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# Hey Google: How can we build critical media literacy?

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# Hey Google: How can we build critical media literacy?

A Field Project Presented to
The Faculty of the School of Education
International and Multicultural Education Department

In Partial Fulfillment
Of the Requirements for the Degree
Master of Arts in International and Multicultural Education

By
Wilson Wang
May 2021

# Hey Google: How can we build critical media literacy?

In Partial Fulfillment of the Requirements for the Degree

MASTER OF ARTS

in

INTERNATIONAL AND MULTICULTURAL EDUCATION

by
Wilson Wang
May 2021

UNIVERSITY OF SAN FRANCISCO

Under the guidance and approval of the committee, and approval by all the members, this field project (or thesis) has been accepted in partial fulfillment of the requirements for the degree.

Approved:

Monisha Bajaj                                          May 1, 2021

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Instructor/Chairperson                                 Date

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ABSTRACT

The year 2020 spotlighted problematic media coverage of the global coronavirus pandemic. Conflicting narratives of the origin of the "China virus" (Campbell & Park, 2020), the silenced journalistic freedoms (Davidson, 2020), and the impact on communities of color (Williams, 2021) created mass confusion during the global pandemic. To help address our understanding of media, teaching civic online reasoning (Wineburg & McGrew, 2017) and critical media literacy are two potential points of emphasis. Building critical media literacy helps resist the echo chamber effect of social media and cable news, which results in polarization and difficult mediation between parties (Bexley & Tchailoro, 2013). In order for social justice to thrive within a community, building critical media literacy is a necessity.

Since the 2000s, smart devices have taken over our lives and our homes. In addition to smartphones growing at a rapid pace from 1.02 billion users in 2012 to 3.8 billion users in 2021 (O'Dey, 2020), the use of smart assistants such as Google Assistant, Amazon's Alexa, Microsoft's Cortana, and Apple's Siri have increased. The increased connectivity of these devices creates an opportunity to augment critical media literacy. When used intentionally, these smart devices can help us learn how to make critical decisions for our day to day lives.

In this field project a chatbot will be designed based on the curriculum by the Stanford History Education Group (Wineburg & McGrew, 2019; Wineburg et al., 2020) on civic online reasoning. A chatbot is a programmed conversation with a computer standing in for a live human being. Chatbots can be accessed interactively and asynchronously by students through smart devices using voice or text.

CHAPTER I
INTRODUCTION

**Statement of the Problem**

The Social Dilemma, a documentary on Netflix, explored how social media platforms use algorithms to polarize audiences and commoditize human behavior (Orlowski, 2020). Placing advertising revenue and user engagement as core business models objectifies people as users to buy and sell, rather than as humans. This has paved the way for corporations and governments to use media to craft disruptive narratives that break apart our communities. During the 2020 coronavirus pandemic, these polarizing views put the United States in the epicenter of disease.

While the origins of COVID-19 were still being investigated, reports from then-President Trump and senior officials dubbed COVID-19 the "China virus" (Campbell & Park, 2020). In China, the New York Times reported that Chinese media was falsely spreading propaganda that the virus originated from foreigners (Hernández, 2020). Finally, the Associated Press reported that the investigation into the origins were being stalled by the Chinese government (Kang et al., 2020). When those in power use media outlets to control and politicize the narrative, what can ordinary citizens do to make sense of what is real?

Reporters covering the virus have also been jailed or gone missing. Davidson (2020) reports from The Guardian that 274 journalists were put behind bars in 2020. Journalist Zhang Zhan was detained in May 2020 after her reporting from Wuhan, China (Davidson, 2020). During the beginning of the outbreak, Chinese doctor Li Wenliang warned his colleagues of a new SARS-like virus (BBC, 2020). However, Dr. Wenliang was forced by police to stop "making false comments" and to stop "disturbing the social order" (BBC, 2020). When journalistic freedom is taken away and media coverage is politicized, individuals have less and less autonomy to voice narratives of the people.

The coronavirus has uncovered a plethora of intersectional issues, such as structural racism and the poverty cycle of people of color. Coronavirus affects people of color inequitably, as African American, Native American and Latinx communities have higher rates of both infection and death (Williams, 2021). Millions of renters cannot afford to pay rent (Beam, 2020) and are in danger of being evicted. Meanwhile, then-President Trump and President Xi of China, at the end of 2020, delivered New Year's addresses that declared economic triumphs for the United States and China respectively (Mason & Morgan, 2021; Shih, 2020). Each narrative is politicized and crafted to convince followers to accept such media messages at face value.

With such stark differences and polarized viewpoints within our communities, how can we use the media and technology to mediate conflict? Finding reliable information on the Internet is a barrier for people worldwide. Sifting through millions of Google results is difficult as the credibility of websites are often hard to assess (Wineburg & McGrew, 2017). Social media networks are littered with fake news and disinformation, combining fact with fiction. Television channels are politicized with one-sided reporting. Critical media literacy is a tool we can use to combat these media narratives.

**Purpose of the Project**

The purpose of this design-based study is to develop a chatbot that can augment the work of civic online reasoning curriculum made available by Stanford History Education Group (Wineburg & McGrew, 2019; Wineburg et al., 2020). This project hopes to create scaffolding that can help springboard daily media consumption into critical media literacy. The intentional use of technology can help us create the digital media landscape that we want to create, not the media landscape that corporations and governments have programmed into us.

This pragmatic approach to document the building of a chatbot according to a curriculum seeks to become a template for other educators and technologists to copy and create their own chatbots. Creating a scaffold for others to feel comfortable creating their own media can help fill the media space with more individual creators. This model is amplified by the work done by small organizations. Youngzine is a news publication platform written for kids by kids. Student writers can use the platform to practice journalism and be heard. ImaraTV is a media platform that brings together youth groups interested in media production to write, direct, and act out a series of episodes around a health curriculum. Youth groups are able to craft their own narratives and work on their real-life media production skills. Stanford Mobile Inquiry-Based Learning Environment (SMILE) is a platform for classroom teachers to encourage students to create their own critical questions in the classroom. Students learn how to create critical questions on topics that matter to them. These are all examples of how we can use the increased connectivity and access to technology to help augment critical thinking and scaffold content creation for more equitable representation worldwide.

**Theoretical Framework**

Transformative pedagogies stems from Paulo Freire's idea of critical pedagogy. In analyzing the world with a critical lens, education can help us to learn and unlearn by analyzing relationships between oppressor and oppressed (Freire, 1970/2000). The banking method of education leads to the use of dehumanizing algorithms and serves corporations well, as they want us to believe verbatim what the marketing tells us. The polarization of our views comes from an uncritical lens and unconscious bias of believing stories that we see. Fighting this with transformative pedagogies is one path forward.

Critical media literacy is a theory in which power, influence and money are considered when analyzing media. This could be through finding the sponsor of the content, as well as recognizing who is benefitting from the content. The critical lens allows one to decouple power and privilege with content, understanding multiple ways content can be conveyed and spun to achieve the desired effect. This critical consciousness gives the person the power to decide whether or not the narrative is one that is worthy of time and amplification. The recognition of the power of production of content (Garcia et al., 2013) brings new possibilities of empowerment.

Design thinking is a theory in which empathy, ideation, prototyping and testing are at the center of developing a product over time. Using design thinking to create media narratives is an opportunity to resist negative media images (Norris, 2014). When creating our own content, the process is iterative in nature. Defining the message we want to send, the audience we want to reach, and prototyping the message we want to convey is a circular process, similar to Freire's reflection to action model (Freire, 1970/2000). Finding our own voice through media production allows us to create our own narrative and breathe more voices and perspectives into the media.

In this project, the intersection of transformative pedagogy, critical media literacy, and design thinking will inform the process of creating a chatbot.

## Significance of the Project

With the transformative power of technology, the significance of this project is to show the possibilities of using technology for good. If we can inspire individuals to create their own content and carve out safe space for themselves in the digital landscape, then information and power in the media will have a transformative effect. As Norris (2014) writes, it is difficult for

"victims of negative social constructions to deconstruct the negative images and reconstruct positive self-images" (p. 73). Helping scaffold this process for everyday citizens to understand the power behind media images will allow them to create their own narratives. Living with our own narratives is much more transformative than living with the narratives forced upon us.

People from privileged backgrounds already have the power and finances to create their own narrative. Sharing this access and opportunity to create maker spaces online for underrepresented voices through podcasts on YouTube, on websites, or even on chatbots is one way to even the playing field. The voices that are silenced can be freed and narratives that are hidden can be brought to light and shared. Our media landscape does not need to be filled with companies deciding what we want to see and hear. We can create our own content and write our own narrative. By building a tool focused on helping us understand our media landscape, this project is intended for individuals to take back control of their own story.

### Definition of Terms

*chatbot*: a computer program designed to simulate a conversation between two people.

*multimedia/digital assets*: video, images, audio recordings provided digitally.

*podcast*: digital audio recording uploaded to a platform such as YouTube.

CHAPTER II
REVIEW OF THE LITERATURE

**Introduction**

Research on 3,446 students by the Stanford History Education Group (Wineburg et al., 2020) found that 52% of high school students believed a grainy video on Facebook qualified as strong evidence of voter fraud. Another 96% of students failed to evaluate the credibility of a website by looking elsewhere—instead deeming the website credible merely by reading the "About" page. The lack of online reasoning skills exacerbates the dangers of echo chambers on digital media, as media is used to fuel misinformation and continue the oppression of underrepresented voices.

The first section of this literature review explores the need for civic online reasoning. As media outlets become more and more politicized, the ordinary citizen needs to become more critical about the news they consume (Wineburg et al., 2020). The impact of mass media increases and decisions to fact check during production and creation of digital content is important (Szu et al., 2017). The second section looks at critical media literacy and media creation. Dezuanni (2015) breaks down the building blocks of digital media literacy. Out of the building blocks, Norris (2014) and Garcia et al. (2013) focus on media production as one way to create space to resist stereotypical media narratives. The third section explores chatbots in education. Classrooms at Georgia Tech (Goel & Polepeddi, 2016) and the University of Vietnam (Hien at al., 2018) were enhanced with chatbots. Heller et al. (2005) take the chatbot concept a step further, creating a chatbot with the personality of the famous late philosopher Freud. Finally, Molnár et al. (2018) look at the history and progression of chatbots and find potential fits for chatbots within education.

This literature review shows the need for civic online reasoning and critical media literacy. The creative aspect of media creation is important in amplifying underrepresented voices, and design thinking leads to the creation of spaces online for people to create their own future. Chatbots can be one way to leverage technology to help teach civic online reasoning and critical media literacy.

**The push for civic online reasoning**

The proliferation of digital media into our lives has created a need for understanding fact from fiction online. Fake news, disinformation, satirical sources, and polarizing social media algorithms (Stern, 2021) create space for news that corporations and governments in power want us to hear—not the news and voices of our communities. Part of the problem is civic online reasoning skills (Wineburg & McGrew, 2019; Wineburg et al., 2020). Another problem is the way education happens through the media (Szu et al., 2017) and the way media enters the classroom (Klar-Magdziarz, 2017).

Wineburg and McGrew (2019) performed an experiment on historians who held PhDs in history, fact checkers, and Stanford undergraduates, measuring their ability to assess the credibility of online information. The results were startling—both the undergraduates and historians scored extremely poorly. Wineburg and McGrew (2019) found that the undergraduate students "could not distinguish between traditional news and sponsored content (advertisements), they rarely evaluated sources (sponsoring organizations or authors)" (p. 6). The researchers found three skills: click restraint, taking bearing, and lateral reading as important skills to assess information online—skills that differentiated fact checkers from everyday digital citizens.

Wineburg, Breakstone, Ziv, and Smith (2020) followed up the experiment with another one on whether students could assess the reliability of a source. During the classroom experiment, students were given a satirical website and were expected to evaluate the validity of the website. Students who simply read the article did not realize that the newspaper was a satirical one. Wineburg et al. (2020) found that the groups of students were easily duped by an official-looking logo or a domain name ending in .org or .edu. A well-designed website with great visuals was one of the false indicators of the reliability of a website. The researchers argued for making rules more simple and removing outdated rules—for example, the ones listed on websites from Stanford, Harvard, etc. (Wineburg et al., 2020)—that continue to confuse students and teachers.

In a summary of the research, McGrew, Ortega, Breakstone, and Wineburg (2017) argued for a new focus on teaching students digital literacy. Instead of focusing on checklists to analyze the content, students should identify the source, analyze the source, and look for other sources online. McGrew et al. found that students were often convinced by pie-charts and tables of statistics. The focus on content allowed "professional looking sites with neutral descriptions [to] actively conceal their true identities and funding" (McGrew et al., 2017, p. 7). Without the methods to identify and evaluate sources, students are easily taken advantage of. Instead of teaching students to analyze the content, McGrew argues for teaching the use of Wikipedia and comparing different sources.

Technology, social media, and news media can bring a dose of freshness to the classroom. Kilar-Magdziarz (2017) found that if teachers provided students with reliable education sources beforehand, students would not need to filter Google search results on their own. However, McGrew (2017) argues that media literacy education should make a more

ambitious goal: students and teachers can learn how to take the power of determining the reliability of a source independently.

### Critical media literacy and media creation

The larger field of critical media literacy aims to understand the power structures that lead to media production and distribution. Dezuanni (2015) breaks down the four building blocks to digital media literacy. Garcia et al. (2013) argue for critical media literacy as a method for transformative learning and breaking down power structures. Norris (2014) performed a classroom study where design thinking helped students create their own narratives to combat and resist harmful media messages. Jocson (2015) uses new media literacies as a vessel for social action in the classroom and beyond. Critical media literacy takes the next step to help students reimagine media narratives and fight for social justice.

Dezuanni (2015) broke down the building blocks of digital media literacy into four sections: interacting with digital materials, understanding media concepts, media production, and media analysis. The study looked at 60 students over three years in Queensland, Australia, finding that the "production of short videos, podcasts and websites are useful forms of contemporary communication" (Dezuanni, 2015, p. 436). While media production is only one of the four building blocks, Dezuanni found that the building blocks can be used in non-hierarchical and non-sequential ways, creating learning opportunities over many educational settings. This shows that digital media literacy can happen at any time, in any place, even within the confines of our own home.

Taking digital media literacy a step further, Garcia, Seglem, and Share (2013) analyzed the pedagogical reasons behind critical media literacy. Garcia et al. found the critical aspect of

analyzing media to include exploring the "difficult-to-see ideologies and connections between power and information" (2013, p. 111). In order to be transformative and break down embedded power structures, students use the creative process to produce their own media messages and narratives. This helps move the students beyond being the consumer into becoming the producer--helping decentralize information and power from the elite. Critical media literacy is an essential component to social justice and creating more equitable media representation.

In a classroom study, Norris (2014) used the idea of critical media literacy and design thinking to challenge 19 African American and Latinx students to create their own digital narrative. The first design challenge was drawing positive affirmations onto a journal cover; the second was making an ode to a loved one. Norris found that the process of creation helped students resist "the negative constructions that were forced upon them by their families, school, and the media" (2014, p. 73). Norris noted that some students refused to create their narrative based on previous traumatic experiences; Norris found this to be an opportunity for teachers to help bridge the gap for students. Design thinking and the process of media production can be one way to help students resist stereotypical and harmful media narratives.

Turning the classroom into a media platform, Jocson (2015) designed and iterated over a new media literacy curriculum with undergraduates and graduate students to "inquire and disseminate findings" and "promote social dialogue and civic dialogue" (p. 42). This use of media literacy beyond the classroom teaches students the power of their voice and presence, as well as practicing the core values of *collaboration*, *participation*, and *distributed expertise* (p. 43). The practical aspect of using media to convey a point of view taught the students both how to produce their own media but also to become better consumers of media. The level of

immediacy and reach that digital media production affords makes the digital space potentially full of gems that can be used for learning.

As the research supports more critical analysis and creation of content, the opportunity for building critical media literacy expands beyond the classroom. Traditional computer labs of consuming content are outdated, as Philip and Garcia (2015) found that students wanted a device where they could be social and interact freely, just like on their own phone. Inclusion of informal learning environments, such as on mobile phones and online spaces provide multiple opportunities for students to interact with the growing digital world. With the ability to critically analyze and create their own content, students can begin creating their own narratives (Garcia et al., 2013; Norris, 2014; Jocson, 2015).

## Chatbots in education

The COVID-19 pandemic and subsequent shelter-in-place forced classrooms to move to online and hybrid classroom formats. To take advantage of this change, smart environments can be designed to improve the teaching and learning experience. Chatbots have already been studied within education: Molnár et al. (2018) found advancements in natural language processing give chatbots potential to understand student questions. Goel and Polepeddi (2016) built "Jill Watson," a chatbot used as virtual teaching assistants. Hien et al. (2018) produced a chatbot to supplement both learning and administrative questions at their university. Heller et al. (2005) investigated giving a persona to a chatbot and reported good engagement results. These works have shown that chatbots can be a valuable tool in education.

Traditionally, chatbots have been programmed in the "retrieval-based model" which functions similarly to rote memorization in humans (Molnár et al., 2018). In recent years, the

power of computing brought "generative-based models" which allow chatbots to learn without a full database of all inputs and outputs, using a machine learning model (Molnár et al., 2018). Continued research into natural language processing creates additional developments that can be used to increase chatbot effectiveness in a classroom setting. As chatbots can be connected to a variety of social networking platforms, Molnár (2018) finds the use of chatbots in messaging services like Facebook Messenger can help supplement teaching and learning.

For classroom instruction, Goel and Polepeddi (2016) built three iterations of the Jill Watson chatbot between 2016-2017 at Georgia Tech. Over 750 students interacted with the chatbot using the online discussion boards. Operating under pseudonyms, the chatbot gradually responded to student introductions and answered student questions. Part of the development included a human-in-the-loop, where new questions were systematically checked before the chatbot responded on the discussion board. Goel and Polepeddi found that chatbots can be used to help address the problem of scaling education to thousands of students in a massive open online course (MOOC) format while answering highly focused questions.

For administrative support needs, Hien, Cuong, Nam, Nhung, and Thang (2018) analyzed the use of chatbots to retrieve and provide information to students on tasks such as registration, scholarships, course grades. The intention was to support the faculty and staff at Ho Chi Minh City University of Science in Vietnam. Hien et al. built the chatbot using the Dialogflow software and a MySQL back-end database, which is able to process student inquiries and pull information from the student information system. Like Molnár et al. (2018), Hien et al. (2018) also used chatbot integration with Facebook Messenger as it was a popular platform for their students. The flexibility of chatbots can supplement learning and decrease the time and human

resources needed for routine tasks. As a result, universities impacted with limited human power can still provide a satisfactory level of service to students.

Heller, Proctor, Mah, Jewell, and Chung (2005) explored the use of a chatbot with a persona to enhance student engagement. Specifically, they investigated whether the use of a chatbot designed to answer questions as the late philosopher Freud would pique student interest. 43 students from Athabasca University interacted with the chatbot for 10 minutes on a website with a picture of Freud, and Heller et al. found 90% high rates of on-task behavior over an average of 27.7 exchanges (2005, p. 6). Having Freud's personality gave the students a real conversation to look forward to; the researchers cited social constructivist theories supporting "collaboration and conversation as a natural and effective means of knowledge construction" (p. 3).

Designing a chatbot to augment learning and integrating with platforms such as Facebook Messenger (Hien et al., 2018; Molnár et al., 2018), Google Assistant, and Amazon Alexa can provide multiple avenues for instruction to match the daily lives of everyday people. The chatbot can be built to create engaging interactions (Heller et al., 2005; Goel et al., 2016). As the literature has shown, chatbots have a big future within education.

## Summary

Teaching civic online reasoning, and by extension, critical media literacy is important in understanding power structures (Garcia et al., 2013) embedded in digital media. The process of creating content helps students understand the inner workings of producing content online. Chatbots have the potential to help augment asynchronous learning for students (Heller et al., 2005; Hien et al., 2018). A chatbot can be programmed to include an interactive conversation

around the Stanford History Education Group curriculum (Wineburg et al., 2020) on civic online reasoning. Finally, armed with a better understanding of the sources of information, students will be better able to identify, evaluate, and compare sources for more intentional use of digital media and social networks.

CHAPTER III
THE PROJECT AND ITS DEVELOPMENT
AND METHODOLOGY

**Methodology**

The curriculum used in this project was developed by the Stanford History Education

Group (SHEG). Lesson plans from SHEG can be found on the Civic Online Reasoning website

at https://cor.stanford.edu/. The lesson plans are licensed under Creative Commons 4.0

attribution, which allows re-use and re-distribution with attribution. Three lessons from the

website were selected to provide a holistic introduction to civic online reasoning. This project

involves taking the curriculum and providing the teacher and student materials in the format of a

chatbot using an iterative design approach.

**Brief Description of the Project**

The project centers around three civic online reasoning lessons teaching students to (1)

identify the source of media content, (2) evaluate the information provided, and (3) cross-check

the information with other sources. The chatbot is designed to ask guiding questions based on the

materials in the lesson plan and encourage students to answer the provided question prompts.

Basic functionality is built into the chatbot to provide feedback during the lesson for the student.

The project involves building an initial prototype of the chatbot and exploring feasibility of

adding more features in the future.

**Development of the Project**

The initial prototype was built in March 2021 over the span of three weeks. Using the

three lessons plans from the Civic Online Reasoning website, the teacher materials and student

materials were combined to stage a conversation around media literacy. Time was spent

considering technological possibilities, building various chatbot features, and testing the software

with different audiences.

The platform of choice was Dialogflow, a natural language understanding platform which

can be used to design chatbots. Dialogflow was acquired by Google in 2016 (Crunchbase) and

the platform has been constantly improved since the acquisition. In Dialogflow's developer

documentation, which is intended for creators of chatbots as a builder manual, best practices

around conversation design are provided. Citing Grice's *cooperative principles* (1975), the

conversation design framework is based on the premise of cooperation during a conversation.

Grice's principles that guide a conversation are (1) the maxim of quantity, (2) the maxim of

quality, (3) the maxim of relevance, and (4) the maxim of manner.

Table 1: Grice's Cooperative Principles

| *Maxim of Quantity* | Respond as informatively as required, but not more |
| *Maxim of Quality* | Do not say anything false or unsupported by evidence |
| *Maxim of Relevance* | Stay focused on the topic at hand |
| *Maxim of Manner* | Avoid ambiguity, obscurity |

In designing the chatbot, I followed the cooperative principles laid forth by Grice and

produced in the three lessons described below. The project provided a technical overview of the

programmatic side of building a chatbot. The pros and cons of chatbots are explored further in

this project. Feedback from colleagues and the creator of the curriculum will be collected at the

end of the prototyping phase to determine next steps.

**Lesson 1: Who's Behind the Information?**
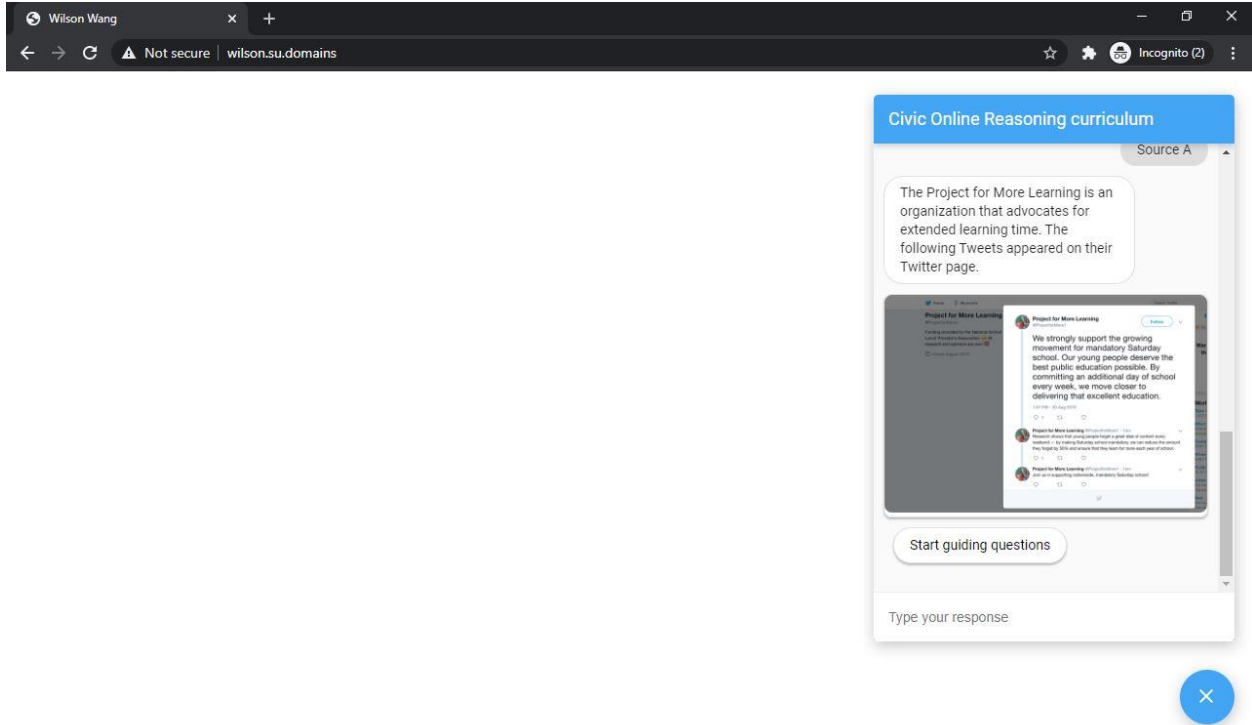


The first lesson centers around identifying the source of information online. The Twitter profile for Project for More Learning, the Facebook page by The Community Sports Alliance, and Dr. Turner's blog are the fictional images provided in the "Who's Behind the Information?" lesson. The learning objectives center around identifying the source of the information, looking at the qualifications of the source, thinking about any biases the source may have, and determining how reliable the source is. The goal for the student is to realize each source has underlying motivations such as profit, justice, or entertainment.

In the first week of programming, I analyzed the lesson plans and found the student materials included multimedia and question prompts to bring out the intended learning objective. This turned out to be a good fit for a chatbot interface, as a conversation naturally flows from one question to another. The Dialogflow software is also flexible enough to include multimedia responses during the conversation. This feature allows the programmer to enrich the

conversation and better contextualize the questions. Including media inside the conversation is a key component of this curriculum, as the goal requires students to analyze digital content such as graphs, images, websites, and blogs.

Integrating the teacher materials proved to be more challenging. In the initial brainstorming phase, creating a teacher or fact checker persona (Heller et al., 2005) to guide the conversation was one idea that could increase retention. Imagine a flowing, natural conversation instead of a student simply answering multiple question prompts. However, this requires additional resources around instructional design that ballooned beyond the scope of a programmer's understanding. Due to the limitations of time and lack of experience in converting a curriculum into a chatbot, the initial prototype was limited to creating simple conversations around the preexisting learning materials.

Choice-based interactions are straightforward inside the Dialogflow software. Providing students with choice helps allow free interactions (Philip & Garcia, 2015) which can make the software feel more natural. The prototype allows a student to choose which lesson to begin with. This helps with providing some autonomy. As a next step, remembering the student's choice and saving student data would add even more usability. From a programming standpoint, saving the student's choice (e.g. the student chose Lesson 1) and removing the option (e.g. mark Lesson 1 as complete) requires a heavier lift. In addition to adding logic to create the flow, data needs to be saved on the server and the student needs to be uniquely identified. In order to constrain the scope of the prototype, this feature will be added on the next phase of the project.
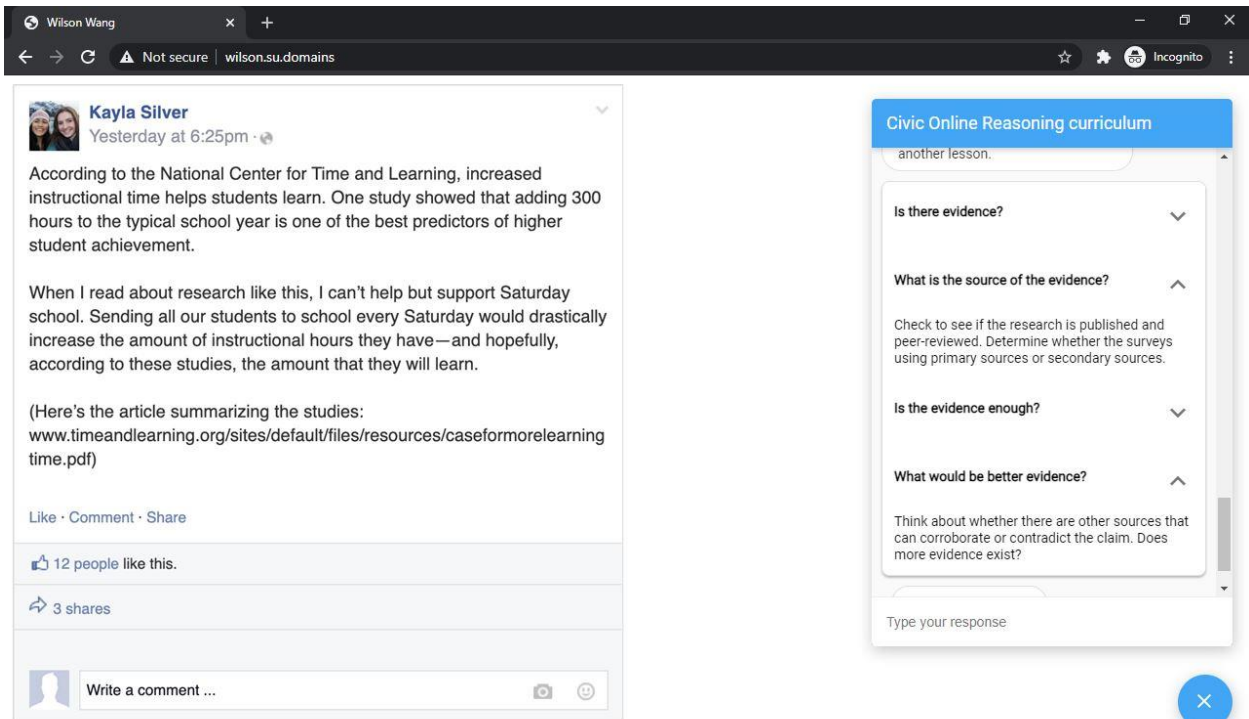
Providing real-time feedback (Goel & Polepeddi, 2016) is another feature which could be extremely beneficial. For example, when a student answers one of the question prompts, additional pre-programmed responses could be created to address the wide range of answers that

a student may have. A potential next step is working with the Stanford History Education Group or teachers to create a database of potential student answers and the accompanying teacher response. Once a dataset of responses are collected, instead of a blank catch-all response and moving to the next question, a student could receive targeted feedback based on the responses they provide.

Real-time feedback, choice-based interactions, better integration of a narrative persona and inserting digital media into the conversation are different methods to make the conversation more engaging for the student. For research purposes, these can be tested and integrated on the Dialogflow platform with specific audiences. One additional hidden benefit of the platform is the ability to create A/B tests, or different versions of the chatbot, to send to each audience and isolate the results. In the next lesson, more features of Dialogflow will be explored.

## Lesson 2: What's the Evidence?

The second lesson centers around digging deeper into the evidence provided and determining the validity of such evidence. The fictional materials include a webpage by School Research, an Instagram photo by the user @parents4sundayschool, and a Facebook post by Kayla Silver. Questions in the lesson plan lead the student to identify the source, the argument, the evidence used to support the claim, and any strengths or weaknesses in the evidence. Students then decide how convincing the evidence is. The goal for the student is to realize all evidence must be verified to determine if the evidence is valid and whether that evidence is enough to fully support the argument.



While building the second lesson, distinct patterns appeared between the first lesson and the second lesson. In order to decrease the repetition for the student, various integrations to

Dialogflow were explored to provide alternative ways to integrate multimedia. One feature was the accordion style response, which allows the student to expand and collapse each item and choose which item on the list they want to learn more about. Following the maxim of quantity (Grice, 1975), these accordions allowed the lesson summary to be concise and decrease unnecessary information given to the student during the conversation.

Heller et al. (2005) found that displaying a website with a picture of Freud provided more context for the student. For this project, instead of providing a multimedia image as part of the conversation interface, building a website allows the multimedia image to live in parallel to the conversation. Imagine between being sent an image via text message, then scrolling back to the image each time you needed it. The difference with the website is having the image live side-by-side, which makes it easy to refer back to the image during the guiding questions. This decision helped reinforce the importance of creating a voice or text based lesson paired with visual evidence. The use of side-by-side multimedia also allows parts of the multimedia to be focused or highlighted, which can help with understanding and relevancy (Grice, 1975).

Chatbots naturally have limitations as they are usually used for stand-alone academic tasks (Hien et al., 2018) rather than holistic presentation of curriculum. For example, one can build a chatbot to show a student their current grade in the class or to display upcoming assignments. However, to deliver a lesson plan normally provided by a trained teacher in a traditional classroom, the context provided by a teacher is lost. For the civic online reasoning curriculum, the teacher materials suggest the three lessons can build upon one another. In the case of a website or chatbot, there is no guarantee that the student has completed the previous lesson or has built the understanding. Coding the chatbot to be stand-alone lessons is a significant deviation away from the lesson plan.

Despite the limitations inherent to chatbots, a chatbot can include features such as an accordion and be displayed on a website. Furthermore, the use of chatbots in the educational realm could provide different ways to access the plethora of open educational resources online.

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The Civic Online Reasoning curriculum is provided under the Creative Commons license, which promotes and allows derivative works while maintaining a lineage of citations. Stanford History Education Group provides these lesson plans and allows them to be redistributed, which creates the possibility for this chatbot to be built. This realization has influenced the end goal of this project, which is to allow full access to the source code of the Dialogflow chatbot to provide space and scaffolding for others to use this foundation as a jumpstart for their own curriculum needs. In the next lesson, practical application of lessons from the Dialogflow platform will be explored.

**Lesson 3: What Do Other Sources Say?**

The third lesson focuses on lateral reading and looking for other sources to corroborate evidence. The fictional materials include the Facebook post by Kayla Silver seen from the previous lesson, an article in the Science section of a local newspaper, and an email from the local teacher union. The students are guided through the lesson to look for relationships between sources and to compare the evidence with neighboring sources. The learning goals include realizing the need to search for different sources and understanding the multiple perspectives from independent sources.

Lateral reading is the focus of this lesson, which requires students to open multiple tabs on their browser. In Wineburg and McGrew's (2019) research study on fact checkers, they found that the fact checkers immediately opened up new tabs (p. 37) to check what other sources say, rather than reading the entire article. Analyzing a single source too deeply makes us susceptible to a single story, as Chimamanda Ngozi Adichie presented in her 2019 TED Talk. This provided

a different technical obstacle. Focusing on lateral reading provided a different technical obstacle, as the need to design an interface to look at multiple sources at one time arose.
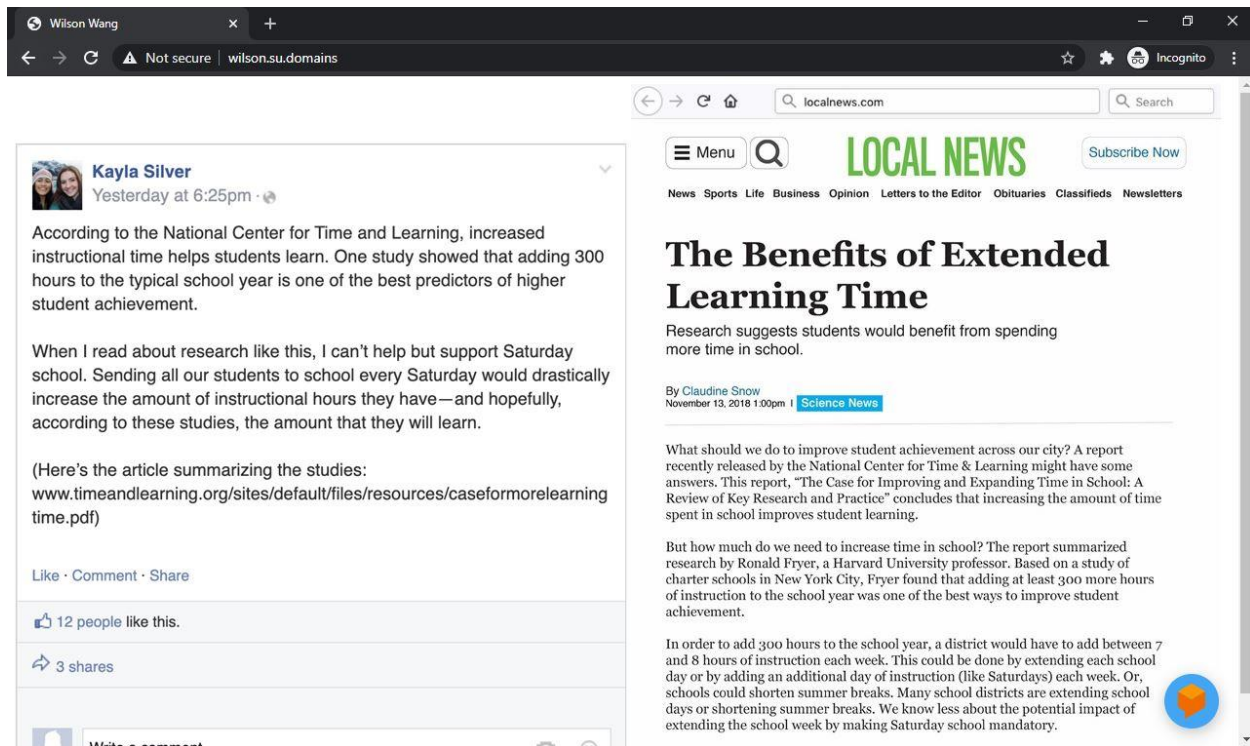


In the classroom, a teacher would hand out the student materials which would include screenshots of all the sources. Aiming to replicate the in-person scenario, a Dialogflow chatbot in union with a website can also handle multiple images at once. Showing these all at the same time can simulate having the resources immediately available on paper. Another enhancement to the website was making the images stay present as the student proceeds through the questions, similar to Lesson 1, rather than having the image scroll away as a normal text-only messaging application would. These small adjustments can make the conversation even more relevant (Grice, 1975) for the student with the lesson plan placed front and center and the technical components behind the scenes.

Another potential use case for the Dialogflow chatbot is using the built-in "suggestion chip" feature, which allows the chatbot to display suggested responses during the conversation.

This could help guide the student in disambiguating the next step according to Grice's maxim of manner (1975). This could also help with research and assessments; in the lesson, the suggestion chips include (1) Trust completely, (2) Trust a lot, (3) Trust a little, and (4) Do not trust. The responses can be recorded for more qualitative assessments and for collecting research data in a structured way. When implemented fully, this can allow a chatbot to provide feedback to the teacher or researcher on the responses of the student.
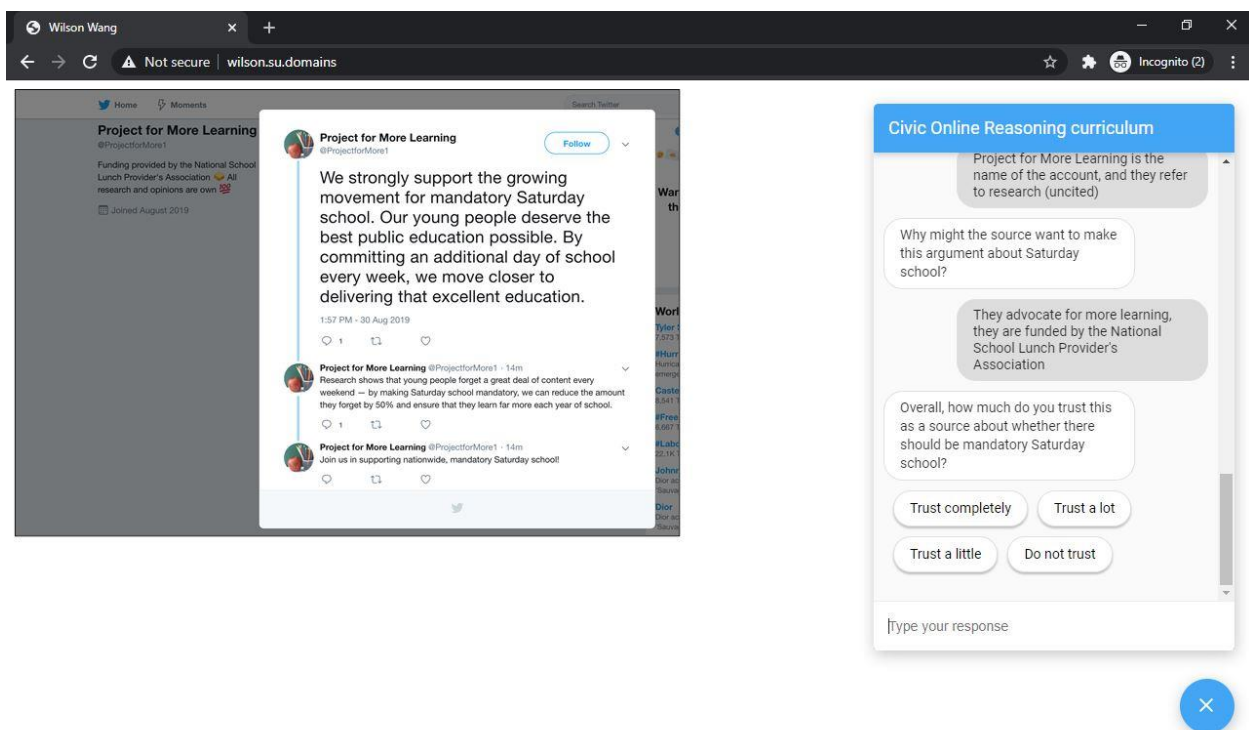


Simulating lateral reading and using suggestion chips to guide the conversation are both ways to make the chatbot more engaging and practical. These features, as well as accordions, website integrations, real-time feedback, a potential persona, and choice-based interactions are all ways that chatbots can be used to stage interactions with the student. In the next section, further feedback will be collected from colleagues and creators to inform the next step of the project.

**Initial Feedback**

After showing the chatbot to colleagues and classmates, the initial response was positive. Some indicated their interest in using the chatbot with their students, and some noted an international appeal to using information and communications technology (ICT). If ICT can be used in an intentional way, it could provide a boost to instruction and curriculum sharing globally. Indeed, providing education and curriculum through mobile devices has been an increasingly common way of reaching the most marginalized students internationally (Crompton et al., 2017). Focusing on accessibility was another popular suggestion, as the chatbot can be used in multiple formats such as on mobile devices, smartphones, or even basic text messaging. On these devices, accessibility features can also be enabled such as increasing the size of text, enabling text-to-talk for individuals with visual impairments, etc. Taking advantage of multiple modes of communication can allow the curriculum to be accessed globally. The Dialogflow platform allows for this possibility and can integrate with Slack, Facebook Messenger (Hien et al., 2018) and Twilio for text messages. Finding ways for students to interact with the chatbot and interviewing/surveying them for their response would be the next step for the project to continue.

**The Project**

The chatbot can be found online at http://bit.ly/cor-chatbot. The project is viewed best using the Google Chrome web browser. The chatbot can be maximized and minimized using the blue icon on the bottom right corner. The source code in its entirety can be found in the appendix, which can be copied, modified, and freely redistributed using the Dialogflow platform. The appendices also include links to resources on how to create a chatbot.

**Limitations of the Project**

This field project relies on the premise of basic digital literacy. There is an assumption that the person interacting with the chatbot is familiar with text-based commands on a website or via smartphone. In addition, use of the chatbot requires both Internet access and access to a computer or mobile device, both of which limit the current reach of the project.

The chatbot is programmed in English and most of the research is based in the United States. In the United States, the CEOs from Google, Twitter, and Facebook testified on how prevalent misinformation and extremism is on social media platforms (Vynck et al., 2021). Misinformation and a lack of civic reasoning can be found to be the cause of much violence globally as well, such as the role of Facebook's platform in spreading widespread false information about the Rohingya population leading to their mass expulsion from Myanmar (Gowen & Bearak, 2017). The internationalization of the chatbot to other languages can provide critical media literacy for global audiences as well. One caveat to teaching civic reasoning globally is the availability of media freedom; if this project was based in a country with media censorship, the critical aspect of the project would likely be frowned upon. This project recognizes media censorship as a limitation on critical media literacy.

The current version of the chatbot builds upon the work of Stanford History Education Group (McGrew et al., 2017; Wineburg et al., 2020) and hopes to augment their work on civic online reasoning. Civic online reasoning is a very narrow subset of critical media literacy. As Garcia et al. (2013) found, producing content is another foundational piece of critical media literacy. In the future, this concept of a chatbot can be expanded to encompass more aspects of

content production. For example, a chatbot can prompt or scaffold a path for students to create content through a blog, a podcast, or a video production.

The format of a chatbot interface attempts to replace a human subject with a computer in a conversation. As such, certain features of natural language are lost, because there are limitations to natural language processing. The chatbot focuses on pre-programmed conversational flows; new responses cannot be generated by the chatbot without additional input from the creator. Although there is a significant amount of natural learning built into Dialogflow and the field of natural language understanding is continuously growing, this project is limited to the scope of a pre-programmed conversation.

CHAPTER IV
CONCLUSIONS AND RECOMMENDATIONS

**Next Steps**

The discussion of the chatbot was brought back to the Stanford History Education Group, the original creator of the curriculum and lesson plans. Teresa Ortega from SHEG offered suggestions and feedback for this project. First, Teresa noted the student-facing nature of the chatbot was a significant change from the teacher-facing materials on civic online reasoning. Teresa noted that a more appropriate chatbot for the context of SHEG is a teacher-facing chatbot that could focus on supplementing teacher training and provide support to teachers who want to learn how to integrate civic online reasoning into their teaching.

The questions and conversation that guide a teacher-facing chatbot are different than a student-facing one. For teachers, Teresa mentioned questions such as "Have you taught a lesson on civic online reasoning before?" to assess teacher familiarity with the topic and suggest potential lesson plan pathways could be an addition to the civic online reasoning website. For teachers accessing the curriculum from other mediums such as a smartphone, sending a small introduction with the produced video on civic online reasoning could help set the stage for teachers who are interested in the program. Through a chatbot, teachers can then be oriented toward various resources, assessments, research, and lesson plans that are published on the website.

The potential of using text messages to reach teachers who are interested in civic online reasoning is an idea similar to what CIVIX News Literacy provides on their website. https://newsliteracy.ca/ctrl-f/. The program, called CTRL+F (Control + F), offers a 7-day text-message based training course. Teresa mentioned that the CIVIX group had good alignment with

SHEG and a similar text message platform could be of interest. Text messaging can help provide small bits of support for teachers who hope to integrate the civic online reasoning curriculum into their classrooms. For example, for teachers who teach outside the history realm (those in Science, Mathematics, or English/Language Arts), they could also have access to the curriculum and be given guided pointers for their specific teaching subject area.

In order to achieve this, further user research on the teachers using the Civic Online Reasoning materials would help form a comprehensive dataset that could inform the chatbot. The dataset would include questions and responses that are accumulated from the teachers who use this curriculum. This could help inform teachers who are interested in the curriculum but are not yet using it. Currently, Teresa finds that most of the questions are fielded informally with teacher training sessions. Finding a set of teachers to provide feedback on the usability of the website would build a baseline for a conversational chatbot. Once the dataset of questions are developed, we can then enhance the website with the chatbot featuring answers to common teacher questions.

**Similar Projects**

Other groups have focused on the narrative approach to using chatbots. Smart Primer, a project from the Stanford Human-Computer Interaction group, looked at using narration to help teach math subjects such as volume. Through their research study, the group's preliminary findings were that having narration increases retention compared to a control group. Additionally, they found having narration plus having a chatbot increases retention even more. Using technology in various ways to achieve the learning outcome is a powerful paradigm as explored with both Smart Primer and Freudbot (Heller et al., 2005).

Chatbots are not the only way to build more engaging and more critical interactions with students using technology. Other projects also promote critical media literacy inside the academic space. Since the onset of the pandemic and remote learning, more emphasis has been placed on using virtual reality platforms. These platforms were once a novel tool; now with the prevalence of technology, these platforms can become a place where students create content on their own. For example, Pano2VR and ThingLink are two platforms that allow anyone to take a photosphere—essentially, a 360 degree photo—with their smartphone and create virtual field trip experiences on their own. As an example, for an admissions event, a former student can explain "A Day in the Life" of a PhD student by simply taking photos and stitching the result together on ThingLink. The value of documenting one's environment through their own eyes—creating localized knowledge—taps into the critical aspect of students, faculty, and staff to build their own narratives.

Another project, the Stanford Mobile Inquiry-based Learning Environment, has been used to help students create questions. One application for a chatbot centers around reading recent news and forming critical thinking questions about that news article. That project includes feeding recent news articles from publishers on the web, analyzing the article text for key phrases, then prompting the students to create questions with the key phrases and question words. With students at the core of formulating questions, the process allows for critical reflection and is a fundamental aspect of critical media literacy.

Outside the academic space, the creation of Wiki Edu is a place for teachers and students to work together on creating Wikipedia pages, which is a great way for students to create content together. This similar thread applies to other aforementioned projects promoting journalism and producing news articles such as Youngzine, which collects writing samples from youth and

provides internships for high school students to write about local and global topics. This process of reporting on news from multiple perspectives and having students create their own article achieves the core production aspect critical media literacy (Garcia et al., 2013). For video production, the platform ImaraTV focuses on getting international sponsorships for youth groups to be active participants in the video production space. This gives the youth practical knowledge for both learning in the moment and work experience for the future. Oakland's Youth Radio (now YR Media) non-profit also holds space for youth journalists to connect with peers across the country to build content and skills in digital media production.

## Discussion

As Crompton et al. (2017) noted in their systematic review of mobile learning, there is potential for students to use technology to help them move from consuming knowledge to producing knowledge. With this intentionality, plus a focus on critical media literacy, the next generation of students, teachers, administrators, and digital citizens will be able to create information online in a meaningful way. The balance of democracy and information generation lies in the ability of everyday people to be able to create their own narratives that they believe in. These narratives, when shared, help fight back against the one-sided narratives that powerful governments and billionaire corporations try to sell.

Chatbots in education can be used in multiple ways and designed with various educational objectives. These chatbots can be integrated on different platforms, including on mobile applications and websites. Even simple services such as text messaging can be used to deliver curriculum, as CTRL+F project has shown. Facebook Messenger (Hien et al., 2018) and other teaching tools such as Google Classroom, Seesaw, or Canvas have potential chatbot

integrations as well. These platforms have a plethora of student work and chatbots could be used to help both students and teachers navigate the online learning realm. Teacher-facing chatbots could be of great value as well; one can imagine timely status reports sent to the teacher in an accessible format. Readily available information to support learning could help alleviate some of the mundane and time-consuming tasks of the teacher. A chatbot, as shown by Hien et al. (2018), can also be used to handle administrative tasks, even though Hien et al.'s research focused on the student perspective. These methods allow educational content to reach teachers and students in their comfort zone.

This project helped identify certain limitations. Building a chatbot requires a team of developers, instructional designers, teachers, user researchers to make a successful chatbot. The technological barrier to entry needs to be improved in order to encourage simpler creation of chatbots. Requiring a programming background to build a chatbot creates this barrier to entry; Dialogflow addresses this better than most chatbot platforms by building a guided user interface. If the average digital citizen can create a chatbot with the same ease that they create podcasts on YouTube or posts on Facebook, the technology would be more accessible to administrators, faculty, and staff who wish to streamline repetitive tasks and curriculum developers who wish to disseminate their content.

## Conclusions

In 2020 and 2021, the coronavirus pandemic brought to light social justice issues including systemic racism, the Black Lives Matter fight for justice, combatting anti-Asian sentiment, and migrant justice for undocumented immigrants. The issues are all controversial, but these issues provide opportunity for learning. Ensuring access to curriculum around civic

online reasoning allows digital citizens to better evaluate the information and misinformation that they are inundated with on a daily basis (Wineburg & McGrew, 2017). For every public service announcement from infectious disease expert Dr. Anthony Fauci about the safety and efficacy of the vaccine, an equal number of tweets, websites, and infographics appear on social media suggesting the vaccine affects fertility or other harmful side effects. The ability of each digital citizen to read stories on both sides, understand how they are made, where they are coming from, and why sources are motivated to post such information is critical to create society based on truth and justice. No story is absolutely false, no side of the story is wrong—but each individual has the right to decide for themselves and should have the skills to make their own informed decisions.

In the National Basketball Association (NBA), the pandemic and violence against Black lives resulted in a day-long boycott during the playoffs. As a result, the league and team owners have agreed to create a $300 million dollar social justice fund. While this is a step in the right direction, this is augmented by player-advocates using their platform and voice to fight for better representation. Matisse Thybulle used the NBA playoff bubble to build his YouTube channel and show a behind-the-scenes perspective from a player. This helps fight the commonly fed media narrative that championships and wins define a professional basketball player. Player-led narratives are important in humanizing their lives and their stories and allowing space for them to voice their concerns and produce knowledge. This movement, in addition to the movement of players to create media companies such as Kobe Bryant's Kobe Inc, Carmelo Anthony's Creative 7, and Kevin Durant's Thirty Five Ventures allows the players to take control of the media narratives and make the financial decisions behind their own production.

Holding space for creative knowledge production from professional basketball player-advocates addresses multiple intersections of a power imbalance: (1) players can show their point of view in contrast with the team or owner's point of view; (2) players can show their personal lives in contrast with the sports media's depiction of a player; and (3) players of color can use their platform to advocate against social injustice. This counters the "single story" as mentioned earlier (Adichie, 2009). The proliferation of podcasts are reaching across the gender spectrum with Chiney Ogwumike and Candace Parker representing professional basketball players that are women. Through each media appearance, the sharing of stories from the perspective of traditionally suppressed player voices is a method to counter dominant media narratives and create social change (Jocson, 2015).

Working at Stanford and studying at the University of San Francisco, I see multiple perspectives. While both institutions fight for equity, that looks quite different with Stanford's $28 billion endowment (as of August 31, 2020) compared to the University of San Francisco's $345 million endowment (as of June 30, 2017). The amount of funding is different, teaching and research intentions are different, and the meaning of diversity and inclusion is different within each institution. Through it all, I see passionate faculty who seek to teach and research to advance the social good in both institutions. Since technology is with us for the foreseeable future, we must engage technology help us create this better world.

## Recommendations

Further research into how critical media literacy can be used to help student learning and teacher training could be very valuable within the context of a post-COVID-19 world. In 2015, a reported $13 billion was spent in educational technology in the US (J-PAL North America,

2019). The amount spent on educational technology has increased steadily, with the Coronavirus Aid, Relief and Economic Security Act (CARES Act) including approval for increased spending in educational technology. Wise use of funding to promote intentional use and curriculum design while including faculty, staff, and students' voices will be beneficial to creating tools that we can use to foster better learning outcomes. Focusing on the ability for students to be producers of content as described by Norris (2014) and Garcia et al. (2013) are key components of creating more equitable representation which starts in the classroom and ends up affecting our everyday lives (Jocson, 2015).

For chatbots, one common thread of research is the use of narration as described by Heller et al. (2005) which used the personality of Freud. The Stanford Smart Primer project also used narration to help teach math subjects. For civic online reasoning, using a fact checker persona or the persona of an activist can potentially help guide, lead, and motivate the students to become critically aware. This can help students stay engaged with the content and to encourage them to take action beyond regurgitation of polarized ideas on their social networks.

For schools, additional resources can be allocated into determining how media production can be implemented with teachers and students in schools. With the increase of social media influencers across all age groups, schools could be teaching critical media literacy to guide the next generation of influencers. Teaching media production also provides practical work experience for the student in the future. With the COVID-19 pandemic rapidly moving teachers to teach remotely, both teachers and students needed to learn how to use Zoom, Canvas, and Seesaw seemingly overnight. Just as teachers and students are continuously learning, policies and resources should continue to adapt to the changing world around us.

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APPENDICES

Hey Google: How can we build critical media literacy?

Google Developers' page on conversation design

https://developers.google.com/assistant/conversation-design/learn-about-conversation

Guide on how to get started with Dialogflow

https://cloud.google.com/dialogflow/es/docs/quick

Interface for managing all chatbot conversational intents



Interface to adding training phrases

Interface for designing which response appears



Integrating the chatbot with Google Assistant

https://codelabs.developers.google.com/codelabs/actions-1#0

The full source code of the chatbot can be downloaded here

http://wilson.su.domains/assets/cor-curriculum.zip

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