

Molding the World's Greatest Army: Napoleon Bonaparte and STEM

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ABSTRACT

When exploring Napoleon's legacy of military success, a critical factor is often overlooked: the incorporation of Science, Technology, Engineering, and Mathematics into military policy. This paper aims to bridge the gap between these disciplines and warfare by analyzing their integration through two lenses: education and strategy. Research was conducted under the guiding question: How did the inclusion of science and its related principles (STEM) within Napoleonic society foster France's military victories and subsequent imperial expansion? To research and answer this question, I employed various primary and secondary sources, ranging from laws, decrees, and personal letters, to journals and scholarly articles. By analyzing these sources, this scholarly paper argues that Napoleon's military use of STEM was a critical component of France's unprecedented success in warfare.

INTRODUCTION

On November 9, 1799, a man entered Paris, to the thunderous applause of a jubilant crowd.¹ His recent military victory at Egypt had transformed him into a national hero.² Trudging slowly in his conspicuous military uniform adorned with a red hat, he entered the lower legislative body — the Council of 500. Eyewitness testimony recounts the pervasive hatred directed at him. Legislators denounced him as a 'dictator' and 'villain'.³ Nevertheless, a day later, he had completely consolidated power over these lawmakers. As he entered their chambers, soldiers quickly followed him, dispersing all dissidents.⁴ There, inside the chamber, he was officially anointed as the new French ruler.⁵ This moment — the Coup of 18 Brumaire — initiated Napoleon Bonaparte's rise to power. A native of the small island of Corsica situated just off France's coast, he ascended to leadership power during a turbulent period of French history. Internal dissatisfaction, poverty, and chaos were rampant throughout France. However, Napoleon's rule proved to be pivotal. He initiated reforms which engendered territorial expansion, nationalism, and meritocracy. Under his rule, France crystallized and emerged as a global powerhouse. A key factor in this growth was Napoleon's radical restructuring of France's military system.

This paper seeks to explore one critical aspect of his military restructuring: the inclusion of Science, Technology, Engineering, and Mathematics — STEM — within military policy. It commences with an

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analysis of Pre-Napoleon aristocratic French warfare. Then, it transitions to the legal framework Napoleon established for future military science integration. From this basis, the paper analyzes how STEM was implemented within the education system and the connection this had with military service. Next, it explores how STEM was implemented in military strategy, delineating its weaponry applications and specific battle studies. It ends by discussing the profound implications Napoleon's military legacy had on American warfare. Ultimately, the paper argues that STEM was both a revolutionary and core component of Napoleon's military success.

BACKGROUND

Aristocratic Warfare

During the centuries before Napoleon's rule, French warfare existed under a completely different set of tenets, rooted in one concept: elitism. The military elite and officers came almost exclusively from the aristocracy.⁶ Even as the monarchy centralized power — creation of the First French Professional Army and disintegration of the feudal system — nobles still retained powerful positions. In mere months, they would advance to the rank of colonel or general.⁷ This pace was quicker than that of a non-aristocratic officer, allowing the nobles to dominate the military ranks. Such unfairness was compounded by the practice of *venality*, which allowed nobles to simply purchase elite positions.⁸ Absolutist rulers came to encourage this culture since it linked noble militarism with royal prestige. For example, Louis XVI legalized the *Segur Ordinance*, making it compulsory for prospective officers to have at least four generations of noble lineage.⁹ Napoleon scholar Rafe Blaufarb denotes this transformation of the army as *noble exclusivism*.¹⁰

Noble exclusivism fostered a rigid military hierarchy. Elite officers viewed common soldiers as dishonorable. As a result, they imposed harsh discipline on their troops while seeking glory for themselves. These class distinctions further influenced military tactics. Officers mistrusted their soldiers, forming their military ranks in strict arrays to carefully monitor them.¹¹

Napoleon Military Framework: Law

The army's outdated structure would change under Napoleon. As part of the broader effort to unify the French army for expansionary purposes, Napoleon restructured the military service system to promote meritocracy. One of this effort's key steps was the legalization of the *Civil Code*. This promulgation was a series of laws uniting France's fragmented legal system. Specifically, Article 7, which stated that, "The exercise of civil rights is independent of the quality of citizens" and the supporting Article 8, which asserted, "every Frenchman shall enjoy civil rights," legally enshrined the equality of all men.¹² These ideas completely dismantled the 'noble exclusivism' within French warfare, and to a larger extent — society itself.

Legal action appealed to the vast majority of the populace. It became the ideological foundation to dismantle antiquated warfare. However, for the state to succeed, law was not enough. Napoleon viewed military glory through a pragmatic lens, acknowledging it would require engineers, architects, and scientists — those with technical skills.¹³

REFORMS

Schooling

As a result, Napoleon reformed and transformed the education system, working to promote STEM within a nationalistic framework. The first step in this campaign was centralized state control of education, termed *Université Impériale*. This system constituted three sections: Primary education, Secondary education, and Further education.¹⁴ Its purpose, as Napoleon writes, included instilling “fidelity to the empire and to the Napoleonic Dynasty”, as well as “securing uniformity of instruction and training for the state citizens.”¹⁵

The first section — Primary Education — was aimed at kids aged six through eleven. Though largely decentralized, it still held common elements of militarism, with all children being taught to hold weaponry.¹⁶ With the second section — *Lycées* — both STEM and nationalism became incorporated in a military framework. The *Lycées*, intended for students between ages twelve to eighteen, saw a clear schooling division: those destined for a military career, and those destined for a civil career. Civil education stressed languages, rhetoric and philosophy. On the other hand, military education stressed mathematics, physics, chemistry, and military matters.¹⁷ The linkage between STEM and military education was made compulsory; *Lycées* required knowledge of chemistry and physics to enter a military career.¹⁸ Furthermore, Napoleon appointed prominent scientists — Pierre-Simon Laplace, Joseph-Louis Lagrange and Joseph-Baptiste Fouriers — as instructors within these institutions. These figures served as icons to the youth, directly tying STEM with ideas of national glory.

The connection between STEM, nationalism, and military education, would intensify within the third section of state schooling — the *Grands Écoles*. These elite and specialized schools merged science with reverence for Napoleon. The most renowned of these institutions was the *École Polytechnique*. While initially more of an engineering-focused school, after careful government intervention, it transformed into a military-focused school, teaching engineering as a means to prepare men for military duty.¹⁹ This transformation produced a cult-like following of Napoleon. Soon, the majority of army soldiers were graduates of this school.²⁰ *Polytechnique* majors ranged from artillery officers and military engineers to scientists and manufacturers.²¹ Interestingly, on Napoleon’s last stand at Paris, these scientists stood valiantly at Napoleon’s side — driven not by strategy, but by loyalty.

Practical Implementation of STEM within Schools

However, Napoleon’s promotion of STEM within these military schools was not merely for ideological assurance. Through teachings that combined STEM with manufacturing, he established the discipline as a practical tool. From 1808 to 1815, about half of the older students (23-24) within the *Polytechnique* created caissons consisting of interchangeable parts for Napoleon’s artillery.²² Furthermore, he established classroom ‘shops’, where structures including water-powered sawmills, clocks, scientific calculators, textile machines, were manufactured. To create these structures involved fusing math, mainly geometry, and science with engineering principles.²³ Furthermore, through regulation of curriculum in a way that emphasized descriptive geometry, calculus, mechanics, and the natural sciences, he drew focus on military applications: geometry to understand terrain, drawing for maps, and mechanics for weapon

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design.²⁴ The principles behind STEM were not separated. Rather, they were taught in conjunction to help guide the youth to military success. Architecture and surveying were also taught in these schools, often infused with mathematical elements built upon theory.²⁵

Scientific Bureaucracy

Napoleon's policy of centralization extended to scientific pursuits. Here, he established a bureaucracy based on two objectives: research and training. As part of the effort to unify the populace, Napoleon consulted with scientists of the French Academy to institutionalize the metric system. The system involved rounding to 6 decimal places, and measurements built upon the 'meter' — classified as a ten millionth of a quadrant around earth. As a result of this homogeneity, tax collection, military conscription, and weight classification, were all rendered more efficient. Additionally, to perpetuate a central role for science, Napoleon bestowed research awards across a variety of disciplines: astronomy, electricity, physics, medicine.²⁶ These awards were glorified to the youth through propaganda, inducing a national belief in scientific exploration and achievement.²⁷ This group would slowly transition into the foundation for Napoleon's empire. 1803 and 1804 are often considered the pinnacle years of Napoleon's scientific endeavor. Not only was the entire state immersed in the discipline, but scientists like Laplace and Lagrange emerged as elite figureheads.

Furthermore, this period heralded the development of field hospitals and surgery under state-sponsored expansion. Medicine was a critical aspect of Napoleon's reforms. He professionalized the field, instituting a state school for medicine: *l'École de Santé*.²⁸ Additionally, he trained students directly under doctors, a practice largely unfamiliar at the time.²⁹ This initiative yielded great success, with there being a sharp reduction in military casualties.³⁰ In the combination of research services to the state and training within a pragmatic lens, Napoleon cultivated an atmosphere perfect for the emergence of *military science*, a discipline that integrated STEM within military conquests to fuel state success.

APPLICATIONS

Military Applications of STEM: Math

The first academic tool implemented in Napoleonic warfare was math. Even before Napoleon's rise to power, math was a prominent part of warfare strategy. During the Battle of Toulon fought between French royalists and republicans, calculation proved key in his victory. While situated in muddy and rugged terrain, Napoleon issued orders to build fascines, groups of logs bound together. These logs were tied to strengthen trench fortifications and create a stable pathway for cannons and supply wagons. In a letter to his military colleague, he calculated that for cannons to advance, fascines must be mandated at 8 to 9 feet long.³¹ He further calculated a required several dozen branches, with willow branches 3 to 4 feet thick.³² On top of these calculations, Napoleon quickly recognized the importance of capturing Fort Musgrave and L'Egulette.

If he could capture these forts, his cannons could reach a farther range, making it easier to bombard the enemy troops. Driven by this understanding, Napoleon made designed his men as a battery — historically

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remembered as the *battery with no fear* —, worked with the artillery directory to create red-hot cannonballs,³³ hired engineers to construct trenches and bridges,³⁴ and even ordered more than one million pounds of gunpowder!³⁵ As a result of these efforts, Napoleon captured the forts. Correct in his prediction, obtaining these two forts made the British harbor untenable, forcing them to leave. Without foreign support, the French royalists surrendered, giving Napoleon his first victory. The combination of log use, engineering of cannonballs, and construction of bridges implies how Napoleon had been utilizing science even prior to its military propagation in the 1800s.

The use of geometry became one of the most visual components of Napoleon's implementation of math in battles. The Battle of Austerlitz, fought between France and the Russia/Austrian alliance, embodies this characteristic.

Facing the combined might of Russia and Austria, two global powerhouses, Napoleon deliberately arranged his troops under the veneer of a right flank. When 85,000 soldiers from the allies rushed in on the right flank, Napoleon leveraged interior lines — short routes between military units — to attack their weakened center, situated at Pratzen Heights.³⁶ Unlike other military rulers who simply bombarded enemies with troops, Napoleon was strategic and incisive in how he fought war, leading to entire combined empires falling at his feet.

Military Applications of STEM: Engineering

Under Napoleon, engineering changes incorporated with STEM principles fueled new military innovation. Military theorist Jean-Vacquette de Gribeauval introduced a new range of four-pounder, eight-pounder, and twelve-pounder cannons, as well as a six-inch howitzer.³⁷ He lessened the weight of weaponry, with one example depicting him halving the weight of cannons. These changes were made possible by precise calculations that standardized cannonball dimensions and calculated optimal barrel length as eighteen times the diameter.³⁸ Consequently, Napoleon's weaponry became the model for future generations, a testament to how engineering fostered incredible military innovation.

Gribeauval also spearheaded an effort to reform cannonballs as perfectly spherical, reducing fire dispersion and ensuring fuel efficiency. These mechanical and physical improvements were supplemented with chemistry changes; under Napoleon, gunpowder's composition changed to 75% saltpeter (potassium nitrate), 15% charcoal, and 10% sulfur.³⁹ This standardization led to more predictable muzzle velocity and range. For saltpeter (potassium nitrate) specifically, new advancements in purification —through chemical leaching and controlled crystallization— reduced unwanted byproducts, enabling faster fire and supporting Napoleon's siege artillery tactics.

Cannonball changes were combined with enhancements made in mortars. The mortar's chamber gradually transitioned from a cylinder to a truncated cone.⁴⁰ This transformation was made under the observation that a truncated cone shape could centre a cannonball. As such, it ensured that the ball would not hit the mortar and lose energy. Engineering was being actively implemented to construct the powerful equipment guiding Napoleon's troops. However, weaponry was not all engineering was deployed for.

Napoleon also heralded the *corps* — groups within the army that could function as independent military units — system.⁴¹ One such group was composed solely of engineers, referred to as the *Corps de Génie*. In his comprehensive list *Maxims of Warfare*, Napoleon codifies their military importance, stating, “Engineer officers should be encouraged in bringing [the art of war] to perfection, and in placing it upon a level with the rest.”⁴² Their strategic value was especially apparent during the Italian Campaign (1792-1801). They cleared roads, mapped supply roads, and built pontoons to traverse the Alps.⁴³ They were also conferred with the most elite education, being trained for years in classrooms before joining the battleground. All of their skills required a good understanding of the sciences: geology and natural sciences to understand the icy, rough terrain of the Alps, as well as mathematics to determine the necessary lengths and material required to build bridges for safe crossing.

Military Formations and Shapes

Napoleon’s warfare tenets were unified around multiple geometric shapes in combination. Firstly, he formed a closed battalion column of divisions, each division in three ranks one pace apart; each division three paces behind the other. This structure resulted in a block of men approximately fifty by twenty-five meters.⁴⁴ In a regimental column, the leading battalion would be followed by the second at a distance of approximately 50 meters.⁴⁵ Dense columns, narrow width, and compact grouping engendered a malleable military formation. By using these smaller, compact groups, less angular adjustment and rotation was required, generating rapid mobility. Such mobility was significant for aggressive conquests and reconnaissance. This type of warfare came to be known as *lightning warfare*, transcending into a key tenet of Napoleonic strategy. The use of math had become enshrined in military strategy.

Napoleon’s implementation of military mathematics was also displayed in his steadfast defensive mechanisms. Hiring Gaspard Monge, a mathematician, to structure military fortresses, led to the first 3-D graphical representation of an impenetrable fortress, based upon orthogonal projection.⁴⁶ Napoleon transmitted this information into his blueprints detailing battles all around his empire.

CASE STUDIES

Academic Disciplines as an Ideological Source: Napoleon’s Egyptian Campaign of 1798

Gaspard Monge, Napoleon’s Mathematician friend, was one of 150 *savants* — scholars assigned to record Egyptian culture and history — that accompanied Napoleon on his Egyptian invasion in 1798. Some members, like Monge, were scientists and mathematicians. However, this expedition extended to historians and archaeologists.⁴⁷ The various observations and artifacts collected by these scholars would culminate in the creation of a comprehensive egyptology book *Description de l’Égypte*.⁴⁸ However, though this book centralized Egyptian knowledge and appeared to be a token of amity, its creation held ulterior motives. According to Charles Gillispie, a pioneer in the history of science:

Above and beyond the enormous compilation of information on Egypt, the significance of the participation of science in the expedition lies in the relation it portended between formal knowledge and politics. Unlike the mercantile colonialism that preceded it, the occupation of Egypt had a cultural component.⁴⁹

Gillispie's statement evidences an attempt by Napoleon to legitimize rule over Egypt through depicting Egyptian history with a European lens, implying an innate European superiority. Napoleon had successfully altered science to justify imperial expansion, marking an unprecedented step in scientific militarism. These Social-Darwinist infused actions were supplemented by attempts to undermine Egyptian faith. A French officer's discovery of the Rosetta Stone in 1799, an aid to translate and understand the Egyptian hieroglyphics, marked a step in westernizing Egyptian culture and denationalizing it as a country. To maintain control over Egypt, Napoleon selected several of his *savants* to serve as the technocratic elite. Moreover, he used art to further the Frenchification initiative, glorifying himself as an "enlightened and liberating figure who colonized Egypt not to destroy Islam but to free the barbaric and oppressed Egyptians from the harsh rule of the Mamluks."⁵⁰

Art and construction became manifestations of Napoleon's hubris; he famously wrote, "Men are only as large as the monuments they leave."⁵¹ Indirectly, such hubris contributed to yet another military application of science. To build as large monuments as possible, Napoleon invested heavily in iron, a previously underutilized tool. New investment in these sources induced foreign economic pathways. Furthermore, Napoleon initiated the construction of numerous architectural wonders using megatons of iron. His most famous construction was the 106-foot *Arc de Triomphe*, which enshrined Napoleon's victory at the Battle of Austerlitz.⁵² Such a commemoration is displayed prominently in France even centuries later, infusing the academic disciplines with a sense of national prestige.

Military Applications of STEM: Technology

Napoleon deployed new military technology built upon STEM principles. While fighting the Austrians during the 1794 Battle of Fleurus, Napoleon formulated a revolutionary idea on how to apply balloons. He integrated them as aerial reconnaissance sources. The launch of these balloons was carefully designed to generate multiple images of 'devils' in the sky, frightening the Austrians.⁵³ This paranoia paved the way for France to swoop and emerge victorious at the Battle of Fleurus. Thus, France had transformed balloons into a form of military power.

Napoleon implemented new technology within cartography. While the powerful Cassini family had created a national map of France decades prior, Napoleon decided to replace this map. It was inaccurate, did not assimilate military strategy, and did not include battlefields.⁵⁴ Experimenting with different measurement scales, Napoleon created a new map to be used by all soldiers: the Geographical Survey Map. This map held important value: it standardized and updated French's national geography, and ensured that all military and civil officers operated with a uniform understanding of terrain, borders, and logistical routes.⁵⁵ By centralizing this cartographic effort under the decree of the establishment of the Corps *Ingénieurs Géographes Militaires*, Napoleon transformed maps into a strategic asset.⁵⁶ This movement allowed French forces to coordinate movements with greater speed and accuracy.

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Furthermore, his decree of the Geographic Military Engineers required the group's education by two professors: one of math and physical sciences for the construction of charts, the other of topography and landscape.⁵⁷ Therefore, he enabled the state to not only enforce orthodox teaching but also induce a sense of unity in the common people through technology. He then combined technology with mathematical calculations intended to best benefit his troops. For example, during his Italian Campaign, he placed a supply depot in Milan. This location was close to where his supply lines would be after approximately 200 to 300 miles of walking.⁵⁸ Furthermore, it ensured his famished troops would have time to rejuvenate when they were just about psychologically finished.

The policy of central authority extended to resource tinkering. Napoleon centralized the procurement and distribution of military resources, standardizing weaponry and reducing design complexity. Despite the undeniable advancements Napoleon made in terms of technology and logistics, it was ultimately this aspect of military science which led to his downfall.

Failure at Russia

The turning point in Napoleon's regime came with his decision to invade Russia. Before this disaster, he was viewed as infallible, annihilating every army and aristocrat force in his path.⁵⁹ Citing Russia's ultimatum of the French's evacuation from Prussia and France's 'destiny' to conquer Russia, Napoleon made a rather hasty decision to declare war. In preparation for the invasion, Napoleon enlarged the *train des Équipage* — a military transportation service that brought supplies directly to the battlefield. It increased from a size of 7 battalions to 26 battalions. With this increase came a new load capability: 9200 tons of material load for 10 miles a day.⁶⁰ However, the supplies proved a severe under-calculation. As a result of a desire to prove superiority, Bonaparte rushed in too unafraid, which Tsar Alexander 1 of Russia quickly capitalized on.

His psychoanalysis of Napoleon led him to create a ruse that made the supply trains useless: firstly, he instituted a scorched earth policy, which perfectly countered Napoleon's rapid advancements. As the soldiers were rapidly advancing through Western Russia, the supply trains were unable to keep up, leaving inadequate supplies.⁶¹ Secondly, he leveraged Napoleon's hubris, understanding that Napoleon would rush in very rashly to the winter cold of Moscow. Ironically, Napoleon had been warned about the perils of Russian winters by his Diplomat Armand de Calaincount.⁶² His disregard for the sciences would expectedly be detrimental; when Russian winter hit Moscow, millions of his soldiers died.

As a direct result of the death toll, Napoleon ordered a 'strategic repositioning' (retreat), but this defensive move only contributed to a greater death toll. Attacks from the Russian offensive, along with hypothermia, exhaustion, and most prominently hunger, reduced Napoleon's army size by around half. Had he listened about the weather and arranged logistics in a more efficient way, perhaps the outcome would have been very different.

LEGACY

West Point

However, Napoleon's military legacy was not solely confined to France. It became the basis for the American Academy West Point's growth and development. Prior to Napoleon's rule, America's relationship with France had still been well-defined. During the American Revolution France aided American colonists in their fight for independence. Firstly, they supplied the strategic and clever general Rochambeau, who was pivotal in securing the coast during the Battle of Yorktown.⁶³ Secondly, they diverted British resources from entering the colonies, setting up a military blockade.⁶⁴ Finally and arguably most importantly, they supplied superior military weaponry and equipment to the Americans.⁶⁵

Following the Revolutionary War's end, America was in dire need of military education and training. This fervent desire led them to enlist French support once again. France then sent their top officers to aid the Americans, *all graduates of the École Polytechnique*.

Officers

The first officer sent, Stephen Rochefontaine, was an aristocrat and military engineer. In America, he became head of the nascent engineering department.⁶⁶ Soon, he was appointed commander of the military academy West Point, by none other than President Washington himself! Rochefontaine's vision of West Point was based on drastic and systemic alteration. He modeled West Point after *École Polytechnique*, mirroring the same engineering curriculum, designating separate buildings for separate services, and making plans for a school academy.⁶⁷ These three characteristics were reminiscent of Napoleon's *École Polytechnique*, demonstrating how schooling cemented Napoleon's legacy in fostering America's military. After Rochefontaine passed away, his work was continued by another *Polytechnique* student Simon Bernard.

Bernard transmitted many of Napoleon's defensive military techniques into West Point strategy: compact columns, pivoting, and defensive maneuvering. However, his efforts did not stop here. Working with the newly created American Board of Engineers, Bernard created a map of the U.S coastline, implementing the skills of mapping and topography learned at the Polytechnique.⁶⁸ Napoleon's ideology of internal improvements was yet another source of influence to Bernard. These ideas are viewed in Bernard's systemization of American navigation, roads, and canals.⁶⁹

However, as America grew in power, it started to veer off French military intervention — it desired national autonomy. Therefore, the French officer program was discontinued. Instead, it was now American officers who were sent to France. These officers gained experience within Napoleon's military institutions. Then, they would return to spread their knowledge within the U.S.A. One of the most important of these officers, Sylvanius Thayer, traveled to France in the 1840s and 1850s. He returned to America with a new set of tenets guiding West Point. The overarching West Point reformation process almost perfectly replicated Napoleon's restructuring of the French education system. Thayer took initial steps including evaluating applicants on merit, establishing a code of conduct, and increasing admission

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selectivity.⁷⁰ After laying this foundation, Thayer instituted changes to the curriculum, overhauling it to correspond as much as possible to that of the *École Polytechnique*. The new curriculum stressed STEM fields such as chemistry, machinery, and hydrostatics.⁷¹ Thayer's initiatives were all underpinned by an intended goal to elevate West Point's prestige.

Since American students were much behind their French counterparts in all aspects of academics, Thayer hired French engineer Claudius Crozet. Crozet spearheaded an effort to develop a sequential math curriculum. Students started with algebra, moved to geometry, and would end with calculus.⁷² Importantly, Crozet promoted geometry, referring to it as “the basis of engineering” — symbolic of Napoleonic warfare.⁷³ Crozet additionally worked to enhance the more practical aspects of military training. In a student's senior year, Crozet taught the science of artillery, civil and military architecture.⁷⁴

American Military Technology

Military weaponry was another source of Napoleonic war influence. During the War of 1812, the United States implemented double-bracket carriages — of the French Gribeauval pattern that Napoleon had used.⁷⁵ As a result of French reliance, American weaponry progressed significantly.

In the Civil War, they reciprocated their gratitude to France, colloquially terming their weapons ‘Napoleons’. The Civil War also saw General Ulysses S. Grant apply Napoleonic war principles — speed of maneuver, concentration of force, and the seeking of the decisive battle — in battle.⁷⁶ Therefore, Napoleon had successfully promoted the inclusion of geometry into American warfare. These military advancements, when coupled with West Point's progression, demonstrate how Napoleon's integration of STEM profoundly impacted America's military.

Military Background

In this paper, one question that has not yet been addressed is the motivation behind Napoleon's implementation of STEM within warfare. To answer this question, it is important to first gain an understanding of Napoleon's personal story and military background. As a child growing up in Corsica, Napoleon immersed himself in the academic subjects, studying military science, geography, and mathematics.⁷⁷ These subjects provided a proper framework for his aspirations to be a military soldier. However, as Corsica was a newly formed territory without any military schools, he transferred to Brienne, home to one of the twelve government military academies. There, he was subjugated to discrimination by his classmates; nonetheless, he continued to pursue math and history at the school, seeing it as a necessity for his future aspirations. Consequently, the school initialized Napoleon's belief of blending academics and militarism. This deep love of books and learning was combined with a fierce patriotism for Corsica.⁷⁸ These two passions became powerful tools for the French state under Napoleon's reign.

Even after Napoleon left the school, there existed a connection between pursuit and education. In fact, his immediate decision — to join the artillery — was rooted not just in a belief of equal opportunity but also in the mathematical talent that would give him an advantage compared to others.⁷⁹ This reasoning foreshadows Napoleon's later standardization of STEM courses and awards, as ways to continue propagating merit and academic achievement.

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COUNTERARGUMENTS

While this paper has argued that STEM was the most significant factor in fostering Napoleon's success, this claim is not a universally accepted idea. Other papers and analyses have posited that Napoleon's success was driven by certain other attributes, with the most notable being leadership, mass conscription policy, and total war.

Leadership and Charisma

The British government circulated a myth that Napoleon was short.⁸⁰ This myth, intended to disparage Napoleon, has persisted into the present times. However, it is not entirely true. Napoleon was 5'6, which was of average height. Yet, when considering the size of the lofty and burly men he was in charge of—some taller than 6 feet—, it is still unbelievable that he was able to maintain command over his army. To do so, he relied on the craft of leadership. His approach to this practice involved rousing speeches aimed at building a unified, collective identity. One such example is illustrated in the Italian Campaign of 1796:

Soldiers, you are naked and ill-fed! The government owes you much and can give you nothing. The patience and courage you have shown in the midst of these rocks are admirable; but they gain you no renown; no glory results from your endurance. It is my design to lead you into the most fertile plains of the world. Rich provinces and great cities will be in your power; there you will find honor, glory, and wealth. Soldiers of Italy! will you be wanting in courage or perseverance.⁸¹

This speech, an archetypal example of how Napoleon effectively dispersed national fervor, inspired his soldiers to continue pushing through the rugged terrain. Interestingly, the syntax of the speech makes no reference to any individual but to a collective body, which Napoleon refers to as 'you'. In this way, he reminds his soldiers they are working for the broader French nation. Even twenty years later, when his army seemed to be losing, he continued to impart powerful words to his troops:

For twenty years, you have constantly been by my side on the road to honour and glory. You have always behaved with courage and fidelity. Again in these last days, you have given me proof of this. I have sacrificed all my personal interests for the good of the nation; so I am leaving. You will serve her always with glory and honour; you will be faithful to your new sovereign.⁸²

This strand of Napoleon rhetoric demonstrates genuine care for his soldiers. Rather than feigned, it is a token of respect for those who had supported him for decades. For an emperor to be addressing his troops at an almost equal level was considered a stigma. However, in this action, Napoleon cultivated a much closer relationship to his troops. In return, he expected strict discipline and accountability from them.⁸³ His personal presence on the battlefield only strengthened the soldier's respect for him; he visited regularly, often eating bread with his famished troops.⁸⁴

Conscription and Total War

Another characteristic cited for his outstanding military success was the mass conscription policy : *Lévee en Masse*. This policy mandated all eligible men 17 and older to join the army and mobilized society for war production.⁸⁵ The result of this directive was the development of *total war* within France. Linking thousands of soldiers with service and military professionalization, total war combined domestic and military policy under one branch to enhance France's national power. It further directed industry and economic ideas to support the military; factories continuously churned out weaponry and other military supplies.⁸⁶ Total war also sought to destabilize foreign governments through non-military means. With the institution of the continental system that forbade trade with Britain, France aimed to defeat Britain in a battle of attrition, founded upon industrial might.

Comparison to STEM

Each individual factor — leadership, conscription, and total war — played an undeniable role in Napoleon's military campaigns. However, effectively integrating each of these factors into a unified system was only rendered possible due to STEM. Leadership was built upon strategic planning that strategically utilized resources — scientific inquiry and optimization. Conscription involved logistics that both calculated supplies and deployed soldiers based upon predictions and foresight. Total war was incorporated into domestic policy through manufacturing. Laced into manufacturing was the practice of engineering, reiterating a scientific connection to total war. Though this shared dimension was shrouded in other components of war, nonetheless, its presence indicates STEM at the epicenter of Napoleonic warfare.

CONCLUSION

Having been ravaged by war and chaos for so long, the common populace longed for stability and a return to order. Napoleon's inclusion of STEM within national policy, for both domestic and military purposes, helped this vision come to fruition. His transformation of the military curriculum and education to focus more on the sciences — integrated within practical engineering classes— infused STEM with ideas of nationalism and power. Additionally, his deployment of the sciences for domestic reforms — standardizing the metric system, increasing medical opportunity — improved living conditions. Consequently, Napoleon's use of STEM fostered unity and nationalism. These ideas were very important in justifying and supporting imperialistic expansion , suggesting that STEM played an ideological role.

Such actions do not overshadow the important contributions STEM made in a practical, military sense. Both during and prior to his global conquest, Napoleon applied science, technology, engineering, and mathematics, in military campaigns. These applications ranged from weaponry and technology to military formation, calculations, and technology. Furthermore, Napoleonic warfare was pivotal in developing America's military academy *West Point*. Such a powerful legacy is only further testament to STEM's influence in Napoleon's warfare — an application that was not only powerful but also revolutionary. The execution of this novel military design yielded incredible results for France: growth in territory,

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nationalism, economic power, and overall prestige. STEM was the missing piece that finally enabled France to emerge as a global powerhouse.

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