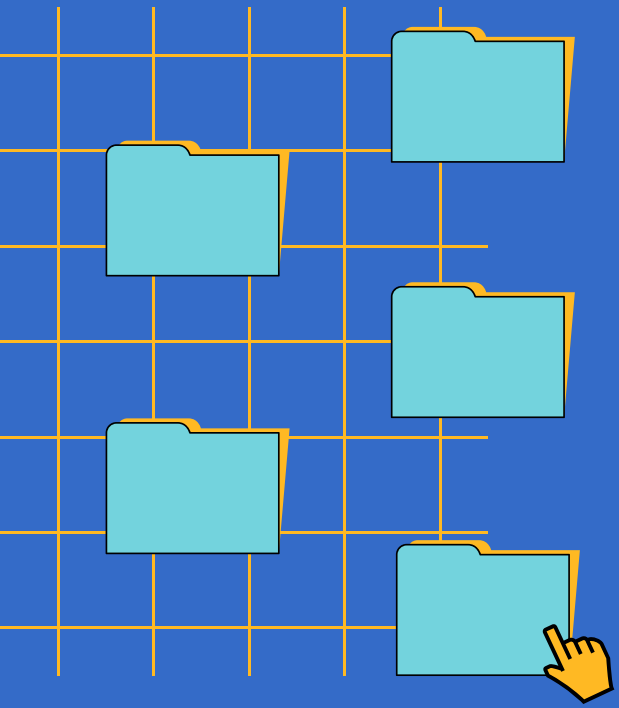
BROWN OPINIONS

CONVERSATIONS:

THE MORAL RESPONSIBILITY OF DIGITAL EDUCATION



Moral Obligation

Digital Fluency

Education as Human Right

Case Study: Brown University

Proposing Solutions

On the moral responsibility of institutions to provide humanities-oriented digital education to its students

By Mason Zhang, Will Havens, Fern Tantivess

Introduction

Institutions must provide humanities-oriented digital education in order to form students capable of operating as moral agents in the modern world. These moral agents are people capable of existing in this world and making thoughtful, independent decisions informed by some rational moral standard. Most importantly, moral agents are able to discern right from wrong and as such be held accountable for their decisions. Information technology is so ubiquitous in our society, and digitization penetrates every aspect of our lives. With the exponential growth of new technological developments, virtual systems possess significant power in influencing the decisions individuals make. As a result, technology and moral judgements are tightly intertwined, and in order to maintain a just society, institutions have a duty to inform the populace on emerging consequences. However, there is controversy surrounding what distinguishes ‘right’ from ‘wrong’ in the pedagogical process. Thus, this paper will explore the philosophical definition of morality itself, and how it relates to contemporary society.

We will provide premises to support the claim that institutions have a moral responsibility by firstly addressing the fundamental purpose of an education, and expanding upon what constitutes digital instruction. We will then highlight why access to this knowledge is an essential *human right,* as well as exploring conflicting conceptions that cause frictional implications. To illustrate these claims and ground it in a real-world context, we will analyze an institutional case study of Brown University, using personally-conducted interviews with Computer Science professors as the primary source for our arguments. Finally, we will discuss a possible solution to surpass barriers that prevent institutions from bridging the digital divide.

Part I: what are the moral obligations of pedagogy?

To define the responsibility of educational institutions, the paper must first lay-down a concrete ethical foundation upon which to build the argument. We shall define moral responsibility using two principles: Immanuel Kant's theory on categorical imperatives and Jeremy Bentham's and John Stuart Mill's underlying ideas on utilitarianism. Ultimately, we will use a conglomeration of the two to support the arguments throughout the paper.

Kant defined categorical imperatives as unconditional truths that all humans are bound to, a moral requirement that is a valid statement in and of itself. It is important to distinguish this categorical imperative from hypothetical ones. In hypothetical imperatives, the truth is only legitimate as a means to an end. For example, "I must do research to complete this paper." While this statement is certainly true, it only exists in an if-then equation. On the other hand, categorical imperatives are rationally necessary and absolute: "I should not kill," does not need justification, to Kant it is simply so.

Kant included access to education as a categorical imperative, stemming from his belief that education was the route to the, "The final destiny of the human race." A destiny of "moral perfection … accomplished through human freedom, whereby the human being is capable of the greatest happiness"[1] For Kant, education was not meant to simply develop one's technical skills that someone could use to fulfill one's ends, but instead to cultivate our moral propensity and character. "The human being should not merely be skilled for all sorts of ends, but should also acquire the disposition to choose nothing but good ends."[2] As humans, each person is entitled to the ability to act as a moral agent as an end in and of itself. Education provides this ability. It not only deeply shapes a person's self-determination and personality, education has also been shown

[1] Phillips, D. C. Encyclopedia of Educational Theory and Philosophy. SAGE Reference, 2014.
[2] Ibid.

to greatly affect one's quality of life in the future. As such, access to education, as part of the development of children as autonomous and moral individuals, is a categorical imperative that government institutions are required to provide.

A similar conclusion can easily be reached through consequentialist methods, specifically utilitarianism. Utilitarianism is more well-known in the general zeitgeist, however we will quickly define it here as it pertains to this paper. Utilitarianism is a branch of consequentialism, which differs from Kantianism in that the consequences of an action are the sole basis on which to judge that action. Although there are many varying interpretations of utilitarianism, the consistent element is the maximization of utility– a metric of usefulness, happiness, or general benefit– for the greatest number of people. In this sense, utilitarians, including John Stuart Mill who was unsurprisingly an early proponent of women's education and suffrage, desired free and public access to education. Education does not just benefit the individual, but also is the foundation of society's progression. Education produces citizens who are increasingly capable of creating new technologies and meaningfully contributing to the economy, which simultaneously benefits the public. Moreover, by creating moral agents of students, education provides a crucial 'checks and balances' system within a democracy. These newly developed autonomous individuals can question and push back on their government based on their moral code, unconsciously providing a crucial public good.

As previously stated, education also helps teach the populace to make more morally sound decisions. This allows students to create avenues for higher pleasures instead of lower pleasures, an idea which stems from John Stuart Mill's theory on utilitarianism. Jeremy Bentham, the founder of utilitarianism, thought all pleasure equal, "the game of push-pin is of equal value with the arts and sciences of music and poetry."[3] Mill disagreed, stating: "It is better

[3] *Rationale of Reward*, Book 3, Chapter 1, Jeremy Bentham (1825)

to be a human being dissatisfied than a pig satisfied; better to be Socrates dissatisfied than a fool satisfied."[4] While the theory is complicated, in essence a higher pleasure is one that exclusively can be appreciated by humans with rational thought; this includes pleasures such as art, philosophy, and politics. Lower pleasures, on the other hand, are animalisitc such as eating, having sex, or enjoying the sun. Building upon Mill's theories of high and lower pleasures, education can be thought of as an encouragement for students to delay easier, lesser pleasures for greater, higher pleasures. By cultivating moral reasoning, education allows higher pleasures to be accessed. In this sense, utilitarian governments have the moral obligation to provide thorough education.

These theories on education can easily be understood through Brown University, as well. Brown declares its mission statement to "serve the community, the nation and the world by discovering, communicating and preserving knowledge and understanding in a spirit of free inquiry, and by educating and preparing students to discharge the offices of life with usefulness and reputation."[5] This purpose maintains utilitarian goals, such as serving the community and world through the education of its students and the cultivation of 'usefulness'. Simultaneously, Brown aims to imbue its students with a Kantian sense of reputation and moral agency.

[4] John Stuart Mill, *Utilitarianism* (1863)
[5] "Brown at a Glance." Brown University, https://www.brown.edu/about/brown-glance.

Part II: Understanding digital fluency

We have shown that pedagogical institutions, whether through utilitarian or Kantian logic, are compelled to provide an education that forms moral agents of their students. Having outlined these theories, we can now begin to explain their imperative to teach digital fluency, which we will define and explore in the following section. Digital fluency is the ability to effectively understand, analyze, communicate, and critique ideas related to the digital world. We can understand this idea in contrast to digital literacy, which only requires the ability to make use of these technologies. While digital literacy is certainly important, fluency goes beyond skill level and asks us to evaluate the technologies that pervade our world. It is important to note that not everyone must become a computer scientist– that is a bleak world in which we hope to never reach. However, every student entering the adult world needs to understand the effects of computer science, the algorithms that change their daily lives and its impact on even our sturdiest institutions.

It is not the intention of the paper to decide what this education should consist of, as that is the role of life-long computer science educators to design. However, on the basic level, this education should include basic understanding of software, big data, privacy, and finally A.I and its social consequences. We believe these topics are and will continue to be fundamental to human life and society, and as such, are necessary to learn. A digital education does not simply entail learning popular programming languages such as Python or Java, but rather, examines how these tools can affect the real world.

We have previously delineated why access to education is both a categorical imperative and the utilitarian responsibility for governments to provide. Scaffolding from this point, we intend to argue that under the umbrella of that larger moral obligation lies the duty to equip

students with digital fluency. Moral agents must be able to make informed and free decisions about their lives. In the digital era, however, it is commonplace for these decisions to occur on the internet. As such, if one is not able to understand the basic workings of the digital world, their ability to become moral agents greatly deteriorates. In the coming section we will explore this reality, and show the necessity of digital fluency.

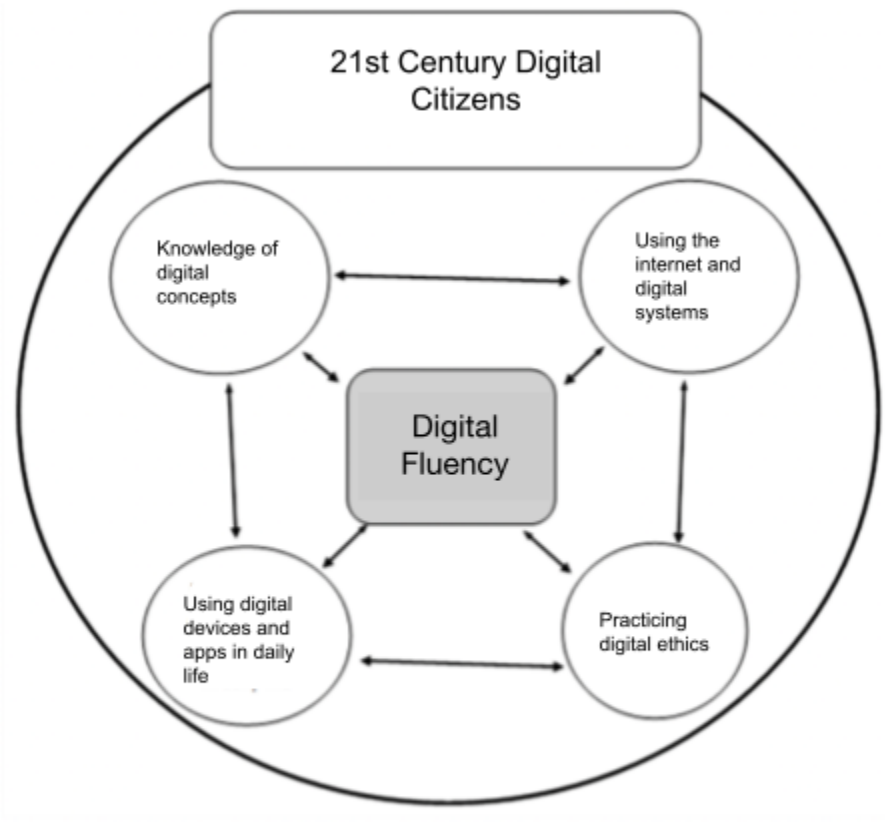


Figure 1. Schematic diagram inspired by the Philippine Department of Education on the importance of digital fluency. Although our framework of digital fluency may vary slightly, the interconnectedness of digital fluency with citizenship is clearly displayed.

Part III: digital fluency as part of a complete education/human right

To begin, this paper will occasionally use the idea of 'human rights,' to justify its arguments and theories. There are many definitions of human rights, including some propose that they do not exist and are simply 'human demands.' This paper will interpret these rights as an extension of categorical imperatives and utilitarian values; rights are concepts that fulfill those two paradigms. Rights differ from privileges just as hypothetical imperatives differ from categorical ones in that they are axiomatic and not dependent on some prior condition. One of the rights that the United Nations recognizes is education. In the famous Universal Declaration of Human Rights (1948), the U.N states, "Education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms."[6] This definition is integral for understanding digital fluency as a human right, as we will explore in the following sections.

Having defined digital fluency under a strong moral foundation, we can now substantiate why it is necessary for a 'complete education,' of which moral agency and autonomy is developed. The paper will present three main arguments to establish this point. First, we will cover the Extended Mind Thesis (EMT) which exemplifies the extent to which technology has become ingrained within, and thus necessary for, human development. Second, we will analyze cases of 'internet manipulation' that have the capacity to restrict and erode the personal autonomy of those without proper digital education.

[6] "Universal Declaration of Human Rights." United Nations, United Nations, https://www.un.org/en/about-us/universal-declaration-of-human-rights.

Part III, Section I: EXTENDED Mind Thesis

To explain why digital fluency is a human right, we will explore how technology is a fundamental component of our everyday functioning. Technological resources have become so thoroughly enmeshed with our lives that they now count as part of internal cognition itself.

One philosophical concept that can explain this is [7] the EMT (Extended Mind Thesis), which states that the mind does not exclusively reside in the mind or body, but instead extends to the physical world. In other words, certain tasks require the body and mind to operate together in a technologically loaded setting. For example, the notes app in our phone could be seen as an extension of our mental faculty of memory; it contains thoughts we have throughout the day, or even passwords or records of exchanges we have with our friends and family. In this regard, our technological devices are a component of our neurological function, and thus access to these devices is a human right for basic function in modern society.

In particular, the COVID-19 pandemic has exacerbated the extent to which technology resides in everyday operations. With the closure of schools and social distancing, in-person instruction was made obsolete, and internet access was necessary to receive any form of education. The concern of internet accessibility is not a new one; in 2016, the UN General Assembly[8] passed a resolution that 'declared internet access as a human right'. However, the resolution was classified as a 'soft law', and did not address *how* punishments could be enforced if nations did not adhere to the guidelines. Five years later, the consequences of this are manifested in the way two thirds of the world's school-age children are obstructed from crucial cognitive development due to lack of home internet connectivity[9]. This is not a matter of social

[7] Danaher, John. "The Threat of Algocracy: Reality, Resistance and Accommodation'. Philos. Technol. (2016) 29:245-268
[8] Barry, Jack. "Covid-19 Exposes Why Access to the Internet Is a Human Right." OpenGlobalRights, 26 May 2020, https://www.openglobalrights.org/covid-19-exposes-why-access-to-internet-is-human-right/.
[9] "Two Thirds of the World's School-Age Children Have No Internet Access at Home, New UNICEF-ITU Report Says." UNICEF, 10 Dec. 2021, https://www.unicef.org/press-releases/two-thirds-worlds-school-age-children-have-no-internet-access-home-new-unicef-itu.

isolation; personal computers are necessary to accomplish certain cognitive goals like assignment completion or intellectual discourse with peers. To compete in a 21st century economy, this growing cohort of young people need to utilize virtual systems as a tool to learn skills transferable to the workforce.

The pandemic has increased the digital divide, which in turn amplified existing inequalities. This is because globally, 58% of school-aged children from richer households have internet access, compared to only 16% of lower-income households.[10] Thus, students in this demographic fall behind even further from their peers and are provided very little opportunity to catch up.

These examples illustrate that socioeconomic and geographic factors should also be taken into account when designing digital curricula. Even if educational institutions incorporate 'ICT'-related courses into their systems, there is no guarantee that it will reach the audience that requires it most. Thus, this highlights the fact that *other* types of institutions, like governmental bodies, also have a crucial role to play in securing the populace with a complete education.

Relating back to Kant's categorical imperative, the Extended Mind Thesis emphasizes that individuals must have access to technological devices, as it provides the capacity to develop the necessary cognitive function to act as a moral agent. Furthermore, from a utilitarian perspective, these digital skills produce productive members of society that create beneficial economic output. All these premises reconfirm the notion that digital pedagogy is a fundamental human right in a contemporary society.

[10] Ibid.

Part III, Section II: Internet Manipulation

Another essential component of human rights is the concept of personal autonomy - the capacity to be one's own self and make informed decisions based on one's own actions. To preserve this right in a contemporary society, individuals must have a basic grasp on the manner by which virtual systems operate. Without understanding the motives behind specific design choices in technological environments, users can be unknowingly manipulated. Specifically, *internet manipulation* refers to the utilization of digital technology (e.g. social media algorithms) for social, commercial, or political benefit.[11]

To understand why digital education is integral in securing personal autonomy, we will explore the concept of 'cognitive hacking'. This is a more dangerous manifestation of AI, as each cyberattack exploits people's psychological vulnerabilities and operates outside of awareness, making it harder to detect. In order to evade these tactics, individuals must be explicitly informed of the technology's inner workings and purpose.

Today's most powerful weaponized form of persuasion is digitally-crafted propaganda employed via 'secret' algorithms on social media platforms. A concrete example of this is TikTok, a video-focused application with 800 million users owned by private Chinese company Bytedance. Tiktok is fundamentally different from other applications; unlike Facebook, which analyzes your current friendship network[12], it uses a behavioral profile to populate a user's feed before relationship data is even added to the equation. Through deploying tactics like negative and positive feedback loops, users can be nudged to behave in certain ways. For example, through the scrolling algorithm, light-hearted or funny videos are deliberately displayed before a propaganda video generated by the CCP, in hopes that the user will share it. This is a form of

[11] Woolley, Samuel; Howard, Philip N. (2019). *Computational Propaganda: Political Parties, Politicians, and Political Manipulation on Social Media*. Oxford University Press. ISBN 978-0190931414.
[12] Kaminska, Izabella. "Cognitive Hacking as the New Disinformation Frontier." Financial Times, 17 Aug. 2020, https://www.ft.com/content/52535b2b-cb23-4ab6-ac66-2859cf9d1ae9.

Pavlovian conditioning; with repeated exposure, the positive emotions become subconsciously linked to the propaganda, and the users can be trained to react positively to positions that support the CCP. Using very specific data like view-time, video repeats, likes, or re-swipes, technology has the capacity to create a user-specific profile of an individual's fears and anxieties, and learn which stimuli are most likely to trigger desired responses, such as to purchase products, or join political movements. If left unchecked, these algorithms can irreversibly damage our ability to form our own judgements. In other words, if individuals are not cognizant of these mechanisms, they no longer hold authority in navigating the online domain, and autonomy is eroded. This illustrates the intense need for students to gain an awareness of manipulative technology through school curricula.

Furthermore, schooling provides an opportunity for students that are interested to delve deeper into the subject matter of Computer Science. Incorporating the humanities into these courses allows individuals to appreciate the responsibility computer scientists have in creating a just society. For example, in the case of TikTok, reverse engineering efforts have been made to understand the inner workings of these algorithms. They discovered protective barriers enforced to prevent people from debugging the app, in the form of encrypting requests with an algorithm that changes with every update[13]. The individuals who do this require an understanding of both the technicalities of algorithms, as well as its complex social implications. Thus, digital education is not complete without the incorporation of an awareness of its ethical consequences.

From a utilitarian perspective, creating morally-aware and technologically-trained students ensures that companies and governments do not abuse their power knowing that the general populace have the ability to understand or decipher their algorithms. This has moral

[13] Kaminska, Izabella. “Cognitive Hacking as the New Disinformation Frontier.” Financial Times, 17 Aug. 2020, https://www.ft.com/content/52535b2b-cb23-4ab6-ac66-2859cf9d1ae9.

implications, as transparency allows for ethical liability that forces authorities to consider the societal effects of its actions.

Today's governments increasingly operate with the assistance of algorithms, which has allowed for rapid positive developments, but also raises issues regarding opacity. Specifically, the threat of algocracy constrains opportunities for human participation, and comprehension of public decision-making. Education prevents the creation of a group of 'epistemic elite' who understand these algorithms, and thus possess unbalanced power in guiding the fate of civilians. The existence of these groups exacerbates inequalities, as the general populace have no way of reversing the sophisticated algorithms designed by technical experts. Again, this confirms the notion that institutions have a moral imperative in providing a digital education.

Part IV: Case Study of Brown University

Throughout each part of this project, we have drawn upon the ideas and perspectives of several experienced scholars and professors who are well-versed in the various research areas of computer science. In the spirit of Brown's open curriculum, the undergraduate-oriented education in the computer science department is a pioneer in the creation of the Socially Responsible Computing Program (SRC). This initiative was started two years ago in 2019, and involves the indispensable work and leadership of specialized undergraduate teaching assistants, called Socially Responsible Teaching Assistants (STAs). Students are able to further explore their interests while presenting and discussing with peers on the consequences of modern technologies.

For example, the SRC program has been successfully integrated with CSCI 0150, the largest introductory computer science course taught at Brown University. Since 1965, Andries Van Dam has been teaching this course, and now, every single lecture is accompanied by a concise presentation from STAs.[14] Topics covered range from labor in the tech industry to governmental surveillance. In the Fall Semester of 2021, there were 341 students enrolled in CSCI 150, who were then exposed to various social implications of the software programs created by computer scientists. On the following pages, we will provide a brief introduction on the background of the interviewees and examine three overarching questions which provide insight on the different aspects of digital education. We greatly appreciate the vital contributions of all the professors interviewed to the formation of this project.

[14] van Dam, Andries. "Reflections on an introductory CS course, CS15, at Brown University." ACM, Inroads 9.4 (2018): 58-62.

INTERVIEWEES

Shriram Krishnamurthi

- Professor of Computer Science @ Brown
- Founder of Bootstrap, "one of the largest providers of formal CS education to girls and underrepresented students nationwide"
- Interests: Human-computer Interaction, CS Education

James Tompkin

- Assistant Professor of Computer Science @ Brown
- Creator of a creative multimedia exhibition in the Museum of the Moving Image at New York City
- Interests: Visual Computing, Image Editing

Lachlan Kermode

- PhD Student in Modern Culture and Media at Brown
- Leader of A.R.G.@Brown, a biweekly reading group focusing on the "technical, theoretical, and historical content of computers"
- Interests: History of Computing and Media

Daniel Ritchie

- Eliot Horowitz Assistant Professor of Computer Science
- Co-Leader of the Brown Visual Computing group
- Interests: Machine Learning, 3D Graphics

*Quotations and images courtsey from vivo.brown.edu, dritchie.github.io, jamestompkin.com, bootstrapworld.org, and brown.argnotes.club

In your opinion, what is the purpose of the Socially Responsible Computing Program?

TOMPKIN: “Giving people sufficient tools to better assess what is happening around them and acting in informed ways so they are not powerless.”

KRISHNAMURTHI: “I want all [my students] to become responsible computer scientists. We are like the guild masters initiating people in a guild.”

KERMODE: “Looking at CS pedagogy and the undergraduate curriculum in particular,
We should rethink the way certain courses are taught and sensitize those modules to potential ethical and moral consequences of the systems which are being learned to build.”

RITCHIE: “It isn’t enough to build the technology in a vacuum. The people who the program is passed onto don’t know it better compared to the developer.”

Takeaway:

Personal autonomy has become increasingly tied to the digital skillset. As public citizens, we have been equipped to assess current situations happening in national discourse. In a digital context, Professor Tompkin rightly asserts the importance of informed decisions by individual moral agents in digital industries. For instance, when computer scientists at Google rallied in 2018 to write a protest letter against Project Dragonfly, a plan to build a censored Chinese search engine, it was then cancelled. To be sensitized to potential impacts, as Kermode suggests, is a vital step in checking organizations and the chief aim of the SRC initiative.

When computer scientists have the tools and knowledge to analyze social implications of technology, a personal level of action is created. With Professor Krishnamurthi’s analogy to medieval video games, educators are often the initiators of future software engineers. Thus, the SRC program has a strong potential for developing thinking tools which equip the future generation in making morally salient decisions. In recent years, it has become evident that versatile skills, such as societal awareness of technology, are desirable on top of technical ability. No longer can computer scientists live in a vacuum, as Ritchie states, because the substantive reality of algorithms impacting our lives cannot be ignored.

What is something most people would not know?

TOMPKIN: “When national broadcasting became possible, the government provided rules for how television broadcasters should operate. No such rules exist for social media now.”

KRISHNAMURTHI: "If someone made a very simple error, it can cause entire systems to blow up. The second most widely used crypto library had an error in that they forgot to make an array bounds check. This is not rocket science, they wrote easy code badly.”

KERMODE: “A lot of computer science research in the US is funded by the military. Software allows for the centralization of power and was developed at least for a govermentalized mentality.”

RITCHIE: “In the computer science research field, high-profile machine learning conferences now require researchers to acknowledge the social consequences of their research.”

Takeaway:

Digital knowledge has become tied to every domain of life. When Kermode references the centralizing nature of software, our daily lives and access to information has indeed become focused on popular search engines such as Google and social media platforms. We must also understand that digital errors are caused by stupid mistakes. It is embarrassing that one of the most widely used cryptocurrency libraries had such an elementary mistake in the code. Thus, learning about digital technology in a substantive way is not as difficult as it may seem. There is a fallacy around the computer science field regarding ‘tech-exceptionalism’, as Krishnamurthi points out.

In addition, Ritchie points to the importance of the social and ethical impacts of digital fluency for even machine learning conferences, making it mandatory to add the societal implications of their algorithms. So much about the history of media is unknown to the wider public, which is aversive to forming informed opinions. If one knew the history of broadcasting rules brought up by Tompkin, one could possess and advocate for more knowledgeable stances.

What gives you hope in the digital future?

TOMPKIN: “San Francisco banning facial recognition [and creating] technological initiatives trying to support the identification of falsified media, this is very good.”

KRISHNAMURTHI: “Social science [has been] revolutionized by computing...[We can create] students who can ask a history question in a data driven way.”

KERMODE: “If people from Brown with a CS degree graduated, [we can] change the industry trajectory [with a] more diverse set of students who feel comfortable to use their tech [skills] in different parts of the world instead of corporate software America.”

RITCHIE: “We are building technologies which make it easier for people to express creative visions. Lowering the barrier for the amount of skill and time required to make interesting 3D graphics has a democratizing effect which can be good or bad.”

Takeaway:

Optimism has never been as important as in the modern age. The numerous issues associated with digital technology may seem alarming, and indeed should be, but they should not be overwhelming. As Krishnamurthi and Ritchie bring up, the way we research in social sciences and express art through multimedia has changed for the better. Never has data analysis been so accessible, thus enabling the discovery of more knowledge. The fact that the SRC program exists at Brown should give hope to the public in the digital future. This initiative has the potential to change the narrative of computer science from one dominated by ‘Big Tech’ companies to a democratized field where different fields intersect through the applications of technology.

There should also be a hope for the government. People may be tempted to fall into cynicism from the apparent paralysis of the federal government in passing effective regulations on social media companies, but municipal and state bodies have the equal capacity to incite vital change. Cities like San Francisco, as Tompkin mentions, have protected the privacy of residents by passing ordinances which ban the usage of facial recognition, an issue which has worsened with digital technology. There are many knowledgeable people who are fighting for these good causes, and the SRC program can only lead to the increase of responsible technologists.

Part V: How should we increase access to a digital education

As we mentioned before, it is not the intention of the paper to design the exact curriculum to teach digital fluency. However, here we will show how implementation of a digital education might occur. First and foremost, we suggest integrating computer science into the core curriculum of the K-12 public school system. It is a reality that there is a limit to the amount of material able to be covered in a school year. Moreover, it's unlikely that the educational system in the United States would remove other core curriculum to make room for Digital Education.

However, as this paper has shown, this is a move that pedagogical institutions are morally obligated to make. The solution to these contradicting realities is merging digital education into pre-existing classes. Instead of trying to teach digital fluency as its own course, the U.S should focus on adding lessons that connect foundational courses with the digital world. One of such programs is organized by Brown's own Shriram Krishnamurthi through an initiative called Bootstrap.

One could argue, however, that a general implementation of a digital fluency program could worsen other notorious forms of the digital divide. While helping close the socioeconomic gap in the education of computer science it might simultaneously exacerbate that gap for women and racial minorities, most notably Native American, Black, and Hispanic students.[15] This is a valid concern. Bootstrap realized this barrier when it chose to transition its efforts from after school hours to the school day, since students of disadvantaged backgrounds may not have the time and resources to attend after school programs. Fusing digital education with the pre-existing syllabus ultimately opens up access to computer science for underrepresented groups.

[15] Myers, Blanca. "Women and Minorities in Tech, by the Numbers." *Wired*, Conde Nast, 27 Mar. 2018, https://www.wired.com/story/computer-science-graduates-diversity/.

Part VI: Further Considerations

It is important to note that there are multiple other issues concerning digital education that are beyond the scope of this paper. In order to modify and improve current systems, institutions must have a way of measuring output to determine success of the program. However, 'measuring' digital fluency becomes convoluted due to the subjective nature of the definition.

For example: even if institutions incorporate a digital curriculum, how can we confirm that students have assimilated the relevant knowledge needed to successfully act as a moral agent? The level of digital fluency required to succeed after graduation varies on a case-by-case basis; institutions may have to adjust and personalize course syllabi according to factors like geographic location, income level, or even current political discourse. If students follow a core curriculum based on a 'one-size-fits-all' philosophy, the content they learn may not be conducive to practicality in a real-world-context. Furthermore, rapid technological expansion can erode our perception of what was once considered 'digitally literate'. For instance, coding languages that were once useful may become obsolete very quickly, and individuals may have to keep up with these developments in order to retain digital fluency.

The issue of measuring outcome is even more complicated when considering humanities-oriented courses. Take, for example, the SRC system at Brown. How do we assess whether students make more moral decisions as a result of the program? If we analyze graduate destination data, how do we determine if a certain job is more 'ethical' than another? Institutions must be conscious of the subjectivity underlying 'socially responsible courses'; it is crucial not to impose certain moral principles onto students, as this in turn restricts personal autonomy.

Moreover, this entire paper is based on the principle that individuals and societies both benefit from increased digital fluency. Digging deeper, however, this argument exists on the

foundational idea that progress is inherently good. However, there also exists a theory that suggests this is not the case. This theory has many sub-categories, each with its own name and specifications: neo-luddism, techno-pessimism, or anarcho-primitivism, etc. Despite their differences, we will discuss these theories as one as ultimately they each propose a similar notion– the slowing or ending of technological progress.[16]

Plainly stated, the counterargument is that we should avoid digital education since technological progress is overall detrimental. There are many different ways to present this claim. One could point to the many studies showing that technology leads to a sense of purposelessness and depression,[17] or perhaps the exponential correlation between the time since the industrial revolution and the rising plethora of environmental issues.[18] One could even make the philosophical argument that technology is simply an addiction, and therefore humans cannot be autonomous moral agents if they are so emboldened to progress. This theory, which draws from Henry David Thoreau's ideas on self-sufficiency and simple living, holds that to be a fully independent being we must only be loyal to our 'natural' selves, our biological and physical needs.[19] Since technology resides outside that realm, it thus limits our autonomy.

This paper is not going to dismiss these claims, but it will argue a certain amount of inevitable technological growth. Humanity has been creating and spreading technology since the beginning of civilizations. To suggest stopping this movement, even if the argument to do so is philosophically sound, is simply unreasonable. Moreover, theories of technological determinism suggest that the "role of a progressive society was to adapt to [and benefit from] technological

---

[16] Gardenier, Matthijs. "The "anti-tech" movement, between anarcho-primitivism and the neo-luddite", *Sociétés*, vol. 131, no. 1, 2016, pp. 97-106.
[17] Lin, L.y., Sidani, J.E., Shensa, A., Radovic, A., Miller, E., Colditz, J.B., Hoffman, B.L., Giles, L.M. and Primack, B.A. (2016), Association Between Social Media and Depression Among U.S Young Adults, 33: 323-331.
[18] David Austin, and Molly K. Macauley. "Cutting through Environmental Issues: Technology as a Double-Edged Sword." *Brookings*, Brookings, 28 July 2016, https://www.brookings.edu/articles/cutting-through-environmental-issues-technology-as-a-double-edged-sword/.
[19] Witherell, Elizabeth. "The Writings of Henry D. Thoreau, On Technology and Progress." *Life and Times of Thoreau*, Apr. 2019, http://thoreau.library.ucsb.edu/thoreau_life.html.

change."[20] In this sense, society exists as a function of technological progress, and therefore the separation of the two is more than unreasonable, it's impossible.

Drawing from the previously defined Extended Mind Theory, a similar response can be given to the idea that we lose autonomy with technology. Technology does not remove our autonomy– it is just an extension of it. This is an important distinction to make since it means that technological progress is not necessarily good nor bad, it simply extends humanity's realm of influence. This amplification is two fold– it can at once improve medicine and communication while it simultaneously intensifies pollution and global warming.

Given the inevitability of technological growth and its ability to augment our moral decisions, the intent of our paper to establish a meaningful digital education is made even more crucial. The focus should not be on the slowing or stopping of technological progress, but instead on the formulation of moral agents who will handle the digital world with care.

[20] Tenekedjieva, Stefanija. "All You Need to Know about Democratization in Technology." *Medium*, Wearelaika, 8 Mar. 2021, https://medium.com/wearelaika/all-you-need-to-know-about-democratization-in-technology-3b43331a495e.

Conclusion

Drawing from the premises provided in the paper, it is clear that institutions have a moral imperative to provide a humanities-based digital education to their students. Using a mix of utilitarian and Kantian reasoning, we defined a complete education as the formation of moral agents who are able to navigate the modern world in a useful and ethical manner. In order to accomplish this feat, contemporary moral agents require a certain level of digital fluency. Without digital fluency, they are subject to internet manipulation, worsened economic opportunities, and by Extended Mind Thesis, are in an even more difficult position to develop necessary cognitive functions. Interviews conducted with Brown University's Computer Science professors exemplified the success of implementing a Socially-Responsible Computing program in a college curriculum. Although there are evident conflicts of interest in designing such curricula, the acute need for interdisciplinary relations trump any bureaucratic issue that can be resolved. Alas, institutions must continue to adjust their systems to accommodate changes in public discourse; the digital revolution intuitively calls for a revolution of pedagogical systems.

Works Cited

Barry, Jack. “Covid-19 Exposes Why Access to the Internet Is a Human Right.” OpenGlobalRights, 26 May 2020.

Bentham, Jeremy. The Rationale of Reward. Hunt, 1825.

“Brown at a Glance.” Brown University, https://www.brown.edu/about/brown-glance.

Danaher, John. “The Threat of Algocracy: Reality, Resistance and Accommodation’. Philos. Technol. (2016) 29:245-268.

David Austin, and Molly K. Macauley. “Cutting through Environmental Issues: Technology as a Double-Edged Sword.” *Brookings*, Brookings, 28 July 2016.

John Stuart Mill, Utilitarianism (1863)

Kaminska, Izabella. “Cognitive Hacking as the New Disinformation Frontier.” Financial Times, 17 Aug. 2020, https://www.ft.com/content/52535b2b-cb23-4ab6-ac66-2859cf9d1ae9.

Lin, L.y., Sidani, J.E., Shensa, A., Radovic, A., Miller, E., Colditz, J.B., Hoffman, B.L., Giles, L.M. and Primack, B.A. (2016), Association Between Social Media and Depression Among U.S Young Adults, 33: 323-331.

Lomas, Natasha. “Most EU Cookie ‘Consent’ Notices Are Meaningless or Manipulative, Study Finds – TechCrunch.” TechCrunch, TechCrunch, 10 Aug. 2019.

“LS-6-Digital-Literacy.” Republic of the Philippine Department of Education, 2017.

Myers, Blanca. “Women and Minorities in Tech, by the Numbers.” Wired, Conde Nast, 27 Mar. 2018, https://www.wired.com/story/computer-science-graduates-diversity/.

Phillips, D. C. Encyclopedia of Educational Theory and Philosophy. SAGE Reference, 2014.

Tenekedjieva, Stefanija. “All You Need to Know about Democratization in Technology.” *Medium*, Wearelaika, 8 Mar. 2021.

Witherell, Elizabeth. “The Writings of Henry D. Thoreau, On Technology and Progress.” *Life and Times of Thoreau*, Apr. 2019, http://thoreau.library.ucsb.edu/thoreau_life.html.

Woolley, Samuel; Howard, Philip N. (2019). Computational Propaganda: Political Parties, Politicians, and Political Manipulation on Social Media. Oxford University Press. ISBN 978-0190931414.

van Dam, Andries. "Reflections on an introductory CS course, CS15, at Brown University." *ACM Inroads* 9.4 (2018): 58-62.