundraising and securing support from private sources, including state and federal grants in order to reallocate resources, so that faculty may be influenced to make it their priority to improve STEM teaching. They insist that an incessant shift of money and attention toward STEM fields will produce students who are appropriately skilled for twenty-first-century jobs, providing the United States with the workers needed for competition.¹⁴⁴

In Minnesota, North Carolina, Ohio, and Washington, for instance, governors and state policymakers have begun realigning postsecondary education with the state's economic goals. In these states, the following steps have been taken to reinforce higher educational institutions as agents of workforce preparation: "set clear expectations for higher education's role in economic development, emphasize rigorous use of labor market data and other sources to define goals and priorities, encourage employers' input in higher education, require public higher education institutions to collect and publicly report impacts, and emphasize performance as an essential factor in funding."¹⁴⁵ Since the beginning of the modern academy, expanding missions to include priorities based on trends and needs revise programs and services based on consumer's needs, finding new ways to track assessments, and generating financial incentives to reward success have been reworded and revisited throughout the debates over the role of higher education.¹⁴⁶

The governors and policymakers in Minnesota, North Carolina, Ohio, and Washington showcase

¹⁴⁴ S. James Gates Jr. and Chad Mirkin, "Encouraging STEM Students Is in the National Interest," *The Chronicle of Higher Education*, web entry posted June 25, 2012, <http://chronicle.com/article/Encouraging-STEM-Students-Is/132425/>.

¹⁴⁵ Sparks and Waits, "Degrees for What Jobs?" 3.

¹⁴⁶ *Ibid.*, 41.

this newly defined argument for vocational education, while using STEM as their crutch for equipping workers with skills they and their states need in the twenty-first century.

Resources supporting programs that facilitate STEM education prove prevalent because state and federal agencies to foundations and industrial partners insist that STEM education can be transformed through strategic infusions of funds. Any agency centered on STEM expertise in the federal government offers support, including the NSF, the Department of Education, the National Institutes of Health, and even NASA. The focus of these agencies lies in undergraduate research experiences and the development of STEM students through the doctoral level. With the Course, Curriculum and Laboratory Improvement (CCLI), the NSF also sponsors projects for course and laboratory enhancement.¹⁴⁷ The 2014 U.S. Budget provides another major source of funding by proposing \$3.1 billion for federal investments in STEM education, which increased 6.7 percent above 2012 funding levels.¹⁴⁸ The Budget contained a method for restructuring STEM education programs to improve the efficacy of federal investments in this area. The 2014 Budget also allotted \$352 million in the Department of Education Research and Development (R&D) portfolio.¹⁴⁹ The Budget will provide continuous support to educate 100,000 effective STEM teachers over the next decade and invest \$150 million to support STEM Innovation Networks—any district involved with universities, science agencies, and businesses.¹⁵⁰ The 2014

¹⁴⁷ Weaver, Haghghi, Cook, Foster, Moon, Phegley, and Tormoehlen, “Attracting Students to STEM Careers,” 13.

¹⁴⁸ White House Office of Science and Technology Policy, “The 2014 Budget: A World-Leading Commitment to Science and Research: *Science, Technology, Innovation, and STEM Education in the 2014 Budget*,” web entry posted April 10, 2013: 2-3. www.whitehouse.gov/ostp.

¹⁴⁹ *Ibid.*

¹⁵⁰ To see further allocation of funds see: *Ibid.*, 7.

federal Budget demonstrates the backdrop for the apparent political confrontation about supporting STEM education over the liberal arts, which can be seen in government funding.

Writing on this issue, Adam Blankenbicker in “STEM and Liberal Arts: Frenemies of the State” quotes North Carolina Governor Patrick McCrory regarding his notion about funding liberal arts education, which he made very clear on the radio in January 2013. McCrory broadcasted, “I think some of the educational elite have taken over our education where we are offering courses that have no chance of getting people jobs ... if you want to take gender studies, go to a private school and take it. But I don’t want to subsidize that if it’s not going to get someone a job.”¹⁵¹ As demonstrated in the report “Degrees for What Jobs,” these statements are not empty threats. The governor does not only talk the talk, but due to the recent restructuring of higher education as discussed earlier, he also walks the walk. Yet, McCrory and other state governors are not alone. The lengthy list of supporters and funders of STEM education outlined previously may indeed be necessary and urgent, yet there remains no document that summarizes a federal plan for supporting arts education. Although the White House website does devote a page to Champions of Change in Arts Education, the Chronicle of Philanthropy reported that The National Endowment for the Arts received only about \$155 million for 2011, which decreased to \$135 million in 2012.¹⁵² This funding, however, is designated for the arts, not necessarily arts education. These numbers spark many questions regarding the allocation of funds, their efficacy in supporting STEM education, and their abandonment of the liberal arts.

¹⁵¹ Adam Blankenbicker, “STEM and Liberal Arts: Frenemies of the State,” *The Teaching and Learning of Science Everywhere*, web entry posted April 1, 2013, <http://blogs.plos.org/scied/2013/04/01/stem-and-liberal-arts-frenemies-2/>.

¹⁵² *Ibid.*

IV. Pragmatic Liberal Arts Debate: Developing the Mind

Since the birth of the acronym STEM, initiatives progressively acquired major support in education and politics. President Barack Obama, for example, introduced a \$250 million private-public incentive to employ and train properly more STEM teachers, and the U.S. Department of Education's Race to the Top grants competition now provide enticements to highlight STEM education on applications. These figures do not include the already \$700 million spent by the federal government, including NASA and NSF, on science and math education.¹⁵³ Most of this financial support addresses the public perception that the United States is losing national and global status in the STEM fields tied to competition and security. Many educational leaders and educators, however, stress the importance of investing in programs that promote innovation and creativity alongside STEM in order to quell these perceived fears.

Although funding is being dumped into STEM education initiatives, college and university budget cuts prove an epidemic across the United States' higher education institutions. These budget cuts are creating and will continue to create a substantial impact on academic priorities. Among the most vulnerable programs feeling the effects of these cuts are those in the liberal arts, particularly the humanities and social sciences. Even though the liberal arts constitute a majority of the core curriculum, such disciplines must compete for funding with disciplines that attract large grants or corporate money. The economic climate following the 2002 recession drove colleges and universities to make these hard decisions, after drops in the market wiped out investment returns and caused tax receipts to fall far below projections. This left about forty states with midyear budget shortfalls that resulted in cuts for public institutions,

¹⁵³ Daugherty, "The Prospect of an 'A' in STEM Education," 10-15.

including higher education.¹⁵⁴ Yet, John D'Arms reported this trend in the declining funds for the humanities starting with statistics that date back to 1970.

The D'Arms Report demonstrated how financial support for the academic humanities between 1970 and 1995 wavered and was unevenly distributed. This report showed that the federal government's contribution through the National Endowment for the Humanities (NEH) declined minimally between 1982 and 1995; however, notwithstanding this small decrease, the share of NEH funding being distributed to academic researchers and academic institutions reduced much more sharply than it did for the "public humanities," which received an increase in NEH disbursements in order to preserve library collections and increase access to them. While government funds for the humanities were plummeting, private funders decreased their support as well. The American Council of Learned Societies (ACLS), the National History Council, and the John Simon Guggenheim Memorial Foundation—the chief private sources of fellowships—reduced their disbursements of funds, including the number of awards granted. In response to D'Arms Report, some higher education institutions increased their investments in the humanities by forming interdisciplinary centers on campus and campaigned for funds meant to support chairs and graduate students in the humanities.¹⁵⁵ At the same time, one budget-reduction approach at some institutions manifested in the reorganization of traditional departments into larger organizations such as a division of humanities or a department of languages and

¹⁵⁴ Linda Ray Pratt, "Will Budget Troubles Restructure Higher Education?" *Academe* 89, no. 1 (January 2003): 33-37.

¹⁵⁵ *Ibid.*

literature.¹⁵⁶ This is one example as to why college and university administrators report that these efforts have been neither easy nor unvaryingly successful.

During the previous two decades, two major occurrences offer context for academic humanities funding. One is the consistent rising cost of scientific research, and the other is the deterioration of resources which public institutions can acquire. Although academic research provides a significant share of the United States' scientific advances, the cost of the sciences has shifted gradually to colleges and universities. Producing these advances has been linked to accelerating the costs of conducting research and providing the infrastructure it necessitates—technology research buildings, equipment, and the employment of new faculty. The cost of academic research in the sciences has also risen because federal policies concerning indirect cost recoveries and requirements for the provision of matching funds have imposed further expenses on universities. Universities are also shelling out a lot more money on attaining and training new faculty in science and engineering. With all these increases in the costs of academic science, questions have been raised regarding how they are financially compensated and whether reductions in spending on the academic humanities have contributed to this compensation.¹⁵⁷

To determine whether the humanities and liberal arts programs are being stripped of their resources in order to provide more funds to STEM education, consider the old adage “follow the money.” In 1996, Congressional appropriations to the NEH were slashed by 38 percent, hitting discretionary grant programs, including funds for fellowships and research, the hardest, and they have not yet recovered. Congressional appropriations to the NEH between 1997 and 2007

¹⁵⁶ Harriet Zuckerman and Ronald G. Ehrenberg, “Recent Trends in Funding for the Academic Humanities & their Implications,” *Daedalus* 138, no. 1 (Winter 2009): 124-146.

¹⁵⁷ *Ibid.*

maintained consistent levels, but by 2006, changes within NEH altered the distribution of expenditures, leaving merely 18.4 percent of discretionary funds available for research in the humanities and for scholarly projects.¹⁵⁸ The 2009 NEH budgets increased for the “We the People” program, which mainly focused on secondary schools, although it delivered some assistance to historically black colleges and universities (HBCUs) and Hispanic-serving and tribal colleges.¹⁵⁹ Even so, the share of support available for the academic humanities from the NEH diminished substantially. The academic liberal arts and humanities did not receive much support from private foundations either. Most private funding was allocated to “public humanities” such as museums and historical societies, while the share of the “humanities and related social sciences” slid down from 2.5 percent to 2.1 percent.¹⁶⁰ Even though private foundations have provided little support to the humanities, they have contributed far more than the NEH. In 2002, foundations spent approximately \$335 million, surpassing the level of funding the NEH provided that same year.¹⁶¹ Today, foundation funding is increasingly steered toward activities proving measurable economic impact, resulting in the humanities receiving even less interest than they were. Both the humanities and the sciences are experiencing the shift in support from the federal government to colleges and universities. Yet, while federal research budgets for some of the sciences have increased, they have not for the humanities. The competition continues for institutional support among the sciences, the humanities, and all the other fields.

¹⁵⁸ Ibid.

¹⁵⁹ Ibid.

¹⁶⁰ Ibid.

¹⁶¹ Ibid.

While funding for higher education is decreasing, the number of students enrolling in colleges and universities is simultaneously increasing. As a result, more undergraduates are being taught with fewer faculty and lesser operating budgets. Seeking job skills, many contemporary prospective students are seeking a more “practical” curriculum than the liberal arts education, positioned at the forefront of general education requirements. The Association of American Colleges and Universities issued a report stating that such a “practical liberal education” aims to meet the needs of these prospective students. The report’s description of “practical liberal education” reads quite similar to the values of traditional liberal education, yet it emphasizes teaching intellectual skills, rather than mastery of a specialized field of knowledge. The pressure from both within and without higher education institutions is pushing toward the public’s vocational needs.¹⁶² Politicians and educational leaders currently speak of STEM disciplines as fulfilling these needs, not the liberal arts or humanities. When teaching loads in the sciences are reduced, for instance, they are often funded by research grants; yet, reduced teaching loads in the humanities hardly ever attain large grants, leading colleges and universities to employ more teaching assistants and part-time faculty to meet the cost of the reductions. Colleges and universities fund research time that enhances their national reputation and attracts enrollments and new grants which is greatly affected under budget pressure.¹⁶³

College and university budget cuts and debates regarding the enhancement of efficiencies in higher education have fueled speculation pertaining to the comparative values of different disciplines. With humanities and social sciences generating less external funding, donations, and municipal investment than the STEM disciplines, critics have argued that such liberal arts

¹⁶² Ray, “Will Budget Troubles Restructure Higher Education?” 33-37.

¹⁶³ Ibid.

courses are therefore less valuable. The critics who champion this argument ascribe value to STEM disciplines by evaluating initial salaries for graduates, job availability, and the need for workers with scientific and technical skills, judging disciplines without well-defined workforce outcomes as less worthy of public support. The headline of the January 29, 2013 article in the *Chronicle of Higher Education* about Governor Patrick McCrory's radio broadcast reads "N.C. Governor Wants to Tie University Support to Jobs, Not Liberal Arts," which demonstrates the public discourse about higher education in regards to the tension between employment goals and the liberal arts.¹⁶⁴ The rhetoric of advocates for a STEM-oriented education mirrors the vocational education arguments put forth during the dawn of the modern academy. With so much emphasis being placed on jobs and global competition, the language defining the STEM disciplines is currently ignoring the role of science, technology, engineering, and mathematics as tools to develop fully the mind and inciting a strong emotional appeal that insists that the STEM disciplines' main value is found in their effectiveness in creating jobs, helping students obtain high-paying jobs, and instilling a strong sense of patriotism. To enter the current public discourse on the role of the liberal arts and humanities in higher education, proponents of a holistic pragmatic liberal arts education are now attaching their relevance not only to education in general, but also specifically how they help bolster the STEM disciplines.

On behalf of the proponents of a pragmatic liberal arts education, there have been many recent calls, including from the 2004 National Academy of Engineering study, for much greater breadth in undergraduate engineering education in particular. A report by the Carnegie Foundation for the Advancement of Teaching argued for integration of material and

¹⁶⁴ Carol Colatrella, "Why STEM Students Need Gender Studies," *Academe* 100, no. 3 (May 2014): 26-30.

opportunities relating material directly to the application of engineering throughout the curriculum. American engineers need additional scopes of knowledge in order to compete globally and to maintain advancement in technological innovation. As business continues to spread internationally, the public need for engineers to understand other cultures and societies increases. Engineers need to master knowledge beyond the concepts of engineering itself to advance and be most effective.¹⁶⁵ Advocates of a holistic education stress that a pragmatic liberal arts education strengthens intellectual capabilities that need to be applied in any career. Education that includes the arts and humanities prepares students to see broadly and to acquire traits essential in a complex and dynamic world, where specialized training quickly becomes outdated and limiting.¹⁶⁶ In other words, it is in our public interest, as well as the professional's personal interest, that graduates prove adaptable and capable of applying their knowledge in different fields. America's higher education curriculum should reflect these public and private interests.

In "Restructuring Engineering Education: Why, how and when?" C.J. King outlines the specific needs that engineering education should consider when broadening the curriculum. King argues for "more understanding of the human condition, cultures, and society, an understanding of the process of innovation, an ability to work in synergy with persons from other disciplines, such as business, law, economics, public policy, political science, and sociology, and an ability to communicate and to express technical issues in simple, understandable terms."¹⁶⁷ Advocates

¹⁶⁵ King, "Restructuring Engineering Education" 1-5.

¹⁶⁶ Charles W. Anderson, *Prescribing the Life of the Mind: An Essay on the Purpose of the University, the Aims of Liberal Education, the Competence of Citizens, and the Cultivation of Practical Reason* (Madison: University of Wisconsin Press, 1993), 51-52.

of the STEM disciplines focus on the commonality between the fields of science, technology, engineering, and math, such as “problem solving, arguing from evidence, and reconciling conflicting views,” yet the logic and creativity needed for these commonalities is also taught by philosophers.¹⁶⁸ The pedagogy of both art and engineering education uphold “problem-based learning” which develops students’ higher order thinking skills by investigating complex problems drawn from real world situations. In STEM courses, learning the basic elements of the design process often corresponds with doing real design projects that engineers face in their careers. In the twenty-first century, art aptitude applies to a broader division of the workforce than skills frequently linked to STEM. America's productivity in creative industries and exports, such as movies, television, and games to architecture and new products and services, is what drives the United States’ competitiveness.¹⁶⁹ Educators can stress why art courses deserve continuous local and national support by emphasizing how the principles undergirding not only philosophy, but also art and design are transferrable in science when presenting information to the public in an engaging manner.¹⁷⁰ This corresponds with Dewey’s model of educating students when he suggests “since art is the most universal form of language, since it is constituted, even apart from literature, by the common qualities of the public world, it is the most universal and freest form of communication.”¹⁷¹ Not only artists do things artistically; art is the way in which people create and express themselves. America’s societal challenges, the dynamic

¹⁶⁷ King “Restructuring Engineering Education” 1-5.

¹⁶⁸ James W. Bequette and Marjorie Bullitt Bequette, “A Place for ART and DESIGN Education in the STEM Conversation,” *Art Education* 65, no.2 (2012): 40-7.

¹⁶⁹ Daugherty, “The Prospect of an ‘A’ in STEM Education,” 10-15.

¹⁷⁰ Ibid.

¹⁷¹ John Dewey, *Art as Experience* (New York: Perigee, 1980), 270.

global workplace, and rapidly advancing technology all require a curriculum that integrates art, design, and science. A pragmatic liberal arts education can provide an environment for developing an engineering education that prepares future engineers for the variety of complex situations they will face.

In “The Prospect of an ‘A’ in STEM Education,” Michael K. Daugherty outlines Storksdieck and White’s views on how integrating art with science and engineering provides future higher education graduates capabilities for not only work but life itself. Storksdieck insists that art should be viewed as a different lens through which to see the world in science, which leads to a diverse understanding of the world. Considering the limitations of scientific research and engineering design, Storksdieck argues that art will help scientists and engineers infuse a degree of creativity and innovation in their work, which becomes equally valuable to understanding science and applying engineering concepts outside their professional lives as well. With art as part of the curriculum, students may find it easier to understand and apply those concepts to other activities and fields of knowledge, which can be seen in design courses where art and engineering are practiced side by side. While White agrees with Storksdieck that the combination of STEM education with the arts would provide a curriculum that instills innovation, he approaches his argument differently. According to White, STEM knowledge corresponds with skills typically associated with the left half of the brain which is logic driven, and research proposes that the arts develop the right hemisphere of the brain, which fosters creativity and innovation.¹⁷² Current U.S. Secretary of Education, Arne Duncan, elaborated upon this claim when he noted in 2013 to the President’s Committee on the Arts and Humanities (PCAH) that “for today’s students to be the innovators and economic leaders of the future, they

¹⁷² Daugherty, “The Prospect of an ‘A’ in STEM Education,” 10-15.

will need to have experiences as musicians and dancers, painters and sculptors, poets and playwrights—in short, they will need to be creative innovators who will build our nation's economy for the future."¹⁷³ A research study conducted by McGrath and Brown in 2005 supports Secretary Duncan's view by projecting that the visual arts prove imperative in cultivating cognition in STEM education. Their research found that visual learning—thinking and communicating visually—engaged the higher cognitive parts of the brain and improved student performance during experimental research tests.¹⁷⁴

As the United States advances, Americans face an explosion of technological information and new tools that advance scientific discoveries, making this scientific literacy even more crucial in the future. In order for graduates to become scientifically literate, they must have at least a minimal understanding of basic scientific concepts that affect everyday life, as well as an understanding of science as a process, and of what science can and cannot contribute to solving problems of today's world. Without this understanding of the process and contributions of science, graduates cannot effectively participate in public policy debates about modern medicine, the environment, and other scientific and technological issues. Teaching science content and process are not mutually exclusive. Many introductory biology courses are no longer superficially surveying many topics but are treating fewer topics in much more depth.¹⁷⁵ This is a way to expose non-science majors to the process of science, and it has been shown that all students learn best in a hands-on, inquiry-based approach to science education, which creates

¹⁷³ Ibid.

¹⁷⁴ Ibid.

¹⁷⁵ Michael A. O'Donnell, "The Role of the Laboratory Experience in Science Education," in *Teaching Essays on Liberal Education Matters at the Millennium*, ed. Mark W. McLaughlin, Drew A. Hyland, and J Ronald Spencer (Hartford: Trinity College, 1999), 73-74.

active problem solvers instead of passive receivers of knowledge. One way to achieve this type of hands-on, inquiry-based science learning is to adopt the teaching laboratory, where colleges have the best opportunity to introduce students to what scientists really do, to make them active participants in what they learn, and to have them consider the relationship of their work to societal issues. Experiences in the teaching laboratory can encourage curiosity and intellectual adventure, promote debate and skepticism about unsupported conclusions, and nurture problem-solving skills useful to all informed citizens. In other words, learning to do science provides the very experiences that are at the heart of a liberal arts education.¹⁷⁶

In 2004, Drake and Burns offered various research reports in their book, *Meeting Standards through Integrated Curriculum*, that demonstrate the collective positive impact of an integrated curricula which manifested in the tangible result of improved test scores. They argue that if STEM education aims to increase innovation and creativity, then the rational course of action is to “integrate artistic design, artistic expression, reflection, and a multi-sensory appeal in the curriculum.”¹⁷⁷ As for college engineering courses, the study of engineering within the context of a liberal arts education provides the curricular flexibility that allows students to pursue diverse interests in the arts and humanities, promotes awareness and collaboration with other fields, often as interdisciplinary science, and serves to develop more fully students’ communication skills than do traditional undergraduate engineering programs at universities. All of these features aid in producing broadly trained, adaptable engineers.¹⁷⁸ Engineering,

¹⁷⁶ Ibid., 72.

¹⁷⁷ Daugherty, “The Prospect of an ‘A’ in STEM Education,” 10-15.

¹⁷⁸ Joseph L. Palladino, “Engineering in the Liberal Arts College: Relevant, Attractive, and Connected,” in *Teaching Essays on Liberal Education Matters at the Millennium*, ed. Mark W. McLaughlin, Drew A. Hyland, and J Ronald Spencer (Hartford: Trinity College, 1999), 83.

characterized by the design process, is not limited to the design of “things,” for example, structures and machines, but also includes intellectual designs, such as conceptual representations, or models of physical systems, or the design of computer programs. Engineering involves creating something new by studying the world using physical laws written in the language of mathematics. This is the “art” of engineering. According to Accreditation Board for Engineering and Technology’s (ABET) definition of engineering, “Engineering is the profession in which knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of mankind.”¹⁷⁹ Traditionally, engineering students follow a rigidly prescribed baccalaureate program, consisting mainly of analytical courses in engineering science. As an alternative to tradition, students may be more liberally trained and thereby develop the art of engineering.

Resident engineering programs offer profound opportunities to educate broadly students of the liberal arts. In 1982, the Alfred P. Sloan Foundation created a program titled “The New Liberal Arts,” funding select liberal arts colleges to create courses that integrate “applied mathematics and technological literacy” with the liberal arts.¹⁸⁰ The goal was to form “technologically enlightened humanists.”¹⁸¹ With Sloan funding, Trinity College began a tradition of developing courses with significant natural science, computing and technological content for non-science majors. Examples include: “Understanding Technology” which examines a survey of technology issues including energy supplies, communications systems,

¹⁷⁹ Ibid., 84-85.

¹⁸⁰ Ibid., 93.

¹⁸¹ Ibid.

computers, environmental issues, and genetic engineering; “Understanding Systems” which introduces an AIDS epidemic model that students later expanded and presented at four international AIDS conferences from 1987 to 1992; “Biomechanics of Human Movement” which demonstrates the application of engineering mechanics to the analysis of dance and athletic performance; and “Principles of Flight” which studies aerodynamic principles, airplane design, flight simulation, and wind tunnel testing, and demonstrates that seemingly advanced engineering topics are accessible to all liberal arts students.¹⁸² The liberal arts setting provides additional course work in the humanities that enhances engineering students’ ability to communicate clearly and persuasively both orally and in writing, by allowing for substantial study in topics ranging in breadth from ethics to foreign languages. Trinity engineering students are required to achieve some depth of study in the arts and humanities by completing at least two courses in the same discipline; however, many students go beyond that by electing a liberal arts minor, combining a B.A. in engineering with a liberal arts discipline.¹⁸³

In comparison to medicine, law, public health, business, and architecture, engineering is the only profession for which the bachelor’s degree is the primary accreditation. Other major professions offer graduate-level professional degrees, constructed on top of a basic liberal undergraduate education. Engineering education finds little room for the much needed breadth in the curriculum because the entire professional program is focused into the undergraduate degree. This professionally-focused undergraduate program relies heavily on rigorous, quantitative aspects of the curriculum which reduces its attraction to a wider range of the population. Engineering education’s quantitative focus and lack of linking their work with social impacts

¹⁸² Ibid.

¹⁸³ Ibid.

contributes to the low enrollment numbers of women and minorities.¹⁸⁴ As an example of a liberal arts course that can help broaden engineering education, gender studies can fill this role as well as increase the representation of women and minorities in STEM disciplines and help prepare them to participate in those fields. Gender studies programs' outcomes include increasing awareness about social organization and cultural values, constructing faculty, student, and alumni networks, and enriching campus community. Georgia Institute of Technology has increased their enrollment of women and historically underrepresented minorities in STEM disciplines which they attribute to academic and social initiatives that integrate gender studies theory and practice in the liberal arts with other academic disciplines.¹⁸⁵

While connecting the concerns of gender studies with STEM disciplines has helped increase employment rates for women in high-paying science and technology jobs and led to improved "work-life balance," gender studies programs have also been linked to informing citizens about social, political, and economic interests and outcomes. Gender studies courses teach students to analyze how gender, race, ethnicity, class, age, and sexual orientation affect participation in society and understand the influence of social contexts and historical effects on contemporary issues. Gender studies help students see females in roles of civic engagement as well as in STEM disciplines by examining the social dimensions of gender.¹⁸⁶ In order to sustain the United States, critics recognize the essentiality of diversifying the engineering profession. The same methods for aiding larger enrollments of women and minorities to STEM-field programs and professions can attract the interest of all students to a holistic education that

¹⁸⁴ King, "Restructuring Engineering Education" 1-5.

¹⁸⁵ Colatrella, "Why STEM Students Need Gender Studies," 26-30.

¹⁸⁶ Ibid.

includes a STEM discipline and a liberal arts or humanities discipline. By generating more breadth, permitting a more flexible starting point in engineering programs, and offering courses that demonstrate what engineers actually do and how they benefit from integration with other academic disciplines, more students may begin to view engineering as relevant and attainable to them.¹⁸⁷ The combination of both the STEM curricula, which concentrates on clear solutions to problems, and art education, which stresses uncertainty and ambiguity, will help develop the creativity and innovation needed in the twenty-first century and described by STEM-centered curriculum advocates as a necessity for global competition. Proponents of the pragmatic liberal arts see the need for both STEM and art education and argue that students are at risk when resources are pulled from one to enhance the other. The only prevention from America's higher education institutions from having both is the false dichotomization initiated during the rise of the modern academy and the conviction that the sciences and arts should be divided and sold to different consumers.

¹⁸⁷ King, "Restructuring Engineering Education" 1-5.

V. Analysis of STEM and Pragmatic Liberal Arts Arguments

Although the original aim of STEM-focused education was to maintain the nation's economic productivity and global competitiveness, critics worry that neglecting the arts and humanities will lead to a one-sided education that fails our culture and society, and therefore advocate a STEAHM-focused approach to higher education, that integrates the liberal arts with the STEM disciplines to a holistic diversified curriculum. The integration of the art, humanities, and STEM disciplines will more effectively serve the public interest than the false dichotomization of the liberal arts and STEM programs, which lead to further privatization of higher education. When reading the words of those advocating for the arts and humanities throughout this current debate, the acronyms, STEAHM or STEAM, appear quite regularly, yet a more appropriate term for describing this desired holistic education would be “pragmatic liberal arts.” In considering the kind of students, colleges, and society Americans wish to develop, one useful solution to the present-day context and stalemated debates is to revive an idea dear to the classical American pragmatists: education as an essential public good for a robust democracy.

The counterargument to the STEM-focused education debate does not suggest that liberal arts curricula should dominate over STEM disciplines. Integration of the two for a diversified education is at the root of the argument; therefore, the pragmatic liberal arts, or STEAHM, advocates suggest that STEM should not be treated as a separate discipline in education, but rather as a cross-discipline approach. Those advocating for the integration of arts and humanities with STEM propose imbuing liberal arts skills—“collaboration, creativity, critical thinking, ethical responsibility, and communication”—with STEM education to enhance the intellectual

skills essential for STEM careers.¹⁸⁸ In 2008, the Conference Board and Americans for the Arts, in collaboration with the American Association of School Administrators, conducted a survey that further supports the connection between the arts, creativity, innovation, and workforce preparedness. The survey study, titled “Ready to Innovate,” questioned 244 corporate executives and school superintendents, asking to define the role of creativity. Results from this study illustrate that employers are seeking new hires who demonstrate the creativity provided by the arts as well as the ability to identify problems and new patterns, integrate knowledge across disciplines, and work inquisitively. Interestingly, this study also found that over 63 percent of the employers surveyed specified that they prefer the creative employee over the employee with technical skills, yet there remains a gap between realizing this need for creative employees and enhancing education that will result in creative employees.¹⁸⁹ Judging the findings of this study, the arts should be integrated into all programs that advocate creativity as a goal. If critics argue that the role of higher education is to prepare future employees and the employers suggest that they prefer prospective employees to demonstrate creativity, then it would seem that there would be more critics arguing for the arts in education than those arguing exclusively for technical training.

One aspect of the pragmatic liberal arts integration argument addresses the STEM-focused supporters’ concerns with job preparedness and attainability by suggesting that educators use inquiry-guided learning strategies to engage students to use their imaginations for creativity and critical thinking, which foster the higher-order thinking skills defined as a goal of

¹⁸⁸ Chuck Cadle, “STEM Should Be a Natural Extension of Literacy Education,” *Huffington Post*, web entry posted January 29, 2013, http://www.huffingtonpost.com/chuck-cadle/stem-education-necessary_b_2576200.html?

¹⁸⁹ Daugherty, “The Prospect of an ‘A’ in STEM Education,” 10-15.

STEM education. In “STEM Should Be a Natural Extension of Literacy Education,” Chuck Cadle expresses this view that STEM is not taught in a vacuum when he suggested that “STEM knowledge should be integrated across the curriculum.”¹⁹⁰ While many arguments for pragmatic liberal arts education demonstrate this rhetoric concerning how the liberal arts assist in preparing the practical skills for job readiness, and while there is nothing inherently wrong with higher education’s attempt to produce graduates who possess more of the job skills required by today’s economy and technologically advancing industry, America’s graduates also need the arts and humanities with STEM to provide a systematic understanding of the tools used within a given career field—medicine, technology, law—which helps the entirety of society within a context. During the dawn of the Industrial Revolution, the academy sought to grapple with the paradox between the intellectual requirements essential to the new industries and the technological advances which made it unnecessary for many technicians to understand the underlying science, increasing workers’ subservience to machines. Today, Americans are experiencing this problem in much the same way and some suggest that to provide more students with opportunities to attain gainful employment, the United States must increase educational participation in STEM disciplines.¹⁹¹ What is missed in this argument is that people from either a STEM-discipline background or a liberal arts background are employed in all professions, regardless of their major. Consider such anomalies as Bill Gates and Mark Zuckerberg—neither graduated in a STEM field, or at all for that matter.

While well known, Gates and Zuckerberg are examples of the disparity that exists between earning a STEM degree and having a STEM job. The Commerce Department, for

¹⁹⁰ Ibid.

¹⁹¹ Noddings, *Education and Democracy in the 21st Century*, 103.

instance, counted only 3.3 million people with STEM degrees out of the 7.6 million STEM workers, and while about 15 million Americans possess a STEM degree, 11.4 million happen to work outside of STEM.¹⁹² In the United States, it is not necessary to have a STEM degree to receive a STEM job, and college graduates will not necessarily work in a field corresponding with their major upon graduation. It would appear that if there is in fact a shortage in STEM workers, that those with STEM degrees would be filling such positions.¹⁹³

The inconsistency between degrees earned and jobs received is not the only reason to reconsider integrating STEM courses with other disciplines. The current state of the petroleum engineering industry, for example, highlights why seeking specialized degrees with promises of securing high-paying, long-lasting jobs can cause a tremendous disadvantage. In early 2014, a petroleum engineering degree promised one of the best paths toward a secure and well-paying job, owing to the shale revolution and the rising enrollments in petroleum engineering programs across America. Now that the price of oil slid down to about \$50 a barrel, petroleum engineering majors far outweigh the need for petroleum engineers. On Public Radio in February 2015, Stephanie Joyce interviewed Professor Carrie McClelland at the Colorado School of Mines regarding the effects of plummeting oil prices and mass company layoffs on students enrolling in petroleum engineering programs. Annually, McClelland invites a guest speaker to her class whom always opens with a question about the number of students who have jobs lined up upon their graduation. Whereas typically about 75 to 80 percent of the students would raise their hand, this time, only about 10 to 15 raised their hands. Some seniors experience rescinded job offers

¹⁹² Robert N. Charette, “The STEM Crisis Is a Myth: Forget the dire predictions of a looming shortfall of scientists, technologists, engineers, and mathematicians,” *IEEE Spectrum*, web entry posted August 30, 2013, <http://spectrum.ieee.org/at-work/education/the-stem-crisis-is-a-myth>.

¹⁹³ *Ibid.*

and many more are now considering graduate school. McClelland insists that the decrease in oil prices is not the only problem. From her experience, there are simply too many students pursuing petroleum engineering degrees, and she adds, “I think the demand has already leveled off even though the number of students continues to increase, and we’re going to see a lot of students that end up with a petroleum engineering degree but have to go find a job in a different industry.”¹⁹⁴

The fear is that a repeat of the 1980s will occur, when students bombarded petroleum engineering programs after oil prices skyrocketed and then abandoned these programs when the industry busted. During that time, the University of Wyoming ended up shutting down the entire program.¹⁹⁵ Shutting down and reinstating such programs is not at all cost effective. If the main concern is financial, than it is not in the students’ best interest to pursue specialized degrees, nor is it in colleges’ and universities’ best interest to persuade students to do so. Petroleum engineering is not the only STEM discipline facing careers that are a flight risk. Over the decades, more increasingly long-term employment with a single STEM company has transformed into a sequence of short-term positions that can swiftly end when a project is finished or the market shifts. Unlike past procedures, employers rarely provide education and training to engineers to keep them up-to-date, rendering unemployed engineers technologically outdated. Another major problem for students seeking a specialization is that there is no guarantee that their specialization will still have a high demand for workers by the time they graduate.¹⁹⁶ Seeking an education that is specialized proves risky for prospective students whose

¹⁹⁴ Stephanie Joyce, “Falling Oil Prices Leave Petroleum Engineering Student Out in the Cold,” *Inside Energy*, web entry posted February 13, 2015, <http://insideenergy.org/2015/02/13/falling-oil-prices-leave-petroleum-engineering-students-out-in-the-cold/>.

¹⁹⁵ *Ibid.*

goals are strictly financial, but there are other repercussions of pursuing an education that focuses on technical skills without integrating the arts and humanities.

Among the problems facing the fields of science and technology, which are addressed in the pragmatic liberal arts education discussion, are the ethical and moral repercussions involved in knowing how technology works, but not knowing when or how to use that knowledge. On the matter, Dr. Kevin Wiles writes in *The Huffington Post* that “there is no formula for that. Rather, how knowledge and technology are used is framed by the moral values people hold. This is evident in the evolving technologies of warfare.”¹⁹⁷ With the development of the atomic bomb in World War II, which demolished an entire population, ethical and moral questions arose, that science and technology alone could not answer. In learning the disciplines of science and technology, students are not taught when and how that knowledge should be used. While ethics and morals are important, the STEM-focused argument proves too narrow. The viewpoint that arts and humanities should be taught alongside mathematics and science also takes into consideration the importance of critical thinking, logic, and environmental issues. Pragmatic liberal arts advocates argue that while it is important for society to educate its citizens in the areas of science and technology, it is also important that graduates understand all the implications of their knowledge.¹⁹⁸ A specific job requiring math and engineering, such as building construction, necessitates more areas of concentration besides engineering a structurally sound building; other aspects of the building must be taken into consideration such as urban

¹⁹⁶ Charette, “The STEM Crisis Is a Myth.”

¹⁹⁷ Kevin Wildes, “STEM Alone is Not Enough,” *Huffington Post*, web entry posted July 21, 2014, http://www.huffingtonpost.com/rev-kevin-wm-wildes-sj-phd/stem-alone-is-not-enough_b_5605877.html?

¹⁹⁸ Ibid.

planning, zoning laws, and environmental safety, which STEM fields alone do not cover. The Green Building Council of Brazil, for instance, initiated building projects with the goals of meeting the needs of a rapidly increasing population with limited resources and constructing efficient and sustainable environmentally friendly buildings, by providing Brazil with renewable energy including hydroelectric, thermoelectric, Biofuels, wind, and solar power. Christine Wipfli describes Brazil's Green Building practices in *The Rio Times* as “expand[ing] and complement[ing] the classic building design concerns of economy, utility, durability, and comfort, with the common objective of having ‘green’ buildings reduce the overall impact of the built environment on human health and the natural environment.”¹⁹⁹ The Green Building Council of Brazil practices and understands structural engineering, not in a vacuum, but as integrated with other disciplines: ethics, environmental policy, public health, urban planning, and economics. Taking into consideration the STEM-focused concern with America's maintained superpower within global competition, perhaps further research should focus on the integrated practices within STEM fields which demonstrate practical application as seen with Brazil's Green Building.

In addressing the STEM-focused argument about our ever-growing globalization, pragmatic liberal arts supporters realize that while it is important to have technologically literate citizens, it is as equally important to develop “an informed, thoughtful, and critical citizenry.”²⁰⁰ Pauline Lipman explains this argument further in “This is America 2005: The Political Economy

¹⁹⁹ Christine Wipfli, “Brazil's Green Building Plan,” in *The Rio Times: News in English for Rio de Janeiro and Brazil*, web entry posted March 2, 2012, <http://riotimesonline.com/brazil-news/rio-real-estate/booming-population-needs-green-plan/>.

²⁰⁰ Pauline Lipman, “This Is America 2005: The Political Economy of Education Reform against the Public Interest,” in *Education Research in the Public Interest: Social Justice, Action, and Policy*, ed. Gloria Ladson-Billings and William F. Tate (New York: Teachers College, 2006), 104.

of Education Reform against the Public Interest,” when she insists that “in the face of growing economic inequality, war, environmental crises, and racial marginalization, education for democratic public participation is more important than ever.”²⁰¹ If the human condition is removed from the learning process and it becomes mere drilling and regurgitation of formulas, our citizens may find passion in misguided pursuits. The human condition—relations and understanding between people and the world as well as between people—needs inclusion within the sciences not because of “feelings,” but because the practical applications of the sciences deal directly with people. Consider the role of a doctor when she or he is diagnosing a patient. The current trend in medicine has increasingly removed the individual’s experience from their laundry list of symptoms, resulting in the notion of precise, objective, and quantifiable diagnoses. The rise of detectable diagnoses have infiltrated health care economics as Diagnosis-Related Groups (DRGs) which drive physician compensation, inspiring specialized training programs along with tremendous advances in how doctors understand and treat patients. While these advances in medical care have helped save many lives, along with such progress, a wedge has been driven between some diagnoses and individual patients. When the patient’s background or genetics are not considered, mistakes are made. Some doctors now focus more on the diagnosis and less on the patient which can result in paying less attention to the root cause of the problem, prolonged discomfort, and other possible effects the body may experience—losing sight of the human condition.²⁰²

²⁰¹ Ibid.

²⁰² Pauline W. Chen, M.D., “Doctor and Patient-The Tyranny of Diagnosis,” *The New York Times: Health*, web entry posted September 18, 2008, http://www.nytimes.com/2008/09/19/health/chen9-18.html?_r=0.

Education that does not familiarize students with the human condition may prepare graduates with the capability of performing basic tasks for their chosen career field, but without the intellectual, theoretical, and conceptual capacity to engage in an analysis of society and without the tools of empowerment to recognize and overcome injustice or intellectual oppression. This sentiment harkens back to the words of pragmatist John Andrew Rice when he suggested that:

We ought to begin to consider education as a thing concerned at least in part with how people feel. If we do not, somebody else will, and all our structure of thought will disappear as quickly as it has in Nazi Germany. There was a country where the universities were concerned with pure thought, where the keenest thinking of the modern world was being done. And yet not a word was heard from the seats of learning when the house painter appeared and roused the Germans to feeling. While intellection was being sharpened and polished, savagery was going its way, waiting for a chance.²⁰³

Higher education can breathe meaning into the humanities requirements, that so many students now find “irrelevant,” if instructors directly connect the content and pedagogical approach to issues of citizenship and government and if the education process were more democratic and less fragmented. The problems in contemporary U.S. democracy and society afford countless opportunities to explore concepts such as truth, honesty, morality, ethics, the human condition, and the law which cannot be fully comprehended through STEM education alone.

The economic, political, and cultural issues of American society fluctuate. The framework for higher education will need to change consistently to keep up with our society’s needs of a particular time and context; however, no matter the specific needs of our nation’s economy and politics, our citizens will always need a diversified education to function as adaptable practitioners, ethically responsible citizens, and competent, democratic voters. The

²⁰³ Katherine C. Reynolds, “Progressive Ideals and Experimental Higher Education: The Example of John Dewey and Black Mountain College,” *Education and Culture* 14, no.1 (1997): 6-7.

privatization encompassing every aspect of our social lives heavily influences our current economic, political, and cultural context. Lipman associates the beginnings of our current context with the education reform that began in the 1980s which focused heavily on “standards, accountability, and market mechanisms to improve schools.”²⁰⁴ The No Child Left Behind Act is an example of the educational policies enacted to sustain the global economic and social agenda that maximizes profits by endorsing the importance of the market and privatizing every aspect of American economic and social life. The acceptance of public services as privatized institutions effectively exchanged the public interest with private interest.²⁰⁵ As perception of education transformed from a public service to a private benefit, the negative results to higher education included cuts to funding, sky-rocketing tuition, and the transition from education as a lifelong learning process into a means to acquire a well-paying job.

Considering our current economic and cultural context, the STEM-focused debaters raise legitimate concerns about individual job security and the downturn of America’s economy which demands STEM literate workers for its human capital. Under such circumstances, Stanley Aronowitz, in *The Knowledge Factory*, stresses the reality that students simply do not “consider learning as anything more than the rituals necessary for obtaining credentials. Whether or not they manage to learn a series of marketable skills, this has become the sufficient justification for spending years attending school.”²⁰⁶ The cut back or elimination of “nonessential” academic programs, such as the humanities and arts, resulted from administrations’ goals to keep up enrollments and receive an influx of funds. Because corporate sponsors, parents, and students

²⁰⁴ Ibid., 100-102.

²⁰⁵ Ibid.

²⁰⁶ Stanley Aronowitz, *The Knowledge Factory: Dismantling the Corporate University and Creating True Higher Learning* (Boston: Beacon, 2000), 159-160.

demand programs oriented to job preparedness, many higher education institutions yielded to pressure and introduced more STEM courses into the curriculum, eliminating the liberal arts under the assumption that there is a method for STEM-field career results, when in reality no such method exists. While it remains a positive aspect to the curriculum to offer more STEM courses, it does not serve students well to eliminate their liberal arts courses in order to do so.

By eliminating the arts and humanities from general education, STEM students narrow their worldview and career options. In 2011, *The Wall Street Journal* quoted Norman Augustine, former chairman and CEO of Lockheed Martin on the role of art, literature, and history in education. Augustine argued, “In my position as CEO of a firm employing over 80,000 engineers, I can testify that most were excellent engineers...but the factor that most distinguished those who advanced in the organization was the ability to think broadly and read and write clearly.”²⁰⁷ It is not simply STEM students that need a foundation in science, engineering, and math—all students do. The STEM shortage should be perceived as a STEM literacy shortage for all students that do not necessitate a degree in a STEM field. STEM skills prove important for everyone’s growth in understanding policy debates, social issues, and calculating risks. When science, math, and engineering are taught well, they “engage students’ intellectual curiosity about the world and how it works.”²⁰⁸ Understanding STEM education as an intellectual endeavor should help eliminate the language used to describe it as technical training for jobs and global competition. This integration of disciplines holds true for the liberal arts major as well. In order to have a diversified education, science-based content and procedure proves imperative for all students and future practitioners. Much like the Socratic Method employed in most

²⁰⁷ Charette, “The STEM Crisis Is a Myth.”

²⁰⁸ *Ibid.*

humanities courses, science courses entail asking questions, proposing tentative answers, and then trying to discover which tentative answer is most likely correct. But one pedagogical practice humanities majors might miss if they do not participate in any science course is the actively engaging laboratory investigation that requires their creativity and critical thinking skills that will help them in a society increasingly dependent on technology. For students not majoring in science, investigative labs help them learn how to evaluate scientific research in the context of societal issues and to acquire the problem-solving skills they will need in any aspect of their lives. The nonscientist, who is never exposed to this manner of inquiry and discovery, will be left behind in tomorrow's increasingly technological environment, unable to make informed decisions about the pressing issues of the next generation.²⁰⁹

While a pragmatic liberal arts education proves necessary for producing future competent practitioners who can adapt to advancing technologies and a dynamic economic and social context, it should not be the sole engine that drives higher education. It is not only important for the integration of arts and humanities into the higher education curriculum for utility's sake, but it is also important in shaping our American ethical and moral character. The factors that drive our society depend on our concept of "the good life," which derives from philosophy and the humanities. The role of technology during former President Richard Nixon's carpet bombing mission in Cambodia demonstrates one example of the malicious execution of technological efficiency when directed by an administration with no clear concern for ethical or moral character. As witnessed in the aftermath of Cambodia, the utility of our technology did not fail—our geopolitics did. The failures of the American campaign in Cambodia lay in the high civilian

²⁰⁹ O'Donnell, "The Role of the Laboratory Experience in Science Education," 80.

death toll and the rise of the Khmer Rouge regime from the bomb craters, elucidating that ethical and moral competency prove just as important as technological competency.²¹⁰

The framework of pragmatic liberal arts education should not only focus on helping students acquire the knowledge and skills needed to become productive workers within society, but it should also develop their commitment and skills to enable contribution toward making America a just place in which to live and work. Colleges and universities should educate students to be ethically responsible and effective citizens when applying their education to ethically complex situations such as war, environmental issues, and energy. The selection of content within this type of framework is crucial in providing the foundation for all learning experiences, making education a process that students continue throughout their lives rather than ending when the diploma hits the palm of their hand. By introducing arts and humanities coursework into STEM disciplines, content taught will be made relevant to the learners, addressing their questions and needs by making connections between the material and the diverse lived experiences within the classroom. The instructor must use the language of the human experience on a daily basis if the students are to make the connections and relate to their fellow students or at least respect their opinions.

The diversity students experience is not a concrete issue that can be added to a curriculum. It is a reality in every American's lived experience each day. This diversity of people and subject matter is required for students to achieve deep understanding. According to Mickey Kolis in *Student Relevance Matters*, "Human issues rarely have one right answer. The ability to appreciate individuality within the group makes it easier for connections to be made, different

²¹⁰ Taylor Owen and Ben Kiernan, "Bombs Over Cambodia," in *the Walrus* (October 2006): 69.

perspectives to be validated, and generalizations to be robust and complex.”²¹¹ Diversity in higher education offers multiple, deepened methods of identifying, describing, and solving our economic, political, and social issues as well as an opportunity to educate students in an environment that reflects the reality of the American lived experience. Teaching students in a diverse setting will provide them with practice for how to get along, make decisions, and take actions in the public interest.²¹² An important aim of a diverse education is to provide students with experiences and materials that will help them develop positive attitudes and behaviors toward individuals from different groups and toward making ethically responsible decisions when it comes to knowing when and how to use technological and scientific knowledge.

In producing an ethically responsible citizenry, a pragmatic liberal arts education would also provide the backdrop for participating in a democratic society as a just and competent citizen. In order to create a reflective and active democratic society that makes decisions and takes actions in the public interest, our higher education framework must promote and practice political, economic, and cultural democracy. Although the new path of education has steered students toward vocationalism and technical training, often creating absent-minded producers and consumers, an entirely different kind of belief system is implied in the various public pronouncements that U.S. colleges and universities make in their catalogs and mission statements. In many ways, these ambitious statements come as close as anything to Dewey’s conception of the proper role of education in society. Upon reviewing the mission statements of a

²¹¹ Mickey Kolis, *Student Relevance Matters: Why Do I Have to Know This Stuff?* (Lanham: Rowman & Littlefield, 2011), 55.

²¹² James A. Banks, “Democracy, Diversity, and Social Justice: Educating Citizens for the Public Interest in a Global Age,” in *Education Research in the Public Interest: Social Justice, Action, and Policy*, ed. Gloria Ladson-Billings and William F. Tate (New York: Teachers College, 2006), 144-145.

randomly selected group of U.S. higher education institutions, the mention of private economic benefits, international competitiveness, or filling slots in the labor market would not be found. On the contrary, when it comes to describing its educational mission, the typical college or university uses language such as “preparing students for responsible citizenship,” “developing character,” “developing future leaders,” “preparing students to serve society,” and so forth.²¹³ In other words, if Americans are to accept these missions, those who work in the academy must see themselves as serving the society and promoting and strengthening democratic self-government. While such a belief system does not preclude individual economic benefits or the preparation of people to serve the needs of employers, the central focus is on responsible citizenship and service. The problem arises when examining the typical U.S. college or university; it is difficult to find evidence of a core commitment to preparing students for responsible citizenship. Many institutions have simply not put their “citizenship” and “service” commitments into practice.²¹⁴

One motive to consider more seriously the public pronouncements of American colleges and universities is the current condition of contemporary U.S. democracy. Recent freshman surveys conducted by the Higher Education Research Institute indicate that student political interest and engagement is at an all-time low.²¹⁵ There remains little implemented by the educational leaders who regularly comment on America’s political apathy. To promote the tenets of “good citizenship” and “developing future leaders” found in the college and university

²¹³ Astin, “Liberal Education and Democracy,” 210-211.

²¹⁴ *Ibid.*, 211.

²¹⁵ *Ibid.*, 211-212.

mission statements, these institutions should introduce more of the liberal arts programs that promote leadership and citizenship.²¹⁶

With a pragmatic liberal arts education, American civic life holds a better chance of becoming a truly democratic society that is sustained by a thoughtful citizenry, who makes decisions and takes actions in the public interest. Higher educational institutions must promote political, economic, and cultural democracy in theory and practice in order for American citizens to have educational experiences they can reflect upon and act accordingly.²¹⁷ Through their failure to adopt a solid curriculum based on pragmatic liberal arts, U.S. educational leaders and policymakers diminish the intellectual tradition that grounds American culture.

Considering the major problems afflicting contemporary American society, it is inadequate to argue that they can all be summed up in the issue of economic competitiveness. Global market competition pales in comparison to the domestic issues of racial polarization, poverty, crime, a deteriorating infrastructure, environmental dilapidation, political apathy, and distrust of our social institutions.²¹⁸ There is nothing inherently wrong with higher education's attempt to produce graduates who possess more of the job skills required by modern business and industry, but it is naïve to think that this will make much of a dent in our myriad social problems. Therefore, educational leaders should heed Hutchins' warning:

²¹⁶ Ibid.

²¹⁷ Banks, "Democracy, Diversity, and Social Justice," 141.

²¹⁸ Astin, "Liberal Education and Democracy," 209-210.

If the whole force of the culture and the government is directed against his having any ideas or information that might lead him to be critical of the government, and if his education is directed only to preparing him for a job, he is unlikely to acquire any such ideas or information in the course of being trained for the job. Hence, it has been said that vocational training is the education of slavery.²¹⁹

By linking the liberal arts to the imperatives of deliberative democracy, the debate on the meaning and nature of higher education undergirds a broader context of issues concerned with citizenship, politics, and the dignity of human life. In this view, colleges and universities can provide a rationale and purpose for higher education, which aims to develop autonomous, democratic citizens and to reconstruct community life by extending the principles of social justice to all spheres of economic, political, and cultural life. This position is not far from the arguments posed by John Dewey, C. Wright Mills, and John Stuart Mill. These theorists fashioned the elements of a public philosophy in which the liberal arts act as a major social site for revitalizing public life. John Dewey, for example, argued that a liberal education afforded people the opportunity to involve themselves in the deepest problems of society, to acquire the knowledge, skills, and ethical responsibility necessary for “reasoned participation in democratically organized publics.”²²⁰

C. Wright Mills urged intellectuals to define the liberal arts and their own roles through a commitment to the formation of an engaged citizenry. Mills envisioned the liberal arts as a social site from which intellectuals could mobilize a moral and political vision committed to the reclamation and recovery of democratic public life. In the most general sense, this means fashioning the purpose of higher education within a public philosophy committed to a radical conception of citizenship, civic courage, and public wisdom. This requires rejecting those

²¹⁹ Hutchins, *The Learning Society*, 55.

²²⁰ Dewey, *Philosophy of Education*, 36.

ideologies and human capital theories which reduce the role of university intellectuals to the status of industrial technicians. Higher education should organize against the structured injustices in society which prevent us from spreading our camaraderie to others who suffer from various forms of oppression and exploitation. It also means augmenting the meaning and purpose of pragmatic liberal arts education by implementing it in the social life of a nation where it can become a public forum for addressing the needs of the marginalized.²²¹

John Stuart Mill recognized the importance of education in alleviating society of social ills in *Utilitarianism*, where he states that poverty—including suffering—“may be completely extinguished by the wisdom of society,” and that a complete education can reduce diseases and social plights and help find a common ground or understanding between enemies.²²² Mill believed that all evils of the world could indeed be removed—or at least limited—as long as every mind of “sufficient intelligence” puts forth the care and effort. In order to achieve “sufficient intelligence,” Mill insisted that students obtain a diverse educational background in business, science, and the arts.²²³ The care and effort of intelligent contribution toward the welfare for all, however, has not been the focus of education.

Instructors must have the knowledge and skills to create democratic courses which implement a diverse curriculum. A thoughtful citizenry cannot be created through STEM education alone. For pragmatic liberal arts education to develop the principles consistent with democracy, pedagogy should embody these practices. This resonates with the ideas of Dewey,

²²¹ Henry A. Giroux, “Liberal Arts Education and the Struggle for Public Life: Dreaming about Democracy,” in *The politics of Liberal Education*, ed. Darryl J. Gless and Barbara Herrnstein Smith (Durham: Duke University Press, 1992), 127-128.

²²² John Stuart Mill, *Utilitarianism* (Lexington: Filiquarian Pub.: LLC, 2007), 24-25.

²²³ Giroux, “Liberal Arts Education and the Struggle for Public Life,” 127-128.

who believed that education itself should be democratic, so that when students finish school, they know how democracy works. In Dewey's perspective, education should provide Americans with the tools to become lifelong learners. Dewey also believed in the importance of art in education, as described in the documentary *John Dewey: his life and work*: "Dewey thought the promotion of the arts played an essential role in the attainment of these goals [and as an] important way in exploring and communicating the richness of human experiences."²²⁴ By implementing Dewey's pedagogy, higher education would foster optimal learning by enriching the life of the whole person, instill adaptability to our ever-changing society, enrich the capacity to learn, enable students to find purpose within their community, and create effectively functioning, responsible citizens in our American democracy. In order to ameliorate America, the best way to prepare students to function in a democracy is to provide them the experience of a democratic education. The aim of education then is the betterment of democratic practices across the entirety of American society.

Because the learning journey is governed by experiences, as these experiences grow, the need for new patterns in the framework of higher education becomes evident, and with recognition of the need for new patterns, a new framework should be developed. These experiences encourage growth and are opportunities for deeper learning. When Jane Addams and Ellen Gates Starr first opened Hull-House in 1889, their original goals were to share art and literary education with the new immigrants within the community.²²⁵ They quickly realized the needs of this community extended beyond social and political dialogue, and they began teaching

²²⁴ Larry Hickman, Francis W Davidson, and John M Davidson, *John Dewey: his life and work*, VHS, Davidson Films, 2001.

²²⁵ Mary McDowell, "Hull House," *The Social Welfare History Project*, web entry posted 2014. <http://www.socialwelfarehistory.com/organizations/hull-house/>.

such practical skills as sewing, cooking, technical skills, and the English language. As new needs emerged, Addams and Starr found they had to scrap their original playbook and alter their course of action. Even though new technical skills were introduced to their mission, Addams and Starr never stopped holding reading groups and displaying slides of paintings, influencing the remarks of one working-class woman who insisted that her experience at Hull house “... gave [her] life new meaning and hope.”²²⁶

Both failure and success are part of the process, and we learn from both. A more current example of this process can be found in the “fail faster” revolution running rampant through business and innovation leaders, including Google, Facebook, Starbucks, and the Stern School of Business. Recent entrepreneurial advisors suggest that successful people actively seek opportunities to push the limits of their skills and knowledge instead of trying to avoid making mistakes and failing. Learning from these failures and successes should also help American educators create new curriculum guidelines and pedagogical practices that will suit the new patterns of the current time and context. Speaking on the matter, Addams stresses the importance of human will and effort in creating effective change, writing that “to point to the achievement of the past as a guarantee for continuing what has since become shocking to us is stupid business; it is to forget that progress itself depends upon adaptation, upon a nice balance between continuity and change.”²²⁷ Curriculum change remains a hot topic for educational debate—good. The curriculum should adapt to the needs of its current society. Within our current academic context, neither a purely liberal arts education nor a STEM-focused education properly equips students.

²²⁶ Ibid.

²²⁷ Jane Addams, *Newer Ideals of Peace* (New York: MacMillan, 1907), 397.

Conservative state and national curriculum policymakers downplay the racial, ethnic, and cultural diversity that has characterized the United States since its beginnings. Critics such as Allen Bloom, William Bennett, and E.D. Hirsch have presented an agenda and purpose for shaping public schooling and higher education that extracts equity from excellence and cultural criticism from the discourse of social responsibility, by insisting that the importance of the liberal arts lies in the study of the Western canon. These politicians and critics claim to renew the language of morality, yet the outcome of their agenda demonstrates an attack on democratic public life by pushing a view of education that celebrates cultural homogeneity, commands respect for authority, supports curriculum changes that pander to labor-market interests, and returns to the old, didactic method of teaching.²²⁸ The liberal arts, however, call for responsible action and strategic risk-taking as part of an ongoing struggle to link citizenship to the notion of a democratic public community and civic courage to a shared conception of social justice, which becomes the foundation for unity rather than competition and discrimination.²²⁹

America's multiple racial, ethnic, and language groups necessitate educators to interact with diversity. Diversity enriches our nation, communities, schools, and classrooms by providing our society with many different and enhanced ways to identify, describe, and solve social, economic, and political problems. Diversity also provides colleges and universities with an opportunity to educate students in an environment that reflects the reality of the nation and to teach students from diverse groups how to get along and how to make decisions and take actions in the public interest. A diverse school environment enables students from many different groups

²²⁸ Giroux, "Liberal Arts Education and the Struggle for Public Life," 123.

²²⁹ *Ibid.*, 135.

to engage in discussions to solve complex problems related to living in a diverse nation.²³⁰

Research indicates that the use of teaching materials and pedagogy that empower students from different racial and ethnic groups to interact positively in “equal-status” situations helps students develop democratic racial attitudes. These kinds of materials and pedagogies can also result in students collaborating with others from marginalized racial, ethnic, and cultural groups.²³¹

The belief that knowledge alone can free man from the terror of ignorance and superstition reinforces the devotion to knowledge as a personal satisfaction. It is knowledge personally acquired and understood which liberates the mind of man from the tyranny and slavery of intellectual oppression. The liberating role of knowledge plays a substantial part in overthrowing political tyrants. The liberal arts first made the individual free as a person, and then have helped to broaden the freedom of the individual in society. The freedom of knowledge is the pathway to a free society. In 2005, David Foster Wallace wrote and performed the Kenyon Commencement Address which delves into the role of the liberal arts in “teaching how to think.” According to Wallace, “learning how to think really means learning how to exercise some control over how and what to think. It means being conscious and aware enough to choose what you pay attention to and to choose how you construct meaning from experience.”²³² He suggests that understanding and controlling how we think is real freedom and “the alternative is unconsciousness, the default setting, the rat race, the constant gnawing sense of having had, and lost, some infinite thing. The real value of an education ... has everything to do with simple

²³⁰ Ladson-Billings and Tate, *Education Research in the Public Interest*, 144.

²³¹ *Ibid.*, 149.

²³² David Foster Wallace, “This is Water,” *Kenyon Commencement Address* (May 21, 2005).

awareness.”²³³ He concludes by insisting that freeing the mind in this way is truly difficult, but to be considered a “well-adjusted” individual, it is necessary. The liberal arts provides the opportunity to avoid intellectual oppression of others and slavery to one’s own thoughts.

By defunding liberal arts programs in favor of courses that focus exclusively on STEM, U.S. colleges and universities are deteriorating authentic education, resulting in the decline of our culture and society by creating obedient, absent-minded workers who either do not realize their situation or are too distracted to make a difference. The liberal arts provide education for empowering understanding of the human condition, so that democratic citizens can identify the structure of education and society, how it is built, and how to recognize and initiate change. An education based solely in STEM disciplines leaves room for distractions, limits theoretical, conceptual, and analytical capabilities, and removes transformative learning. Educational leaders must cultivate a public language which rejects inequality in higher education and awakens students to the structures of oppression at work in both institutional settings and in everyday life. By cutting funding from the liberal arts education, half of the equation for an informed, literate, and compassionate society is being eliminated from the curriculum and altering our cultural and educational language toward submission to the state and the economy.

²³³ Ibid.

Conclusion

Incorporating the arts and humanities with STEM disciplines will undoubtedly bring about a well-rounded, whole education. As long as higher education continues to bifurcate the liberal arts and STEM curricula, our language of higher education will continue to focus more on private interest rather than the amelioration of the public. When this happens, higher education is no longer viewed as a means of learning and acquiring the tools for adaptability, ethic responsibility, and civic courage, but as a commodity to be bought and sold for specified training.

To support this claim, I analyzed the history and recent trends of privatizing changes in American higher education by demonstrating the transition of education's role in society's economic and political needs, which included the introduction of the "human capital" model. This model shortchanges America because our economic and political concerns are not the only issues our society faces and must be addressed by informed and intellectual citizens. Yet, public perception about higher education is becoming increasingly narrower, focusing on the financial return on investment. Policymakers and parents continue to urge students to consider college for the sole purpose of social mobility, which helped transform education into big business. When students focus on education as primarily a means to achieve financial gains, they lose the proper reflection about their role in society and what kind of life they want for themselves. One important concept that education borrows from the business world is the bottom line. Where businesses view the bottom line as profit for owners and stockholders, education leaders and policymakers speak of the bottom line in terms of accountability and student achievement which are measured by the standardized testing of rote knowledge.²³⁴ The language of business and

²³⁴ Noddings, *Education and Democracy in the 21st Century*, 155.

vocation is suffocating the current STEM model of education debates as previously outlined. The rhetoric of the STEM-focused model of education introduced the importance of our nation's economy, global competitiveness, and the individual's training for a well-paying job, but this privatizing of higher education leads to training rather than learning.

In a knowledge-intensive environment, where business is global, competition challenging, and change unrelenting, a pragmatic liberal arts foundation helps prepare working professionals for a dynamic organizational environment. The nature of the professions in the twenty-first century necessitates an adaptable practitioner in our ever-changing environment. When colleges and universities cut breadth from the curriculum in favor of efficiency, even degrees meant for specific careers deteriorate because that specific career may fall victim to what Michael S. Teitelbaum, a Wertheim Fellow at Harvard Law School and a senior advisor to the Alfred P. Sloan Foundation, calls the “alarm, boom, and bust” cycle.²³⁵ Teitelbaum suggests that since the 1950s, this cycle began when “someone or some group sounds the alarm that there is a critical crisis of insufficient numbers of scientists, engineers, and mathematicians” which means that America “is in jeopardy of either a national security risk or of falling behind economically.”²³⁶ Currently, America is sounding the alarm and heading toward boom as demonstrated in the \$3 billion each year allocated between 209 STEM initiatives.²³⁷ In the 2013 article, “The STEM Crisis Is a Myth,” Robert N. Charette suggests that one aspect driving and propagating this cycle is the bottom line, including maintaining an influx of STEM professionals, keeping wages in check, and alleviating American fears about national security. Charette

²³⁵ Charette, “The STEM Crisis Is a Myth.”

²³⁶ Ibid.

²³⁷ Ibid.

provides Teitelbaum's concerns on toting a STEM crisis when one does not in fact exist: "When previous STEM cycles hit their 'bust' phase, up-and-coming students took note and steered clear of those fields, as happened in computer science after the dot-com bubble burst in 2001."²³⁸

Debating the importance of science and mathematics in this manner misses the point.

Educational leaders need to convert their worship in defining immediate STEM outcomes and concentrate more on understanding and providing an educational environment that will instill STEM literacy which, through the dynamic process of inquiry, develops the mind rather than breeds working drones. The language of "STEM literacy" should not focus on learning for the rote knowledge attained through STEM disciplines exclusively, which can later be regurgitated on an exam, but rather focus on creating the ability to use STEM literacy as a lifelong, learning process. Yes, it is important to train graduates for job preparation, but a purely STEM education will not suffice in preparing for it, and this should not be higher education's only concern.

Other concerns addressed by pragmatic liberal arts education advocates involve not only the private interests of job readiness or the public interest in the economy and global competition, but also the public investment in creating ethically responsible citizens in a robust democracy. I addressed the ethical implications in science and technology when science literacy does not focus on when and how to apply such knowledge. I also queried the results when educators remove feeling and the human condition from the curriculum, how students' passions may arise in unethical pursuits. I now offer a solution to our current context and stalemated debates, which is based on the theories of Dewey, Addams, Rice, Mill, and Emerson to advance my claim, is to recover the American pragmatist idea that education must be an essential public good for a strong and vibrant democracy.

²³⁸ Ibid.

For higher education to accomplish this, Dewey believed the function of a liberal arts education was

to use the resources put at our disposal alike by humane literature [and] by science ... so as to secure ability to appraise the needs and issues of the world in which we live. Such an education would be liberating not in spite of the fact that it departs widely from the seven liberal arts of the medieval period, but just because it would do for the contemporary world what those arts tried to do for the world in which they took form.²³⁹

The language of education that students take with them from their college experience should embody a vision capable of providing them with a sense of history, civic courage, and democratic community. With this new language acquired through the collaborative effort of STEM and liberal arts education, it will be possible, according to Jane Addams, “for groups to find clues to a new life pattern in situations of tension, for it is when old values are at hazard that new values get their first attention. The groups realize that the whole situation is calling for inner and outer adjustments, and the moment may give effective direction to half-formed purposes and may integrate them into usability.”²⁴⁰ As a matter of pedagogical practice, students need to learn and practice a language that cultivates a capacity for reasoned criticism. Needless to say, such a language is at odds with the language of conservative restoration that continues to cut from educational funding. Collectively, Americans need to decide how to talk about citizenship, democracy, and modes of literacy in a manner that conceives of higher education as the catalyst to develop the minds of students. In the meantime, we cannot expect our educational system to develop intelligent and ethical human beings if all the forces of our culture are focused on developing producers and consumers, yet conservative state legislators continue to make decisions that suit these interests. With the integration of STEM and the liberal arts, creating

²³⁹ Dewey, *Philosophy of Education*, 87.

²⁴⁰ Lagemann, *Jane Addams on Education*, 210-211.

space for broad inquiry, pragmatic education will instill the habits of action and thought that help students lead more reflective and meaningful lives in the workplace and in their everyday experiences.

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