

JIPP

Journal of
Interdisciplinary
Public Policy

Volume 2 Issue 4 (Fall 2021)

Technology in Policy

NFTree: Art Without Emissions

*Margaret Moore, Charles Averill, Neal Gandhi,
and Jeniel Zimmerman*

Balancing Tech Sustainability and Scalability: Lessons from *Learning Equality*

Maanas Sharma, with Dr. Jamie Alexandre

And more...

FRONT MATTER

The *Journal of Interdisciplinary Public Policy* is a quarterly, open-access journal for youth. We elevate diverse perspectives in public policy and highlight the need for interdisciplinary thinking to create equitable policy. Whatever your interests or skills, there's a [home for you](#) at JIPP.

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This issue of the *Journal of Interdisciplinary Public Policy* takes an unconventional form. Reflecting our dedication to elevating *all* ways of presenting policy, this issue is the first to be primarily composed of *policy memos*. A special thanks to our partners at Hack+Policy Foundation for their support during this initiative. This change is reflected in the formatting throughout the edition, including but not limited to our choice to section the publication by topic area and not medium. We hope you enjoy this special project.

Maanas Sharma

Issue Head & Lead Editor

Technology in Policy

Volume 2, Issue 4

Fall 2021

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THE ENVIRONMENT

NFTree: Art Without Emissions

To: The Digital Arts Industry

From: Margaret Moore^a, Charles Averill^a, Neal Gandhi^a, and Jeniel Zimmerman^b

Executive Summary

Art is in the midst of a technological revolution. Non-Fungible Tokens, a method of applying unique values to digital content, have enabled digital artists to sell their work online as never before. This revolution, however, is not a green one, with electricity-guzzling cryptocurrency forming its basis. The industry — and the planet — would benefit greatly from adopting a non-cryptocurrency minting process, as implemented by [NFTree](#).

Background

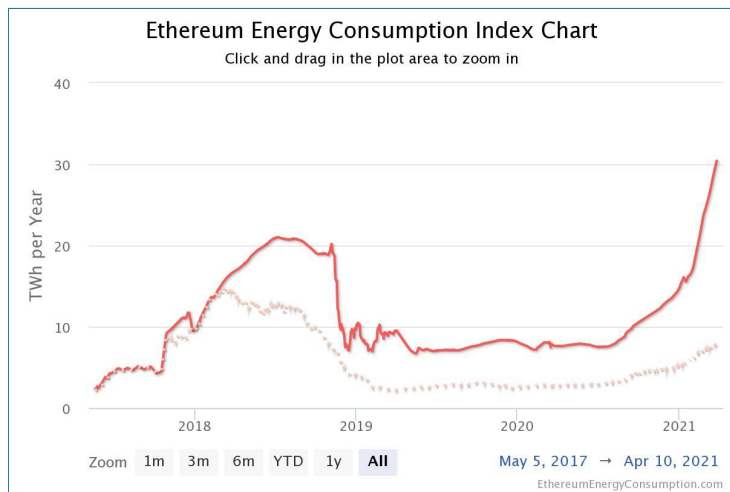
Non-Fungible Tokens, or NFTs, serve as digital proofs of ownership, permanently tying a file to a token on a cryptocurrency — typically Ethereum — blockchain, a ledger of transactions that can be used to verify the item's authenticity. That process, known as "minting", makes each NFT unique, like a signature from its creator. While anyone can still view the work, owning its NFT grants buyers certain usage and bragging rights, creating the air of exclusivity that has led to its current popularity explosion. NFTs create scarcity: by labeling a digital piece as the original copy, artists are able to ensure the value of the individual work, rather than losing out to the copy/paste function. This empowers monetization in an otherwise difficult-to-protect industry. It also allows creators to insert conditions within the file, such as preventing unauthorized use or paying a cut of resale profits back to the original artist.

Problem Statement

However, the environmental drawbacks of NFTs are massive. Mining, the process by which computers generate currencies like Bitcoin and Ethereum, requires enormous amounts of electricity to operate. Most major currencies work via vast networks of computers competing to be the first to guess an encoded number, like solving a puzzle. These puzzles are designed to be inefficient — which secures cryptocurrency generation, but at a high electrical cost.

Ethereum mining, which shot up with the rise of NFTs that relied on it for encryption, accounts for 14.35 metric tons of CO₂ emissions a year, with the energy of a single trade

sufficient to power an average U.S. household for over 2 days. Bitcoin, another cryptocurrency used in transactions, matches Switzerland's entire carbon footprint. Spikes in energy consumption due to mining have already caused power grid failures, sparking fires, and incurring overload damage. Long-term, cryptocurrency's energy inefficiency contradicts the fight against fossil fuel consumption, contributing to the larger climate crisis. Ethereum alone uses over 30 billion kilowatt-hours (kWh) a year, estimated at \$3.2 billion/year of environmental



damage. Notably, that figure does not include non-climate damages, such as health costs incurred by pollution.

NFTs play a critical role in overall cryptocurrency energy use: the most popular NFT auction houses have put out over 2,000 metric tons of CO₂ total since launch (McDonald). Given the growing concern over the effects of climate change on the global population, curbing NFTs' environmental footprint is imperative.

Recommendation

A solution to NFTs' environmental problem is desperately needed. Current proposals fall short in addressing the damage caused by cryptocurrency mining; most simply look to alleviate negative effects rather than stopping them at the source. For example, alternative cryptocurrencies exist that use less energy than Ethereum, but, ultimately, they still rely on mining. As another option, projects like ImpactScope have been launched to offset NFTs' carbon footprint, encouraging users to donate to international conservation projects, but this still allows carbon emissions to occur. The last option is to abandon non-fungible tokens completely, which risks losing out on a revolutionary advance for digital art.

However, minting unique signatures for digital content does not inherently require the use of blockchain. While cryptocurrency mining is a method of verifying a piece's authenticity, it is not the only way. Many platforms verify uniqueness through the use of a Universally Unique Identifier, or UUID. UUIDs have an incredibly high rate of variance, making them a computationally cheap method of generating unique values. Using UUIDs to verify unique signatures would eliminate NFTs' ecological impact without sacrificing their unique opportunities in e-commerce for both creators and collectors. **NFTree** would be a platform for the sale of digital art using this UUID system as an alternative minting mechanism, ensuring

authenticity without harmful emissions. Future work may focus on audience interactions, improving the auction feature, and adding an “upvoting” feature to improve user experience.

The benefits of adopting non-blockchain minting are numerous. By eschewing the use of cryptocurrency, NFT mining’s demand on power grids — and the resulting ecological harm — is eliminated. Shifting to this model would increase profits for buyers, sellers, and the platforms that host them, too. Take ArtStation for example. The digital art platform sought to sell NFTs on their website, but faced enormous backlash from their user base over environmental concerns, forcing them to abandon the idea entirely. NFTree would allow companies to sell digital art without alienating “green” users — potentially expanding the current market. Going off Ethereum would also eliminate its “gas fees,” lowering the cost of entry for new artists and increasing profit margins for buyers and sellers alike.

Digital art sales would still face issues like fraud prevention that continue to make verifying content creators a pressing concern, which merits further investigation. Shifting away from cryptocurrency may deter some users wary of more stable currency; however, the clear benefits of “going green” outweigh the risks. For every die-hard cryptocurrency fan turned away by the use of new mechanics, there are more of the uninitiated who could have an easier entry into the market by removing both the complexity of blockchains and the fees incurred with Ethereum use, making this a net beneficial move for the industry and environment.

Conclusion

The art world’s technological revolution need not rely on inefficient — and environmentally dangerous — cryptocurrency mining. By implementing a Universally Unique Identifier to authenticate works, the industry can adapt to the future, protect the rights of digital artists, and prevent a significant rise in emissions. Through environmentally-conscious innovations like NFTree, we can ensure a greener and cleaner future in digital art.

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Alleviating Indian Farmer Distress Of Crop Disease

To: Indian Agricultural Research Institute

From: Digvijay Singh Rathore^a, Sariyya Mammadzada^b, and Rachana Kommineni^c

Executive Summary

The deficient agricultural conditions of Indian farms, including the lack of adequate technical resources to excel in lucrative, nutritious cultivation, have deprived the national Indian society of their proper dietary needs. The difficult and unclear detection of crop diseases contributes to the loss of vast amounts of nutritious food and thus contributes to the food insecurity the nation faces. This negatively affects Indian society as it generates a population of hunger and dependability on imports of processed food. Additionally, with the governmental imposition of the new controversial "Farm Bill" policies that disrupt the marketing system, farmers are in urgent need of agricultural improvement. The *Bean App* leverages computer vision technologies to detect if a set of crops has pathogens. Widespread installation among Indian farmers will ensure that they have the technical assistance needed to efficiently identify diseases and treat them accordingly.

Introduction

The lack of disease control in India has detrimentally affected its rapidly growing population. With only 10% of the country's investment emphasized towards agriculture, farmers have been deprived of access to essential tools and knowledge about agrology and agrotechnology. The absence of government support only indicates how vital it is to address this issue at hand and help alleviate some of the stresses farmers endure. It is estimated that around 16,000 Indian farmers die due to suicide every year — most due to the socio-economic issues they were facing.

Crop diseases bring various social and environmental financial concerns as well. Each crop has economic value, India loses \$500 billion each year due to numerous diseased crops. Additionally, the lack of domestic food yields the need for processed food importation, making it difficult for the average classed families to access nutritious food.

Upon interviewing the farmers mainly from west India and a few other parts of the nation, we found that even individuals with years of experience in agriculture struggle to accurately diagnose plant diseases. This results in a significant outlay for incorrect medication. Hiring

experts or seeking advice from government professionals isn't accessible because of the funds required and inadequate availability in all regions of the country.

The proposal for the *Bean App* will help tackle the matter of unclear crop disease detection as it will enable farmers to efficiently facilitate disease management of crops. It is a downloadable free app that recognizes disease through a machine learning-enabled computerized analysis of a picture. Better yet, it can even diagnose a set of plants rather than one with over 84% accuracy, considering the limited dataset we had. With more resources, in terms of computer power and datasets for a varied range of plants, we can train extremely accurate and faster ML models.

Recommendation

The fundamental issue is the effective detection of disease within crop fields. The *Bean App* can decipher this issue through the integration of Artificial Intelligence into daily farm life. With a camera lens, the application will analyze the health conditions of a set of plants. Furthermore, with the objective of accessibility of resources to Indian farmers, the application will be free of charge. Any additional features will be purchased separately by individuals at their own convenience and will have no affiliation to the organization.

Although the *Bean App* is technologically advanced, it is crucial to accentuate the limitations farmers may be faced with when using it. One of the major setbacks is the distribution and awareness of *Bean* within the Indian population. The lack of networking connections can toughen the process of advertisement. Despite this, already established village administration authorities can ease the process of spreading awareness. The fact that over half a billion of the rural population have smartphones makes the *Bean App* a much more accessible solution. On top of that, the infrastructure around internet access in India is growing rapidly and it is expected to have the most active internet users in the upcoming years.

The implementation of the application to crop fields is strongly recommended to farmers in India. It offers a technological solution to enhance agricultural growth and rural development. Existing policies are no longer feasible to modern Indian agronomy as they fail to prioritize food security measures and agricultural progress. According to the World Bank, "India's rice yields are one-third of China's and about half of those in Vietnam and Indonesia. The same is true for most other agricultural commodities." With numerous evidence from studies such as this one, it is conspicuous that agricultural productivity has significantly declined. Despite this, India can gain agricultural fertility once more through the support of technological tools such as the *Bean App*.

Impact

The Bean App addresses the socioeconomic and environmental needs of farmers. It will allow better facilitation of crop fields and will hamper the numerous diseased products since farmers will now be more aware of the conditions of their crops. In the broader context, it can assist India's dietary needs as there will be less importation of processed foods and more access to domestic, nutritious food.

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SOCIETY

ReNews: A Real Solution to Fake News

Akash Chandrayan^a, Keira Wong^b, Krish Shah^c, Priyanshu Vanani^d, and Tamish Shukla^e

Executive Summary

Fake news is prevalent in all sorts of ways through newspapers, magazines, and especially the internet. Over time, this has made it difficult to know what can or can't be believed. The spreading and sharing of misinformation by people through social media also play a huge role in gaining traction with fake news. There are few systems present that are designed to combat fake news and those can be easily manipulated through user comments. To counter this, our team has created a program that will take an article as input and evaluate its authenticity. On top of that, if an article is found out to be fake, the program will suggest better news sources to look into based on your interests.

Introduction

The universe of “fake news” is much larger than simply false news stories. Some stories may have a nugget of truth but lack any contextualizing details. They may not include any verifiable facts or sources.

Fake news can be of multiple types:

1. **Satire** – made-up stories that aren't meant to be taken seriously; written to joke about the news or celebrities.
2. **Clickbait** – eye-catching but misleading headlines; designed to get people to click on links to make money or views for a website.
3. **Propaganda** – false facts which are written to promote a political agenda or a set of ideas.
4. **Mistakes** – sometimes accidents can happen, but a trusted source will always correct errors in their stories and say when they've got things wrong.

There are not currently adequate tools present to help thwart fake news. There are mostly only manual methods of recognizing fake news. The ones that are automated only check some specific articles (e.g. FactCheck.org) and have limitations. A team at Penn State's College of Information Sciences and Technology showed how these fake news detectors on social media sites can be manipulated through user comments.

These sites such as Facebook are the main target for the widespread use of fake news. In 2014, there was an alarming story that bounced around accruing hundreds of thousands of likes: the small town of Purdon, Texas, was reported as quarantined after a family of five was diagnosed with Ebola. The story was a total hoax, put out by a deeply cynical site called the National Report.

A rather limited number of people are educated on this crucial topic. The media should be an informative haven rather than a medium for spreading fake news. The spread of anti-vaccination misinformation on social media, (and its implications for public health and the global fight against COVID-19) is a textbook example of how misinformation can have serious real-world effects, particularly while we tackle the virus.

ReNews

For people wanting to educate themselves on current events, politics, or any story, the truth is paramount. No one wants misinformation when they read articles, documents, or the newspaper. Our product, ReNews, brings the light of truth into our digital world of information.

ReNews is a product solely built for the purpose to flag websites that contain false information. It recognizes fake news instantly. Using this tool, fake news will be much easier to spot in our day-to-day lives. ReNews' competitors only contain information on particular articles on the internet, while ReNews is able to dictate the truth on any article it sees.

We have built ReNews in two ways, to allow the user to choose what is best for them. First, we made a [website](#) that takes in articles and spits out the truth. For more frequent users that are in a rush, we made a Chrome extension that sits happily in their browser.

Objectives

1. ReNews recognizes fake news almost immediately and indicates the user, as well as uses machine learning to function. This will help improve the system over time. The program searches for flagged websites and articles from a vast database that assists in generating the information needed.
2. ReNews has an added feature that provides reliable and trustworthy sites based on your interests, related to the topic you were searching for. If the original site is found out to be fake, this function will provide aid and allow the user to obtain the result desired.
3. On top of that, once a fake article or site is found, the system could send a detailed report to the concerned authorities immediately. The authorities will take the action that

they deem is necessary. Along with that, the database will also be updated from time to time.

Technical Information

To combat the devastating effects of fake news, we utilized machine learning (ML) — specifically linear and logistic regression — to determine the validity of an article. We first constructed the ML model with Python in the Flask framework and deployed it on Heroku. We created a front-end website with ReactJS in which the user could input their article. Later we realized that it would benefit the user experience to have a Chrome extension instead, so we built that using the classic HTML, CSS, and Javascript.

Potential Limitations

1. The primary difficulty is that the user will have to select and paste the text every single time they would like to check an article or a website. In the future, we hope the system would develop to automatically scrape the necessary information off of a website.
2. The second issue that arises is that this is a newly designed model. Hence, there are still chances of falsely labeling a fake news source as real or vice versa. This could be a threat to the validity that our innovation promises. However, we are still improving our model to ensure that this possibility is lessened. As of now, our model has a 96.25% accuracy rate.

Conclusion

The effects of fake news can be catastrophic. Elections are meddled with, businesses fail and individuals are shamed based on a lie. People who spread fake news do it for their own profit. Strict regulations and actions on fake news should be promptly taken as it is of great concern. However, there are very few of these regulations being implemented. This is where ReNews plays a major role. Our team hopes the system that we have created would enact a substantial change in the fight against fake news.

With ReNews, we are renewing the face of storytelling. No more media manipulation or suspicious stories — we simply want to bring humanity to real news. The world has too many stories to pollute with fictitious fables. Let's flip the switch, for real this time.

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Balancing Tech Sustainability and Scalability: Lessons from *Learning Equality*

By: Maanas Sharma

I recently sat down with Dr. Jamie Alexandre, the co-founder and Executive Director of Learning Equality, a 501(c)3 non-profit committed to enabling every person in the world to realize their right to a quality education, to discuss the organization's journey, mission, and how it is bridging the gap between governance, sustainability, and scalability.

Why don't we start by talking a little bit about Learning Equality and your products?

After working as an intern with Khan Academy, a colleague and I had the idea of bringing the Khan Academy experience offline using a low-cost Raspberry Pi computer to serve the half of the world without access to the Internet. After a prototype was developed, we open-sourced the technology, known as *KA Lite*.

Shortly after it launched, it sparked an enthusiastic global response that led to a flood of requests for support, features, and partnerships. This sparked a decision to go “against the current” and create a nonprofit organization focused on supporting learning by means of offline-first educational technology. From the feedback we received, we realized the need to distribute materials beyond Khan Academy content (which is what *KA Lite* focused on), to provide better support to educators, and for an improved experience for discovering relevant learning resources.

So through our next technology, *Kolibri*, we continued to bridge the online and offline worlds, enabling more equitable access to education technology in an inclusive way, but we also allowed different communities to contribute their own educational materials, organize them for their purposes, align them to local curricula, and adapt the platform to suit their unique needs.

Of course, Learning Equality prides itself on a strong sense of justice. What actions have you taken to promote equity in the products and their deployment?

Indeed, equity has been at the forefront of everything that we do from the beginning. The biggest piece of that is this focus on offline first. Often, a platform is designed first as an

online tool, and then parts of it are taken offline — that's offline second. Our focus on what it means for a whole ecosystem to work completely offline and never need to be online is critical, because connectivity is one of the significant barriers to equitable access to education technology. Also, since the other considerable barrier is the cost of hardware, we are designed to work on older or legacy devices and a wide variety of operating systems. Being "device agnostic" is another portion of equity because that allows for existing infrastructure to be leveraged wherever possible.

Second, our push for curriculum alignment is rooted in equity as well. A lot of the content in our library is not going to be aligned to a country's specific standards. So, the more we can scaffold that process and reduce the time needed to find suitable content also serves equity, because those who have the least also have the least time and resources to do that themselves.

An additional path to equity is whom we choose to work with. By working with partners that focus on serving particular communities, we can better understand those communities' needs and design our platform to better address those. As an example, we work with UN Women to understand and support the needs of women and girls, and UNHCR to meet the needs of refugees and migrants. So, whom an organization is serving and how they could help us better support a marginalized group are key considerations when choosing whom to work with.

Learning Equality has also been notable in its decision to open-source both of your main technologies. What have been the benefits and drawbacks of that decision?

From the start, one of our core values was openness and wanting to share what we were creating as broadly as possible. We've continued down that road for a number of reasons.

One advantage is that you enable people to take the technology and make it their own, in a way that they wouldn't necessarily if you had it closed-sourced (even if it was made freely available). For example, a random guy in Russia came along and helped create a standalone app for KA Lite on Android, which was something we wouldn't have had time to get to for a long time. Still, for us, 90% of the development is internal, but engaging a broad community of developers is an exciting benefit.

Some downsides to open-sourcing are that it creates extra work in terms of documentation and coding standards. But those are all things that you want to have anyway, so it's just putting more pressure on you to create something better. It also takes away some leverage in the sustainability model. We're funded partly by philanthropy but also by earned revenue. So, even though the software itself is open and free, we have a model of value-added

services that can support a large well-funded organization around things like training, customization, technical assistance, or hosting. But, we have less leverage in terms of some of those services with everything being completely open, because some other third party could out-compete us in price.

Again, that's a trade-off we're willing to make because of all the other benefits of being open and because we don't want to be a bottleneck — there's only so much work that we could take on, so we want to foster an ecosystem of others building sustainable models around the tools as well.

Likewise, why did you decide to be a non-profit rather than a for-profit company?

It's a similar kind of answer to that of open-sourcing — there are trade-offs.

The biggest is the types of funding sources that are going to be available. As a nonprofit, you're not going to get VC (Venture Capital) funding or anything where people expect a financial return on their investment, because that's not compatible with the model.

Conversely, many grants, philanthropy, and other funding sources are not going to be available to a for-profit model.

So, it's really dependent on the individual projects/model — which of those avenues is most likely to create something that supports the sustainability of the work? For us, because we're making public goods and open tools, it was a non-profit.

Finally, what role do you think technology will play in the fight for universal quality education (like UN's Sustainable Development Goal #4)?

One thing that's clear is that technology is not a silver bullet. It is only a tool that can be very powerful, if used effectively. Thus, the real change happens in mindsets, training, support, and experimentation, producing new learning experiences that can leverage technology better and that are centered around human experiences.

However, the focus for many years on the Millennium Development Goals was on school access and school enrollment. And so, those rates did go up dramatically. Because the focus was on access rather than on effective learning, and they didn't have enough capacity to hire and train new teachers, the learning outcomes (literacy rates and numeracy rates) weren't going up at pace. Therefore, quality of education is where the biggest gap still exists, which is what this SDG aims to address.

Thus, the question becomes, "how can we ensure that students are learning effectively?" This is also a place where leveraging the technology to support teacher training can come

into play. Even if they're not teaching with technology, technology can be used to help up-skill teachers to enable them to better teach students. And we've seen that happen across many contexts in our work at Learning Equality, in addition to our primary model, which involves learners themselves directly engaging with the technology.

EDUCATION

SpendWell: Proactive & Hands-On Financial Education for Younger Generations

To: Dr. Miguel Cardona, Secretary of Education, United States of America Department of Education

From: Ma. Rizza A. Cerilles ^a, Verencya Oktoviani ^b, Areeb Khawaja ^c, and Ananya Basu-Kaul ^d

Executive Summary

Numerous countries, including the USA, experience a crisis in financial literacy. It is often overlooked by formal education sectors. One solution to that is to incorporate financial education within secondary and post-secondary education curriculums, with the help of a financial mobile app, where students and even the general public, can experience hands-on learning by managing their finances in real-time: SpendWell.

Background

Financial literacy has been overlooked by formal education sectors. Schools, both secondary or postsecondary, focus on academics but neglect to incorporate important life skills & knowledge such as financial literacy. According to the National Center for Education Statistics, one in five American 15-year-olds doesn't understand basic financial concepts. This is highly concerning and shows that the country is in dire need of financial education, especially for younger generations.

As defined by the Task Force on Financial Literacy, "financial literacy means having the knowledge, skills, and confidence to make responsible financial decisions." This means people not only need to be knowledgeable but also need to put the skills and knowledge into practice. In fact, the many conceptual definitions of financial literacy fall into five categories: (1) knowledge of financial concepts, (2) ability to communicate about financial concepts, (3) aptitude in managing personal finances, (4) skill in making appropriate financial decisions, and (5) confidence in planning effectively for future financial needs.

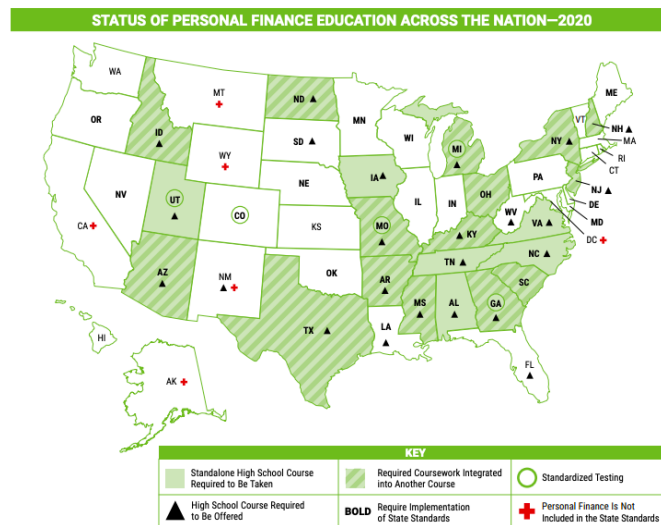
Financial literacy is crucial, not only to an individual's personal finance state but also to society as a whole. Financial literacy can improve the literacy of financially vulnerable people, thereby alleviating poverty.

The Problem

Financial literacy among Americans has been steadily declining. The rate of financial literacy for Americans fell from 42% to 34% between 2009 and 2018, even though over 70% of Americans self-report being highly financially literate. The rate is also significantly lower for younger generations. In fact, only 24% of Millennials in the USA demonstrate basic financial literacy.

Young generations, especially freshly graduated high school students, face financial challenges as they embark on their post-secondary studies or start a career in the workforce. As a new college student, one important responsibility that they face is the management of personal finances, including debts. In the 10 years following the end of the Great Recession in 2009, student loan debt itself increased nearly 130 percent. More than half of all American students have to go into debt to get through college, and their average student loan debt topped \$37,500 in 2020 (EducationData, 2021). Young generations are also much more likely to spend more recklessly, especially with the rise of online shopping, which creates ample opportunities to use and overextend credit, accumulating debt quickly.

A 2020 survey by National Foundation for Credit Counseling (NFCC) shows how student loans have increased over time, and how the debt status is for students and young adults. In 2014 and 2020, from \$1.06 Trillion to \$1.57 Trillion, respectively, a tremendous increase in only six short years. Unfortunately, the alarming increase in debt is not matched by the increase in financial education across the USA. A Next Gen Personal Finance 2019-2020 Report shows the disparity of financial education in various US states (see figure below). Financial education is yet to be incorporated properly in formal education curriculums.



Source: Next Gen Personal Finance Report 2019-2020

The Solution

According to the study of Urban, et al. (2020), well-funded teacher preparation may be key to successfully implementing financial education programs. If high schools in the United States require their students to complete financial education before graduation, it will discourage young people from lacking the self-control and awareness to invest in financial literacy and underestimating the long-term implications of their current financial decisions.

Georgia's approach is the most effective of the policies discussed in the study. It has three unique components: (1) Provided funding for two experts to train teachers on the new curriculum for standardized the course offering and prepared teachers to cover the new personal finance material, (2) teachers are certified experts (certified economics teacher or having obtained a broad field certification in social studies) to reduce the probability that a teacher has unrelated specialization in teaching personal finance, and (3) student standardized testing included topics from the economics course, including personal finance content.

These requirements resulted in fewer defaults and higher credit scores among young adults, but this general finding masks important heterogeneity at the state level. The heterogeneity goes beyond variation in course requirements and standardized assessments. Behavior also affects the fragility because of the diverse financial education policies across states on financial knowledge being measured. As it estimates the effects of these requirements on the credit report outcomes of 18- through 21-year-olds, the young people are just establishing their financial independence and financial knowledge that will help them develop future positive financial behaviors.

Consequently, we are proposing the integration and incorporation of financial education within the formal education curriculum, in both secondary and post-secondary education. As stated by Tim Ranzetta, co-founder of Next Gen Personal Finance, "If there is one thing I've learned in trying to bring personal finance education to every high school student in America, it's that high school teachers are the ones who will make it happen." This solution is also backed by research. In a survey of nearly 16000 college students, research by The National Endowment for Financial Education shows conclusively that well-educated students exhibit positive financial behaviors.

This financial education curriculum will also be supported by technology, specifically mobile-based apps, where students can learn how to manage finances in a hands-on way. In this way, younger generations can learn about personal finance formally, but also informally with the help of a mobile app. With the help of a financial mobile app, to incorporate financial education within secondary and post-secondary education curriculum. Students and even the general public can experience hands-on learning by managing their finances in real-time. An app wireframe prototype with a policy to promote financial literacy is created – *Spendwell*.

Spendwell is an integrated Money Management and Financial Education App. The features include:

- **Money management**, which includes budget allocation, savings calculation, reminders, and financial simulations. The app can also learn about user spending habits & offer suggestions to manage their money better.
- **Financial education** in the form of bite-sized financial education to complement financial education from schools. The topics covered include Financial Literacy 101, Investment Basics, Budgeting Basics (e.g. 50.30.20 rules), Credit Checks, Tax Checklists, Budgeting for Debt Payments, and Personalized Budgeting, such as budgeting for college students or people with children.

With this integrated app, students and general users will be able to simultaneously learn personal finance and directly apply what they learned - all in one app.

Conclusion

Financial literacy is crucial not only to each individual, but also to society as a whole. The huge gap in financial literacy can only be filled with proper education, both in formal and informal sectors. This can be achieved by integrating financial education in secondary and post-secondary curriculum, supported by readily available technology that suits the needs of the 21st century – in the form of a mobile app: Spendwell. It is a Money Management and Education App that aims to close the gap in financial education, so that poverty can be alleviated, thus increasing prosperity in the country.

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Introducing STEP: the Specialized Technological Education Platform

To: Joanne LaCrosse, Director of Special Education Services, New York State Education Department

From: Brian Caballo^a, Aishah Daiyan^b, Samayeeta Maitra^c, Elijah Qin^d, and Ahmya Rivera^e

Executive Statement

In order to provide the best learning environment for students with disabilities and health concerns (D/H), it is important to ensure that proper resources are adequately provided. More often than not, special education students are not prioritized, and thus do not receive the best education they can. Our policy is to implement a specialized learning software as an essential part of D/H students' curriculum to bolster academic performance and inclusion, ultimately creating a cost-effective solution that sufficiently tailors to students' individual needs.

Background

In the 2015-2016 school year, 65% of high school students with disabilities graduated, which pales in comparison to the 84% of all high school students that graduate. This expresses a pre-existing educational struggle faced by D/H students. Hence, with poorer resources and lacking services, special education students are bound to face exacerbated struggles during remote learning necessitated by the coronavirus pandemic.

The population of students requiring special education services is considerable; in the 2018-2019 school year, 14% of students aged 3–21 received services, or 7.1 million students nationwide. Of the 7.1 million students, 33% had specific learning disabilities. With such a tremendous, unprioritized population, it is important to consider the accessibility and effectiveness of online educational tools used. Such tools should not be limited to use in the times of remote learning, but continuously in the future, as the D/H student educational struggle has been a persistent issue that has not been effectively addressed.

Recommendation

In order to support D/H students with an easily accessible educational service, we recommend the Department of Education require the implementation of a universal online

specialized learning classroom platform, **STEP**, that will become an integral part of the general education of D/H students.

Similar to popular classroom platforms like Canvas and Google Classroom, STEP offers an online classroom experience revolving around organization and communication. However, STEP takes the experience of D/H students in mind and strives to cater to their needs. Teachers from multiple classes can post assignments with simple phrasing consisting of only due dates and coursework instructions. Courses are viewed as individualized classrooms that match the curriculum to the pacing and style of its personalized student, which better fits the needs of each student. Speech recording is another feature included for Dyslexic or speech-impaired students to easily navigate through the website features and voice out any questions or tabs they want to go to. Other features will be available depending on the needs of the student. The implementation is to begin as soon as possible in order to give students ample time to familiarize themselves with the software.

Evidence and Analysis

It is evident that a lack of special education resources stems from a lack of funding and prioritization. Figure 1 displays a study conducted from 1998-2007 in which the amount of educational expenditure for special learning needs was less than 15% of the money spent on total education, mainly due to the lower population of special education students. However, as the years progressed, the amount spent on special learning continuously declined while total expenditure decreased, showing an insufficiency in regard to special learning needs.

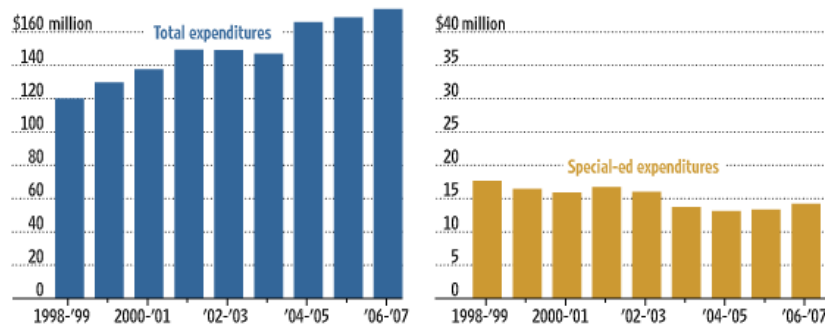


Figure 1: Total Expenditures vs Special Ed. Expenditures

The lack of funding ultimately exemplifies the lack of concern over students with special learning needs. However, the implementation of STEP benefits both parties, students and schools. Students are able to learn effectively while being among their peers while also costing the district an insignificant amount of money. In fact, on average, the usage of a school administration software costs \$5.94 per student monthly.

Additionally, for many years, D/H students and parents have been complaining about the lack of technological educational assistance used in the classroom, as seen in Figure 2, which is concerning as society and the workforce are becoming increasingly reliant on technology.

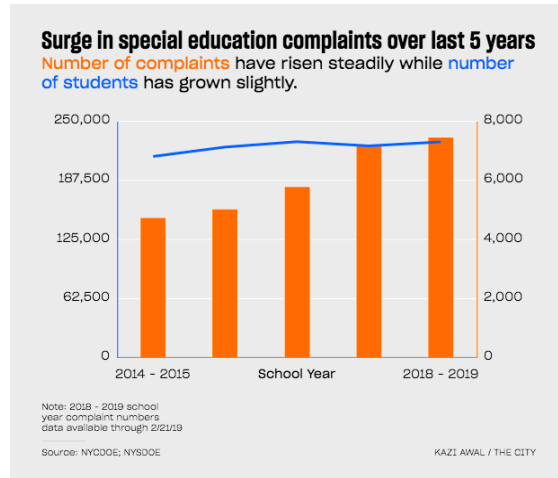


Figure 2: Special Ed. Complaints Over 5 Years (NYCDOE, 2019)

The implementation of STEP also entails a curriculum where technology is largely used. In other words, D/H students are able to develop important skills while also learning their course material effectively.

Additionally, in a questionnaire conducted by a school on the usefulness of technology skills for special learning students (e.g learning to email, learning about and how to use cloud storage, etc), it was generally found that students found it useful and would prefer to utilize it in their everyday lives. The data collected is considerable; providing D/H with necessary resources enables students to succeed in both their academic studies as well as their future careers—making the implementation of STEP ever-crucial.

Policy Impact & Limitations

The implementation of STEP will assist D/H students to obtain a more effective and personalized education. Additionally, STEP can provide once uneasily obtainable resources, such as mental health support for D/H students. In this way, D/H students can have quality education regardless of an environment change, and useful tools that they can benefit from in the future. With this, parents are at ease knowing that teachers and peers can easily be contacted with the click of a button. Their knowledge of technology may translate to greater opportunities in the future. Therefore, the implementation of STEP will enable students to perform to the best of their ability, both in preparation for their future careers and their current course material.

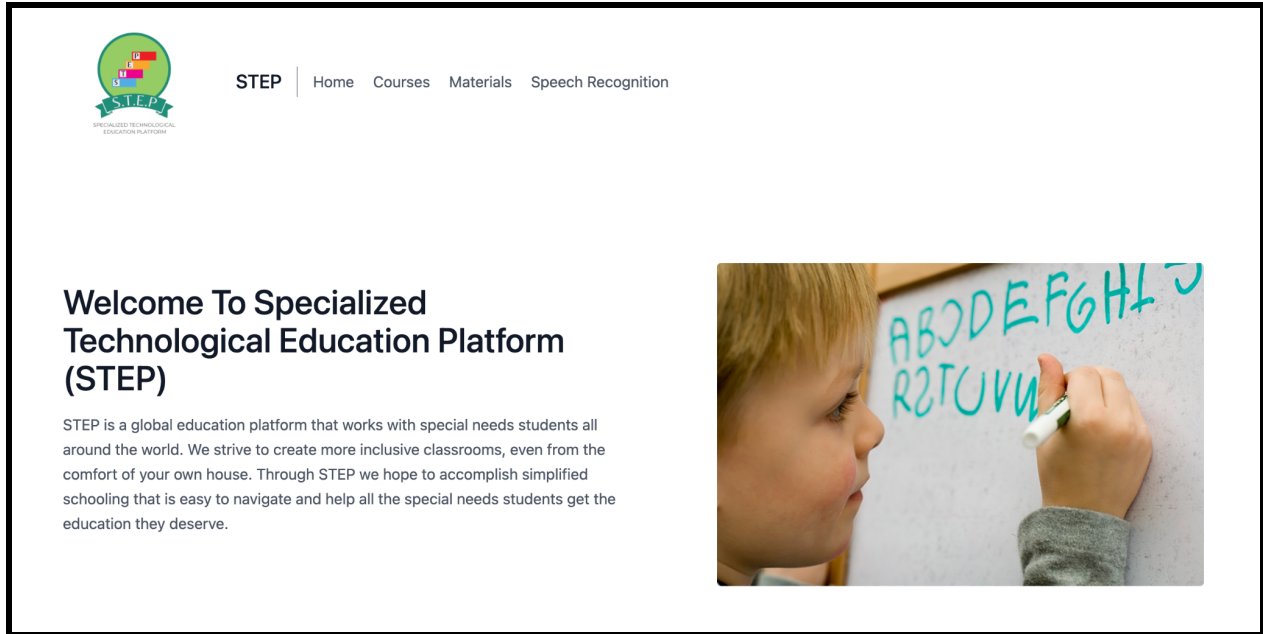


Figure 3: STEP website platform

However, with the addition of new software, there must be a learning curve, which may be troublesome for some students. Additionally, because education is to become mainly technology-based, issues with WiFi and a lack of devices may negatively impact learning. Lastly, as students with special learning needs exist everywhere, schools with lower funding may not be able to afford the platform.

Conclusion

For much too long, society has placed too little concern over students with special education needs. Our current system already harms D/H students, as they are continuously not being provided adequate resources. Therefore, the usage of STEP may best benefit D/H students widely. Students will not only be able to receive the care they need but also be benefitted from the social support and technology skills gained through STEP, both of which can be used for their careers in the future. Rather than continuing to uphold standards of education that are inconsiderate and less inclusive to D/H students, implementing a new program that specifically caters to special learning needs levels the educational field. Therefore, implementing such a change is critical in maintaining education equivalency for disadvantaged D/H students.

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