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World War I Technology Advancements and the Effect they had on Society

World War I was said to have the most dramatic change in technologies, completely revolutionizing the future of modern warfare. Weaponry, such as machine guns, aircrafts, and submarines, were just few among the many reformed equipment used in the war. In addition, chemical warfare was first brought about with the use of poisoned gases. Because of these new and improved tactics, it strongly helped the Allied Powers defeat the Central Powers in the long run. However, after the war, many countries faced difficult crises with debt because of all these new advances in technology and warfare. Inflation was a big issue during the post-war era around the early 1920's, which, in turn, led to even bigger concerns.

As one of the most deadly weapons in the war, the machine gun was thoroughly improved to become much more lightweight. By 1917, the United States was rapidly producing machine guns, and even grenades, faster than any other country.¹ In just about a year after the war began, military officers were “complaining that their men had forgotten how to use their rifles” and instead turned in favor of the hand grenade.²

Characterized as “the science and practice of powered, heavier-than-air flight”, aircrafts were finally becoming more developed in the early twentieth century. As to most common knowledge, the first flight was taken by the Wright Brothers in 1903. Ever since then, the understanding of aviation has grown, and the desire to develop a more technologically-advanced plane with powered human flight.³ In the beginning of the war, the United States were few in

¹ Baughman, Judith S., Victor Bondi, Richard Layman, Tandy McConell, and Vincent Tompkins. "The Technology of War." *American Decades* 2 (2001): 1910-1919. Accessed June 11, 2012.

² Showalter, Dennis. "New Weapons: Did World War I Accelerate the Technological Development of Weaponry?" *History in Dispute* 8 (2002): 193-201. Accessed June 11, 2012.

³ Weeks, Albert L., and James R. Millar. "Aviation." *Encyclopedia of Russian History* 1 (2004): 103. Accessed June 11, 2012.

number of airplanes and pilots. However, near to the end of the battle, they had forty-five units of planes and several hundred pilots.⁴ Having the assembly-line being first introduced, it made it possible, a lot easier, and much quicker for these aircrafts to be mass-produced, allowing the United States to be able to manufacture so many.⁵

The United States were quickly becoming more intelligent with their military technology as they had created submarines that were built to submerge underwater longer than the German U-boat. Those submarines had been built with the upmost technology, even including an electric engine. On top of that, to help fix the range of enemy's guns, two scientists, William D. Coolidge and Max Mason, devised specific listening devices that were also used inside of the United States submarines.⁶

Tanks were first introduced into the war in 1916. Because they were brought in prematurely, they tended to breakdown quite often, and were not up to par with the rest of the technological advancements. Nevertheless, only a couple years later, the Allies had control of hundreds of tanks, instead of only a dozen, or so. These improved vehicles, called the Whippet tanks, could now go up to eight miles per hour, instead of two, and were much more reliable. Compiled of light-weight machine guns, trench mortars, grenades, and flamethrowers, these tanks helped battle against infantry attacks.⁷

⁴ Baughman, Judith S., Victor Bondi, Richard Layman, Tandy McConell, and Vincent Tompkins. "The Technology of War." *American Decades 2* (2001): 1910-1919. Accessed June 11, 2012.
<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3468300636&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

⁵ Showalter, Dennis. "New Weapons: Did World War I Accelerate the Technological Development of Weaponry?" *History in Dispute 8* (2002): 193-201. Accessed June 11, 2012.
<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX2876800034&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

⁶ Baughman, Judith S., Victor Bondi, Richard Layman, Tandy McConell, and Vincent Tompkins. "The Technology of War." *American Decades 2* (2001): 1910-1919. Accessed June 11, 2012.
<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3468300636&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

⁷ Showalter, Dennis. "New Weapons: Did World War I Accelerate the Technological Development of Weaponry?" *History in Dispute 8* (2002): 193-201. Accessed June 11, 2012.
<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX2876800034&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

Chemical warfare was, by far, one of the most revolutionary tactics used. It entails the “use of natural or synthetic substances to incapacitate or kill an enemy or to deny them the use of resources such as agricultural products or screening foliage”. The most commonly used types were chlorine, chloropicrin, phosgene, trichloromethyl chloroformate, and mustard gas.⁸ From the Kaiser Wilhelm Institute for Physical Chemistry at Berlin-Dahlem, Fritz Haber received the Nobel Prize for his design of ammonia from nitrogen in the air. After this, he continued to improve his design, eventually leading to the development of chemical gases used by the Germans in combat.⁹

The French troops were the first to use tear gas in attempt to drive German soldiers out of the trenches. In response, the Germans then created chlorine, which was the first use of chemical weapons on a massive scale. France reacted by producing phosgene gas, which was eighteen times more powerful than the chlorine gas.¹⁰ Haber had then influenced the Germans to create dichloroethyl sulphide, which is known today as mustard gas. Mustard gas was first used in combat in 1917 on the Ypres front.¹¹

Most chemical gases were said to be odorless, although mustard gas had a faint smell of mustard or garlic. The only way armies knew a gas attack was coming their way was when a brown or white cloud formed. The main purpose of using these deadly gases was to just disable the opponent’s troops. Some would suffer from blisters, irritation in the eyes, and vomiting as

⁸ Freedman, Bill, Chris Cavette, K Lee Lerner, and Brenda Wilmoth Lerner. "Chemical Warfare." *The Gale Encyclopedia of Science* 2 (2004): 828-831. Accessed June 11, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3418500481&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

⁹ Roff, Sue Rabbitt, Neil Schlager, and Josh Lauer. "The Use of Poison Gases in the First World War." *Science and Its Times* 6 (2000): 450-452. Accessed June 11, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3408503688&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

¹⁰ Embar-Seddon, Ayn, and Allan D. Pass. "Chemical Warfare." *Forensic Science* 1 (2009): 228-230. Accessed June 11, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX2273900098&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

¹¹ Roff, Sue Rabbitt, Neil Schlager, and Josh Lauer. "The Use of Poison Gases in the First World War." *Science and Its Times* 6 (2000): 450-452. Accessed June 11, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3408503688&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

side effects. However, with repeated exposure, these effects would be increased, eventually leading to chronic illnesses and long-term disabilities; sometimes even death. Some scientists even argued that “these weapons were more humane because unlike bullets, they disabled more men than they killed”. However, no long-term studies were ever done to those who were exposed after the war.¹²

Although not all numbers were recorded, these gases caused about 100,000 deaths and 1.2 million injuries.¹³ Because gas masks were in such a high-demand and could not be mass-produced quickly enough, hundreds of thousands of soldiers were exposed to the poisonous gases.¹⁴ This documented the first time these incredibly poisonous chemicals were used on such a large scale by anyone.¹⁵ However, not all chemical gases were used directly against humans in combat. To attack their enemy’s economy, some gases, like ecocide, were used in large quantities to be unloaded on their land and in the ocean, causing those areas to be incredibly poisonous and making many ways to get or grow food impossible. Over 100,000 tons of these fatal chemicals were used in combat from both sides.¹⁶ In later years, Fritz Haber’s developments

¹² Roff, Sue Rabbitt, Neil Schlager, and Josh Lauer. "The Use of Poison Gases in the First World War." *Science and Its Times* 6 (2000): 450-452. Accessed June 11, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3408503688&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

¹³ Freedman, Bill, Chris Cavette, K Lee Lerner, and Brenda Wilmoth Lerner. "Chemical Warfare." *The Gale Encyclopedia of Science* 2 (2004): 828-831. Accessed June 11, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3418500481&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

¹⁴ Roff, Sue Rabbitt, Neil Schlager, and Josh Lauer. "The Use of Poison Gases in the First World War." *Science and Its Times* 6 (2000): 450-452. Accessed June 11, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3408503688&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

¹⁵ Embar-Seddon, Ayn, and Allan D. Pass. "Chemical Warfare." *Forensic Science* 1 (2009): 228-230. Accessed June 11, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX2273900098&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

¹⁶ Freedman, Bill, Chris Cavette, K Lee Lerner, and Brenda Wilmoth Lerner. "Chemical Warfare." *The Gale Encyclopedia of Science* 2 (2004): 828-831. Accessed June 11, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3418500481&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

eventually led up to the creation of Zyklon B, which was used to kill the Jews inside gas chambers at German concentration camps in World War II.¹⁷

Most people made a living and income by importing and exporting, foreign investment, and rates of exchange between currencies. Most countries even paid for their expenditures from 75 to 85 percent by large-scale borrowing. However, no one seemed to realize the fact that massive quantities of borrowing to fund war would eventually lead to high taxes after the war.¹⁸ After the war had ended, inflation began. Inflation is known as “a sustained rise in the general price level”. After 1914, inflation was on the rise, allowing it to become quite common of many countries’ economy. National debts skyrocketed. Prices of consumer goods rose rapidly until around 1920, when countries began to try and restore and adhere to the new gold standard, which would eventually lead back into a normal economy. However, this attempt soon failed.¹⁹

In the early 1920’s, because of war budgets and the high demand, which caused a shortage on consumer goods, the value of money went down along with the standard way of life. It is unknown exactly how much the war itself cost, but an estimate varies from \$250 to \$300 billion. Most of the money used for weaponry and other expenses the Great War used had come from borrowing, but now the bills were due, and it was near to impossible to find a way to pay

¹⁷ Roff, Sue Rabbitt, Neil Schlager, and Josh Lauer. "The Use of Poison Gases in the First World War." *Science and Its Times* 6 (2000): 450-452. Accessed June 11, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3408503688&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

¹⁸ O'Brien, Patrick. "The economic effects of the great war." *History Today* 44, no. 12: 22. History Reference Center, EBSCOhost (accessed June 14, 2012).

¹⁹ Merriman, John, and Jay Winter. "Inflation." *Europe Since 1914: Encyclopedia of the Age of War and Reconstruction* 3 (2006): 1411-1416. Accessed June 15, 2012.

<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX3447000466&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

them back. Just about every one of the Allies was in debt other than the United States. Europe singlehandedly owed the United States over \$10 billion.²⁰

Not only was inflation an issue for the Allies, but it caused extreme economic crises for the Central Powers, as well. Germany's loss in World War I caused the country to suffer from hyperinflation.²¹ Prices rose by factors of 4.2 in Germany.²² Other than the millions that had died fighting in battles, millions more died from the starvation and disease in the few post-war months. Although France was part of the Allies, they were also in great danger. They had a massive debt to the United States along with a country filled with devastated men.²³ The United States believed that all debts should be repaid, while Britain believed they should just be dropped. However, if the United States demanded repayment, then Britain would be required to collect from France and other countries that owed them debt.²⁴ Because France had no assurance from the United States or Britain that they would handle their balance due, the French reached out to weaker countries. The French then opted to hand over their issues to Germany.²⁵ France had decided that once Germany paid their expenses, they would then do the same.²⁶ Although Germany tried as best as they could to reconstruct the damages, everything remained equivalent

²⁰ Jewsbury, Wallbank. "Economic Crisis and Political Retreat." *World War One, Page One*. N.p., 1992. Web. 14 June 2012. <<http://history-world.org/ww3.htm>>.

²¹ Quenoy, Paul. "German Economic Crises: Was the Economic Instability of Germany after World War I Caused by the Victors' Demand for Unreasonable Reparations?" *History in Dispute* 17 (2007): 112-119. Accessed June 15, 2012. <http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX2877700026&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

²² O'Brien, Patrick. 1994. "The economic effects of the great war." *History Today* 44, no. 12: 22. History Reference Center, EBSCOhost (accessed June 14, 2012).

²³ Quenoy, Paul. "German Economic Crises: Was the Economic Instability of Germany after World War I Caused by the Victors' Demand for Unreasonable Reparations?" *History in Dispute* 17 (2007): 112-119. Accessed June 15, 2012. <http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX2877700026&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

²⁴ O'Brien, Patrick. 1994. "The economic effects of the great war." *History Today* 44, no. 12: 22. History Reference Center, EBSCOhost (accessed June 14, 2012).

²⁵ Quenoy, Paul. "German Economic Crises: Was the Economic Instability of Germany after World War I Caused by the Victors' Demand for Unreasonable Reparations?" *History in Dispute* 17 (2007): 112-119. Accessed June 15, 2012. <http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX2877700026&v=2.1&u=ccmorris&it=r&p=GVRL&sw=w>.

²⁶ O'Brien, Patrick. 1994. "The economic effects of the great war." *History Today* 44, no. 12: 22. History Reference Center, EBSCOhost (accessed June 14, 2012).

to what it had been. Germany finally took action by initiating inflation, which caused the German economy to reach record-breaking lows when it spun out of control.²⁷

The results of the post-war inflation eventually took an even bigger downfall. In the late 1920's, an economic downturn that produced a consequence of a severe and long recession occurred. This is known today as the Great Depression. Farmers drastically increased production of their crops, like grain, cotton, and corn, in hopes to make back much of the money that was lost during the war. Farmers obtained more debt from spending money on further machinery and increased shipping volumes in order to grow and ship the excessive amounts of crops they wished. To their surprise, they found themselves with a vast surplus. This affected the price of crops and caused a decline in farming profits. By 1929, cultivators' incomes only made up one-third of the national average. Their debts increasingly became worse when the Dust Bowl occurred, leaving all crops to wither away in a drought, making it impossible for farmers to even grow anything at all. Majority of farmers were then bankrupt.²⁸

Although World War I had a technological breakthrough with the way war was fought, it eventually led to an economic downfall in later years. Machine guns, hand grenades, airplanes, submarines, and tanks all were extremely costly to build. With every person's mind set on winning the Great War, no one ever thought about going through a great depression afterwards from all the debt and expenses, especially since everyone, both men and women, had jobs in some way shape or form during the war. It's also difficult to grasp the fact that the creation of chemical warfare would ever be used off the battle grounds in attempt to kill all those with a

²⁷ Quenoy, Paul. "German Economic Crises: Was the Economic Instability of Germany after World War I Caused by the Victors' Demand for Unreasonable Reparations?" *History in Dispute* 17 (2007): 112-119. Accessed June 15, 2012.
<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX2877700026&v=2.1&u=ccmorris&it=r&p=GURL&sw=w>.

²⁸ "Great Depression." *Everyday Finance: Economics, Personal Money Management, and Entrepreneurship* 1 (2008): 81-83. Accessed June 15, 2012.
<http://skynet.ccm.edu:2057/ps/i.do?id=GALE%7CCX2830600032&v=2.1&u=ccmorris&it=r&p=GURL&sw=w>.

certain religion, the way that Adolf Hitler had done to the Jewish only some number of years later. World War I was an extremely important event in history because of all the technology that was created and the major effects it had on the world post-war. These effects will be forever known and will never be forgotten. How could one ever not recall the Great Depression and the Holocaust with Adolf Hitler? If World War I had never happened, technology would not be what it is today, and although the post-war effects were absolutely horrid, they are eternally marked down in history.

Annotated Bibliography

Baughman, Judith S., Victor Bondi, Richard Layman, Tandy McConnell, and Vincent Tompkins. "The Technology of War." *Gale Virtual Reference Library*. Gale, 2001. Web. 08 June 2012.

Here, Baughman writes about all the new inventions and technology that were used in World War I. She writes about when each machine was first invented, then how it was revolutionized to be used in the war. Even submarines, airplanes, chemical gases, and trench warfare were explained in how they were each used in the war. This piece of writing will be exceptionally helpful to me in writing my paper because there was so much detail on so many various weapons used in World War I and how they impacted the way war was fought.

Embar-Seddon, Ayn, and Allan D. Pass. "Chemical Warfare." *Forensic Science*. Vol. 1. Pasadena: n.p., 2009. 228-30. *Gale Virtual Reference Library*. Web. 11 June 2012.

This particular piece of writing goes into great detail about chemical warfare, giving an exact definition and the significance of it during wartime. Embar-Seddon put in plain words how the French were the first to use chemical warfare, the Germans counteracted, then the French came back with even stronger chemicals, etc. He then explains how chemical warfare is used in the modern-day world and how each chemical is classified according to their form. This writing will be very helpful because Embar-Seddon explained how chemical warfare first came about in combat and how each side reacted when it was used.

Freedman, Bill, and Chris Cavette. "Chemical Warfare." *The Gale Encyclopedia of Science*. Ed. K. Lee Lerner and Brenda Wilmoth Lerner. 3rd ed. Vol. 2. Detroit: n.p., 2004. 828-31. *Gale Virtual Reference Library*. Web. 11 June 2012.

Here, Bill Freedman explains what exactly chemical warfare is and how it was used in war. He describes each kind of chemical that was used and how it affected people or the ecosystem. This writing also gives numbers as to just about how many tons of lethal chemicals were used during just World War I and how many deaths and injuries it caused. This writing will be useful to me because it thoroughly explains chemical warfare and gives great detail into how it was used and affected others.

"Great Depression." *Everyday Finance: Economics, Personal Money Management, and Entrepreneurship*. Vol. 1. Detroit: n.p., 2008. 81-83. *Gale Virtual Reference Library*. Web. 15 June 2012.

This particular piece of writing describes the Great Depression and how it began. It says that the marking of the beginning of the depression began after World War I when farmers thought they could grow crops excessively, but ended up with a surplus and no one made any money, especially after the Dust Bowl occurred. I believe this will be valuable because it tells how the end of World War I eventually led to the Great Depression, which is one of the most memorable events in history.

Jewsbury, Wallbank. "World War One, Page One." *World War One, Page One*. N.p., 1992. Web. 15 June 2012. <<http://history-world.org/ww3.htm>>.

Wallbank Jewsbury, here, wrote about how the world went through an economic crisis after World War I. He even gave an almost exact number as to how much the war itself cost, and it was funded for mainly by borrowing. He continues to write about the incredible debt the world went through, and how it seemed impossible for anyone to ever get out of such despair. This article will be immensely useful for me because it talks about how not just one country went through an economic disaster, but the entire world did, and it explains how for each one of the countries.

Merriman, John, and Jay Winter. "Inflation." *Europe Since 1914: Encyclopedia of the Age of War and Reconstruction*. Vol. 3. Detroit: n.p., 2006. 1411-416. *Gale Virtual Reference Library*. Web. 15 June 2012.

The Chapter on inflation in the *Encyclopedia of the Age of War and Reconstruction* explained inflation in great detail and even how it is started. Merriman and Winter wrote about how inflation seriously affected people after World War I, mainly in the United States. It even talks about how World War II was involved in inflation and the effects that had on countries, as well. This writing will be incredibly helpful because it defined inflation, how it works, and how it eventually led to the Great Depression.

O'Brien, Patrick. "The Economic Effects of the Great War." *History Today* 44.12 (1994): 22. *History Reference Center*. Web. 14 June 2012.

In this article, Patrick O'Brien talks about the impact the war had on the economy. He wrote about how average people made a living during the war, and how each of them were affected. Statistics were even given to show how badly inflation had an impact on people. This article will be useful for my paper because O'Brien speaks of how new technology was appeared year after year, eventually causing a dramatic effect on the economy.

Quenoy, Paul. "German Economic Crises: Was the Economic Instability of Germany After World War I Caused by the Victors' Demand for Unreasonable Reparations?" *History in Dispute*. Vol. 17. Detroit: n.p., 2004. 112-19. *Twentieth-Century European Social and Political Movements: Second Ser. Gale Virtual Reference Library*. Web. 15 June 2012.

Paul Quenoy talks about how the economy in Germany suffered from hyperinflation and a great depression after their loss in the war. He says how France put their burden on Germany, and Germany could not handle it all. He then speaks of the reparations Germany had to go through in order to attempt to change their horrid economy. This writing will not be extremely helpful, but it makes some good points to show that not only the Allies went through an economic crisis after the end of the First World War.

Roff, Sue Rabbit. "The Use of Poison Gases in the First World War." Ed. Josh Lauer and Neil Schlager. *Science and Its Times*. Vol. 6. Detroit: n.p., 2000. N. pag. 1900 to 1949. *Gale Virtual Reference Library*. Web. 11 June 2012.

Sue Rabbit Roff speaks of the background of chemical warfare first being invented by Fritz Haber in 1914. She even gives exact numbers, as much as they were recorded, to how many soldiers were gassed, and how many actually died from it. She then talks about how the invention of poisoned gases would eventually be developed into something far more serious when Adolf Hitler used it in gas chambers in the concentration camps during the Holocaust. This piece of writing will be extremely helpful to me because it talks about the beginning history of poison gases and even the impact the gases had on soldiers and how severe they actually were.

Showalter, Dennis. "New Weapons: Did World War I Accelerate the Technological Development of Weaponry?" *History in Dispute*. Vol. 8. Detroit: n.p., 2002. 193-201. *World War I: First Ser. Gale Virtual Reference Library*. Web. 08 June 2012.

Dennis Showalter explains, in depth, many different types of technological developments during the World War I era. He writes about how quickly and rapidly technology changed throughout this time. Grenades, airplanes, German U-boats, submarines, and tanks were some of the most detailed. This writing will be helpful for my paper because it has a lot of variety in technology and even explains how each weapon was used in the war.

Weeks, Albert L. "Aviation." *Encyclopedia of Russian History*. Ed. James R. Millar. Vol. 1. New York: n.p., 2004. 103. *Gale Virtual Reference Library*. Web. 11 June 2012.

The chapter on Aviation in the *Encyclopedia of Russian History* defines aviation and how it first started out with the Wright brothers in 1903. Albert Weeks wrote about the first aviation developments in Russia, and how a breakthrough occurred with the development of the four-motored airplane during World War I. He then goes on to talk about the Soviets in World War II and the planes built for the Red Army. Although this chapter talks about World War II, it has a lot of good information on the history of aircrafts and how they were revolutionized in the beginning of World War I.