**The Bombe’s Influence: Shaping Technology, War, and Society**

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IDS 403

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April 20, 2025

**Technology and Event Description**

During World War II, Britain and its allies used a machine created by the Poles to break German encrypted messages. As the war continued, the Germans made their messages more complex to break and changed them daily, making it difficult to decipher and keep up. To solve this problem, Alan Turing and his team at Bletchley Park created a machine called the “Bombe” that could quickly test many code possibilities and even find the correct one. The Bombe machine was used by the British to decipher German messages that led to saving many lives and winning key battles throughout the war. Its success showed how powerful computers and computing algorithms can be, which laid the foundation for future cybersecurity, military intelligence, and modern computer science.

**Technology and Event Description: Social, Cultural, or Global Event**

Germany used the Enigma machine to encrypt military communications during the war in 1940. British intelligence and allies needed to find a way to decrypt German messages to gain intelligence on military movements. Poland’s early work on breaking the Enigma, called a Bomba, laid the foundation for breaking German communications (Gladwin, 1997). Still, the encryption required a more advanced machine. The British government gathered a team at Bletchley Park, where Alan Turing and Gordon Welchman worked together in designing the Bombe machine. Details to ensure a thorough description include machines used before the Bombe machine, such as the Bomba, the impact of the Bombe machine on the war, and the role Turing played at Bletchley Park.

**Technology and Event Description: Technology**

The Bombe machine was a groundbreaking technology that helped decipher Enigma messages, significantly improving the speed and efficiency of codebreaking during World War II. The Bombe worked by simulating Enigma machine settings to find possible matches for intercepted German communications (Gladwin, 1997). The machine created at Bletchley Park went beyond influencing military applications for the military but also influenced the development of early computers and algorithmic concepts. Bletchley Park became “one of the most important and renowned technological centers to emerge in Britain during the Second World War” (Smith, 2014). The great success of the Bombe helped raise new ideas and concepts in intelligence and security that are still brought up in discussions today.

**Technology and Event Description: Societal or Cultural Influences**

The creation of the Bombe machine was a significant advancement in computing that laid the groundwork for the technological world we live in today. People worldwide use technology daily, but not everyone has equal access to it. For example, countries like the United States, the United Kingdom, and parts of Europe have access to technology, the internet, and computing systems that stem from the Bombe. In contrast, areas like Africa are impacted by the cost that hinders access to the internet and technology. This is referred to as the digital divide. As Mozilla (2021) mentions, the digital divide exists everywhere, primarily seen from the gap between the richest and poorest countries, where 80% of the people living in the Europe region have access to the internet, compared to the Africa region, where only 26% have access. Although the Bombe machine is mainly seen as having a positive impact on those with internet access, the ones without access may view the creation of the Bombe negatively since it will only further increase the gap in the digital divide. As a result, those places without internet access will fall even further behind, causing them to miss out on quality education, job opportunities, healthcare updates, and economic growth.

**Technology and Event Description: General Education Lens**

The historical lens is the best choice for analyzing the impact of the Bombe machine. This perspective allows us to view the Bombe as a significant turning point in technological evolution during a major conflict that influenced modern computing, cybersecurity, and intelligence operations. This was an easy choice over the other lens because the historical lens helps highlight the rapid need for technological advancement during wartime. To fully understand the Bombe machine’s influence, we must look at its historical context and the lasting inspiration it left on society and global security.

**Technology and Event Description: Thesis Statement**

Examining the Bombe machine through a historical lens, this key World War II technology helped break the German Enigma code while shaping modern computers, intelligence operations, and gender roles in technology.

**Critical Analysis**

Analyzing the Bombe machine through a historical lens helps us understand how a single invention can significantly impact war, technology, and society. Analyzing this impact will also give us a better idea about who it affected and how they were affected by it. By studying the Bombe and its impact, we can better understand how to create new technology that helps more people, even those without internet access.

**Critical Analysis: Impact on Institutions**

Analyzing the Bombe machine’s role during World War II from a general education lens, we can see how it affected various institutions such as politics, community, family, economy, education, and market-driven organizations. The Bombe played a significant role in influencing education, particularly in computer science. Breaking the Enigma code helped display Turing’s work in computing, which inspired the development of modern computer science programs. According to Smith (2014), the development of the Bombe at Bletchley Park helped demonstrate the power of machine-based problem-solving. It influenced the development of educational programs that focused on computing and cryptography. This inspired universities to create specific departments that focused on computing and cryptography. The impact of the Bombe on education changed how universities viewed technology, highlighting the importance and need to learn and adapt in technological fields continuously.

**Critical Analysis: Social Practices**

Analyzing how the Bombe machine shaped social practices such as communication, interaction, behaviors, and traditions shows how technology changed society. The Bombe machine paved the way for modern computing, which significantly influences how we communicate, interact, and access information in our daily lives. However, not everyone experiences these technological advancements equally. Vogels (2021) states, “rural adults remain less likely than suburban adults to have home broadband and less likely than urban adults to own a smartphone, tablet computer, or traditional computer.” People who live in rural areas face a more negative impact from technological advancements than those in urban or suburban areas. For example, during the COVID-19 pandemic, schools were shut down, but students had to continue learning from home, which required them to have internet and a computer. Those living in urban and suburban areas are more likely to have the tools necessary to continue their education, whereas those living in rural areas are forced to fall behind due to their limited access to the internet and technology. In the past, communication methods were limited, and learning from home was not possible, but significant technological advancements like the Bombe machine not only improved our society but also contributed to the gap in today’s digital divide.

**Critical Analysis: Limitations That Could Benefit from Change**

One specific limitation the Bombe machine had was relying entirely on humans to interpret and manage the data the machine had created. Although the Bombe machine was a groundbreaking technology, it still required a human to manually operate it and understand the cipher data created. According to Gladwin (1997), the Bombe played a major role in breaking the German code. However, it could only work with one specific machine setting at a time. Once the enemy changed the Enigma settings, the Bombe had to be completely reconfigured to decode the messages again. This slowed the decryption process and required humans to manually operate the machine, which had to be skilled and trained to change the machine's settings. Even though the Bombe increased the time to secure and break messages during the war, it could have better supported allies during the war by eliminating the human factor and being fully automated. This could have made the full deciphering of messages even quicker, potentially ending the war sooner and minimizing casualties.

**Critical Analysis: Strategies to Address the Limitations**

One major limitation of the Bombe machine, used during World War II, was that it relied on known parts of enemy messages called “cribs” to work correctly. The Bombe would be ineffective if no good guess could be made about the message. As explained by Gladwin (1997), the success of the machine often depended on the ability of cryptanalysts to make accurate assumptions about message structure. At the time, developers solved this issue by working with language experts and pattern analysts. Today, similar limitations can be addressed with advanced machine learning models, more intelligent data processing, and adaptable systems that can detect patterns even when the input is incomplete.

**Critical Analysis: Factors That Could Impact Understanding**

Two important things that affect how people see the role of technology in the Bombe’s use during World War II are what they believe and what they assume. Many people thought that only human effort won the war, so they did not realize how important machines like the Bombe really were. As Smith (2014) described, this assumption often led to the underappreciation of the machine’s complexity and importance in breaking encrypted German communications. Additionally, some believed that machines could not perform tasks better than humans, limiting public understanding of what the creation of the Bombe machine accomplished.

**Critical Analysis: Benefits and Challenges**

Critically analyzing technology helps us understand its broader effects, such as how the Bombe shortened the war and saved lives. According to Gladwin (1997), Turing’s invention went far beyond its mechanical purpose; it reshaped the future of computing and intelligence work. The benefit of this kind of analysis is that it shows how deeply technology influences society. However, a challenge is that many technologies, like the Bombe, are complex or kept secret for security reasons, making it hard for people to question or improve them without access to full information. This makes it even more difficult for people living in areas that have limited access to the internet or digital devices. Those without access are often left out of the loop about new technologies, and when complex machines like the Bombe are created, it makes it even more difficult for them to learn about it and implement that change into their cultures.

**Critical Analysis: Strategies for Personal Goals**

One way to use critical analysis in daily life is to understand whether a piece of technology solves the problem it claims to solve. This can apply when choosing a new app, using educational software, or setting up security tools. Just as engineers questioned whether the Bombe was solving the right problem during its development, modern users should consider how a tool fits their goals (Smith, 2014). Thinking this way helps make smarter tech decisions at school, work, or home. For example, analyzing the Bombe machine led to the improvement of computers, which now help us communicate, automate tasks, and solve complex problems. Using this approach to critically analyze new technology, we can better understand its effects on different cultures in society. This thinking allows us to continue to create new technologies that not only improve our lives but also help in closing the digital divide that exists today.

**Reflection**

Using critical analysis tools helps me look deeper at how technology works and impacts society. As a current computer science student, it has helped me understand the different impacts technology can have on people. It has shown me that not everyone has equal access to technology, which forces me to be more open about different perspectives. Overall, it has helped me become a better computer science student and solve complex problems that improve our society equally.

**Reflection: Individual Framework of Perception**

Critically analyzing technology’s role in an event has helped change how I perceive the world. Looking at technology through different lenses allowed me to understand its role in the world more than just being a tool for entertainment. After learning about Alan Turing and the creation of the Bombe machine, I realized that technology can also help us learn about our history. I noticed how much we rely on technology, especially in major conflicts such as World War II, where the creation of the Enigma machine influenced British victory. This perspective of how technology has improved in the world allows me to understand how complex problems were solved, expanding my problem-solving skills and creativity even further. It also showed me how technology is not equally available to everyone and creates a digital divide in society. Having different perspectives creates open-mindedness and helps me develop new technologies that affect everyone equally.

**Reflection: Bias**

Examining my bias has helped me realize that I avoid or choose certain technologies based on brands or trends. For example, when Mac laptops came out, I have always wanted one because they were so popular and new. Once I was able to afford one, I bought it right away. I did not know much about the laptop's specifications then; I just knew that it was a popular, solid computer, and everyone around me had one. After gaining a deeper understanding of technology, I realized that my Mac was incompatible with many programs I needed for school and work. This showed me that my decision to buy this expensive laptop was based on trends rather than actual needs. Now that I am aware of this bias, I take more time researching and comparing devices to fully understand my actual needs to ensure that they meet them.

**Reflection: Field of Study or Profession**

Critically analyzing how the Bombe machine created by Alan Turing during WWII can completely change the course of history. The Bombe machine is an excellent example of how technology can impact the technical and ethical aspects of the world. The world would be in a very different place today if Germany and the Nazis had won the war rather than the British and allies. Analyzing the Bombe machine as a computer science student, I can see some of the earliest steps to modern computing. The work Turing did to create the Bombe led to the creation of the Turing machine, a theoretical model of how computers process instructions. This is still used in computer science programs today to understand computer algorithms and problem-solving. Not only did the Bombe machine help win the war, but it also shaped the way computer science students today learn and understand computing by introducing key concepts like algorithms and machine processing.

**Reflection: Different General Education Lenses**

Looking at the event of the Bombe machine created by Alan Turing during World War II from another general education lens, instead of a historical one, would give me more of a focus on how the machine worked and the technical parts used. For example, using a natural science lens would shift my focus to the scientific process and methods used to create the Bombe machine. This would include how the Bombe used patterns, early computer concepts, and algorithms to solve the Enigma codes. This perspective would dive into how Alan Turing’s work influenced the start of early computer science programs rather than being a tool that changed history.

**Reflection: Interactions**

Critically analyzing the Bombe machine’s role in World War II can help people with different viewpoints or cultures see how technology can affect their lives by bringing people together and solving complex issues. Alan Turing’s creation of the Bombe helped end the war faster and saved many lives worldwide. Turing’s machine, the Bombe, “enabled the British to read German naval messages, helping to turn the tide of the war in the Allies’ favor” (Gladwin, 1997). This shows us that even though the Bombe was built in one country by the British, it still had an impact on people all over the world. Critically analyzing its impact on allies worldwide can help people appreciate and understand the value of technological advancement, even if they have different perspectives or come from various backgrounds. An example from my life where greater awareness of technology strengthens individual conversations is being in Afghanistan, teaching the local Afghan Army and the United Arab Emirates (UAE) how to use our technology to fight ISIS-K fighters. In this situation, it goes beyond just learning the equipment. Instead, it was about building trust, cooperation, and achieving a common goal of working together to beat the enemy. This is where I understood their experiences and perspectives on war. That experience shows how a single piece of technology can unite cultures, influence conversations, and impact lives worldwide.

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