The effect of the cold war on stem education

War, Cold War

During theCold War, the struggle for power between the communists of Soviet Russia and the pro-democracy politicians of the United States escalated in numerous proxy wars, acts of espionage, and potential nuclear warfare. Behind it all however, the Cold War was a breeding ground for competition in the fields ofscience, technology, engineering, andmathematics.

From the 1960s, upon the spark of the Space Race with the Soviet Launch of Sputnik, to the 1990s with the reunion of East and West Germany, the Cold War was a period of increase in occupations related to science, technology, engineering, and mathematics. Using statistical data during the Cold War's time frame related to this increase, we can ask the question—to what extent did the Cold War effect the number of occupations related to science, technology, engineering and mathematics?

Answering such a question will provide us with the necessary details in understanding why and how the increase of such occupations occurred specifically during the Cold War compared to other historical eras. For the sake of keeping this research paper within the word count limit, the term " science, technology, engineering, and mathematics", will be shortened to STEM. The purpose of this paper is to examine the extent to which STEM related variables of the Cold War such as the space race, acts of espionage, proxy wars, as well as the improvement of military weapons, affected the statistics regarding STEM related occupations at the time.

To achieve the purpose of providing an answer to the research question, I will utilize statistical data from before, during, and after the Cold War. This data will be presented in such a way that they may be compared to each

other, providing the understanding that there was indeed an increase and decrease of such STEM related occupations. After establishing this, such fluctuations in statistical data will be attributed to Cold War events at the time of the fluctuation. A large proportion of the statistical data utilized will be from government statistical agencies and university polls.

By achieving my purpose, the reader may come to understand the role STEM related variables and occupations in global affairs, and the extent to which they effect

Summary of Evidence

Throughout much of the Cold War, competition between pro-Democracy countries and their Communist counterparts was tense. The Soviets and their proxies were determined to expand their influence, the United States was just as determined to stop them. STEM related resources were almost always credited with decisive victories, whether in espionage or wartime.

Science and technology, as Daniel Yankovich, a social scientist fromHarvardUniversity had once stated, “ were almost universally credited with a decisive role in gaining victory in war, prosperity in peace, enhancing national security, improving ourhealth, and enriching the quality of life”. Throughout much of the 1950s, the United States felt, and appeared, as though it had the upper hand and prowess in STEM related fields. This was still the mind set throughout the decade, even with the introduction of Soviet made nuclear bombs.

By 1957 however, America had been beaten to the space race. With the launch of the Soviet Sputnik, America’s comfort in the idea that they were

the leaders of this particular field was shattered. Quick on its feet, the United States immediately began pushing effort for a larger STEM taskforce. Congress began focusing in on funding the Americaneducationsystem, and the result was a huge growth in STEM related occupations. By the 1980s, there were approximately 2. 5 million employees in STEM related fields (National Science Board, Science and Engineering Indicators 2008, Figure 3-1).

This increase in public interest in the STEM related fields, both on the local public and national level, was very clearly a product of the rivalry between the Soviet Union and America. Both sides clearly understood the power of having the best possible weaponry, something that could only be attained with the brightest minds. Gone were the days were having the most men would win the battle; the Cold War was an era of scientific andtechnological progress. Even in the American education system, trends in doctorate degrees were evident enough of the public’s enthusiasm in participating in a new, fruitful field.

From 1971 to 1985, the number of engineering and engineering technology master’s and doctorate degrees increased from 16, 443 to 21, 555 degrees. (National Science Board, Science and Engineering Indicators 2008, Figure 3-1). It is very evident that the American people were just as concerned about national security andpatriotismat the time than the politicians were. From 1950, there were less than approximately 500, 000 STEM employees. By 1960, this figure had increased to approximately 1. 25 million, by 1970 at least 1. 75 million, and by 1980 about 2. million ((National Science Board, Science and Engineering Indicators 2008, Figure 3-1). (Refer to appendix 1

for a more accurate line graph of this trend.) It is important to note however, that all these growth spurts were sparked by the technological, scientific, engineering, and mathematical advancements that both the Soviet Union and the United States accomplished. It was during the Cold War that atomic energy, the most powerful energy that could possibly be harnessed with the technology at the time, came under heavy research.

Both Soviet and American physicists and engineers strived to construct powerful atomic bombs. The soviets went on to construct an even more powerful bomb, the hydrogen bomb, and even detonated the most powerful hydrogen bomb in history, the AN602 HB “ Tsar Bomba” in 1961. (Gerovitch: ‘ Mathematical Machines’ of the Cold War: Soviet Computing, American Cybernetics and Ideological Disputes in the Early 1950s page 54)The bomb triggered even more efforts by the United States in improving their aerospace, aeronautical, and national security fields.

The internet also came into being in the early 1970s, originally intended as a security network in keeping classified nuclear codes top secret. Satellite technology was also at its peak during the Cold War, the USSR having sent the Sputnik in 1957, and America’s Explorer 1 the following year. It was also during the Cold War that the United States sent the first man onto the man, Neil Armstrong, on July 20, 1969. (Gerovitch: ‘ Mathematical Machines’ of the Cold War: Soviet Computing, American Cybernetics and Ideological Disputes in the Early 1950s page 53)

It is not a coincidence that the increasing STEM occupation trend during the Cold War occurred at the height of the “ cold” conflict between the United States and the Soviet Union. The two were rival powers, both competing

ideologically, and ultimately, in engineering, science, technology, and math. This competition resulted in huge advances in the STEM fields, many of which still hold a great deal of impact today, such as nuclear weaponry, satellite technology, espionage, and space travel.

This research study will aim at answering the question, to what extent did the Cold War effect the number of occupations related to science, technology, engineering, and mathematics? By answering this question, you, as the reader, may come to understand the implications the Cold War had on STEM occupations at the time, as well as the value STEM occupations held in shaping what the Cold War was and ultimately, the present day. C. Evaluation of Sources 3 marks Researching this topic, I utilized a number of resources.

Of all my resources, I relied greatly on the American National Science Board's Science and Engineering Indicators, 2008 document, which provided statistics on the growth of STEM related occupations from 1950 until 2000. There were a number of other resources I could rely on, but I felt that this gave the most accurate and credible description of the Cold War effect on STEM fields through a critical, statistical analysis. The resource itself is held credible through the fact that the National Science Board is the single government organization that represents the broad U. S. cience and engineering community. The members of this board are appointed by the President of the United States of America, and are approved by the Senate. The statistics presented in the document, Science and Engineering Indicators, 2008, utilized for this particular Internal Assessment is an accumulation of statistical surveys conducted from 1950 until 2000. Another

resource that I found extremely useful in producing an accurate portrait for analysis was ‘ Mathematical Machines’ of the Cold War: Soviet Computing, American Cybernetics and Ideological Disputes in the Early 1950s by MIT’s Slava Gerovitch.

The document explored an interesting phenomenon, the effect of the Cold War on scientific, technological, engineering, and mathematical growth, from two different sides—the U. S. A. , and the U. S. S. R.. Gerovitch’s document carefully explores the application of STEM products from both sides of the Cold War, analyzing such applications from both the Soviet and American perspective. The statistics mentioned in this Internal Assessment can all be found in the appendix, all of which are derived from the American National Science Board’s Science and Engineering Indicators, 2008 statistics document.

The resources utilized in this research paper are credible, coming from both government agencies as well as research done by professors from top tier American universities. It is important to note that statistics can only go so far in proving the answer to the research question I have presented. Given the fact that it is not difficult to fabricate such numbers, I understand that there is a limitation of the scope of this research, whose parameters are set specifically at establishing a relation between a statistical increase of STEM occupations and Cold War tension.

In order to fully understand the scope, content, and limitations of this Internal Assessment, one must assume that all forms of statistical data and historical documents utilized as resources, are in fact, true and credible forms of data. D. Analysis 6 marks The Cold War definitely affected the rate

at which STEM related occupations grew from the 1950s to the mid 1990s. Growth of STEM related occupations was merely a symptom of the tension between the United States and the USSR.

Both the United States and the USSR were competing for the position as the head technological global power, a position that at the time was, and still is, a symbol of national security and foreign dominance. As Paul Josephson, a Soviet technological historian, noted in his research, the more Stalin demanded a ‘ great transformation of nature’ the more industrial and technological research projects ensued. Despite the fact that the statistics did indeed show a growth of nearly 6. 5% from the 1950s to the mid 1990s, it is important to note theenvironmentat which STEM related occupations grew.

Although both competitors, the United States and the USSR both demanded an increase in high tech defense systems, some forms of STEM related research were deemed “ unnecessary” to the cause, and as a result, were left unfunded. The lack of funds literally suppressed such research. As Slava Gerovitch puts it, campaigns against such research “ destroyed personal careers and closed whole areas of research; in a number of disciplines, the most dogmatic of trends prevailed, imposing narrow conceptual frameworks and stifling creative thought. It is interpretations of historians such as Slava Gerovitch that it is important to understand that, although the demand for STEM related research was great, it was limited to STEM related research that fit thegoalsof the two competitors. Physiology, medicine, cybernetics, and genetics, for example, were suppressed during Stalin’s reign, fields that

were deemed to idealistic and too Western. Genetics, for example, was labeled a “ whore of capitalism” by Soviet ideologists.

It was these STEM fields, fields that were far too close to clashing with Soviet political ideology, that STEM related research did not grow. The Soviet Union wanted to “ surpass” Western research, not “ criticize” it. Fields such as physiology, cybernetics, and genetics, were far too ideologically charged, meaning they invoked some level of philosophical, ethical, and political clash, and had very little to do with technological prowess at the time. Fields such as physics, information technology systems, mathematics, and physical engineering were the most desired.

Physics brought the USSR their first atomic bomb as well as their, and the world’s, first man in low earth orbit, information technology systems brought the soviet MESM, the first operating stored program computer in continental Europe, and engineering brought the construction of Soviet missiles and Nuclear submarines. All these fields and their products were “ appealing” to the Soviet administration and its ideologists, specifically because they flourished even under a totalitarian system, and gave power to the Soviet Union during the Cold War’s arms race.

The growth in the United States had a similar characteristic with that of the USSR. Within STEM growth, the life science fields (biology, genetics, etc.) grew the least. This characteristic however, resulted from lack of interest in the field, unlike the Soviet Union’s deliberate banning of such fields. This lack of interest was a direct of product of the lack of funding. Federal and military funding during the Cold War was primarily aimed at the physical science fields (physics, chemistry, technology, physical engineering, etc. , as they

were the forms of measurement in global power. It was because of this lack of funding that the United States public lost interest. From a practical point of view, it is a logical conclusion to make, given the economic conditions of the time. Physical sciences were where the most attainable and lucrative forms of income existed, and it was only natural for the average American to head into a financially attractive field.

As a conclusive analysis, it is not difficult to recognize that both the United States and the USSR experienced remarkable growth in STEM related occupations as a result of their competitive nature in the arm's race during the Cold War. The term " STEM" encompasses fields ranging from the most technical of fields as nuclear physics all the way down to the most ideologically and philosophically charged fields as biology. As a result, to answer the question, " To what extent did the Cold War affect the growth of STEM related occupations? one must interpret the whole definition of the term STEM, recognize its parameters, and understand that even with the growth of STEM related occupations, there was a slower, declined, or even non-existent, growth in politically charged and " uninteresting" fields such as that of the life sciences, whether politically induced or because of lack of interest. E. Conclusion 2 marks In conclusion, the statistics presented by the National Science Foundation of the United States clearly shows an increase in STEM related occupations from the 1950s to the mid 1990s.

Occupations that experienced the most dramatic increase included physicists, and engineers. Upon the introduction of computers and other computational tools, mathematics and information technology systems also experienced an increase. Based on when these increasing trends occurred,

and other events that occurred along those times, it is not difficult to see a correlation between the positive growth trends and the tense, competitive events that occurred between the USSR and the United States.

From nuclear bombs, the space race, and computational and information technologies, the USSR and the United States competed against each other to gain the position as the leading global power. And given the nature of the competition, the only method of attaining such a position was to have the top scientists, engineers, mathematicians, and information technology specialists. With a sudden demand for such occupations, STEM occupations, it was inevitable for an increase to occur. But one must also be aware that with great demand for certain STEM occupations came a great level of ignorance for others.

Biology and genetics for example, experienced the least growth. Such was the case in the United States and the USSR, although the circumstances leading up to the phenomenon were very different. Biology and genetics did not thrive in the United States for inadequate funding and lack of public interest, while the same situation held true in the USSR due to their overtly philosophically and politically charged nature. As a result, to answer the question, “ To what extent did the cold war effect the number of STEM occupations from the 1950s to the 1990s? , one must understand that although the Cold War did increase the amount of STEM occupations, it also brought upon a certain level of negligence towards other fields, such as biology and genetics. But even more important than answering the question, the implications of this study are clear—that STEM related occupations effect the world to a very high degree. The course of the Cold War was literally

paved by these STEM occupations, and even in the real world today, STEM occupations shape world affairs. Everything from a laptop to an atomic bomb, are all products of STEM occupations.

As a result, it is important that we understand that the scope of this internal assessment is not merely limited to answering the core question of this internal assessment, but to assess the degree to which STEM related occupations play in world affairs, both in the past and present. F.

Sources and Word Limit

Websites

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