

BE SKEPTICAL, SAVE TIME:  
TEACHING GENERATION Z TO DETERMINE THE  
CREDIBILITY OF ONLINE INFORMATION

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### **Dedication**

I dedicate this dissertation to my family; I love you all so much. To my children, Katelyn, Jason, Elizabeth, and David. Thank you for your encouragement and understanding. You have made me stronger, better, and more fulfilled than I could have ever imagined. I love you more than you will ever know. I am so proud of the people you are, and I want you to know you can achieve anything you set your mind and heart to. To my partner, Karl, your love and support of me goes beyond what words can adequately express. I am so thankful we did this together. To my parents, thank you for believing in me and raising me to think for myself. It means so much that you are always willing to help drive to a soccer game, cook a meal, watch children and manage daily life. To my sister Jasmine who has always been my champion and trusted friend. I also dedicate this dissertation to my many friends who have supported me throughout this process. Thank you for being my village and providing endless social, emotional, and physical support. I will always appreciate all you have done.

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## **Abstract**

This qualitative study aimed to explore sixth-grade students' reasoning as they conducted their online inquiry research projects while the teacher simultaneously taught them the skills necessary to evaluate the information obtained from the Internet. The author of this qualitative study played a dual role as the researcher and sixth-grade English language arts teacher. Using critical participatory action research, she worked with her colleagues to observe, reflect and design a new curriculum to meet the challenges of supporting sixth graders to conduct research using Web 4.0 technologies. The research question guiding this study asked what happens when Generation Z students conduct inquiries on the Internet when teachers are instructing them to evaluate information and reason online. Data sources included: interviews, observation, and multiple artifacts collections. Employing Erickson's interpretive research methods, three assertions were found: 1) Generation Z students rely on heuristics when deciding what to trust online, 2) Generation Z students need instructional support to determine the credibility of online information, and 3) Generation Z faced challenges offline which often became challenges online. Due to these findings, it is suggested that educators recognize the online inquiry heuristics guiding Generation Z's decision-making and use that knowledge to empower students to access credible information. This will require a comprehensive approach to critical media literacy focused on explicitly teaching and providing practices to middle school students as they learn to take a skeptical stance toward online information and read laterally to confirm the credibility of online information.

*Keywords:* critical media literacy, heuristics, online inquiry, credibility, Web 4.0



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## **Chapter One: Introduction**

### **Background to the Study and Purpose**

As a teacher of middle school English language arts (ELA) and a parent of children developing critical media literacy, I am fascinated with how children engage with the Internet. My own experiences have led me to hone in on how students currently make inquiries online and reason about what to trust. Such observations have led me to believe that instruction on such topics needs to be more overt and deliberate. The media, messages, and information students consume online is influenced by social contexts shaping how they make meaning in their daily life (Kellner & Share, 2007). There is, therefore, a need for critical media literacy skills so that students can evaluate text and media (Semali, 2003) while considering the power a message holds (Alvermann & Hagood, 2000) in order to participate in a democratic society (Brown, 2015).

This is not a new idea, as a quick Google search of "how to evaluate web pages" or "teaching website evaluation" yields vast results from K-12 schools, universities, libraries, teachers, and blogs providing free lessons, toolkits and criteria for evaluating the trustworthiness of online information. For example, a popular tool is the Currency, Relevance, Authority, Accuracy, and Purpose (CRAAP) Test (Blakeslee, 2004). The questions posed in the CRAAP test are important, but ultimately it is unrealistic to engage in a 25-question checklist (see Appendix A) every time someone encounters an online source, and many of the items on the list are better suited to older versions of the Internet. I was deeply concerned that many of the recommended checklists asked students to evaluate a website based on what the web designers have presented without confirming the credibility of the information elsewhere. I needed a new

approach that did not rely on outdated and lengthy checklists or abstract concepts I felt were unrealistic for sixth-graders to use in their daily life, and had the potential to lead my students to believe inaccurate and misleading information.

From a larger perspective, "intentionally falsified news has become notorious, lucrative and pervasive," and the networked setting of this media creates an "epidemic of disinformation and misinformation to spread rapidly, much like a viral contagion" (Rubin, 2019, p. 1018, 1021). Because so much disinformation and misinformation exist, the Internet's pace of design and development has outpaced teachers' and students' methods for evaluating sources (Wineburg & McGrew, 2019). As a result, "people struggle to evaluate information" and "risk making decisions that go against their own interests" (McGrew et al., 2018, p. 187). Ultimately, students' lack of online reasoning and inability to evaluate information affects everyone in a democratic society. Public opinion surveys show that many Americans (68%) are concerned that made-up news and information are eroding confidence in government institutions, and most (56%) believe the results of such issues will continue to get worse (Mitchell et al., 2019).

There is a great deal of research on reading and researching online through a critical media lens (Coiro et al., 2016; Greene et al., 2014; Lankshear & Knobel, 2008; Leu et al., 2013; Leu et al., 2014), and it is unanimous in calling for K-12 educators to teach students to more effectively inquire online. Yet teachers still lack the necessary skills and tangible support to equip students for the Internet's complex challenges. Recent public attention to the spread of misinformation reaffirms the importance of teaching students to critically evaluate online information. Accordingly, I situated this study within a critical participatory action research (CPAR) framework in order to seek my own answers alongside students, working to create a

curriculum that would represent a step forward in my own practice. While this study did not yield a single answer sufficient to address these myriad issues, the insights I share in Chapters 4 and 5 offer ways to forward the conversation for other educators seeking similar aims. I drew from existing research that examines how students evaluate online information (Kiili, Leu, Utriainen, et al., 2018) and reason online (Breakstone et al., 2018a; McGrew et al., 2017; McGrew, 2021b; Weinberg & McGrew, 2019), out of a recognition that educators need more information on how to support students effectively. Therefore, this study grew out of a desire to contribute new insights into how the youth of today (referred to as Generation Z) make and construct meaning on the current Internet referred to as Web 4.0. This requires an examination of how the Internet is shaped by Web 4.0 technology, which affects how students determine the credibility of the information they encounter. What follows are three compelling warrants for a study such as this, with context from the research literature to support them.

1. The prevalence of misinformation online creates an urgent need for students to be able to determine the credibility of information in online inquiries.
2. Generation Z students need to be explicitly taught how to evaluate online information and develop online reasoning skills.
3. While there is extensive research on the complexity required to evaluate and make determinations about online information, teachers lack useful resources to teach students how to do this.

In the following section, I justify each of these claims and explain how they shaped my research questions, enabling me to contribute uniquely to the field of literacy.

### ***Prevalence of Misinformation***

Misinformation is a concerning and complex societal issue (Mena, 2021) because many people rely on the Internet for information yet do not know how to wisely assess and evaluate that information (Wineburg & McGrew, 2019). For the purposes of this paper, I agree with others who define misinformation as inaccurate information that impacts understanding and opinions but was "spread without the intention to mislead" (Hameleers, 2020, p. 2). However, disinformation means someone deliberately altered and created false information to deceive or manipulate others (Marwick & Lewis, 2017). In other cases, some misinformation comes from simple human error, with no intention to cause harm. Today's K-12 students (Generation Z) have only known a digitally connected world where they simultaneously have proficiency using computers, phones, and smart devices while struggling to determine the credibility of an overwhelming amount of online information (McGrew, 2021b). The current Internet has created an environment where individuals are far more likely to see and spread inaccurate information. False stories are 70% more likely to spread than true stories, and true stories take six times longer to reach the same amount of viewers as false stories (Dizikes, 2018). Even most adults believe false information and news significantly influence confidence in institutions and their fellow Americans (Mitchell et al., 2019). Democratic societies require the circulation of reliable information; technology is a tool that can support democratic involvement by amplifying oppressed voices, yet it can hinder democracy by spreading misinformation (Buckingham, 2019).

The spread and prevalence of misinformation and disinformation online are significant challenges in society (Colomina et al., 2021; Polizzi & Taylor, 2019; World Health Organization, 2020). Misinformation refers to information that is objectively incorrect and not based on

empirical evidence but without the intention to mislead, where disinformation is deliberately fabricated in order to achieve a political goal; however, both are a concern as they result in the spread of false and misleading information (Marwick & Lewis, 2017). In order to engage in democratic processes, individuals need to be able "to equip themselves with information and empower themselves to act on that information" (Howell & Brossard, 2021, p. 7). However, individuals are concerned about the confusion around basic facts related to current events and issues caused by made-up information and news (Mitchell et al., 2019). While misinformation and disinformation are not new phenomena, the decline in public trust is significant (Buckingham, 2019). People are not only more skeptical of misinformation, but also accurate information (Clayton et al., 2020). The concern is that decreasing trust in institutions and access to trustworthy information can erode democracy (Barton, 2019).

Disinformation is increasingly more common worldwide, contributing to a polarized society lacking common views of reality; those responsible for false narratives have been linked to a growing disinformation industry (Fisher, 2021). Since 2009, sixty million dollars have been spent on these disinformation firms in the U.S. alone (Bradshaw et al., 2021). Economies created around the public's engagement with disinformation contribute significantly to the growth of intentionally falsified information on the Internet (Rubin, 2019). Research shows that an individual's single exposure to information increases their belief in the accuracy of both fake and real news (Pennycook et al., 2018). Further, texts are never neutral: our experiences and beliefs shape our understanding and belief in information (Vasquez et al., 2019). Therefore, the growth of misinformation and disinformation online requires a critical literacy perspective to help students "understand the motivations and intentions of people who produce and publish media



content" (Kupiainen, 2022, p. 15). Critical literacy asks individuals to query, "What is truth?" while also considering who has access to information, who benefits from information, and whose interests are being represented (Luke, 2012, p. 4). Such questions are a vital part of determining the credibility of information on the Internet.

The spread of misinformation marginalizes legitimate news and shapes whose narratives are told (Barton, 2019). "From the first libraries of Alexandria to Google," knowledge has been connected to power; many seek to control access and interpretation of that information (Luke, 2012, p. 5). Democratic societies have a long tradition of questioning knowledge, yet this is significantly more challenging in an Internet environment where online searches are shaped by algorithms and personalized ads (Haider & Sundin, 2022). In an environment where personal, political, and civic information becomes a commodity for power, profit, and influence, there is a clear need for "students to not only judge credibility but also evaluate information on controversial or divisive topics in a way that helps them develop truthful assessments, and [develop] responsible civic discourse" (Addy, 2020, p. 30).

### ***Explicit Instruction to Determine Online Credibility***

Generation Z K-12 students are immersed in rich communications and everyday literacies in a social world that is increasingly shaped by the "ubiquitous use of digital technologies" (Erstad et al., 2019, p. 2). Their learning environments are increasingly mobile and personalized, and students have growing engagement with social media and videos in their everyday lives (Anderson & Jiang, 2018; Common Sense Media, 2019). Survey data of teens in America show that 95% of teens state that they have access to a smartphone, and of phone users, 83% describe using their phone to learn new things; 45% describe themselves as being online almost

constantly (Schaeffer, 2019). Such statistics indicate the urgent need for them to know how to effectively evaluate online content (Kupiainen, 2022). While children's education typically focuses on reading comprehension and literacy skills, scholars have reported that they have limited abilities to evaluate information from an Internet full of diverse beliefs and often conflicting information (Kiili, Leu, Utriainen, et al., 2018).

The prevalence of internet usage and the concerns of misinformation have led to questions about whether technical solutions such as corrective actions and warning labels may be able to address concerns related to students' ability to evaluate online content. However, Oeldorf-Hirsch et al. (2020) warned that labels from fact-checkers on memes "did little to affect perceptions of credibility" (p. 693). Additionally, when individuals encounter labeling systems for inaccurate and false information, most users inaccurately infer that all unlabeled information has also been vetted. Such an assumption is concerning since creating fake information is easier than debunking existing fake information (Pennycook et al., 2020). Vraga et al. (2020) found some value in having experts immediately respond to misinformation with correct information, yet this is challenging to enact because often expert information is "lost in the noise of a busy social media feed" (p. 14). A more recent Facebook whistleblower indicated its algorithm prioritizes information that elicits more provocative responses (like the angry emoji), resulting in users viewing more misinformation than if that algorithm ranked responses equally (Axon, 2021). This means any corrections or information from verified experts does not often reach people. Indeed, information labeled as disputed has been found to increase beliefs in partisan censorship (Vogels et al., 2020).

Taken together, such realities indicate the importance of teaching individuals to take a skeptical stance toward our current society's information infrastructure while managing undue distrust or criticism (Haider & Sundin, 2022). If people see labels as a partisan attempt to control what they view, such labels will not help them to identify accurate and credible information. There is the additional caution that censorship can threaten democracy by limiting freedom of expression (Nyhan, 2020). Democracy requires freedom of speech and resilient, perceptive citizens who can navigate mis- and disinformation to participate in democratic purposes. Today's Internet and advanced algorithms make it even more urgent that students learn to effectively evaluate the information they encounter online (Polizzi & Taylor, 2019). Research also indicates that students in the U.S. lack such skills. Next, I will share some examples.

Breakstone, Smith, Wineburg, et al. (2021) found that high school students across the nation fell short in their ability to engage in online reasoning skills to determine the credibility of online information. Kiili, Leu, Marttunen, et al. (2018) indicated sixth-grade "students are limited in their ability to evaluate online," and schools need support in developing instructional practices related to evaluating online information (p. 549). High school juniors and seniors need to be explicitly taught to evaluate evidence because students rarely question the origins of information in an online environment where misinformation appears alongside accurate information (McGrew, 2021b, p. 92). Later you will read in Chapter 4 and 5, that all of these studies described above point to similar findings as the ones that emerged from this study, and confirmed the need for schools to go beyond the state standards. Yet, I will highlight more nuanced recommendations to teach students how to be thoughtful consumers of information.

Current research has shown that students' prior knowledge does not necessarily help them to more effectively determine credibility (Jones-Jang et al., 2021), and students are more likely to believe information if it supports their existing perspectives (Kahne & Bowyer, 2017).

Researchers who recognize students' limited ability to evaluate online sources call for such skills to be taught alongside early literacy skills (Eskelä-Haapanen & Kiili, 2019). Students need to be taught "specific reading and literacy skills so they can evaluate information in their everyday digital environments" to critically reflect on and understand online information (Kupiainen, 2022, p 15).

In my own teaching, I perceived the urgency and importance of teaching my students to be skeptical of the information they encounter online without simply accepting what they encounter or becoming defeated by the task of evaluation. I recognized my need as a teacher to better understand the nuance behind students' online choices. All the above published studies informed my thinking not only in how to develop a curriculum designed to address students' digital literacy needs (associated with evaluating information), but in also shaping the design of this dissertation study. That said, my study was more nuanced since I not only sought to understand how Generation Z middle school students evaluated online information, but I also sought to explore how my curriculum might help them do it more effectively.

### ***Teachers Lack Resources for Online Reasoning and Evaluation of Information***

Using critical literacy perspectives, I sought to challenge "the status quo to discover alternative paths for self and social development" (Shor, 1999, p. 2) and set about to help my students evaluate information and reason online. I was excited to adjust my ELA curriculum, yet I could not find the appropriate resources to help middle school students. Instead, I saw a variety

of gatekeeping structures that did not prepare my students to experience the freedom of accessing credible information (Breakstone et al., 2018a).

As an ELA teacher educating Generation Z middle schoolers, I took responsibility for supporting my students to make meaning in a world that is increasingly reliant on using the Internet to access information. Despite the fact that my students are more likely to rely on Google search engines and videos than textbooks or manuals for research (Shatto & Erwin, 2017), I could not find appropriate materials or curricula to guide the students in effectively evaluating online information. Unfortunately, this experience reflects a more significant trend across the country, where districts and schools do not prioritize digital literacy education materials (Turner et al., 2017). I want my students to be prepared to participate in a democratic society and know how to make decisions based on accurate information (McGrew et al., 2018). I chose to "act upon this new knowledge in order to bring about social justice and equality" (Shannon, 1990, p. 149).

I began my investigation by going to the Internet (using Google search engine) to search for lessons and curricula. While there was no shortage of resources, I found most were checklists or acronyms that focused on evaluating information by looking at the "website's internal features" (Wineburg & McGrew, 2019, p 121). As I stated earlier, lengthy checklists like the CRAAP test (Blakeslee, 2004, Appendix A) are widely used. While there are some great intentions behind these checklists they were designed for older versions of the Internet fueled by Web 2.0 and Web 3.0 technologies. Upon reviewing the 25 questions asked in the CRAAP test, I found questions ask users to evaluate surface features such as the "spelling, grammar or typographical errors" or details that are easily manipulated or obscured such as "author's

credentials" and whether the "tone seem unbiased" (Blakeslee, 2004, Appendix A). Additionally, this checklist "places value on making the source fit given criteria" and asks users to make decisions based on the factors that are easy to fake (Addy, 2020, p. 24). I found only one that might require the reader to leave the provided source of information, "Can you verify any of the information in another source or from personal knowledge?" (Blakeslee, 2004, Appendix A). However this question also allows the evaluator to rely on their personal knowledge. This is concerning given that individuals are more likely to believe information if it supports their existing perspectives (Kahne & Bowyer, 2017). In my view, which corresponds with other researchers (Breakstone et al., 2018a), the current Internet has outpaced such methods of evaluation and creates a "false sense of confidence" (McGrew et al., 2017, p. 7).

Historically, the Internet evolved from Web 1.0, which was a primarily read-only platform in 1989, to Web 2.0 (beginning in 2004), which was a more shared reading and writing platform. In 2010, Web 3.0 came into existence; it was labeled semantic due to its relationships between users and data, which rely increasingly on machines and algorithms (Choudhury, 2014). Web 3.0 technology was shaped by the growing data from the many Internet connected devices in our lives and the platform-based nature that individuals engage with the Internet from social media and other app platforms rather than typing in a web address (Kohnen et al., 2020). Beginning around 2020, researchers view the various ways to access the Internet as Web 4.0. While it is still being defined and operationalized, Web 4.0 is a place where users experience an even more personalized experience, where digital devices communicate with other digital devices with the support of artificial intelligence independent of the human user (Almeida, 2017; Choudhury, 2014; Nath & Iswary, 2015; Tekdal et al., 2018).

Teenagers have grown up reading various overlapping multimodal texts in a digital world that includes texting, social media, and general web browsing (Rutherford et al., 2017). Students who have grown up in the digital world are often assumed to have a set of skills due to their age, but they have a range of experiences and resulting digital literacy competencies (Harlick & Halleran, 2015). With augmented reality, artificial intelligence, big data, and the Internet of things, the demands of Web 4.0 will require that teachers prepare learners for the range of things they may experience in the future (Peredrienko et al., 2020). Whereas Millennials (those born between 1981 and 1996) were mainly taught the importance of focusing on a single source, determining its credibility, and then consuming that information as truth, this next generation, Generation Z, must be taught differently as they are more likely to come across a great deal of misinformation (Seemiller & Grace, 2018). With the changing nature of the Internet and the larger world, it is evident that "to be literate tomorrow will be defined by even newer technologies that have yet to appear" (Leu et al., 2013, p. 1150). Ultimately, my examination of the literature taught me that I needed to move away from outdated, time-consuming checklists and instead seek to verify the information by comparing sources (Buckingham, 2019).

As my internet searching led me to resources and checklists not supported by the literature, I dug deeper into the existing literature on students' online inquiry, evaluation, and reasoning to begin to craft my own curriculum. Existing research has established that most students cannot effectively evaluate and determine the credibility of online information (Breakstone, Smith, Wineburg, et al., 2021) and that most students do not graduate high school with the skills needed to safely and effectively navigate a complex digital landscape (Turner et al., 2017). Specifically, students need new levels of discernment to appropriately evaluate the

credibility of sources (Mirra et al., 2018). This means they may need to evaluate two or more sources for each query they make (Kiili, Leu, Utriainen, et al., 2018; Seemiller & Grace, 2018). I began formulating my curriculum by beginning with the online research process conceptualized by Kiili, Leu, Utriainen, et al. (2018):

(a) locating information with a search engine, (b) confirming the credibility of information, (c) questioning the credibility of information, (d) identifying main ideas from a single online resource, (e) synthesizing information across multiple online resources, and (f) communicating a justified and source-based position. (p. 325)

I focused the curriculum on the importance of confirming and questioning the credibility of information, which requires students to confirm and question the credibility of information before using it (Kiili, Leu, Utriainen, et al., 2018). While Kiili, Leu, Utriainen, et al. (2018) had sixth-graders competing simulated tasks to better compare and quantify results, I endeavored to create a curricular plan that would teach students while they engaged in real-life research tasks.

From this focus on what it means to confirm and question the credibility of online information, I explored research by McGrew et al. (2018) that focused on civic online reasoning skills. This work asked students to consider, "Who is behind the information? What is the evidence? What do other sources say?" (p. 168). While these questions align with other teaching resources such as the CRAAP (Blakeslee, 2004, Appendix A) test, which also ask if authors have authority, McGrew's research was more applicable to this study because it requires students to leave the original source to read other material (also known as reading laterally) in order to rigorously confirm the credibility of sources. This was useful for teaching my students to confirm the credibility of online information, as well as being more attainable than lengthy



checklists. All these articles compelled me to address digital literacies purposefully with my students. Therefore, this study focused on how to create space for students to pursue their authentic inquiries while providing instruction on how to evaluate information and reason online in real-life contexts.

### **Summary**

Access to credible information is crucial in a democratic society, but the volume and speed at which misinformation spreads has led to a growing distrust in public institutions. An important step toward empowering Generation Z students who have grown up in a digitally connected world is to teach them how to find credible information. Existing research has established that students are generally ill-equipped to effectively evaluate online information (Breakstone et al., 2018a). While research has shown how students are using the internet to search for information and evaluate online, the changing nature of Web 4.0 requires that teachers have instructional practices and curriculum that meets the needs of students navigating the current Internet. For instance, my study parallels research by McGrew et al. (2018) because they also looked at middle and secondary students' ability to evaluate online information. However, at the middle school level McGrew et al. (2018) only looked at paper tasks (printed selections of websites) requiring students to determine who was behind the information contained in printed online articles. In contrast, in Chapter Three you will learn in more detail how the sixth-grade students in this study were given tasks that encouraged Internet use to find various sources as a means of evaluating information. McGrew et al. (2018) found that students were not prepared to evaluate the huge volume of information available; furthermore, they emphasized the need for online reasoning instruction and encouraged more research to be done that allows students to

focus on a "topic about which they feel strongly" (p. 185). My study addressed this call by allowing for students to pursue inquiries of their choice. Additionally, since I was compelled to empower my students to access credible information, I followed McGrew et al.'s (2018) recommendations for making online reasoning instruction part of the curriculum.

While previous studies have examined students' existing skills in isolated tasks (Breakstone et al., 2018b; McGrew et al., 2018), my study was distinct as it offers insights into the online inquiry decisions of middle school students as they evaluated the credibility of online information during authentic inquiry projects over the course of five months. This study is important because, while middle school students are online using digital media, they lack the skills needed to "keep them from becoming misinformed while still allowing them to enjoy the benefits that digital networks offer" (Walsh-Moorman et al., 2020, p. 29). Furthermore, McGrew et al. (2018) recommends students have explicit instruction and "opportunities to learn and practice these skills" (p. 186). This study addressed these recommendations; I seek to contribute to this growing field of critical media literacy using Critical Participatory Action Research. As a teacher-researcher in collaboration with a co-teacher and students, I explored how to teach students to evaluate information and reason online. Teachers and schools need tangible curriculum and instructional practices such as the ones emerging from this study to support students' in accessing and evaluating credible information.

### **Research Question**

Accordingly, this study explored the core research question, "what happens when Generation Z students conduct inquiries on the Internet when teachers are instructing them to evaluate information and reason online?" This question reflects my commitment to Ericksonian

research priorities, which I explore further in Chapter Three. It also demonstrates my commitment to helping my Generation Z students evaluate online information. This inquiry developed out of previous studies which examined students' online inquiry behaviors (Kiili, Leu, Marttunen, et al., 2018) and research indicating the need to better understand and teach Generation Z students' ability to find credible information online (Breakstone et al., 2018b; McGrew et al., 2019; Kohnen et al., 2020). It also constituted an opportunity to explore this topic alongside students working in an authentic classroom environment, one of the core priorities of critical participatory action research. In the chapters that follow, I begin Chapter Two with a theoretical framework of social constructivism and provide perspectives on literacy and technology as well as the connections to power and critical literacy. The remainder of Chapter Two reviews the literature related to critical media literacy and determining the credibility of information online. Chapter Three describes the qualitative methods informing this study, with a discussion of Ericksonian priorities and critical participatory action research structures, which enabled me to systematically inquire about what happens when Generation Z students conduct inquiries on the Internet when teachers are instructing them to evaluate information and reason online. I also describe the curriculum I co-curated to instruct sixth-graders to evaluate information and reason online. Chapter Four describes transformations in practice and examines different phenomena related to the research question. Through vignettes and evidential warrant from various data sources, I document the findings of the study. Lastly, Chapter Five discusses the findings in connection with existing literature, and provides practical implications and directions forward given this study's insights.

## **Chapter Two: Theoretical Framework and Literature Review**

### **Theoretical Framework**

I begin this chapter with the theoretical underpinnings that inform this study: (a) social constructivism theory, (b) distributed cognition, (c) perspectives on literacy, including the role of technology in literacy, and (d) the relationship between power and critical literacy across these themes. Social constructivism is the primary theoretical framework for this study, since Internet use and learning in digital forms requires engagement and knowledge formation within collaborative environments (Reynolds, 2016). Additional frames are explored to explain how the role of literacy and technology shaped this study. Finally, due to the cognitive aspects of literacy shaped by technology, distributed cognition brings together the socio-cultural realities of social learning and constructing knowledge online while honoring the cognitive demands of literacy with new technology (Hutchins, 2006).

### ***Social Constructivism***

Social constructivism (Vygotsky, 1978) is the theoretical framework that serves as a basis for this study. According to Dewey (1910), knowledge is not the result of internal consciousness but requires activity in the world; this constructivist theory is the foundation for social constructivism. Within constructivism, things have meaning in relation to other things; learners construct knowledge from the meanings, generalizations, organization, and qualities of observed and experienced things (Dewey, 1910). This means knowledge is not passed from teacher to learner but rather constructed by learners as they make meaning in the world, an idea that rests upon Vygotsky's (1978) notion of social constructivism, which describes all knowledge as the result of human interaction within social groups. Cognitive development is thereby a social

practice where knowledge is co-constructed between learners; even environments shape what and how individuals learn (Vygotsky, 1978).

Social constructivism is one of the lenses I used to examine students' literacy practices as they made meaning and interacted in digital environments. It meant that I viewed their meaning-making process as a knowledge formation process, transmitted through social membership and developed through interaction. Such views make literacy a social constructivist process (Au, 1998). As media continues to evolve and represent a range of new formats, individuals interact with more content in digital settings, leading to more extensive knowledge construction on the Internet (Reynolds, 2016). This means researching and searching for information online constitutes a constructivist inquiry process where learners developed understanding through exploration (Friesem, 2019). Learning through and with the Internet is a socially constructed process because individuals navigate through a range of digital media, making meaning from others' socially-constructed content. As society shifts and grows, technology literacy is becoming increasingly necessary for participation in society (Bawden, 2008). Dewey (1983) recognized the ever-shifting nature of societal growth and the importance of education that recognizes "democracy has to be born anew every generation, and education is its midwife" (p. 139).

Learning online requires peer engagement as learners problem solve and engage in inquiry; therefore, it is a social constructivist process (Reynolds, 2016). Vygotsky (1978) described learning as occurring through dialogue, and in the current digital world, adolescents are dialoguing more than ever in digital communities (Ciampa, 2016). From a social

constructivist perspective, learning is social and arises from two or more people and contexts interacting, which forms the basis of digital learning (Kafai & Resnick, 2012).

Since the Internet lends itself to non-traditional learning spaces, teachers need to equip students with the tools to successfully construct knowledge in a wide range of digital spaces (Kalantzis & Cope, 2015). Also, it is important to recognize the ways such spaces and the processes of knowledge construction within them can give or deny power (Street, 2003). In the twenty-first century, one example of this is that certain individuals or schools lack the financial means to acquire technology and implement programs that support understanding and application of new technologies (Collins & Halverson, 2009).

Teachers need to teach students to be effective at constructing knowledge in complex digital formats (Kanniainen et al., 2019) so they are able to participate effectively in a digital society (Turner et al., 2017). Specifically, students need to be taught that "online information is socially constructed and distributed" if they are to fully understand the need to critically evaluate information online (Eskelä-Haapanen & Kiili, 2019, p. 184).

### ***Distributed Cognition***

At first glance, the cognitive processes needed to explore literacy in digital settings may seem at odds with a sociocultural perspective, which emphasizes literacy as something that happens between people, society, and context, rather than a cognitive process existing within an individual's head. However, the work of distributed cognition provides possible new foundations for digital learning and literacy research since it encapsulates the complexity of new digital communication and technology interactions in sociocultural contexts. Distributed cognition is not a type of cognition but a perspective of all cognition, including the interactions between

people and objects in the environment (Hollan et al., 2000). According to Hutchins (2006), cognition requires interaction because "cognition is distributed across brains, bodies, and a culturally constituted world" (p. 376). In this model, digital computing devices become tools, artifacts, and objects that serve as partners in cognition alongside the individual, culture, and community (Hutchins, 1995; Pea, 1993; Salomon, 1997; Valanides & Angeli, 2008).

Distributed cognition builds from Vygotsky's (1978) work, and the viewpoint that people and tools are linked to a social context rather than existing in isolation. From this sociocultural perspective, learners' use of tools and technology bring about cognitive development, which is embedded into social practices (Lund et al., 2014). Literacy is therefore a sociocultural process in which learners link complex cognitive processes and social resources to work reciprocally for meaning production. Social constructivism considers individual growth in the context of society and culture because they are internalizations of external activity (Vygotsky, 1978). In this vein, offline literacy has long been viewed as an internal process requiring organizing, selecting, and connecting information to one's social world to make meaning. Yet in and of themselves, texts do not carry meaning and knowledge; it is learners' interactions and experiences with texts that enable them to actively build "mental representations by combining new information from the text with previously acquired knowledge" (Spivey, 1987, p. 172). Rosenblatt (2005) described this as a transactional process representing the complex and variable interactions between individuals and texts to create meaning. Similarly, digital literacy requires individuals to construct understanding using various cognitive processes which are filtered through their social origins. This corresponds to Au's (1998) argument that literacy is multidimensional, with room for both social and cognitive elements.

Research on distributed cognition in the past twenty years has often been linked to digital literacy, where learners use digital tools to learn. In such studies, social and cognitive elements of learning merge as individuals learn and make meaning. According to Iordache et al. (2017), distributed cognition is a model for digital literacy which refers to users' meaningful interactions with the tools that expand their mental capacities. Connecting with social constructivism, Perkins (1993) suggests that knowledge and information are held across tools as well as people in a given community. Heersmink and Knight (2018) argue that taking a distributed cognition view of learning helps researchers view the Internet as both a tool and an artifact that can support authentic learning opportunities related to finding and organizing information. Nersessian (2006) demonstrated this through a case study of participants conducting experiments in a science lab, where they engaged in cycles of learning between humans (social) and artifacts (objects or tools). The study revealed that learning is a constantly evolving integration of cognitive and cultural elements in problem-solving environments.

Shaffer and Clinton (2006) explored distributed cognition in the digital age where it is difficult to separate the person from the tool; from this perspective, cognition is not just composed of human beings and tools but the reciprocal nature of tools/objects and people to take action. The idea that humans do not just use objects but interact with and through those objects was further developed by Heylighen and Beigi (2018). Their research looked at how computers that exhibit memory and decision-making are part of the distributed cognition framework, illustrating how cognition is not held in an individual, but rather across a range of distributed minds. This model demonstrates how thinking and action require multiple agents (human and non-human) to work together with knowledge that is both held by humans and outside of



humans. Human minds are not independent; instead, they are connected through networks of both human and technological agents, enabling problem-solving and action (Heylighen & Beigi, 2018). Computers that communicate independently and use artificial intelligence are changing this digital landscape. In summary, these considerations are relevant when considering the impact of the Internet created by Web 4.0 technologies on learning. It necessitates an updated view of distributed cognition that not only sees technology as a tool used by learners, but recognizes the ways learners themselves are embedded in the sociocultural network.

### ***Perspectives on Literacy and Technology***

While this study is ultimately about critical media literacies, which I discuss further in this chapter, it is imperative to start from a theoretical perspective on how literacies have been defined and perpetuated. Such theories deeply inform my views and situate this study. This study is oriented around the seminal works of literacy research which frame literacy as a social process that makes use of a "range of cognitive, social, interactional, cultural, political, institutional, economic, moral, and historical contexts," all of which are continually changing how literacy is defined (Gee, 2014, p. 2). Street (2005) describes literacies as the ways in which people make and communicate meaning for success in everyday life. They are also deeply embedded in people's daily practices (Barton, 2001) and can be understood by examining the sociocultural practices in which people engage (Gee, 2014). Informed by these researchers, I define literacy as how people make and communicate meaning, and attend to how that meaning is shaped by the social, cultural, and everyday contexts of a person's everyday life. New technology has significantly impacted society, and literacy is framed in the practices of people; therefore, technology shapes literacy. Writing, the printing press, computers, the Internet, and handheld

computing devices are all technological developments that shape people's social practices and impact literacy. Nothing about these ideas is new. For many in our current society, the ability to communicate and engage in literacy is reliant on our technological tools (Van Scoter & Boss, 2002). The ubiquitous presence of technology shapes our daily lives, society, and culture and impacts how people make meaning in their daily lives. Literacy is examined through the changes in culture and context created by technology as individuals make meaning in the world (Willinsky, 2017). As these shifts are continuous and ongoing, I seek to contribute more empirical data to the field, by examining how teachers and students navigate and evaluate online information in order to make meaning in a social environment shaped by changing technology.

In examining the role of technology in literacies, some researchers argue that technology, computers, and the Internet are societal influences constituting the everyday contexts that impact how people make and communicate meaning (Gee, 2014; Street, 2005). However, in a world shaped by ever-changing technologies, literacies have different definitions for different people. For example, Coiro et al. (2008) argue that the introduction of technology alters language and literacy. This is in contrast to the belief that technology is just the newest tool with which individuals and communities engage in the same old literacy practices (Batron, 2001). Building off existing new literacies theory, which prioritize the ways social contexts have always shaped literacy, Leu et al. (2013) argue that "the Internet changes the nature of literacy" (p. 1156). Leu et al. (2014) recommend using a dual-level theory of new literacy, which distinguishes between new literacies with lower-case letters and New Literacies with uppercase letters. The lower-case definition would encompass studies that focus on specific aspects of literacies, such as multiliteracies, content-specific literacy, or multimodal literacy. Such studies are essential for

revealing specific changes in literacy education settings, but a broader lens is required to effectively study multiple, lower-case new literacies. Therefore, the upper-case New Literacy definition makes space for these overlapping literacies while acknowledging the complex and continuously changing nature of technology (Leu et al., 2014). This definition emphasizes the need for learners to rapidly adapt to changing technologies if they are to effectively engage socially, think critically, understand multiple viewpoints and modalities, communicate, and make meaning (Leu et al., 2013).

The didactic nature of technology was strongly evident for the student participants in my study; their literacy was deeply impacted by technology. Therefore, I chose *not* to use Leu et al.'s (2013) definition of uppercase or lower-case new literacies for my study. Although the research completed by Leu et al. (2014), Leu et al. (2013), and Ciro et al. (2008) illustrated the skills necessary for a range of literacies related to technology, their definition only defines new literacies in terms of the rapid change created by technology. Instead, I conceptualized the role of technology as part of the social and cultural everyday context in which literacy occurs. This is aligned with the definition provided by Knobel & Lankshear (2014), where literacy is a way to communicate, generate, and negotiate meaning through participation in various socio-cultural contexts including those created by new technologies.

For the purposes of this study, digital literacy is conceptualized as occurring within a sociocultural context, comprised of meaning-making activities between people and society (Street, 2005). Using distributed cognition (Hutchins, 1995) digital literacy includes complex cognitive processes that occur across the individual, the tool, and culture (Gomez et al., 2010); technology not only serves as a tool, but as an agent of knowledge creation and action

(Heylighen & Beigi, 2018). The ubiquitous nature of technology is changing the everyday context of peoples' lives (Leu et al., 2014), and this means to be literate today requires more than just the ability to use technology, but to understand how the connected world is being shaped by technology, and then using that understanding to effectively construct knowledge and engage with others (Knobel & Lankshear, 2014). Additionally, the ways in which technology shapes the social world requires me to consider the role technology plays in reinforcing or denying power.

### ***The Relationship Between Power and Critical Literacy***

Throughout each of the subsections listed above, power was a recurring concept. This is because when learners make meaning in the world, they encounter structures and opportunities that support or deny access to the meaning-making process; as a result, there are those who are given power and those who are denied power (Street, 2003). Specifically, the roles of literacy, technology, and decision-making are central issues of power in how meaning is made in schools and on the Internet. Therefore this study is also framed through a lens of power.

Technology in the classroom can potentially change power relationships because it removes the historical gatekeepers on information (Somekh, 2007). When a student uses the Internet to look up information in an instant, they have power that was not present in previous generations of learners; however, with this power comes new challenges as students must seek opportunities to use that information in meaningful ways rather than simply being digital consumers of information (Hughes et al., 2017). Literacy with the current Internet requires that students be empowered to wisely direct their learning, use various digital tools, and make meaning in digital spaces (Richardson, 2016). Furthermore, some argue that despite the potential for the Internet to be a democratizing force in education that supports shared knowledge and

power, it instead serves to reinforce existing power structures; those who have advantages become further advantaged while those with the greatest needs continue to see growing gaps between themselves and their peers (Shelby-Caffey, 2021). If these gaps are to be closed, it is necessary to consider the role of power as students learn and discover online (Emejulu & McGregor, 2019).

Examining the impact of power on literacy and online practices led me to consider the role of critical literacy. Critical literacy considers the use of language to question power relationships and social structures that shape how people see themselves (Shor, 1999). When individuals question texts, they question the world, because they ask whose interests a text represents and explore how texts reinforce or deny power (Janks, 2018). Related to John Dewey's social context for education, critical literacy uses language to question power in society (Shor, 1999). Additionally, from a perspective of distributed cognition, I considered the cognitive elements involved since technology is a tool that can reinforce existing power structures in a social environment. This leads me to assert that critical literacy in the current information and Internet connected environment requires critical thinking (Kupiainen, 2022), and to consider the cognitive elements of evaluation in critical literacy. To be critically literate, individuals must evaluate how their understandings are shaped by language (Shor, 1999).

In education, critical literacy helps students to see and question the power relationships which impact social structures (Behrman, 2006). In addition, critical literacy educators help students see how forces in society influence their lives (Degener, 2001), by guiding students to develop an awareness of how systems of power affect their lives (Hackman, 2005). Specifically, educators who work from a critical literacy perspective must support students to consider the

power that texts hold and question whether those texts promote equity or injustices (Janks, 2018). My critical literacy perspective is rooted in a literacy education background shaped by literacy instruction within how people make meaning in society.

### **Literature Review**

In Chapter 1, I defined and shared background about the prevalence of misinformation and the changing nature of Web 4.0 technologies that require teachers to offer explicit instruction to help students determine the credibility of online information. The lack of resources for online reasoning and evaluation of information available to teachers positioned my study and clarified my warrant. Next, I cast a wide net to review empirical studies about critical media literacy and explore how individuals determine the credibility of information online, to further inform my study.

### ***Critical Media Literacy***

The evolution from Web 1.0 to Web 4.0 has brought a range of shifting definitions of what it means to be literate in this space. Defining literacy is complicated when digital literacy, media literacy, and information literacy have similar and overlapping definitions (Koltay, 2011). An exploration of the evolution of literacy and the Internet is essential to understanding the need for critical media literacy on the current Internet. This topic has been discussed and debated for decades; most begin with Gilster's (1997, p. 1) definition of digital literacy as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers. Formed during Web 1.0 technologies, this definition reflects the nature of Web 1.0 as a read-only format where users had access to a range of sources (Nath & Iswary, 2015). Eshet-Alkalai (2004) describes digital literacy as a framework of "five types of literacy:

(a) photo-visual literacy; (b) reproduction literacy; (c) information literacy; (d) branching literacy; and (e) socio-emotional literacy" (p. 94). This definition reflects the changing nature of the Internet at that time, which offered multimedia sources, more opportunities for collaboration, and the beginnings of hypertext as it is known today. Web 2.0 technologies are characterized by users' ability to be active participants, not just reading but also writing and contributing (Tekdal et al., 2018).

Definitions of literacy shifted as the Internet evolved to Web 3.0, which was rooted in hypertext and the semantic web designed to be read by both computers and humans (Nath & Iswary, 2015). It is argued that the nature of digital media's multiple pathways through hypertext creates an environment that requires a different set of skills than traditional offline text-only literacy. "New media cannot be 'read,' page after page; they require an understanding of navigational schemes and information architectures" (Kalantzis & Cope, 2015, p. 383). With the evolution of Web 3.0 and hypertext, understanding about reading comprehension has shifted to include distinct digital reading skills, and educators learned that simply moving existing materials online is insufficient for helping readers become critical consumers (Leu et al., 2015). When a student explores digital media, they will often "create their own reading pathways due to the nonlinear nature of many digital texts through the selection of hyperlinks" (Neumann et al., 2017, p. 473). Concerningly, while reading in hypertext is a non-linear process, much of the digital literacy research offers linear steps or skills. Such models for online reading view it as a process requiring readers to: 1) identify a problem, 2) search for information, 3) evaluate information, 4) process that information, and 5) communicate their understanding (Leu et al.,

2013). The problem with this model is that it is not clear how to teach students to evaluate information.

We are through the semantic web transition that characterized Web 3.0, and a new evolution has resulted in communication between computers which is outside of the user's control (Tekdal et al., 2018). Web 4.0 is characterized by more content being created by computers and devices that are not human, resulting in a pervasive network in which humans and machines interact in a symbiotic relationship (Almeida, 2017). Additionally, individuals face literacy challenges due to machine learning and the algorithm-driven Internet (Valtonen et al., 2019). Current users of Web 4.0 are accessing the Internet at a time with a great deal of conflicting information. The volume of misleading and inaccurate information requires an interconnected process of locating, synthesizing, and communicating understanding (Kiili, Leu, Marttunen, et al., 2018). As a result of the semantic nature of the Internet, people experience considerably different digital information and therefore need to evaluate and process information from multiple sources. Therefore, the current Internet requires a reevaluation of the models used for online literacy, focusing instead on how individuals search for information and confirm the credibility of information (Kiili, Leu, Utriainen, et al., 2018).

Rather than focusing on digital literacy competencies, educators must use definitions of media literacy to help students to meet the challenges of navigating an Internet shaped by Web 4.0 technology. Media literacy considers how media can influence and impact various aspects of our lives; from this perspective, learners must be empowered with not only the knowledge of these influences but the critical thinking skills required to protect themselves from the potentially harmful effects of media (Potter, 2013). Issues of power in media literacy require a critical



literacy lens. The ever-present nature of Internet based information demands a critical literacy lens, which thoughtfully considers the "relationships of [people] with their world" (Freire, 1970, p. 485-486). Critical media literacy focuses on the responsibility of educators to guide students to look at how our current environment is shaped by algorithms, monetization, moderation, and consumption, and consider how myriad media platforms shape our understanding of the world (Lyiscott et al., 2021). This enables learners to see beyond the manufactured binaries of truth and falsehood, helping them consider the range of influences that shape our understanding of information. This enables individuals to challenge assumptions and disrupt power structures as they critically reflect on the message rather than being passive consumers (Tisdell, 2008). If teachers are to help students build a democratic society and appropriately navigate the nature of the Internet, critical media literacy is essential for helping students evaluate information, question power, and make informed decisions.

### ***Determining the Credibility of Information Online***

Students who are unable to gather or analyze accurate information cannot contribute effectively to such a democratic environment. It is therefore incumbent on educators to specifically teach students to find accurate and credible information. This can be challenging on many levels, beginning with defining the word “credible.” Credibility is a concept related to how believable people find something to be. While *credible information* is not the same as *truthful information*, for teachers who seek to help students access and critically evaluate information as trustworthy, it is important to acknowledge that discerning truth requires a complex consideration of how information is represented in the world (Buckingham, 2019). Throughout history, truth has been connected to power and when facts are used to serve the interest of power,

educators must help students engage with information "whether they agree with them or not" (Janks, 2018, p. 95). The conflict between lies and truth is not new, but the current internet has made it easier for misinformation to spread (Buckingham, 2019). Students can grow cynical of the current information landscape online; "trust is dead for many students, and skepticism lives" (Head et al., 2020, p. 19).

While instruction has historically focused on helping students find relevant resources in an academic context, current information landscapes make it even more essential that students know how to think critically, are empowered to judge credibility, evaluate information, assess truth, and engage in civil discourse (Addy, 2020). In addition, teachers must help students learn to navigate digital spaces and use digital sources to prevent them from becoming misinformed (Walsh-Moorman et al., 2020).

**Seeking Relevant Information Online.** Despite the importance of such skills, research indicates students engaging in online inquiries often focus on finding quick answers, foregoing an evaluation of credibility along the way. A study by Walraven et al. (2009) looked at ninth-grade students as they searched for information online; they found that participants made decisions about what to click based on quick assumptions about how helpful the site would be in giving them the answer to their questions or inquiries. Participants spent most of their time searching for information and very little time processing the information they found; ultimately, the students' evaluation of information was primarily based on how closely the information pertained to their inquiry goals (Walraven et al., 2009). These findings align with research from List et al. (2016), which looked at undergraduate students' justifications for online source selection. They found participants were more likely to be concerned with relevance or ease of

use rather than reliability or credibility. Kiili, Leu, Utriainen, et al. (2018) also looked at the role of relevance as they examined the online research skills of sixth-graders and found that before students can consider a range of different perspectives, they first need to locate relevant sources. Similarly, Goldman et al. (2012) found that stronger learners use relevance to make navigation decisions, but soon move on to other criteria to determine the credibility of the information. When searching for information during online inquiries, students often overgeneralize relevance as a criterion for reliability, trust, and credibility. The research of McGrew (2021b) found that high school students evaluating online information used "reliability" and "useability" as synonyms, noting that relevance and accessibility were driving factors for many students as they gauged useability. Similarly, Coiro et al. (2015) looked at how middle school participants inquired online and found that most could not clearly articulate their justification for claiming a source is reliable; in fact, some of those who attempted to provide a reason used a range of "naive or surface level criteria" such as the topical relevance of the information to determine reliability (p. 292). When looking at how struggling learners made sense of online information and evaluated sources, Goldman et al. (2012) found that students were more likely to use relevance to evaluate a source and less likely to evaluate the credibility of the information itself. As students go online for information, they must be able to find relevant information. However, if students continue to focus on relevancy as a measure of credibility, they risk believing inaccurate or misleading information.

As I explored each of these studies, I predicted my own sixth-grade students might also exhibit some of the same online research behaviors. This research, combined with my personal

knowledge of students, guided me in designing some instructional directions as I sought to create a curriculum that would help me support my students.

**Reliance on Top Search Results.** A preference for top search results and quick answers has been the historic preference for past and current generations of internet users. Seemiller and Grace (2018) describe Generation Z students as having nearly infinite places to get information, and therefore research is "less about acquiring new knowledge and more about accessing a quick answer" (p. 35). This generation prefers fast, attainable information; they are accustomed to using search engines to get instant answers and instant gratification (Gergő, 2016). This is similar to previous generations, which sought the path of least resistance to achieve learning goals (Clark et al., 2011). To meet the needs of Generation Z, Arth et al. (2019) asked professors of undergraduate students to share their recommendations for students seeking truthful information online; professors in this study recommended that students needed to be encouraged to go beyond the surface of information presented online because there is a "common desire for quick answers" (p. 66). When students focus on speed, they are more likely to conduct surface-level skimming and engage in shallow learning modes while searching online (Loh & Kanai, 2016).

McGrew et al. (2017) observed that college students typically click on the top search results as they searched for information online, in contrast to professional fact-checkers who engaged in click restraint, meaning they "regularly scrolled down to the bottom of the results page, sometimes even to the second or third page, before clicking on a result" (p. 8). In contrast to fact-checkers, Breakstone et al. (2018a) found that students do not display click restraint when browsing through the search results, often choosing top results over more reliable results. The

authority students place on search engine results was explored by Novin and Meyers (2017), who studied how college students constructed knowledge on a new scientific topic from search results. They found that users had a high amount of trust in top results, and the order of search terms impacted whether they focused on the controversy related to the topic (Novin & Meyers, 2017). Many students "trust that Google puts the most reliable sources at the top of the search results;" therefore, they have no reason to look past the first few search result entries (Breakstone et al., 2018a, p. 31). The same is true of past generations who also tended to select top search results (Granka et al., 2004) and place more trust in the top search results (Pan et al., 2007).

In western cultures, reading occurs from top to bottom and from left to right; search results mimic this formatting, placing the most relevant results in the top-ranked position (Baeza-Yates, 2018). Algorithms were initially designed to match users with the most useful or relevant information based on the probability that the information will meet the user's needs (Pan et al., 2007). Yet as users are increasingly going to social media for information, the ranking of information is impacted by input data which varies by user and is shaped by ever-changing algorithms, therefore increasing the potential for bias to shape the information received (Kulshrestha et al., 2017). Bias is exceptionally complicated and present in all parts of life, not just on the Internet. Therefore, it is essential to recognize that algorithms that rank and sort information based on our choices, metadata, and bias results in search results and information feeds that are more personalized and curated, shaping an individual's views of the world (Baeza-Yates, 2018). Looking specifically at the Google algorithm's Top Stories feature, Trielli and Diakopoulos (2019) describe a search algorithm that "embodies other editorial values" which impact attention to news sources and information (p. 12).

As users increasingly rely on these algorithms to give them the results they seek, the algorithm has increased power to decide what people see. Such a dynamic creates high trust in a curated and algorithmic Internet, leading to either naïve evaluators who lack agency or confident evaluators who lack necessary skepticism (Haider & Sundin, 2022). For this reason, agency is an essential element of critical media literacy, to help students navigate an algorithm culture to resist power structures present in algorithmically-curated information (Velkova & Kaun, 2021 ). Reliance on top search results and trust in easily accessible information is part of why critical literacy is so vital; it can help individuals consider the power relationships at play as they make meaning on the Internet. Further, critical media literacy can help them consider the range of influences shaping their understanding of information.

As I stated in the previous section, the existing findings surrounding students' tendency to rely on top search results is prolific; I predicted my own students would exhibit similar online behavior. These findings convince me more than ever that overt instruction is needed to help students counteract the habit of only clicking on top search results, by helping them develop a critical and questioning mindset that is appropriately skeptical of what they encounter online.

**Surface Feature to Determine Credibility.** Additional factors impacting how learners make decisions about the credibility of online content are features of websites and visual elements. Li and Xie (2020) looked at the impact of images shared on Twitter and resulting user engagement; they found that image quality (images taken by professionals versus amateurs) increased engagement. Beyond the idea that image quality shapes people's beliefs of content credibility, other surface features are relevant to notions of credibility. Wineburg and McGrew (2019) asked college students to evaluate websites for credibility, and found that students were

much less likely to leave an initial site to verify the credibility. Sixty percent of participants indicated the more biased website was more reliable due to its more desirable surface features like design, URL, layout, and appearance of authority. In a study by Breakstone, Smith, Wineburg, et al. (2021), more than half of the high school students who viewed a video purporting U.S. voter fraud thought the video provided substantial evidence. Students tended to stay on the initial website housing the video, which meant they were unable to explore the true claims of the video, which actually originated in Russia. Similarly, 96% of students were not able to determine the fact that the fossil fuel industry funded a climate change website because students relied exclusively on surface features that are easy to manipulate, like the look of the page or the "About Us" sections (Breakstone, Smith, Wineburg, et al., 2021). For years, research has indicated the importance of surface features for shaping users' perceptions of trustworthiness and credibility (Agosto, 2002). While there have always been those who seek to deceive others through the media, the current trends of digital manipulation and the ease with which people can create professional looking websites has surpassed students' ability to effectively and critically evaluate them. This reliance on surface features is of great concern, given the accessibility of professional media tools for those who would manipulate or mislead (Breakstone, Smith, Wineburg, et al., 2021).

**Heuristics.** The growing concern about bias and misinformation on the Internet has led researchers to investigate the causes of rapid dissemination and the public's subsequent belief in misinformation. While AI and computer algorithms are responsible for part of the spread of misinformation, humans are responsible for the bulk of misinformation being spread on the

Internet (Vosoughi et al., 2018; Wijenayake et al., 2020). As a result, researchers have sought to understand what makes individuals believe and share inaccurate information.

The study of heuristics provides a lens for understanding how people participate in online decision making. As people deal with complex life problems, they use heuristics to identify which information to prioritize in their decision-making. Cognitive heuristics are “information processing strategies that ignore information to make decisions more quickly and with less effort than more complex methods, and thus they reduce cognitive load during information processing” (Metzger, 2013, p. 214). This can be viewed as a process of seeking the path of least resistance in order to reduce the effort required for decisions (Shah & Oppenheimer, 2008). Simple heuristics help individuals make decisions in a complex social world (Hertwig & Hoffrage, 2013). Heuristics are important because they help researchers evaluate the efforts people prioritize within their decision-making processes. While many might include various decision making processes as heuristics, the key component for this study was whether a learner’s cognitive process reduces effort for the task (Shah & Oppenheimer, 2008). The Internet is vast, and the amount of information that online users face can be overwhelming; therefore, heuristics are used to minimize effort and save time by decreasing the cognitive load required to make decisions (Metzger & Flanagin, 2013). While there are many ways to categorize the time saving and effort reducing behaviors that could be associated with online decision making, for the purpose of this literature review, I focused on three types: recognition heuristics, social endorsement heuristics, and confirmation bias.

Recognition heuristics describe the process people use to make judgements and inferences about new information based on how it relates to existing information (Goldstein &



Gigerenzer, 2002). Recognition heuristic also refers to how "people make a judgment based on how much a new situation resembles a situation with which they are familiar" (Baybutt, 2018, p. 208). One example of this was Borukhson et al.'s (2021) research, which looked at a data set of 3309 participants as they read real and fake news articles and were asked to rate them for accuracy. They found that participants used a recognition heuristic to consider the accuracy of various articles based on their personal familiarity with the articles' topics. Individuals who encountered familiar online news information were more likely to determine that information as credible even when it contained a label stating that it had been disputed by third-party fact-checkers (Pennycook et al., 2018). This perceived familiarity can make it challenging for Internet users to take a skeptical stance and critically evaluate online information (Pennycook & Rand, 2020).

Both offline and online, people seek to determine credibility as they evaluate trustworthiness. In an environment where knowledge is socially constructed, individuals seek social connections to support them in determining credibility, and when online, "people are inclined to believe information and sources if others do so also, without much scrutiny of the site content or source" (Metzger & Flanagin, 2013, p. 215). Also referred to as endorsement heuristics or the bandwagon effect, social endorsement heuristics describe how people rely more heavily on information shared by their social contacts (Horne et al., 2020). Mena et al. (2020) looked at information shared on Instagram and found that message credibility was strengthened when a product or news item was endorsed by a trustworthy personality. A study by Seo et al. (2021) found that vulnerable and lower-educated populations are more likely to believe misinformation due to social endorsement heuristics; most low-income African American

participants in this study shared that their decision about a source's credibility was based on discussions with their friends and family.

Confirmation bias relates to the likelihood people will view information as credible if it confirms their preexisting beliefs (Meppelink et al., 2019). Kahne and Bowyer (2017) looked at the ability of 15-27 year-olds to determine the credibility of online information and "found that the impact of alignment with one's prior beliefs was greater than the impact of whether a given statement is accurate" (p. 25). Mena's (2021) research similarly found that individuals without many prior beliefs or knowledge about a topic were better able to correct misperceptions when presented with new information compared to those with prior beliefs and knowledge.

Wijenayake et al. (2020) looked at online participants who interacted with real and fake news postings, finding that most participants were likely to conform to majority opinions. However, when participants held a previous belief that disagreed with the majority opinion, they were more likely to disregard the majority opinion and, as a result, sought out information that aligned with their previous beliefs. When internet users engage in confirmation bias they are more likely to struggle to correct misconceptions and focus on information that confirms their existing beliefs.

**Evaluating Online Information.** Information has long had gatekeepers, like librarians and educators, who decide what information is available to students. Yet these gatekeepers also often had limited resources and space with which to hold and share information. The Internet offers a completely different reality, with considerably more information and almost no gatekeepers (Lynch, 2016). Compared to just a generation ago, students have access to an incredible amount of information in various formats. It is essential to evaluate how students make decisions and recognize how false information dissemination shapes students' experiences

and permeates every area of their daily life, economics, health, and voting (Araujo, 2021). The sheer volume of online information and the extra burden of needing to discern the accuracy of this information is also extremely stressful (Cooke, 2018).

Generation Z quickly retrieves information online and shows fluency with digital devices, but this does not necessarily ensure the sophistication required to accurately judge and evaluate online information (McGrew et al., 2017). Students are not effective evaluators of information on the Internet, with few able to confirm the credibility of online information. Kiili, Leu, Marttunen, et al. (2018) found that sixth-grade students are limited in their ability to evaluate online information. In fact, half the student participants in this study failed to question the credibility of the information, and only 17% gave relevant justification for their evaluation of the information. The unprecedented access to information from many sources means Internet users need additional tools and strategies for evaluating online information. Most research looking at text relevance and evaluation over the past 40 years has been limited to evaluating a single source because researchers had been primarily focused on students' ability to comprehend texts. However, relying on information from the Internet requires students to shift from evaluating one source to examining texts from multiple sources (McCruden, 2018).

Wineburg and McGrew (2019) found that while college students relied on surface features to evaluate online information, professional fact-checkers could find credible sources and learn more in less time by lateral reading. Lateral reading is a process of confirming the credibility of online information by quickly leaving a source and opening a new tab to investigate whether the initial source was credible enough to read further (McGrew et al., 2017). Despite having an amazing opportunity to use the vast, accessible information available to find

the truth, "people don't do that, they don't check, they don't verify" (Araujo, 2021, p. 24).

Research by Tynes et al. (2021) found less than 1% of participants aged 11-19 showed mastery in their ability to identify inaccurate information online. Those who showed mastery, as evaluated by the digital media literacy rubric created by the researchers, displayed a distrust of non-verifiable evidence and the ability to read laterally for verification which allowed them to recognize false claims (Tynes et al., 2021).

**Students Need to be Taught to Determine Credibility.** As I stated above, the term credibility is a complex notion, often aligned with information that is considered to be accurate, real, or trustworthy. Due to the gaps in students' ability to evaluate online information, students must be taught to determine the credibility of information they encounter on the Internet. Literature offers solutions to the challenges presented by the current Internet. Jones-Jang et al. (2021) examined a range of self-reported literacies and adult participants' ability to identify false news stories in an online survey. Only information literacy skills (navigating and locating information) had a moderate correlation with a participant's ability to identify fake news accurately; other literacy skills and even high digital knowledge (advanced searches, wiki, malware, tagging, PDFs, spyware, etc.) were not correlated to the ability to accurately identify fake news. Additionally, those who self-reported experience with fake news or familiarity with the news topic did not excel at identifying false stories (Jones-Jang et al., 2021). Such research indicates that, because the quality of information is a concern, students need to have literacy skills in digital mediums to identify bias and unlearn misinformation (Jeong et al., 2012; Seemiller & Grace, 2018).

Despite the intentional misinformation students must navigate on the Internet, Alvermann

and Sanders (2019) caution educators not to ignore the motivation students have to engage with popular media; they call for youth to be encouraged and engaged "in an open-ended approach to learning in the classroom as it is in the everyday world outside of school" (p. 23). Unified proactive efforts to support the general public to recognize and stop the consumption of disinformation and misinformation is an urgent concern for all, but especially for the most susceptible populations, like students (Rubin, 2019). The ability to make decisions and advocate for one's interests relies on their ability to distinguish truth from falsehood. Therefore teachers must prepare students to critically evaluate online information through explicit instruction (McGrew, 2021b). Furthermore, to give students a competitive advantage in navigating an information-based society, it is necessary to teach digital and media literacy (Turner et al., 2017). Recognizing the power that media has to inform or misinform students, the current study focused on how students can use a lens of critical media literacy to evaluate online information and determine its credibility.

Today's Internet has evolved a great deal from its origins and will continue to change, forcing ongoing educational evolution (Demartini & Benussi, 2017). Vosoughi et al. (2018) found and verified that people, not bots, are the primary drivers of false information. Using Twitter data from 2006 to 2017, they found that false news stories were 70% more likely to be retweeted by people than true stories. Beyond the need for distributors and platforms that host misinformation to take ownership of these issues, individuals must also learn how to navigate online information and discern facts from lies (Araujo, 2021). Bias and misinformation are not new, and it reflects what already exists in society; the current concern is that because of the amount of information online and the rate at which it moves, there is the potential for even

greater reach (Baeza-Yates, 2018). A study conducted by Breakstone et al. (2018a) found that middle school aged participants often could not tell the difference between ads and news, and "if students are unable to identify who is behind the information they encounter, they are easy marks for those who seek to deceive them" (p. 31). Recognizing that the tools that students are given for evaluating online information are likely to change as technology and society shift, the current challenges presented by mis- and dis-information require teachers to focus on equipping students not only for current realities, but ever-evolving ones.

Civic online reasoning provides a potential structure for teaching students to evaluate online information by asking, "Who is behind the information? What is the evidence? What do other sources say?" (McGrew et al., 2018, p.171). To meet the goals of online reasoning, teachers can teach students to engage in click restraint as they evaluate search results and to read laterally to verify information (Wineburg & McGrew, 2019). McGrew et al. (2019) further broke down what it means to read laterally by indicating students who encounter unfamiliar information on a website should make it a habit to immediately open a new tab to research the author or sponsoring organization. Once the user has an idea of who is behind the information, they can return to the initial information source to analyze the evidence. Evidence from within the website can be confirmed by verifying claims using additional sources rather than solely relying on hyperlinks or references provided (McGrew et al., 2019). Hämäläinen et al. (2020) looked at sixth-grade students as they evaluated online sources, and they found that students struggled to evaluate evidence and determine credibility. Specifically, when evaluating the credibility of information, they did not corroborate with other sources. While many teachers emphasize

teaching students to evaluate digital sources, significantly fewer emphasize the importance of exploring various sources (Hatlevik & Hatlevik, 2018).

Walsh-Moorman et al. (2020) explored how to support middle school students to become more intentional evaluators through lateral reading. Teachers modeled lateral reading and conducted think alouds to demonstrate evaluative techniques and source evaluation within a classwide research project. They found students often struggled to go beyond the original source and required repeated instruction and practice. Beyond teaching lateral reading and click restraint, students need further support to develop necessary discernment and judgment (Wineburg & McGrew, 2019). Similarly, Tynes et al. (2021) emphasized lateral reading is insufficient to counteract misinformation; students need access to curriculum and regular teacher modeling to develop the critical lens necessary to evaluate the historical contexts, race, and bias embedded in algorithms. Teachers are thus encouraged to teach students to be thoughtful consumers of information and use discernment of search engine results; such efforts need to occur across the curriculum and will take time and reinforcement to achieve (Breakstone et al., 2018a). Additionally, it is important to note the extra effort required for helping underserved populations gain these skills. They continue to experience not only the digital divide of access to technology and high-speed Internet, but minimal instruction on how to effectively navigate these tools and become savvy digital media users (Breakstone, Smith, Wineburg, et al., 2021). Teaching lateral reading and click restraint are not enough; researchers indicate the need for shifts in the way all subjects are taught to appropriately equip students with the skills to evaluate the credibility of online content.

### *Summary*

When searching for information online users are concerned with the relevance and usability of sources (Goldman et al., 2012; List et al., 2016; Walraven et al., 2009) and are likely to select top search results (Breakstone et al., 2018a; McGrew et al., 2017; Novin & Meyers, 2017). Once a selection has been made, students rarely leave the initial site and create ad hoc lists of surface features which are used as criteria for evaluating credibility (McGrew, 2021b). The volume of information and sophisticated manipulation of online material requires students who can evaluate online information by confirming the credibility of information they encounter (McGrew et al., 2017). Therefore teachers must instruct students to evaluate online information with tools like click restraint and lateral reading (Wineburg & McGrew, 2019) and empower students with a critical lens to evaluate the larger context and role technology plays in the information we encounter online (Tynes et al., 2021). While many studies focused on students' existing skills, Kohnen et al. (2020) and McGrew et al.'s (2019) studies looked at the impact of modest interventions aimed at teaching students to evaluate online information. My study was different because I worked with middle school students over a long period of time, contextualized within pandemic restrictions, with technology shaping every aspect of our work. I also met the call of dozens of studies that identify the lack of instruction as a problem without offering any particular solutions with an action research study that actively recruited participants to work alongside me in developing a better understanding of how to support students in finding and analyzing online information. Knowing the urgent need facing my students, I knew that action was needed despite a lack of curricular materials. My study is unique due to my ability to take the existing literature recommendations and create and curate a new curriculum that teaches



students how to critically evaluate online information. Chapter 3 describes the rationale for qualitative methods, context and participants, sources of data, data analysis, and limitations.

### **Chapter Three: Methods**

The purpose of this study was to explore what happens when Generation Z students conduct inquiries on the Internet when teachers are instructing them to evaluate information and reason online. This study afforded an opportunity to explore this topic alongside middle school students working in an authentic classroom environment, which is one of the core priorities of critical participatory action research. Accordingly, this study became a critical participatory action research study, which used interpretive research to explore how Generation Z students engaged with online research and how they grew in their ability to determine the credibility of the information they encountered.

#### **Research Question**

As I wrote in Chapter 1, despite widespread attention and concern about misinformation, students are limited in their ability to effectively determine the credibility of the information they find online (Breakstone, Smith, Wineburgh, et al., 2021). Even students who are able to articulate the steps for effectively evaluating online information rarely do so in practice (Hargittai et al., 2010). As a result, to be informed citizens of the 21st century, students must understand how information is produced, manipulated, and targeted for distribution (Mirra et al., 2018). Scholars such as Turner et al. (2017) encourage educators to understand how to support students to be critical consumers who analyze and evaluate online information.

As a result, I sought to create curricular materials to support my students' online reasoning by teaching them to evaluate and determine the credibility of digital information. These realities fueled my desire to investigate the question, *What happens when Generation Z*

*students conduct inquiries on the Internet when teachers are instructing them to evaluate information and reason online?*

### **Overview and Rationale for Qualitative Methods**

Engaging in systematic inquiry about one's teaching practice requires a study design that considers "how people make sense of their world and the experiences that they have in the world" (Merriam & Tisdell, 2015, p. 13). Qualitative research makes space for "exploring, discovering, describing, and constructing" the human practices involved in literacy in a range of situations (Duke & Mallette, 2011, p. 302), making it an appropriate method for this study. The very nature of digital literacy required me to consider how social contexts, technological opportunities, and educational contexts work together in complex ways. Qualitative methods afforded me multiple opportunities to explore such interactions with depth and flexibility (McDougall et al., 2018). Accordingly, I conducted a real-world application of qualitative methods in order to understand how students evaluate online information. I trusted I could come to understand how and why students use online sources as part of their learning, by using the tools of qualitative research to examine how students use literacy skills to navigate their worlds.

As stated previously, I employed a social constructivist lens to understand how students made meaning and determine the credibility of information. I also considered the impact of technology and cognitive practices through the lens of distributed cognition. Qualitative research enabled me to use these lenses as I sought to uncover and understand my students' technological behaviors within the social context of a classroom (McDougall et al., 2018).

### ***Interpretive Research***

In this study, ethnographic research traditions offered an underlying qualitative structure from which to interpret the "patterns of symbolic action that create and maintain a sense of organization" (Walsham, 1995, p.74). Interpretive research was most appropriate since I needed to know "what was happening" in a naturally occurring setting (Erickson, 1985, p. 121). Interpretive research seeks to "improve our understanding of human thought and action through the interpretation of human actions in their real-life context" (Myers, 2017, p. 86). These methods were particularly valuable in the classroom because interpretive research presumes that classrooms will differ; the goal of interpretive research is not to seek similarities but rather to discover ways in which social and cultural groups relate to the actions and choices of individuals (Erickson, 1985). The constantly changing nature of technology and varied social contexts of classrooms required me to study these phenomena in context enabling me to "understand a new phenomenon or re-think an old problem in a new way" (Myers, 2017, p. 86). Interpretive research positions educator-researchers as participants and observers who are both "looking and asking" through a recursive process of observation and interviewing. Such reflective cycles give insights into key linkages in the data and strong, triangulated evidence to support claims (Erickson, 2012). One limitation within interpretative research is related to researchers' tendency to make premature assumptions. To combat this, interpretive researchers must engage deeply in the data analysis process to systematically collect and analyze triangulated data to ensure strong evidential warrant for their conclusions (Erickson, 1985).

I chose interpretive methods (Erickson, 1985) because I wanted to know what *happens* when Generation Z students conduct inquiries on the Internet when teachers were instructing

them to evaluate information and reason online. I emphasize *happens* because Erickson (1995) explains that this word invites researchers to understand "issues of human choice and meaning" while also exploring "issues of improvement in educational practice" (Erickson, 1985, p. 122). Since my research specifically examined the social issues related to how Generation Z students made meaning and evaluated information during online inquiries, interpretive research enabled me to make meaning from the "human interpretations and meanings associated with computer systems" (Walsham, 1995, p. 75).

### ***Critical Participatory Action Research***

I also utilized methods associated with critical participatory action research (CPAR), since these aligned with my research question and my goal of humanizing the research process. Building on a foundation of action research, I employed CPAR to involve my students as participants. I did this because I sought to enact transformational research that challenges traditional power structures (Kemmis et al., 2014). I also did this to counteract the way Generation Z students experience a world where most answers to their questions are a quick Internet search away, yet they spend all day in schools where gate-keeping structures demand they rely on pre-determined resources and knowledge (Breakstone, Smith, Wineburg, et al., 2021). Since I view this dichotomy as robbing students of opportunities to practice the skills they need to access and evaluate credible information on the Internet, I prioritized CPAR. This commitment also enabled me to learn and grow alongside my colleagues as we sought to transform our instruction and empower our students. By reprioritizing power for those who research is designed to serve, I humanized this research, prioritizing my students' experiences and perspectives. In the following section, I briefly explain the values embedded in critical

participatory action research, including how participants ought to be positioned, how data is collected and analyzed, and the limitations of this type of research.

Action research is a form of inquiry that allows practitioners to investigate and evaluate their actions in order to understand their practice through cycles of observation, reflection, action, evaluation, and modifications (McNiff & Whitehead, 2011). While action research has many variations to match the vast range of problems requiring action, these variations share in common the idea that people have the capacity to actively participate in all aspects of research designed to improve educational experience and outcome (Kemmis et al., 2014). Accordingly, action research-based educators use cycles of reflection and action alongside their students and colleagues, in order to support learning and better educational processes (Machin & Mastromatteo, 2012). Participatory action research recognizes that the research process cannot be neutral, shifting research from informative to transformative by working *with* participants to make change (Baldwin, 2012). What makes participatory action research *critical* is the way researchers prioritize reflection aimed at transforming their practice, all while challenging power structures (Kemmis et al., 2014).

### ***The Blend of Interpretive Research and CPAR***

I posit that interpretive research and CPAR can be applied in a complementary way. This is because interpretive research values teacher reflexivity and prioritizes teacher agency (Erickson, 1985). Similarly, CPAR empowers educators to make change alongside the students they serve. Using CPAR provided a more fluid and responsive process where students and I collaboratively engaged in cycles of self-reflection in order to transform our practice (Kemmis et al., 2014). This meant my researcher's notebook and collaboration with other teacher peers were

important elements of the research process. While CPAR calls on research to be transformative, a researcher cannot change their practice until they understand their practice (Kemmis et al., 2014). Interpretive research thereby seeks to "improve our understanding of human thought and action through the interpretation of human actions in their real-life context" (Myers, 2017, p. 86), so we can then thoughtfully transform practice.

Since my collaborative practices and teaching were rooted in CPAR and focused on empowering students through cycles of self-reflection, I required interpretive methods to understand my own transformations. Thus, my critical participatory action research was driven by my desire to transform my practice in ways that empowered students.

## **Context and Participants**

### ***The Context***

The School and Online Learning due to the COVID-19 Pandemic. The SARS-CoV-2 respiratory virus responsible for the 2019 outbreak of coronavirus disease, drastically altered the educational landscape for all K-12 students and teachers. The unique circumstances created by the pandemic became a significant influence in this study, because students and teachers faced a great deal of uncertainty, disruptions to daily life, economic stressors, and health concerns.

In March 2020, the school where I taught closed its physical building due to the COVID-19 pandemic. While online learning opportunities were provided, state guidance to teachers was to make learning optional and limit new content. For the 2020-2021 school year, the superintendent of schools worked with the local school board to determine whether the community would pursue in-person, online, or hybrid instruction to begin the school year. With infection rates in the county increasing, limited access to timely testing, and a per capita

infection rate over 10 per 100,000, the school board voted to make learning online for most middle school students for the first 27 weeks of school, which was September 8 to March 9. Only students identified as having the highest educational needs or those who lived in rural locations where an Internet connection was not available were provided access to the school building. Those who attended in person worked with a learning coach who provided educational environments that met state and CDC guidelines, primarily supporting students to log into virtual learning curriculums and Zoom-based classroom spaces. Except for a few students who lived in a rural area where a school-provided wifi hotspot yielded no signal, most of the students on my roster were not present face-to-face in a school building.

Such drastic changes demand attention to the term *school*, which some consider to be the building where learning occurs. But during the 2020-2021 pandemic and school year, many redefined that word to include the systems and structures that supported learning for students across a range of settings. The school I teach at had implemented a one-to-one laptop initiative for the nine years prior to the 2020-2021 school year. As part of the district's commitment to supporting 21st-century skills for all learners, all sixth through twelfth grade students were issued a laptop to be used at home and school. This existing structure was extremely helpful when the pandemic shifted educational structures so radically; the students already had access to laptops and teachers were already accustomed to maintaining digital classrooms where assignments, a calendar of events, and daily class agendas were regularly posted. These existing structures supported teachers and students to pivot more easily.

Nevertheless, with learning occurring exclusively online, these laptops moved from being an educational tool to the primary vessel whereby students could receive instruction and engage



in learning. Students received instruction exclusively online as they used laptops for synchronous instruction through Zoom, video conferencing, and asynchronous instruction through the learning management system Schoology. Students in financial need were provided with wifi hotspots or reimbursed for Internet costs. Students were encouraged to log in daily for synchronous classes but could choose to conduct all work asynchronously. During these synchronous classes, I observed students logging in from a range of locations, including their homes (e.g., bedrooms, living rooms, front porch), friends' and family members' homes, cars, doctors' offices, community centers, learning pods hosted in the school or other locations, and other settings I could not interpret. When I taught synchronous classes, I was personally located in my home's basement alongside my three children, who logged in daily to their online Zoom classrooms.

Prior to the pandemic, students and teachers met in a suburban middle school in Virginia that served sixth, seventh, and eighth grade students. The school population of 675 students had a range of ethnic and racial identities, including 27.56% Hispanic, .15% Native American, 5.19% Asian, 21.33% Black, 38.37% White, 7.26% multiracial, and .15% Native Hawaiian or other Pacific Islanders. In addition, students in the school who identified as socio-economically disadvantaged comprised 56.30% of the school population, and students receiving English for Speakers of Other Languages support represented 19.41% of the school population.

**COVID-19 Pandemic.** As of 2022, the impact of the pandemic on students' lives and learning is still coming into focus, and research in this area is limited as the world continues to experience the impact of the COVID-19 pandemic both in school and in daily life. Some initial studies (Bailey et al., 2021; Lewis & Kuhfeld, 2021; Panagouli et al., 2021) looking at how the

pandemic affected existing gaps between advantaged and disadvantaged students found that achievement gaps grew. Aucejo et al. (2020) considered college students from varying socio-economic statuses and found that students from lower socio-economic backgrounds had more significant health and economic disruptions related to the COVID-19 pandemic compared to advantaged peers. Additionally, they were more likely to have a close family member experience income loss or reduction and rate their health worse than their higher-income peers (Aucejo et al., 2020). While not all students experienced direct health or economic struggles during this time, the larger uncertainty, disruptions and change made it challenging for all students to feel secure.

In addition, myriad aspects of children's lives changed when communities went through different phases of shutdowns and closures. Youth surveyed by Chaturvedi et al. (2021) found that many students likely experienced significant disruptions to their sleeping habits, daily fitness routines, and social interactions during the COVID-19 pandemic. Before the COVID-19 pandemic, a meta-analysis conducted by Wang et al. (2018) found that loneliness was a predictor of depression and that those with greater social support were more likely to experience a decrease in symptoms related to anxiety and depression. Cao et al. (2020) looked at the epidemic's impact on college students in China and found that economic stressors, changes to daily life, and academic disruptions were positively associated with anxiety symptoms. While fostering relationships and building community with students to support learning has always been crucial, it was especially important with so many students and teachers feeling isolation due to the COVID 19 pandemic. Reflecting on the months of remote learning and Genius Hour time during the pandemic, I observed that "kids had such a strong desire for social emotional needs

that that took the place of everything else" (Amanda, February 9, 2021). With social distancing and other physical barriers to social connection, education systems needed to look at ways to support students in overcoming loneliness and isolation created by the pandemic (Radwan et al., 2020). In addition, with many students relying on a range of non-academic support provided by schools, such as mental health services and meals, educators had to consider many factors as they strove to support students' social-emotional and mental health needs (Hoffman & Miller, 2020).

Data from other school closures offer insight into how school closures affected students; researchers von Hippel and Hamrock (2019) found inconsistent evidence of gaps growing during the summer compared with a typical school year, and most replicable gaps formed before students entered the K-12 school system. When considering the impact of absences on middle and high school students' achievement, Liu et al. (2021) found that those who missed an average of 10 classes scored lower on tests and received lower course grades than those who attended classes regularly. COVID-19's impact on student attendance and participation was part of the context of this study. While on paper attendance during remote learning was similar to previous years, the day-to-day experience was that some students only logged in for a few minutes or never engaged (verbally or through the chat). Building off existing studies on how lost instructional time due to summer break, partial absenteeism, and full absenteeism can affect academics, Kuhfeld et al. (2020) projected that prolonged periods of school disruption would have major impacts on student learning, and potentially increase existing academic gaps.

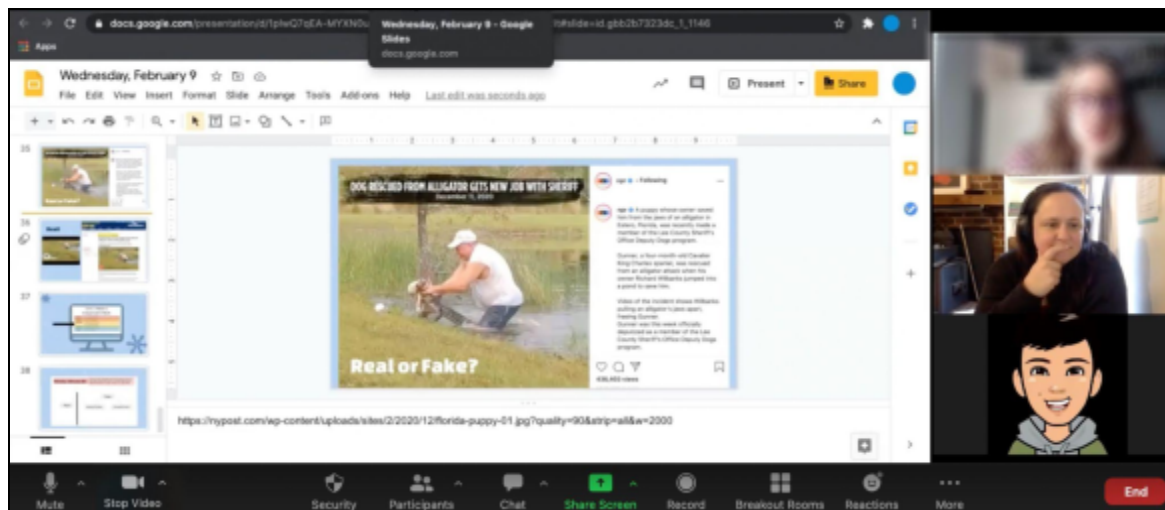
Researchers examining the implications of school closures and distance learning during the COVID-19 pandemic have found a range of impacts on students. For example, fifth-grade

students entering the 2020-2021 school year after a two-month spring 2020 closure in Germany had slightly lower reading and math competencies than the average score of students from the three previous years (Schult et al., 2021). In a rapid review of existing research on COVID-19 school closures, Zierer (2021) found a significant range of effects on students' learning, which primarily depended on individual schools and teachers. When looking at student learning during the eight weeks prior to the closure and the eight weeks of the Spring 2020 closure, primary school students learned more than twice as fast attending school in person compared to distance learners, while secondary students did not show a significant difference between in-person learning and distance learning (Tomasik et al., 2021). Researchers looking at primary school students in the Netherlands found that the learning loss for students from less educated homes was far more significant than those from higher-educated families, suggesting the pandemic has unequally impacted different communities (Engzell et al., 2021). Similarly, when looking at the difference in achievement between individual students, Tomasik et al. (2021) found an increase in differences between students, making the groups more heterogeneous than before the pandemic. I observed clear differences in how my students experienced the pandemic and remote learning. Where some had adults checking in on them and their own space from which to log into class, others were always in a new location, or could be seen caring for siblings. Both the COVID-19 pandemic and the existing research indicate additional challenges for underserved students significantly shaped the context of this research study.

**Zoom Classroom.** The school where I taught implemented Zoom's video conferencing platform to host online classrooms from September 2020 to June 2021. Class began at a set time each day, and students switched between Zoom meetings hosted by their different teachers.

Classes for students occurred daily, Monday through Thursday, with Fridays reserved for office hours. The Monday through Thursday class periods were 90 minutes, but due to the school division's policies limiting synchronous learning, we could only require students to stay logged into Zoom for about 45 minutes per class. The rationale for limiting synchronous time was based on concerns about students having too much screen time. Therefore, teachers generally stayed logged into the Zoom call for the entire 90-minute instructional block to support students who requested help with their asynchronous work. Office hours occurred on Zoom once a week on Fridays by appointment; students did not typically access teacher support during these times. Therefore, all interested students were invited to join office hours for an online inquiry project labeled Genius Hour, which I describe in the next portion of the chapter. Office hours were ninety minutes long, and students from any instructional block could log in for academic support or to be part of the online inquiry project.

**Figure 1**  
***Zoom Classroom Screenshot***



Within the Zoom platform, students began class in a digital waiting room until the teacher allowed students to enter the main video conference room. Students could choose to have their

cameras on or off and use the unmute button to share aloud. Students were required to have their name or chosen nickname displayed. Some chose to have an avatar or icon in place of live video sharing, but many remained as black boxes with white names. A chat feature was available for use, which the teacher could temporarily pause if it became distracting to learning. Students could chat with the whole class or private message a teacher, but students could not private message each other. The image above (see Figure 1) shows a typical set-up for class instruction with the teacher screen-sharing a presentation, and on the right-hand side of the screen from top to bottom is another teacher (blurred), me, and a student displaying their avatar. The toolbar at the bottom of the screen allowed for navigation between Zoom features. The teachers used breakout rooms to allow for small group instruction, quiet working space, or behavioral redirection.

**Online Inquiry Project During Genius Hour Time.** The initial context for collecting data surrounding what happens when Generation Z students conduct inquiries on the Internet occurred during Friday office hours during our Genius Hour time. Two other teachers and I dedicated time to supporting students to be successful in using the Internet to answer authentic questions using credible information. Genius Hour was the structure we chose for online inquiry because my co-teachers and I sought to have "students' interests guide inquiry learning" (West & Roberts, 2016, p. 227). Youth see the Internet as an opportunity for open-ended learning (Alvermann & Sanders, 2019), and the students in my classroom wanted opportunities to use Genius Hour time which provided them with the space and freedom to explore and learn more about a topic of their interest on the Internet.

Genius Hour is an idea that originated from the business world, specifically Google. Technology companies often make use of creative time to foster innovation and product advancement. According to Google's 2004 Founders' IPO Letter, such time "empowers them to be more creative and innovative" and has resulted in many of the company's most successful products (Alphabet Inc., 2004). At the time of that letter, Google claimed that twenty percent of an employee's time was dedicated to allowing them to pursue their interests related to what they think will benefit the company. While the reality of an actual 20% policy at Google has been disputed by some, others indicate that Genius Hour creates a culture in which employees and their ideas are valued, giving them the space and freedom to innovate (Tate, 2013). The idea of 20% of time free of normal work constraints became the basis for Genius Hour in classrooms. Juliani (2014) described Genius Hour as time that is set aside each week for students to explore something that they are passionate about, then create a tangible product they present to the class. The definition of Genius Hour provided by Juliani (2014) guided the creation of our classroom Genius Hour time, which was focused on helping students use the Internet to ask questions and seek answers online as they complete an online inquiry project.

The literature has various examples of classroom teachers who explore opportunities to apply this practice, but there is little research on the use of Genius Hour itself. The principles in which Genius Hour is based are well-researched; an emphasis on inquiry, reading and writing to learn, opportunities for choice, and authentic products are all aspects of learning that motivate and inspires students (West & Roberts, 2016). The structure of our Genius Hour time focused on students' online inquiries, in an effort to promote student ownership of their learning (Lim, 2004). Research by Reynolds (2016) found that digital inquiry designed around authentic

learning tasks and digital products can increase student engagement. Furthermore, by teaching these skills, educators help students bridge their in- and out-of-school learning and literacy practices and develop crucial tools to construct knowledge, take action, and solve real-world problems (Coiro et al., 2017). Genius Hour can also help students to develop agency, making choices and taking action around topics that matter to them (Coke, 2018).

Some criticisms of Genius Hour involve the fact that students receive less direct instruction that they may need (Ozyer & Wilson, 2016). As Chapter 1 established, there is an urgent need to teach students to evaluate information and reason online (McGrew, 2021b). For this reason, my co-teachers and I worked to develop a curriculum that could guide students to evaluate the credibility of online information within inquiry projects that nurtured their interests. While most of this instruction occurred during Friday office hours labeled as Genius Hour time, our use of CPAR led us to continually reflect on our practices and find opportunities to add critical media literacy into our standard curriculum for all students. As a result, Genius Hour expanded past Fridays to some whole class lessons and individualized instruction on other instructional days.

**The Professional Learning Community.** For further context in this study, it is important to point out that I was a member of a professional learning community (PLC) which included six teachers who worked collaboratively to plan ELA instruction for sixth-grade students at our school. In brief, a PLC is a community of teachers who use their daily lived experiences in the classroom to engage in critical reflection alongside others in order to increase knowledge and promote student learning (Vescio et al., 2008). To support the school-wide expectation that teachers of the same grade level and content area work collaboratively to create common



assessments and pacing to address grade level standards, the daily schedule for students and teachers is designed to ensure these teachers have common planning time.

At the time of this study, I had been a part of this PLC for five years as a collaborative special education teacher. Often my role in this space was to engage in reflective dialogue with my colleagues, sharing my experience and knowledge as both an ELA teacher and special education teacher. As a ELA teacher, I prioritize having meaningful opportunities for students to engage in content and learning connected to state standards, and as a special education teacher, I focus on how to make modifications to lessons and create accommodations that increase access to learning for all students.

During this study, our PLC met formally twice a week, and on some occasions, we met more often to discuss lessons and other things related to student learning. Student learning has been found to improve when teachers participate in a PLC (Vescio et al., 2008). The reason I share the PLC context is because all curriculum for sixth-grade ELA including the critical media literacy lessons and online inquiry project lessons were planned in collaboration with my PLC. I was not alone in making curricular decisions. Together, we discussed our goals for each unit, lesson, and assessment, then assigned tasks and jobs to be completed individually or in small groups based on these decisions. My use of critical participatory action research was aligned with the PLC because we looked to "improve educational practices and the outcomes of education" (Kemmis et al., 2014, p. 21).

### ***Participants***

**Amanda.** In this study, I was not only the researcher, but I worked as the special education co-teacher in the English language arts (ELA) classroom under study. At the time of

data collection, I had been teaching for 14 years. I identify as a white female and I was 35 years old when I participated in these dual roles, as researcher and teacher. In my role as teacher, I worked primarily with another teacher, Megan, in a co-teaching arrangement that paired a general education teacher with a special education teacher. Together, we share responsibilities for planning, instruction, grading and other classroom duties. Under the co-teaching model at my school, I was a special education teacher who was not assigned to only special education students, but rather, to serve all students in partnership with Megan, my co-teacher.

**The Co-teachers: Megan and Sarah (all names are pseudonyms).** Megan and Sarah both agreed to be participants in this study when I shared my interest in understanding how students engage in inquiry on the Internet. Megan further shared that she was interested in using our Genius Hour time, as a critical participatory action research project that would allow us to collaboratively understand and better meet our students' digital inquiry needs. I obtained informed written consent (Appendix B) from them and they both knew they could opt out of participation at any time.

At the time of the study, Megan had been teaching at this school for six years as a sixth-grade ELA classroom teacher and two years as a teaching assistant in various grade and content areas. She identifies as a white woman and was 29 years old at the time of data collection. We had taught together for four years. In the 2020-2021 school year, our classroom also had a student teaching intern, Sarah, who was working on her graduate degree and teaching certificate from a local university. She identified as a white woman. Due to a time conflict with her graduate classes, she was not often present during Genius Hour time with students, but she was occasionally part of collaborative discussions as part of the PLC.

**The Classroom Students.** I invited all 45 of my classroom students from my two co-taught sixth-grade heterogeneous ELA classes to participate in Genius hour time and have the opportunity to complete an online inquiry project. Twelve students chose to be a part of Genius Hour time, and all were invited to be part of the research study, but they were not required to be part of the study in order to be a part of the online inquiry and associated mini lessons. Five students indicated that they were interested in being part of the study; consent was obtained from both students (Appendix C) and parents (Appendix D). While the individual socio-economic status of students is information the school does not permit to be shared, I can say four of the five students represented populations that have been typically underserved in schools. One student identified as non-binary, three students were current or recently-exited ESOL students, and one student had an IEP. The ethnic representation in our participants was two Hispanic students, two White students, and one Asian student.

During Genius Hour sessions, students engaged in inquiry tasks, guided by teachers' mini-lessons embedded within an online inquiry project, and our PLC examined how students were learning. Table 1 provides a quick glance summary of the student participants and their interests; pseudonyms are used in place of the students' real names.

**Table 1**  
***Classroom Student Demographic and Project Summary***

Name	Race/Ethnicity	Age	Gender	Online Inquiry Topic
Sophia	Asian	11	Female	Musical Passions
Izzie	Hispanic	10	Female	Sewing a Dress
John	White	11	Male	Gaming PC Design
Diego	Hispanic	11	Male	Soccer Skills and Conditioning
Riley	White	11	Non-Binary	Modeling and Scripting in Roblox

The following profiles for each student are compiled from the demographic information shared when students were enrolled in school, along with my observations of their characteristics as we worked together during class time. I also used observation transcripts and student work samples to describe students' Genius Hour projects. While the school did formally identify non-binary students within their data management system, we encouraged students to share their preferred name and pronouns for use in our classroom. Accordingly, I used preferred pronouns *they/them* for my non-binary student throughout this study.

***Sophia.*** Each morning when our Zoom classes started, Sophia was the first student logged in, with camera on to greet Megan and me with a smile, and "good morning." However, during the class sessions, she was generally quiet and turned her camera off as soon as her classmates arrived in the virtual space. When the class transitioned to independent work and students could leave the Zoom classroom to work asynchronously, Sophia often chose to stay on Zoom to get extra help or just spend more time on the call. Sophia was in our English for Speaker of Other Languages (ESOL) program; she spoke both English and Vietnamese at home. Her Individualized Education Plan (IEP) stipulated she receive support and accommodations to access grade level material. During Genius Hour, Sophia chose to study how to become a better singer.

***Izzie.*** Before even meeting Izzie, I recognized her name as being a sibling of someone I had taught a few years before. While she was often a little hesitant to speak out during class time, I knew that if I called on her, she would have good insights about what we were learning because she was engaging with the class discussion. I got to know Izzie through using the breakout room feature in Zoom. She would often stay during independent work time, and complete her work in

a breakout room, using the ‘ask for help’ feature to call a teacher into the room if she had questions. Izzie spoke both English and Spanish at home, and received support through the ESOL program to grow her academic vocabulary in English. When we invited her to join Genius Hour time, she expressed excitement and enthusiasm to pursue her interest in sewing. This was something she saw her mom do and she was curious to learn more. Izzie’s family moved to a different district mid-way through the school year, and while Megan and I guided her inquiry for several months of Genius Hour meetings, we did not get to see her completed project, which was a dress she sewed, based on her study.

**John.** While the school provided laptops to all students, John logged in every day from his desktop setup at home, where he gamed frequently. Even before joining Genius Hour time, I got to know John well; he was quick to volunteer an answer or share a connection to what we were learning. Megan and I invited him to start an online inquiry project with us because we noticed he was finishing his independent work very quickly. John was excited to pursue his interest in designing a dream PC gaming computer through his online inquiry project. Since he regularly finished his assigned classwork early, he typically worked on his online inquiry project throughout the week.

**Diego.** Logging on and seeing Diego’s camera turned on each morning was an encouraging reprieve from the typical black boxes for each student’s name. Diego often shared his ideas during class and frequently made connections between educational content and his real life. At different times, we met his younger brother and family dog in the background. Diego often spoke of his Columbian heritage and was fluent in both Spanish and English. He was identified by the school division to be part of the gifted and talented program, and during class,

we often noticed he sought opportunities for additional rigor and engagement with academic concepts. Diego was quick to volunteer interest in Genius Hour time because it let him pursue his interests and spend additional learning time with teachers and classmates. While Diego could be found inquiring online about a range of topics that interested him during Genius Hour time, his online inquiry project focused on helping him improve his soccer skills by establishing a training routine.

**Riley.** Early in the year, most of my interactions with Riley were via the Zoom Chat feature. Riley identified as Non-Binary and preferred chatting to speaking on-screen. They slowly began to share more about themselves and their interests, and soon became an active member of Genius Hour time. Riley often shared about their interests related to coding, video games, manga, and cosplay. Eventually Riley decided to focus their Genius Hour time on growing as a content creator in a video game they were interested in Roblox Studio. They subsequently spent much of Genius Hour time learning how to script and model to create both the physical items in their video game and the actions the players would be able to take in the game. Riley considered themselves a very tech savvy person who often connected with peers virtually through Discord and video games.

**Role of the Researcher.** In addition to being the special education classroom teacher in this space, I was also the primary researcher. As a doctoral student at the University of Hawai‘i at Manoa, I sought to use critical participatory action research to understand my practice and grow alongside my colleagues and my students engaged in critical media literacy. I began this research project out of two key motivations: first, to fulfill the requirements of a PhD

dissertation, and second, because I was passionate about understanding what happened when my students inquired on the Internet.

This dual role of researcher and teacher required me to use multiple lenses when reflecting on my students' learning. Given the complex task of understanding what happens when my students inquire online, the constantly changing nature of technology, and resulting social contexts required me as an interpretive researcher to "have a view of their own role in this complex process" (Walsham, 1995, p. 77). Connected with my theoretical framework of social constructivism, interpretive methods are based in social relationships and "concern issues of human choice and meaning, and in that sense they concern issues of improvement in educational practice" (Erickson, 1985, p. 122). Specifically when looking at research related to how people and technology interact, interpretive research is growing due to its ability to look at and understand real life situations which can be messy and complicated (Myers, 2017). Through the lens of distributed cognition, interpretive research allowed me to look at how technology was a tool that impacted how my students determine the credibility of online information.

Since the ways learning occurs in a real classroom is different from those portrayed in academic research, critical participatory action research (CPAR) allowed me to make judgments about how to improve practice, prioritizing the knowledge and understanding embedded in our own classrooms (Kemmis et al., 2014). My first priority has always been my students' learning, and using critical participatory action research methods allowed me to be more systematic in supporting my students' digital literacy needs. Specifically, because we were looking at the needs of students in digital settings, the nature of participatory action research gave us necessary flexibility and continual reflection in order to update our practices (Hughes et al., 2017).

Furthermore, I recognized that "to transform our world, we need to transform our practices" (Kemmis et al., 2014, p. 49), and I sought to do this by challenging existing power structures, placing participants' experience front and center to transform inept social structures (Souto-Manning, 2014). During the data analysis phase, I used thematic analysis and reflective writing to construct assertions about how students inquired online and determine the credibility of information on the Internet. My ability to reflect on and refine assertions was shaped by not only my reflective writing, but by conversations with co-teachers, as they continued to help me make meaning of the learning in our classroom, reflect, and grow. Based on the ideas that all people's knowledge is valuable and local people possess expert knowledge, critical participatory action research prioritizes authentic and relevant action to meet the needs of a community (Kemmis et al., 2014).

I believe that "we learn in relationship to others" (Green, 2014, p. 154). Because my goal was to humanize the research process, I needed to consider my role both as a participant and researcher in order to understand the multidimensional and complex human actions shaped by meaning making. I was a participant as well as an observer; this meant my role as an observer was known to all participants, and I prioritized my role as a participant (teacher and collaborative partner) above my roles as an observer and researcher (Merriam & Tisdell, 2015). I also served as an instrument of data collection as I conducted observations, recorded student conversations, conducted interviews, transcribed and analyzed data, all in order to make meaning and enact change.

Researchers who study inside the settings of their professional work are not neutral and must be diligent to identify and explore their deeply rooted biases and unconscious habits



(Raveaud, 2015). As the designer of this study, I must acknowledge my biases stemming from personal experience as a teacher, parent, and user of the Internet. For example, I have long believed schools should more comprehensively give students overt instruction on how to analyze online information. For too long, I have seen how standardized testing practices privilege print based texts, or simply move traditional texts online, rather than expand the possibilities of new texts and authors for students. These are some of the reasons I embarked on this effort to create an online inquiry curriculum with my PLC team. Additionally, because this study took place where I teach and collaborate with colleagues, my researcher's role demanded I ensure that my prior experiences and relationships with the participants did not impede my truthful reporting. I viewed my experiences as a source of motivation for a study that mattered to me, that could make a difference for students, but it required me to be open to unexpected or discrepant data.

In this research study I worked to balance the roles of critical participatory action research and qualitative research. The first valued my insider status and deep knowledge of the community as a means by which I might enact change within educational systems. The second demanded in-depth, truthful accounts to support my conclusions. It required me to actively manage bias by strategically moving back and forth between using my personal experience to provide insight while actively working to collect, analyze, and incorporate unexpected information and data. This also required me to be transparent about my biases with my colleagues, so that I could more readily revise my thinking (Kirshner et al., 2011).

When I first began using Genius Hour to support students' online inquiry projects, I was unsure of the best ways to instruct them to inquire online and appropriately determine the credibility of the information they encountered. Using CPAR helped me identify my students'

needs and use those observations to inform my teaching. I found that my students needed skills to judge the accuracy of information, and practice metacognition to cultivate awareness of their own biases. They also needed to practice finding credible information using lateral reading (Hodgin & Kahne, 2018). I realized I myself did not regularly use the skills I was seeking to help my students learn; although I frequently read laterally to fact check, I rarely seek source information and have poor click restraint. I recognized these things about my own habits through regular collaborative discussions with my colleagues. Then I reflected individually to consider how to confront how these habits and biases might be impacting my data collection and reflection process. I used a researcher's notebook to record my thoughts and ideas related to the research, which served as an additional reflection point. Despite the concerns of insider research, an insider role offers powerfully relevant knowledge construction that is specially designed to support the community from which it emerges (Scheanen et al., 2012).

### ***Online Inquiry Curriculum***

As previously indicated, the pandemic shifted many aspects of schooling, canceling standardized testing in the Spring of 2020, and making it optional in Spring 2021. Since teachers were limited to 45 minutes of synchronous instruction and students still struggled with focus and attention in those virtual learning environments, many parts of the general ELA curriculum were different during the 2020-2021 school year. At the direction of our school and division leaders, our PLC refocused on key concepts from ELA, and took years of existing curriculum and lessons and made it accessible in digital formats. Many students completed their asynchronous work quickly or came to office hours with all their classwork completed, simply wanting to be online with teachers. This unique setting provided both the opportunity and time to commit to an online

inquiry project. Genius Hour time was an optional enrichment activity open to all students. The online inquiry project ran from September through March of the 2020-2021 school year. We ended the original online inquiry project in March when the school moved to a hybrid schedule and it was not logistically possible to continue in the format in which we had begun.

**Genius Hour Time.** We called our time together Genius Hour and it was originally designed to allow students to explore their interests online, under teacher guidance to better understand their instructional needs. In alignment with CPAR, we refined our instruction to meet the needs of students. The overall learning outcomes determined by the PLC were: (1) have a structure for students to record ideas, document sources of information and describe why a source is trustworthy, (2) encourage students to take a skeptical stance when online, (3) explicitly teach students to use a search engine and have click restraint, (4) explicitly teach students to read laterally in order to confirm credibility of the information they encounter online.

**Curriculum Structure.** Within each lesson, Megan and I were responsive teachers, which meant we adjusted the curriculum day by day as we worked with students. Since students moved at various paces on a variety of topics, we offered students self-paced lessons and videos they could access when they were ready, alongside real-time guided instruction when they had challenges. We provided ongoing support through whole-group, small-group and individual instruction. CPAR led us to create, enact, reflect upon, and revise lessons based on the insights we gained from time with students. Table 2 indicates the tools we created and lessons we conducted, arranged in the order we intended for students to follow. Since the activities were self-paced, students sometimes completed tasks out of the intended order.

**Table 2**  
**Online Inquiry Curriculum**

Lesson Title	Explanation
<a href="#">Introduction</a> dix E)(Appen	All students were given a brief introduction to Genius Hour time and invited to be part of dedicated time with student-led inquiry on a topic of their choosing with support to learn enough to create something based on their interest. In addition to the slideshow and teacher descriptions, the students viewed this YouTube video: <a href="https://www.youtube.com/watch?v=COF-bqZuE-I">https://www.youtube.com/watch?v=COF-bqZuE-I</a>
<a href="#">Step 1: Getting Started</a> (Appendix F)	As students were ready to begin using the Internet to inquire about topics of interest, teachers worked one on one or in small groups to introduce the <i>Getting Started</i> tool which provided a structure for documenting ideas.
<a href="#">Step 2: Narrowing Your Focus</a> (Appendix G)	As students were ready to begin using the Internet to inquire about topics of interest, teachers worked one on one or in small groups to introduce the <i>Getting Started</i> tool which provided a structure for documenting ideas.
<a href="#">Step 3: Researching</a> (Appendix H)	Guided by their research questions students were supported by their teachers to document the information they found online and from other sources on their <i>Researching</i> chart. In addition students were encouraged to paste the URL they used to find the information and a description as to why they selected and trusted this source.
<a href="#">Mini Lessons Reflection Sheet</a> (Appendix I)	The <i>Mini Lessons Reflection Sheet</i> was used to help students reflect on the lessons presented in each video as well as for the teacher to reflect on how to use or improve these materials in the future. We began with lessons targeted on how to use search engines and conduct basic inquiries, and each lesson built on the skills from the previous, eventually focusing on the need for students to read laterally.
Mini Lesson: <a href="#">Basic Google Search and Search Terms</a>	This video describes using search terms in Google to facilitate finding relevant information. The video describes using URL, titles and snippets to help the searcher get a lay of the land before making a selection. Additionally it introduces the idea of how data collection makes each search is specific to that user. It also mentions the presence of automatic answers from google, discussion of ads, the potential value of wikipedia, and not to rely only on top results. The video directly states that students should not use a single source and instead use multiple sources in order to confirm evidence. Lateral reading is modeled briefly, but it is not names. The primary focus of the video is how search terms shape results and why search terms matter.

Mini Lesson: <a href="#">Advanced Search Terms</a>	In this video advanced search options are used to refine a google search to yield results that are more specific to the users needs. It describes how to read Google <i>local listings</i> display and how google uses data to try to figure out what you want in search results.
Mini Lesson: <a href="#">Image Searching</a>	This video describes when it could be helpful to have information presented visually through a Google image search. It also defines sponsored listings, points out predicted possible search terms and describes using URL and title in an image search. The video describes how an image search could be helpful to get you started, but it is still important to read the source of that information and determine if the evidence provided can be confirmed.
Mini Lesson: <a href="#">Can I trust this information?</a>	This video lesson describes how fact checkers don't spend too much reading time on a single source unless it has been confirmed elsewhere. That students should check multiple sources to confirm information and cautions against relying on a URL or nice visual elements of a website.
<a href="#">Step 4: Final Product</a> (Appendix J)	Students received one on one discussion time with a teacher to review what they learned from their inquiries and support students in beginning to think about how they will communicate their inquiry findings. Once students decided how they wanted to put their learning into practice, they worked in collaboration with the teacher to create and refine a final product. The <i>Final Product</i> document served as a tool to link their final product and reflect on the process.

**Instructing the Curriculum.** Megan and I began the online inquiry project by asking students about their interests, helping them identify potential topics. As we discussed our goals, Megan shared, "I think for students to determine something they are curious about, and to have some guidance in how to seek out valid and reliable information about what they are curious about" (Megan, September 17, 2020). Online inquiry should begin with the students' personal experiences (Coiro et al., 2016). Our first group of students who wanted to join Genius Hour time had a simple chart to organize their ideas. Megan and I then guided students to find things that interested them using the document called *Step 1: Getting Started* (Appendix F). In our early days, we set the students free to "go find some information about your topic" (Megan, October 2,

2020). Similarly, as I spoke to students I said, "We don't have to pick anything yet. We're still exploring. So pick multiple topics that you want to explore and eventually we'll get to something detailed" (Amanda, October 7, 2020). Offering learners space to explore and wonder about real life issues and make connections to their own experiences is how the digital inquiry process begins (Coiro et al., 2016). Even the video we chose to advertise the Genius Hour project ended with the line, "So, go explore, learn and make something" (Spencer, 2017). Genius Hour gave students autonomy to "ask questions, think, learn and explore the things they loved and were curious about" (Juliani, 2014, p. 50). We frequently reminded students that exploration is a foundational part of beginning any Genius Hour time.

When Megan and I began Genius Hour, our goal was to provide students with choice and agency in their learning while helping them develop critical media skills. We wanted to help connect our learners to relevant experiences (Coiro et al., 2016) and support students for success in digital environments (Collins & Halverson, 2009). Knowing that online inquiry requires guidance and structure (Coiro et al., 2016) and resources to support the process whether the teacher is by students' side or not (Richardson, 2016) we created the resources and tools described in Table 2. In addition to these structures, we sought additional ways to explicitly teach students to evaluate the evidence for claims they encountered online (McGrew, 2021b). As I considered what to include in the curriculum, I reflected in my researcher's notebook, "I am trying to figure out how to even start making these lessons. It's one thing to read about it, but to take the research and apply it feels like a huge leap (October 2, 2020).

Eventually, I decided to structure the lessons and activities around Kiili, Leu, Utriainen, et al. (2018), using their description of how students research and comprehend online:

(a) locating information with a search engine, (b) confirming the credibility of information, (c) questioning the credibility of information, (d) identifying main ideas from a single online resource, (e) synthesizing information across multiple online resources (f) communicating a justified and source-based position. (p. 325)

CPAR demanded ongoing reflection to drive action; this meant we were constantly revising Genius Hour instruction. These principles guided us, but they were also challenging to put into practice, given students' specific needs. Since I had "done so much research and learning on the topic," I hoped I was prepared to create a curriculum, but instead I felt "more overwhelmed, not empowered" (Researcher's Notebook, October 7, 2020). Due to their simplicity, it was very helpful to use the guiding questions described in the McGrew et al. (2018) study, "Who is behind the information? What is the evidence for its claims? What do other sources say?" (p. 171). We encouraged students to use the Internet like a fact checker, asking them to read laterally to confirm or deny information rather than simply evaluating a single source by reading vertically (Breakstone, Smith, Wineburg, et al., 2021). Since our students were very focused on relevancy of information and relied too heavily on sources recommended by social groups, we began with the idea of considering *who is behind the information*, and *can you trust it?* Since it is difficult to determine the answers to these questions by reading vertically, we helped students understand what lateral reading could offer them. We thought this first step of lateral reading could help our students develop the questioning mindset required to not only verify credibility, but lead them to identify who and what motives were behind the information.

## **Data Sources and Collection Procedures**

Given the highly complex nature of digital literacy, and my implementation of both interpretive and CPAR methods, I knew there was not a single method, tool, or assessment that would help me fully understand my students' meaning making processes. As a result, I made use of multiple data sources, including interviews, observations, and artifacts which I collected using video recordings with screen captures and field notes. I transcribed and coded all recordings, which I explain further in the next section of this chapter. This systematic and rigorous data collection process helped me explore what happened when underserved Generation Z students conducted inquiries on the Internet during Genius Hour projects during the 2020-21 pandemic. Next, I share the rationale and collection procedures for each data source.

### ***Interviews***

Merriam and Tisdell (2015) describe interviews as "necessary when we cannot observe behavior, feelings, or how people interpret the world around them" (p. 88). To understand the internal inquiry processes students create as they navigate the Internet, I interviewed each student participant two times to better understand their experience, knowledge, behavior and beliefs. I specifically used semi-structured interviews. The semi-structured interviews relied on a set of open-ended questions (see Appendix K) that guided, rather than dictated, the interview's progression. I did this to explore interesting areas while following respondents' interests and concerns (Smith, 2003). This meant I sometimes changed the wording of a question based on how a student responded (Merriam & Tisdell, 2015). For example, I asked Sophia, "What worked best for you to find the answer to your questions?" she replied, "Uh, I'm not sure, what else is there to say?" When I changed the wording to, "Why would research be hard or why



would research be easy?" (Amanda & Sophia, March 2, 2021) she was better able to give me an expanded response.

I conducted semi-structured interviews with open ended questions (Appendix K) with students following each recorded think aloud observation. These interviews encouraged student participants to reflect on the digital literacy practices that they used while navigating the Internet that day (Coiro & Dobler, 2007). The goal was to obtain additional understanding about what students were thinking as they engaged in online reading, research and creation, and to gather more contextual clues about their social and cultural environment (Ward & Traweek, 1993).

Since lessons and work sessions occurred fluidly throughout the project, I conducted semi-structured interviews with teacher participants before the beginning of the project (September 2020), at the midpoint (January 2021), and at the conclusion of the project (March 2022). Each interview took roughly 45 minutes and included 4-9 general questions to guide our discussion (see Appendix L). I gained further detail as I gently probed and sought clarification, enabling me to provide depth, complexity and clarity about the online inquiry lessons while finding out information that was not directly observable (Stake, 2010). To foster trustworthiness in the study, I recorded, transcribed, and observed the video recording of the interviews to provide reliability and triangulation.

### ***Observations***

For qualitative researchers, "observation is a research tool when it is systematic, when it addresses a specific research question, and when it is subject to the checks and balances in producing trustworthy results" (Merriam & Tisdell, 2015, p. 138). Observations are one of the main sources of qualitative data for research of online behavior (Mann & Stewart, 2000), and in

combination with video recording, can provide rich information (Stake, 2010). Capturing multimodal communications across multiple layers of digital literacy practices provided various opportunities to reflect on student practices (Bhatt et al., 2015).

Critical participatory action research also uses observations to inform practice (Kemmis et al., 2014). When investigating technology and education through action research, video recordings are often used to help researchers capture insights into behaviors, knowledge, and relationships (Somekh, 2007). All of these were good reasons for me to collect video and screen recordings during the Genius Hour work. Video recording enabled me to document this data most accurately compared to missing details during live note-taking. Interpretive methods complemented the use of video observation because it helped me make sense of invisible things by constant reflection and refinement (Erickson, 1985). The ability to review, reflect and grow my teaching as informed by video observations shows the blend of CPAR and interpretive methods.

**Teacher & Student Observation.** Between September 27, 2020 and March 3, 2021, I observed/recorded Megan, Sarah and myself teaching, planning, and/or facilitating online inquiry instruction during 47 class or office hour sessions. Because of my dual roles as teacher and researcher, I collected the observational data by recording each class session using the Zoom recording option. This created a video recording of students and teachers who chose to share their faces live in Zoom, where I was able to capture conversations, screen sharing, and chat conversations. To observe the choices that students made as they searched, I collected screen recordings as students navigated between lesson materials and web browsers to conduct their online inquiry project (Mutta et al., 2014). This enabled me to gain further insight into the

student learning and digital literacy practices that are seemingly invisible in traditional observations or video recordings (Bhatt et al., 2015).

As I observed these recordings, I not only transcribed the entire video, but took field notes in my researcher's notebook (see example below from January 9, 2021) as if I were a researcher in the back of the room.

*Diego did not finish the mini lesson videos before trying out the strategy being suggested. They used the video like a tutorial to guide them in action/practice, and didn't even finish the tutorial video before launching into exploration. Lots of problem solving was visible, and the teacher was a guide asking questions to stimulate thinking and understanding about the process.*

In addition to observing students' learning in class, I wanted to understand their online thinking process, so I occasionally had them "think aloud" as they searched and evaluated information. This helped me gain insight into what was happening when students read online, given the complex multi-text and intertextual relationships of online reading (Mason, 2018). When beginning the think aloud portion of a student observation, I prompted students by saying, "As you conduct your research and search online, please say out loud what you are doing and thinking, so that we can learn about what is going on in your mind as you engage in inquiry." If the student participant seemed to be acting without sharing, I prompted again by saying, "please say out loud what you are doing and thinking" or "can you explain why you did that?" While such requests risked disrupting the students' cognitive process (Ericsson & Simon, 1993), it helped students who were not familiar with the think-aloud process to more effectively share what they were thinking (Pressley & Afflerbach, 1995).

## *Artifacts*

Artifacts are authentic representations of students' digital inquiry (Reynolds, 2016). Two key artifact sources served in this study: the students' Genius Hour assignments and my researcher's notebook.

**Student Assignments.** The students were asked to produce five different assignments which supported the final online inquiry project. The five artifacts I examined were called (1) Step 1 Getting Started (Appendix F), (2) Step 2 Narrowing Your Focus (Appendix G), (3) Step 3 Researching (Appendix H), (4) Mini Lessons Reflection Sheet (Appendix I), and (5) Step 4 Final Product (Appendix J). The students were encouraged to use these assignments as tools to record their ideas along the way. They also had freedom to use other methods of recording their ideas, if that was their preference. Artifacts of literacy represent cultural practices and allowed students to play a role in how they were represented; by including these artifacts into the data set, we supported student voice in research and tried to limit the marginalization of certain literacy practices (Kirkland, 2014). A key element of Genius Hour time was that it allowed students to engage in authentic inquiry based on their interests resulting in an artifact or product that reflected their choices and resulting knowledge (West & Roberts, 2016). Each of these student assignment artifacts showed how teachers endeavored to structure the online inquiry activities and served as a source of data, showing student progress as they constructed meaning, obtained knowledge, and employed critical media literacy practices.

**Researcher's Notebook.** The second artifact was my researcher's notebook. I took part in self-reflection focused on promoting action and transformation in my critical action research study, and made use of a researcher's notebook as a data source. A researcher's notebook

documents one's personal investigations of practice during action research, specifically, it was the place where I documented summaries of interactions, ideas, notes on practice, and connections to references (Feldman et al., 1998). I used a digital spreadsheet to keep a detailed record of the research project. I dated each entry and in one column I recorded my observations, ideas, and impressions throughout the Genius Hour curriculum. The next column held my connections and questions. As I viewed video data and transcribed, I also recorded field notes. These were different from my analysis of what was happening in a given video; I viewed field notes as another way of collecting data.

Action Research values journaling as a means by which to record ideas, ask questions, and be reflective (Mac Naughton & Hughes 2008). The researcher's journal is a vital form of data collection designed to document such transformations and triangulate conclusions across different forms of evidence. Researchers take action based on the in-depth evidence, "writing their unfolding history as they make it" (Kemmis et al., 2014, p. 18). Using interpretive research to record my notes and reflect empowered me to make meaning in context (Sechelski & Onwuegbuzie, 2019). Additionally, artifacts gave the research additional depth and triangulation of findings (Stake, 1995).

### **Data Analysis**

After all the data was collected from these various sources, I engaged in interpretive research methods, combined with thematic analysis. This meant using interpretive research protocols in an authentic classroom setting led me to take "careful recordings of what happened" when my students conducted inquiries on the Internet (Erickson, 1985, p. 121). When analyzing these data, I started with thematic analysis because it provided me with the best route to draw

rich details from the complex data I collected across multiple participants (Braun, & Clarke, 2006). Thematic analysis is "a form of pattern recognition within the data, where emerging themes become the categories for analysis" (Fereday & Muir-Cochrane, 2006, p. 82). I examined the data through careful reading and rereading, identifying themes as categories for analysis (Fereday & Muir-Cochrane, 2006). Following the creation of themes, I used categories to guide further reflection and begin the process of constructing assertions to answer my research question. I also used writing as a "method of discovery and analysis" to construct knowledge and understanding in a world shaped by language (Richardson & St Pierre, 2000, p. 923). My assertions arose from reflective writing as I focused on constructing my understanding of the phenomena. I attended to the rich context within which it is held, and revised consistently to identify key linkages between data and evidence to support my assertions (Erickson, 1985). This data analysis process took place over the course of eight discernible phases.

### ***Phase One***

In the first phase, I began the process by reading verbatim transcripts from observation and interview recordings (Adu, 2019). I hired NVivo Transcription service to transcribe the audio from each video recording, then confirmed the accuracy of these transcripts as I reviewed each video. Additionally, Zoom session recordings included transcripts from the Chat feature which kept time stamped records of written communication between teachers and students. I added these chronologically to the final version of the transcripts in order to capture the big picture of all spoken and written communication that occurred during observations and interviews. As I checked transcript accuracy and added chat records, I also recorded and documented field notes in my researcher's notebook to note my initial impressions. Field notes included observations

that were not reflected in the transcripts such as this entry from February 17, 2021, "Riley searches 'ups and downs of youtube' then changes search terms to 'pro's and con's of youtube.' Next scrolling through the 'people ask' questions and answers, they read a few of those." As I moved through the phases of analysis it was helpful to have field notes which described the actions taken by students, which were not reflected in the transcripts.

### ***Phase Two***

During the second phase, I read and reread each observation and interview transcript to familiarize myself with the data and generate a list of initial ideas (Braun & Clarke, 2006). Adu (2019) refers to this process as creating initial memos which contain raw, unexamined, and not yet connected "initial thoughts about the data" (p. 87). I engaged in this process of creating initial memos by writing my initial ideas and impressions in a notebook. The goal of this phase was to immerse myself in the data, since familiarity serves as "the bedrock for the rest of the analysis" (Braun & Clarke, 2006, p. 87). Using my initial ideas and impressions, I reviewed transcripts to identify relevant portions of data, or empirical indicators. Empirical indicators are sections of the data selected due to their ability to help answer the research question (Adu, 2019). I used the highlight tool in NVivo to mark these portions. As I reread transcripts to mark these portions, I referenced them in my researcher's notebook with my initial ideas and impressions. I was careful to assign the highlighted transcript quote to that initial idea and impression using the code feature in NVivo, as a means of preserving early hunches in the research process for additional analysis. Some examples of initial ideas and impressions that I generated included: bias, evidence, examining sources of information, gut feelings, information overload, skimming vs deep reading, and trust.

### ***Phase Three***

During this phase, I used interpretation-focused coding methods because it was consistent with the purpose of the study. This method of coding goes "beyond just describing the empirical indicators" to consider the meaning behind the data; as a result, codes are focused on exploring and understanding a specific experience (Adu, 2019, p. 32). In order to begin creating interpretation-focused codes and make meaning from the data, I reviewed transcripts with the research question in mind, creating codes which answered my "*what happens when*" question. I began by grouping ideas from my empirical indicators to create codes. When I identified a significant word, phrase or statement, I reflected on its meaning in order to generate a description-focused code that represented my understanding of the information, while considering the participants' background and what they are trying to communicate (Adu, 2019). For example, the code, *evaluating sources*, enabled me to encompass the empirical indicators of bias, evidence, examining sources of information, gut feelings, information overload, and trust. During phase 3, I often found myself returning to phase 2 as I highlighted new information to create additional empirical indicators in order to construct description based codes. This phase represents how thematic analysis is a process that is recursive rather than linear allowing for movement "back and forth as needed" (Braun & Clarke, 2006, p. 86).

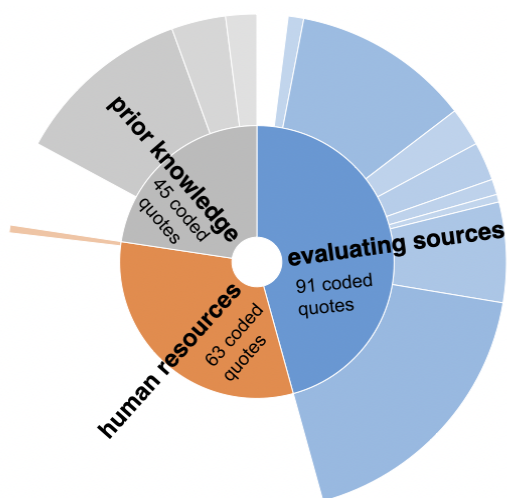
### ***Phase Four***

After I completed the initial coding described in phase three, I organized them in order to determine any existing patterns and group them into broader themes (Braun & Clarke, 2006). I did this by compiling a list of generated codes, placing them in alphabetical order, and looking at the frequency of each code in the data (Adu, 2019). With the research question in mind, I looked



at the frequency of each code and reread the portion of the transcripts associated with each code, which helped me decide which codes to combine into themes and which to abandon. For example, Figure 2 below shows three codes I created in phase three: human resources, evaluating sources and prior knowledge.

**Figure 2**  
***Codes That Created the Theme Sources of Information***



The inner circle of the figure is a circle graph showing the initial code and the number of transcribed quotes associated with each code. The outer circle represented the initial ideas that were combined to create that code. Together these initial codes became the theme *Sources of Information*. Upon reviewing the coded observation and interview transcripts, I was able to see the pattern that all of these coded entries showed examples of the sources of information used as students engaged in their online inquiries during Genius Hour.

### ***Phase Five***

In the fifth phase, I reviewed, revised, and sought connections between the themes generated in phase four. I looked for abstract concepts that linked codes to see if any codes could be combined into themes, keeping in mind the idea that themes should directly address research

questions (Adu, 2019). For example, when reviewing the themes *teaching structures*, *relationships*, and *exploration*, I realized these were all related to the student-directed learning practices that we were using to facilitate students' ability to inquire online. As a result, I combined these codes to create a single theme: *student-directed learning*. From this point, I reviewed and refined themes by rereading transcription quotes connected to each theme and confirming coherent patterns within each theme. During this phase, I also removed, added, combined or separated themes based on additional distinctions (Braun & Clarke, 2006). For example, the code *asking questions* was initially listed under the theme *critical thinking*. When reviewing the associated observation and interview transcripts, I read various examples that showed how asking questions was a strategy teachers used to help students reflect on their decisions to click. One example of this was when I asked Diego, "How can you change your search to find more of what you're looking for?" (Amanda, October 23, 2020). These were not examples of students thinking critically, but rather of the teacher trying to support and encourage additional thinking. As a result, these coded items were moved to the theme, *student-directed learning*.

### ***Phase Six***

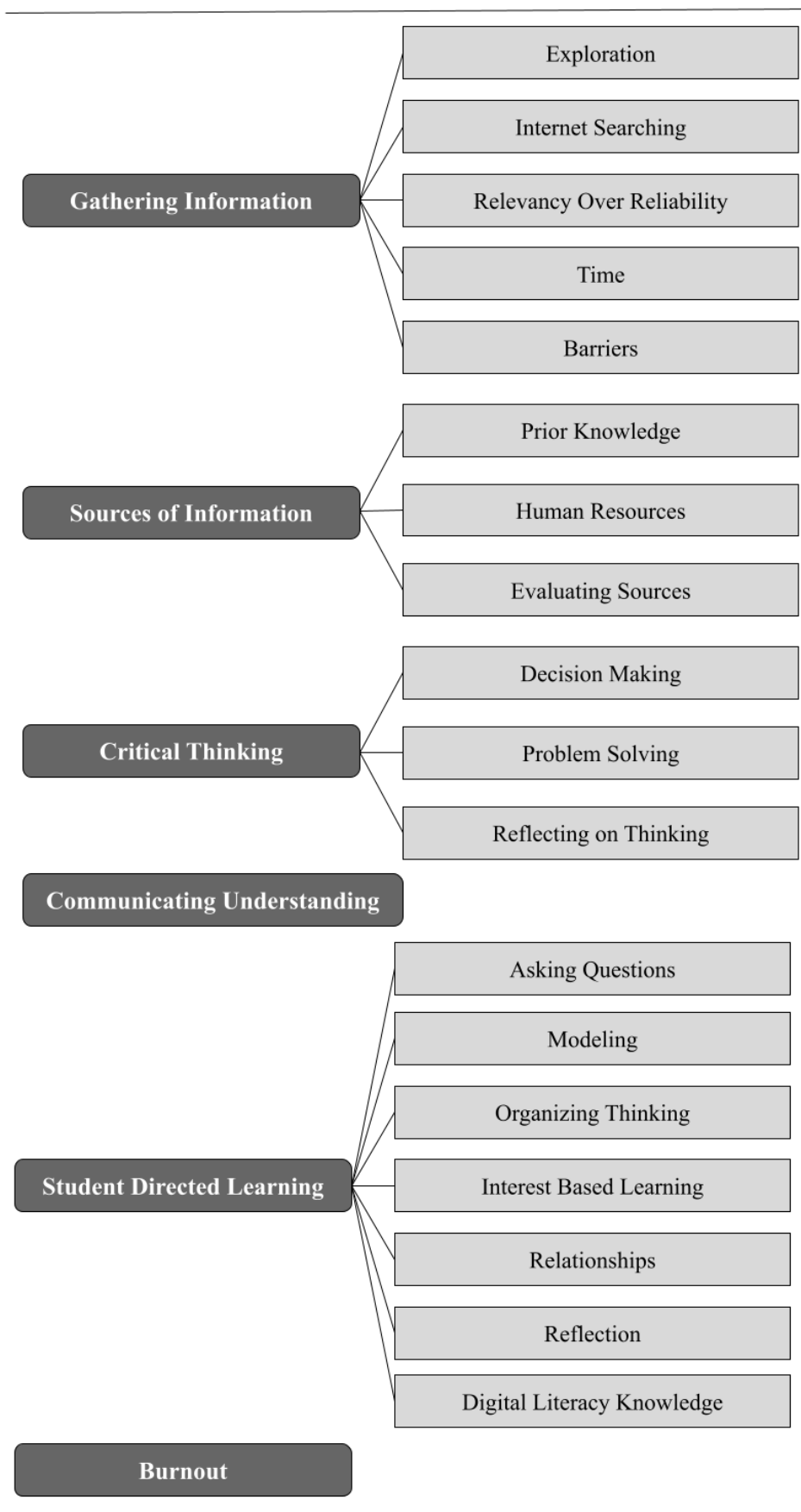
Once themes were established, I sought to clearly define each theme and distinguish it from the others (Braun & Clarke, 2006). Figure 3 shows my themes and related codes at this stage. I reviewed the coded observation and interview transcripts and began writing about each theme and how it related to the overall research question. I then wrote about how the codes were related within each theme. As I did this, I also reviewed corresponding artifacts, triangulating to artifacts like students' inquiry projects, or a particular mini-lesson used that day. This

back-and-forth between data added depth and detail to my explanation of themes. This recursive process required problem solving; I used writing to make "strategic decisions about what material to include, how to sequence it, and how to handle the inevitable tension between presenting evidence and overview" for each theme and supporting codes (Erickson, 2012, p. 1463). This writing process yielded six final themes encompassing 20 broad codes across the 47 transcripts created from observations, interviews, and student think alouds.

### ***Phase Seven***

In this phase, I moved to Erickson's (1985) analytic protocol and generated a set of assertions, which are meaningful claims which must be substantiated by adequate confirming evidence from multiple data points (Erickson, 1985). Using a writing-to-learn mindset, I leaned into a process of writing about "something that I did not know before I wrote it" (Richardson & St Pierre, 2000, p. 924). This allowed me to generate and test assertions by looking for key linkages between data; this helped me connect data to observed phenomena. Using interpretive methods, I continued "reviewing evidence until all relevant data [were] identified and compared" (Erickson, 2012, p. 1460). In my first draft, I wrote six assertions. As I continued to write and analyze, my assertions changed; I gained confidence in substantiating them with multiple points of data (Erickson, 1985). In the end, I could substantiate three assertions with compelling evidence; these are shared in Chapter Four. These assertions were generated through reflective writing and interpretive methods that met the needs of real life, just as teachers and classrooms are designed to meet the needs of the students in front of them.

**Figure 3**  
*Codes That Emerged When Generation Z Inquires Online and Resulting Themes*



Some of the assertions in Chapter 4 contain pre-existing categories that became clearer after I had inductively analyzed them, but I primarily used an organic process of interpretive research to review data and find links between data sources. For example, I initially wrote the assertion, *Prior exposure increases student belief in information (and misinformation)*, to explain how students were likely to believe things they had seen or been told by others. After doing further research, I used existing definitions and terminology to rewrite that assertion into a sub-assertion: *Generation Z students' belief in online information and misinformation increased as a result of confirmation bias, social endorsement heuristics, and recognition heuristics.*

### ***Phase Eight***

Lastly, following Erickson's (1985) recommendation, I wrote vignettes to provide the reader with key details from the data and foreshadow the evidence for assertions within the findings. Writing vignettes and commentary helped me demonstrate awareness and balance in my analysis and direct reporting (Erickson, 1985).

### **Limitations**

In CPAR, a researcher must identify limitations or potential weaknesses in order to grow and reflect. As a classroom teacher learning with my colleagues and students, I regularly reflected on the research design in order to plan my next step (Kemmis et al., 2014, p. 111). Such reflective efforts yielded four limitations to my research design which bear explanation: lack of existing research, sample size, dual role of researcher and participant, and concerns related to interpretive research.

### ***Lack of Existing Research***

The first limitation of the study is that it was based on a classroom-based application of Genius Hour and teaching students to navigate Web 4.0, which has limited basis in research. The primary reason for the Genius Hour structure was that it provided a student-directed opportunity to navigate the Internet based on their own interests, since there is evidence that authentic tasks can increase engagement (Reynolds, 2016) and promote literacy growth (Purcell-Gates et al., 2007). Web 4.0 technology is new and still evolving; there is a limited understanding of what it means to teach and conduct inquiry on the Internet landscape (Tekdal et al., 2018). Megan and I experienced this limitation as we worked on creating and implementing these lessons, and found our own understanding of how to best navigate Web 4.0 and find credible information shifted regularly. For example, when we need to teach this unit next, we will not use the mini-lesson video titled *Can I Trust This Information?* as it relied on a hoax website and hoaxes make up very little of what our students encounter online. We learned this was problematic because students developed the false impression of a fake binary on the Internet, when in fact there are often many layers to understanding the credibility of online information (McGrew et al., 2017). We discussed this with Diego who recommended we make a video with a different webpage that felt more relevant to students and what they might come across in their normal searching (Researcher's Notebook, January 15, 2021). The lack of existing research in these areas further underscored the need for this study and future research on this topic.

### ***Sample Size***

The second limitation of the study design was a small participant sample. It is necessary to reflect on the selection process for this study; since participation was voluntary, those who

already had a higher degree of self-determination and interest were more likely to choose to attend additional enrichment learning time outside of the required virtual school learning time. A small participant sample does not yield generalizability, similar to many other qualitative studies. Yet this is not a problem for educational CPAR, which does not prioritize generalizability, but the idea that teachers are empowered to make change in their own classrooms because "they can clearly be recognized as contributions not only to the education of the people involved, but also to wider social movements in the interests of the whole human community" (Kemmis et al., 2014, p. 13). Furthermore, qualitative research is interested in "examining people's lives in rich detail," which often requires smaller, purposefully chosen samples (p. 138).

Furthermore, the participants in this study represent a diverse group of students from a range of ethnicities, cultures, languages spoken, races, and genders. However, one key demographic of the larger school population was not represented, our black students. Moving forward in this CPAR journey, I will continue to reflect on how to expand classroom practices and engagement for all students to ensure that everyone can grow in their ability to navigate the Internet and find credible information.

### ***Dual Role of Researcher***

The third limitation of this study is the impact of assumptions held by insiders; I considered these from my dual role of researcher and participant. Insiders often choose their research sites due to years of experience and interest around an issue, which means they also often make assumptions about what they will find (Drake, 2010). While being an insider can provide access to research sites and useful insights, familiarity can lead to researchers perpetuating dominant assumptions rather than generating new perspectives (Kelly, 2014).

Another concern is that a researcher's competing motivations cause problems; where researchers often seek to be an agent of change, this may be in conflict with an educator's need to support student learning (Nolen & Putten, 2007). To address these concerns, I utilized recommendations from Nolen and Putten (2007) to establish democratic relationships between myself and all participants, to ensure everyone was part of making decisions within the research. I did this by reflecting frequently with Megan, as my co-teacher, discussing how our lessons went, how students were doing, and making collaborative plans to support student learning. Furthermore, I sought students' feedback on lessons and activities, asking them to guide our Genius Hour curriculum by telling us what they needed for their particular projects. Because participant action research seeks to make change through collaboration, there is a higher burden on the researcher to share power and responsibilities; this requires building trust (Mac Naughton & Huges, 2008). Therefore as an insider researcher, I considered and reflected on my existing beliefs as I engaged in research, flexibility moving between insider and outsider to consider the implications of my research (Drake, 2010). I did this by reflecting on my ideas and assumptions throughout the process. When I moved into the analysis stage of research, I was able to reflect on those assumptions and relied on data-based evidence to confirm or deny my existing beliefs.

In qualitative studies, a researcher's perspectives influence the research process; this requires researchers to examine their own beliefs so as not to unduly influence data collection. Such efforts increase transparency, reveal the complexity of interpretive research, and strengthen evidence within the study (Johnson & Waterfield, 2004). Reflecting on the entries in my researcher's notebook, I observed my beliefs related to online inquiry and determining the credibility of online information. The following excerpts highlight my key beliefs that emerged



as I was constructing the curriculum and seeking to understand my students' online inquiry needs. As I was considering students' early explorations where they avoided using the organizational charts I provided, I wondered to myself, "because there is so much information always at your fingertips, we feel like we can always quickly find what we want, so why save or reflect?" (Researcher's Notebook, October 7, 2020). I struggled with deciding "how much to teach versus how much to observe" my students as they engaged in their natural online inquiry (Researcher's Notebook, October 8, 2020). By reflecting on these thoughts, I could better consider my impact on the qualitative inquiry process (Watt, 2007). I was "surprised that I did not encourage lateral searching to confirm the information, but maybe I was also just relying on old habits" (Researcher's Notebook, October 8, 2020). I encountered conflicts in myself, where I might say I valued teaching students to lateral read as fact-checkers would, yet when I went on the intent, I relied on information from familiar websites and news sources, choosing not to read laterally, myself. I could identify with how my students did not want to expend the extra effort and energy to confirm the credibility of all information I found.

Using my researcher's notebook to reflect such issues helped me refocus on research literature that would help me design useful lessons and materials for my students. Megan and I started teaching mini-lessons, beginning with search techniques because we believed students were "just going to google image search or trusting the google curated answer at the top without reading any further." This required us to "talk about credibility, ads, and ranked searching" (Researcher's Notebook, October 14, 2020). We expanded our lessons to include click restraint because we observed students clicking without being able to identify why they were choosing a specific source of information. Because I believed in "the value in slowing down and thinking"

(Researcher's Notebook, October 14, 2020), I could thoughtfully weave my beliefs and observations into new directions for student learning. I referenced existing research on critical media literacy to construct lessons to help students foster click restraint, and read laterally to confirm the credibility of online information. Using my researchers' notebook both during the data collection and analysis portions of the study helped me document my preconceptions, reveal my assumptions, and examine my beliefs (Johnson & Waterfield, 2004). Qualitative researchers are instruments of data collection; my researcher's notebook served as a "powerful learning tool" for reflexivity as I carefully considered how my behavior and beliefs shaped the inquiry (Watt, 2007, p. 83).

Interpretive Methods. Lastly, I considered that a limitation of interpretive methods is that these methods can result in researchers making premature assumptions or assumptions with limited evidence. The video recordings helped me address this limitation because I transcribed each observation to ensure robust accuracy, viewing and reviewing videos multiple times to conduct a systematic analysis (Erickson, 1986). Additionally, the use of video recordings helped me keep an open mind to novel phenomena and unanticipated findings because it allowed for me to move between analytic steps as my hypotheses and interpretations evolved (Derry et al., 2010). This back and forth process was also reflected in my researcher's notebook. I found myself making assumptions about a students' behaviors as they engaged in their think alouds protocols during online inquiry, ones that I needed to revise as I looked closer. For example, I assumed from my real-time observations that Riley was using "surface understanding which is heavily reliant on prior knowledge" (Researcher's Notebook, November 13, 2020). When I rewatched the video recordings of Riley's work and compared it with an interview excerpt where

they shared that trying something out is how they verify the information they encounter, I was able to further confirm this with Riley's artifact where they recorded their justification for selecting a particular website to include in their assignment; all of a sudden, my perception of Riley's work that day shifted. Video recordings of both interviews and observations, in combination with artifacts, allowed for a variety of avenues to observe students' online inquiry behaviors. This range of data sources transcended the individual limitations of any single data source, enabling me to triangulate and develop stronger concluding assertions (Erickson, 2012). I made use of many sources and systematic analysis from which "data must be constructed" (Erickson, 1986, p. 149).

## **Conclusion**

This study was designed using CPAR to explore what happens when Generation Z students conduct inquiries on the Internet when teachers are instructing them to evaluate information and reason online. This study added to what is known about how students determine the credibility of online information by offering its unique context looking at middle school students working in an authentic classroom environment. CPAR called Megan and me to solve a problem we experienced, the lack of curricular materials, by constructing lessons and materials to teach our students needed critical media literacy skills. Focused on cycles of self-reflection, I required interpretive methods to understand my own transformations and identify key linkages used to form the assertions. Chapter four will describe the assertions with detailed evidence to describe the specific actions of students and teachers within our learning context.

## **Chapter Four: Findings**

This qualitative study aimed to reveal what happens when Generation Z students conduct inquiries on the Internet when teachers are instructing them to evaluate information and reason online. The data collection process was aligned with critical participatory action research integrated with interpretive methods. The study took place in two sixth-grade classes, which I co-taught with Megan in a unit designed to help students effectively evaluate information and reason online as they conducted online inquiry projects. Guided by my research question, I used critical participatory action research to reflect on the needs of my students and transform my practice as a teacher and collaborative partner in my school.

Together with Megan, I not only changed practice related to our students' instruction, but she and I also led conversations with fellow teachers and school leaders. We wanted to help other educators in our school setting empower students to critically evaluate information, supporting their development as effective members of a democratic society. Building off recursive processes of reflection and action with participants described in Chapter 3, this chapter offers accounts of how students and teachers reflected together to understand what happens when students inquire online and how this led to transformations in practice. We did see overall indications that students could better navigate the Internet in ways that increased their access to credible information. Yet change is challenging; this chapter describes key moments in our work together that point to the complexity, nuance, and effort required to teach and learn.

Interpretive methods enabled me to explore my broad research question along the various, complex phenomena associated with following and guiding students' instruction and online inquiry projects. As we researched and worked together, I generated and tested assertions,

looking for key linkages between data (Erickson, 1986). The subsequent findings in this chapter are thereby derived from observations, interviews, researcher reflections, and artifacts of student work. The following assertions and sub-assertions offer a roadmap for what I explain throughout this chapter:

1. Generation Z students relied on heuristics (time-saving practices and mental shortcuts) when navigating online and deciding what information to trust and categorize as reliable.
  - a. Generation Z students described relevant information and reliability in a synonymous manner, as they quickly looked for information that provided an answer to their inquiries;
  - b. Generation Z students made quick decisions that relied on top search results and surface features when inquiring online;
  - c. Generation Z students' belief in online information and misinformation increased as a result of confirmation bias, social endorsement heuristics, and recognition heuristics.
2. Generation Z students needed instructional support in order to determine credibility and read laterally;
  - a. Teaching Generation Z students to navigate the Internet required an environment that fostered learning through building relationships, encouraging student-directed learning, and being responsive to students' needs.
  - b. Teaching during the COVID-19 pandemic created challenges for teachers
3. Generation Z students in this study faced challenges offline, which often become challenges online.

For each main assertion, I begin with a vignette (Erickson, 1986) to bring the data to life. Each vignette is a story of how my particular Generation Z students navigated online information during this study. Following each vignette, I introduce the assertion to focus on key details necessary for interpretation (Erickson, 1986). This is followed by detailed evidence and nuanced details outlined within sub-assertions, in an effort to describe the specific actions of students and teachers within our learning context. It is embedded with commentary designed to reflect the interpretive perspective, highlight key linkages in the data, and offer specific evidence to clearly support assertions.

**Generation Z students Relied On Heuristics (Time-Saving Practices and Mental Shortcuts)  
When Navigating Online and Deciding What Information to Trust and Categorize as  
Reliable**

*Logging into Zoom and opening office hours on a Friday, I was quickly greeted by the familiar faces and avatars of Megan, Riley, and Diego. We chatted about our day for a little while, and then I helped Diego finish a history assignment as Riley worked on their math test. I invited Diego to share his screen as we transitioned to his online inquiry project. He began typing into Google: "ball control drills in soccer." He specified how he used the predictive Google search terms to save time and prevent unnecessary extra typing. He then clicked on the first link, and only five seconds into viewing the video he grabbed the URL to put in his chart. Diego immediately started typing in his next search: "exercise for speed and reaction for 20 feet of space." Then he began explaining that he considered his search terms in order to find better information that more specifically fit his needs. As Diego scrolled past the videos listed in his search results, he quickly selected the top website result. Next, he bounced back to the search*

*results in two seconds, possibly because of the slowly loading website. Diego adjusted his search to: "exercise for speed and reaction with cones." The same website he was on previously showed up purple, indicating it was already clicked, as the second to the top link. He selected it again, and this time the video had loaded. He clicked to open the video on YouTube rather than viewing it embedded in the webpage. After five seconds of listening, he scrolled past the person talking and used thumbnail previews to find the specific drills being shown. This was enough for him to put it in his research chart and move on. All of these clicks happened in quick succession; there was barely time for me to process what he was clicking. I asked Diego why he selected this video to include in his project, and he said, "I think it's something my coach would do, so it's good." Diego mentioned that he was effective at searching online and using search terms, because he was able to get what he "wanted quicker" and then make modifications to his search as needed. He elaborated that you can check if "it's reliable and you know what you want." Diego continued, "there's many different videos of what you want, but there's some that are just better for you, and that could help you more."*

This vignette illustrates one particular Genius Hour session where Diego's desire for speed and his use of heuristics guided his online decisions about what information to trust. Several moments within this vignette capture the main assertion along with various sub-assertions described in further detail later. My analysis of the data showed that participants were guided by heuristics in many nuanced ways. What follows is a brief retrospective interpretation (Erickson, 1986) to describe the ways in which this online inquiry with Diego connects with the overall assertion and related sub-assertions.

As illustrated in the vignette, Diego moved quickly to complete his inquiry task, often making decisions about what to click or what information to include in his project based on a few seconds' time. I noticed Diego's quick decision making skills, then reflected in my researcher's notebook that according to Diego, being "trustworthy or reliable [means a source] agrees with what he believes, looks right, or matches what he has read before." I also reflected on how "he described reliability as something that he has seen a bunch of times before" (Researcher's Notebook, December 9, 2020). Beyond Diego's desire for speed, I noticed he and his classmates sought information applicable to their needs; they took mental shortcuts to select and trust information, mistakenly referring to it as *reliable* even though they had not taken steps to check the credibility of the information as we had asked them to do in the mini-lessons just moments before. My data, as evidenced in the vignette, showed Diego's reference to the terms *reliable* and *relevant* were synonymous because he described getting what he wanted during a search, "it's reliable and you know what you want...there's many different videos of what you want, but there's some that are just better for you, and that could help you more" (Diego, December 4, 2020). This heuristic is explored further in the sub-assertion: *Generation Z students described relevant information and reliability in a synonymous manner, as they quickly looked for information that provided an answer to their inquiries.*

As I examined other students' decisions as they inquired, my data analysis led me to note another example of heuristics; students struggled to confirm the credibility of information (as defined in Chapter 2) when they engaged in mental shortcuts focused on top search results and surface-level cues (Researcher's Notebook, February 9, 2021). For example, Diego frequently selected from the top one or two results in his Google search. The full scope of search engine



bias shaped by proprietary algorithms is still unknown (McGrew, 2021a). Megan and I offered a socially constructed a plan for classroom instruction informed by lessons learned from Wineburg and McGrew (2019) who observed skilled fact checkers who use click restraint to carefully survey the search results were more likely to consider the credibility of the information they used and less likely to be deceived. Despite receiving this instruction from Megan and me, students continued to rely on top rankings, and seemed to click without considering how the ranking worked. Neither did they question the credibility of the algorithm. Similarly, students used a website's look and relied on the information presented from a single website rather than confirming the credibility of the information by reading laterally. As I watched Diego make these digital moves, I reflected in my researcher's notebook on how students make decisions based on how something looked real or appeared to be of a high quality based on the design and structure of the webpage (Researcher's Notebook, January 15, 2021). I recalled research by Wineburg and McGrew (2019) which showed that students were more likely to favor biased sources of online information when they used surface features like the layout, design, and appearance of authority to evaluate credibility. This heuristic is further described in the sub-assertion: *Generation Z students made quick decisions that relied on top search results and surface features when inquiring online.*

As our time continued, a pattern emerged in the data surrounding the students' reliance on prior exposure, social relationships, and confirmation-seeking searches to justify their determinations of credibility. For example, I noticed John describing his information as "reliable" because it was something he had "seen a lot before" (Researcher's Notebook, December 9, 2020). I reflected in my researcher's notebook that I worried his mental shortcut of valuing familiarity

was a heuristic that may lead him to create an "echo chamber or silos of information," to believe information that is not credible (December 9, 2020). In the vignette above, Diego shared how the video reminded him of a drill his coach would use, and therefore it was worthy of being included in his project. He gave no reason to consider the credibility any further because as he constructed his understanding from the technology tool available he believed the quality of the video was reinforced by his prior knowledge and social relationship with his coach. This heuristic is detailed in the sub-assertion: *Generation Z students' belief in online information and misinformation increased as a result of confirmation bias, social endorsement heuristics, and recognition heuristics.*

Each student participant in my study used a variety of heuristics or mental shortcuts as they navigated the Internet. Some examples include: looking for a quick answer, assuming that information that appeared relevant was also reliable or credible, assuming something was accurate because it was familiar, judging online content by its appearance, or selecting the top search results provided by an algorithm. The sub-assertions below provide additional examples indicating the various mental shortcuts or time-saving practices students used as they conducted online inquiries. My analysis allowed me to see the fine nuances of each of these heuristics, which is another reason I present several sub-assertions for each main assertion.

***Generation Z Students Described Relevant Information and Reliability in a Synonymous Manner, as They Quickly Looked for Information That Provided an Answer to Their Inquiries***

This sub-assertion section first illustrates the patterns related to students' motivation to look for information quickly. Then, I explore how students specifically focused on information that provided an answer to their inquiry, indicating how they conflated the concepts *relevant* and

*reliable* in their search efforts. My analysis showed that Generation Z students' preference for time-saving practices and quick results was an early and frequent occurrence throughout the study. When I was immersed in my teacher role, I did not initially recognize the patterns and shortcuts they used. However, when I reflected on the day's learning as a researcher, I recognized the limited amount of time students were willing to spend on their Internet searches. I wrote in my researcher's notebook, "they seem to be clicking with minimal reflection or consideration as to why they click" (Researcher's Notebook, October 14, 2020). During Genius Hour time, students quickly decided what information to use and where to click. Four of my five participants clearly prioritized speed.

John was another student participant for whom speed was a priority. He relied on the Google answer box, also referred to as the featured snippet, at the top of search engine results because "it's nice to have that answer right away" (John, February 26, 2021). Izzie also opted for top search results to save time. During one observation, I watched her select the first link, and when I asked her "why?" she indicated that she had misclicked and went back to choose a different link. She said the reason she made this decision was because "I want to see which one has more so I don't have to keep on looking at it" (Izzie, October 21, 2020). This indicated her priority to easily find what she was looking for, and perhaps some feelings of fatigue related to having to read through many things and make decisions (Researcher's Notebook, October 21, 2020). Riley and I were working through their ideas and research for a new Genius Hour project when they shared their preference for speed, stating, "but my mind works better when I'm doing things extremely fast" (Riley, February 26, 2021). I began to see how students' cognitive choices

intersected with technological tools to sometimes avoid evaluating the information used to construct knowledge.

However, Sophia was an outlier in this; she did not prefer speed in her online searches. Her movements on web pages and search engines were much slower, and I could often hear her reading and sounding out the words on the page. Her need for additional processing time was visible in everything we did together, and it was not surprising to me that she also desired additional time to conduct her online inquiries. I reflected in my researcher's notebook that I noticed Sophia was struggling to make a decision or to even know she needed to make a decision because reading and understanding information was a challenge for her (Researcher's Notebook, December 15, 2021). Similarly, Izzie occasionally seemed to get stuck on vocabulary during her inquiry and needed support sorting through the information before she could recognize that the next step was a decision or action; however, when I prompted her with a question, "So what search term do you think you want to use?" she was able to make a decision and move forward (Amanda, October 21, 2020). While Sophia and, to a lesser degree, Izzie showed a need for additional processing time and therefore moved slower in their online decision-making, there was an overall trend in my Generation Z learners to move quickly when making decisions about where to click and what to consume on the Internet.

As I sought to understand the patterns related to what happens when students move quickly in their online inquiries, my first clue was the frequency with which students used the word *reliable* as a synonym for *relevant*. Their desire for quick answers and relevant information was everywhere in my transcribed conversations with my co-teacher, Megan. She described one of her observations by saying, "one thing I do notice is that there's a quick decision, like a yes or

no decision. Is it helpful or not helpful?" She went on to describe that students were quickly making determinations about the information they viewed, "scrolling through different pages where he's like, no, this isn't like going to work or like, yeah , this makes sense." She believed that the students were looking to see if the information could immediately be confirmed as helpful or not (Megan, December 15, 2020). Our lesson materials and classroom observations reflected our desire to help students thoughtfully determine if the information was reliable and trustworthy by confirming either the credibility of the source or confirming that the same information could be corroborated elsewhere. However, within the classroom space we provided for online exploration, students' online searches invariably focused on the perceived usefulness of information, with little consideration as to its source credibility. They used words like "reliable" and "trustworthy" when describing their selection process for online materials, but did not demonstrate efforts to confirm credibility. As they constructed meaning using the Internet, any information that yielded a quick and relevant answer was good enough for them.

All five of our Genius Hour students were observed searching for information that was relevant or helpful to their inquiries and their final products, and my follow-up interviews added extra nuance in how they experienced this as a driving force. For instance, when I asked Sophia about her inquiries, she reflected that she prioritized helpful information when looking at her research document. In the column that asked, "Do I trust the information? How do I know?" she recorded, "I love this website because it is helpful and improves my singing." and "I think I can trust it because it gives the lesson" (Sophia, Step 3 Researching Document). Figure 4 shows how she documented her perceptions of helpfulness and its relationship to the information's relevance. She also communicated that she was unsure about what to trust and that information

was more desirable if it was easier for her to understand, "Maybe yes I can trust it because it gives you ideas and helps you, it's kinda easy" (Sophia, Step 3 Researching Document).

**Figure 4**

***Sophia's Step 3 Researching Document***

Step 3: Researching		
My research question		
How to learn to be a better singer.		
Information that is helpful	Link to Website	Notes about website (do I trust the information? How do I know?)
you to reach those high notes. With enough practice, you will be able to hit those notes without the need to fake crying.	<a href="https://www.voicelessons.com/blog/tips/tips-to-improve-your-singing-voice/">https://www.voicelessons.com/blog/tips/tips-to-improve-your-singing-voice/</a>	I love this website because it is helpful and improves my singing.
Give off confidence, be brave Try to do singing and to hear yourself Sometimes people make mistakes it make sing better, sometimes hard	<a href="https://ehomerecordingstudio.com/how-to-learn-to-sing/">https://ehomerecordingstudio.com/how-to-learn-to-sing/</a>	Maybe yes I can trust it because it gives you ideas and helps you, its kinda easy
1)breath 2)warm up 3) find your range 4) try to sing along to a song you like with voice recorder 5)drink plenty of water 6) practice daily	<a href="https://www.wikihow.com/Learn-to-sing">wikihow.com/Learn-to-sing</a>	I think i can trust it because give the lesson

Riley described having a similar motivation to find information that helped them understand how to play and create video games. Their primary focus was finding applicable information, and they often relied on YouTube because "it has a lot of information" (Riley, November 13, 2020). As our conversation continued, Riley shared that their main goal was to get useful information; it was credible when "they actually try it out for themselves to make sure that it works or not" (Riley, November 13, 2020). Riley often described their desire for fast information that met their specific needs but they had a unique way of determining the credibility of information by successfully applying those tips and tricks to their own gaming (Researcher's Notebook, November 13, 2020).

When doing a post-observation interview with Diego, I asked what advice he would give classmates about reading and researching on the Internet. He replied, "check what they click on, to make sure that it's what they want - what they're looking for" (Diego, December 4, 2020). It struck me how important he found it to locate what fits your needs when you are gathering information. The phrase "useful to you" came through in both the interview and the observation. While many of our early lessons focused on effectively using a search engine to find relevant information, he neglected the portions of the lesson focused on reading laterally to confirm the credibility of information or author. Most decision-making was centered around how to help him get the information he needed. If it met his need, he automatically deemed it reliable (Researcher's Notebook, December 4, 2020). John demonstrated a similar use of the word reliable. I was surprised how often he used the words "reliable website" in his post-observation and interview. John described his search process as successful because "it gave me the answer, and I can rely on it" (John, December 9, 2020). While I did not see any evidence that he confirmed the credibility of the information he used, he often stated that the information was reliable. When I asked him to explain what he meant by reliable, John shared that "it means trustworthy, and I know that it's a good website to get information off of" (John, December 9, 2020). This led me to believe that the information itself was the primary indicator he was using to determine credibility, and as a result, he viewed *relevant* and *reliable* as synonymous terms. Ultimately, observations, interviews, and student documents showed all students placed a priority on finding the "right" answers; they made choices based on relevancy, rather than reliability. This meant students often (incorrectly) interpreted information as reliable.

***Generation Z Students Made Quick Decisions That Relied on Top Search Results and Surface Features When Inquiring Online***

My participants' desire for speed was also evident in their quick decisions about whether or not to stay with a source. They primarily relied on the surface features of web pages and top search results when inquiring online. When working from search engines, video observations and transcripts show all students started with Google after Megan and I directed them to use a search engine. As students shared their screens and talked through their online inquiry process, Google was students' first step for gathering information.

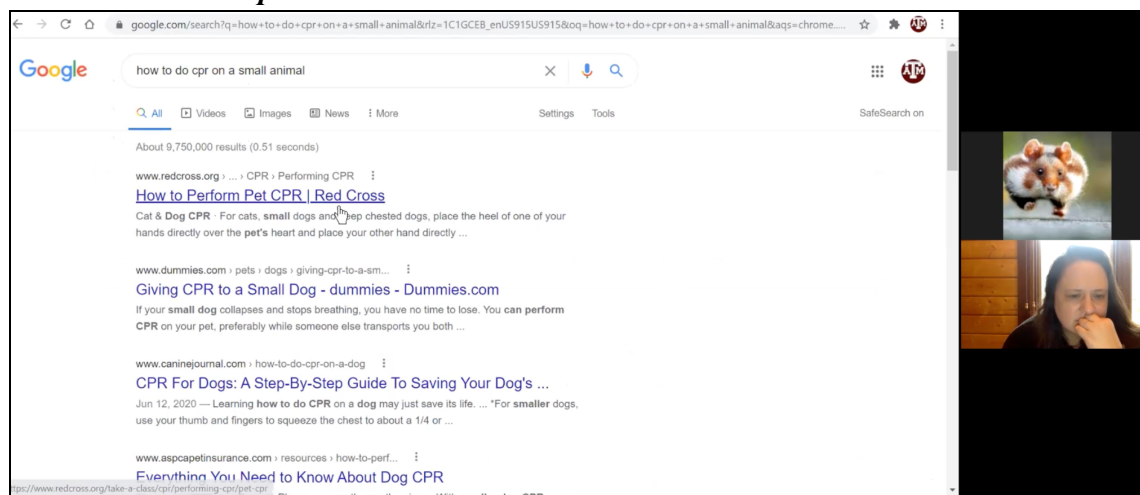
It was also noteworthy that students invariably chose to look something up online during Genius Hour, rather than talking with their peers, doing schoolwork, or just feeling curious. When feeling like they have something they are unsure of, Riley shared, "I just kind of Google it" (Riley, January 22, 2021). Similarly, when asked in her post-observation interview about how she was going to work toward her online inquiry project goal of getting better at singing, Sophia responded, "by searching it up" (Sophia, March 2, 2021). Searching for things on the Internet was students' default method for finding answers to their questions, and searching on the Internet meant using the Google search engine.

As students used Google, they demonstrated a preference for sources listed at the top of their search results or highlighted answers provided by the search engine. When I asked John why he clicked on a specific website from his search results (shown in Figure 5), he responded, "it was at the top of the list, which usually means it's more reliable" (John, February 26, 2021). While I questioned whether to highlight this data exemplar in support of the previous assertion, I chose to put it here because the context indicates John put his trust in the ranking of the search



results. When I asked John to tell me more about that, he responded that he liked "to get that little white box that tells me the information" (the Google snippet) because "sometimes it's nice to have that answer right away" (John, February 26, 2021).

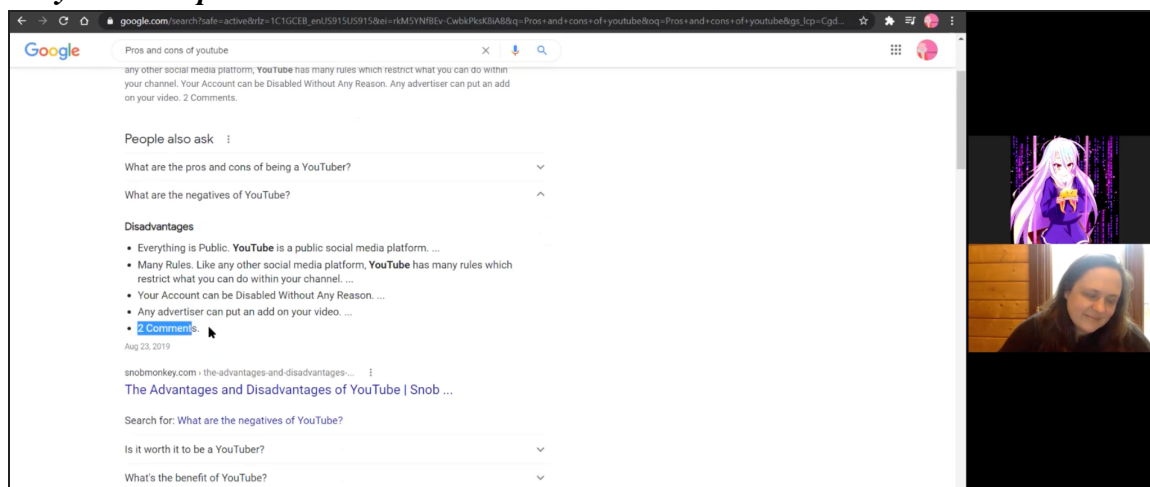
**Figure 5**  
***John Selects the Top Search Result 02/26/2021***



Riley looked up "pros and cons of YouTube," hovered over the top search result with their cursor long enough to read the title. They moved swiftly to the Google snippet *People Also Ask*, which was listed second in the search results. Riley started thinking aloud as they read aloud the questions and answers listed under *People Also Ask*. Each answer displayed two or three lines of text from websites selected by the algorithm; a screenshot of Riley using this feature is in Figure 6. The significance of this moment was Riley's focus on finding relevant information to answer their inquiry. They read an answer in the Google snippet and compared it to their previous experience saying, "Oh yeah, I've had experience with that" (Riley, February 26, 2021). Here, Riley used recognition to guide their belief in the information encountered. In fact, when confronted with a Google Snippet response that did not make sense (Figure 6), they called out, "What?! Two comments. What does that even mean, two comments?" Despite their confusion

and awareness that this information did not make sense, they did not stop to inquire more deeply. Instead, they continued, skipping some but reading and opening most results on the Google Snippet *People Also Ask* list. Once Riley realized these questions were interesting, but not really what they were seeking in the original search, they paused and verbalized, "I don't need the rates, I need if it's good or bad." In this example we see how Riley's understanding is shaped by a cycle of learning where they rely on their own socially constructed knowledge and the decisions of technological tools connect them with additional information.

**Figure 6**  
***Riley Uses People Also Ask 02/26/2021***

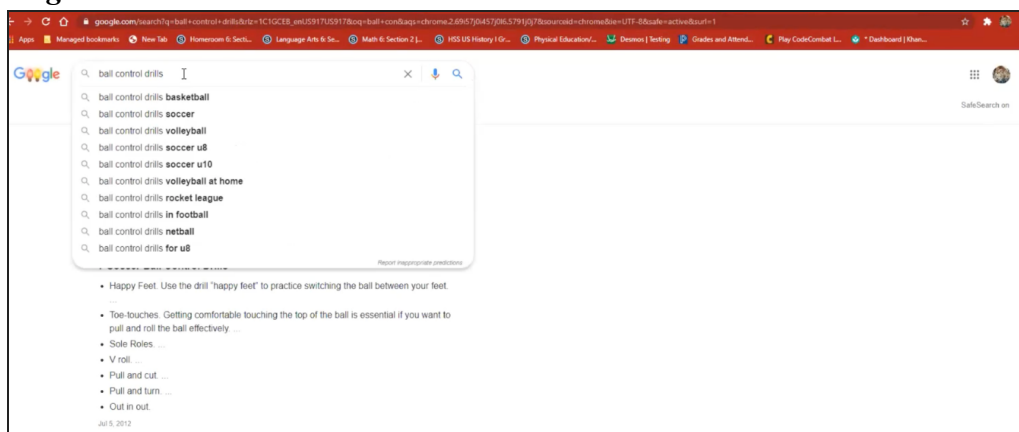


As I reflected in my researcher's notebook, I noted Riley quickly read a bunch of algorithm-derived answers listed second in their search engine results. They neither checked the sources of any of the information nor questioned the credibility (Researchers Notebook, February 26, 2021). Riley scrolled back to the top-listed link and clicked it, saying, "Maybe this will help" (Riley, February 26, 2021). Having now opened the top search result in a new tab, they focused on finding their answer in the method described in the previous sub-assertion, quickly

skimming the text, reading aloud, and agreeing with the text if it aligned with their own experience, with no move to question or verify credibility.

Another example of how students quickly grabbed one of the top links in a search engine was noted in the first vignette, when Diego searched for *ball control drills soccer*. He described aloud how he used the predictive Google search terms to save time and prevent unnecessary extra typing; Figure 7 is screenshot taken during his think aloud. He clicked the first link and, only five seconds into the video, grabbed the URL to put in his chart (Researcher's Notebook, December 4, 2020). During Izzie's search, she ignored the Google suggested answers and selected the second website listed on her Google search, taking a few seconds to describe that she clicked that one because it had the word "pictures" in the title (Izzie, November 23, 2020). Similarly, Sophia also was observed scrolling past Google selected answers and selecting the top website listed in her Google search (Sophia, January 26, 2021). Overall, all students used Google for their searching, staying on the first page of provided results to use top links, suggested answers, or suggested features.

**Figure 7**  
***Diego Uses Predictive Search Terms 12/04/2020***

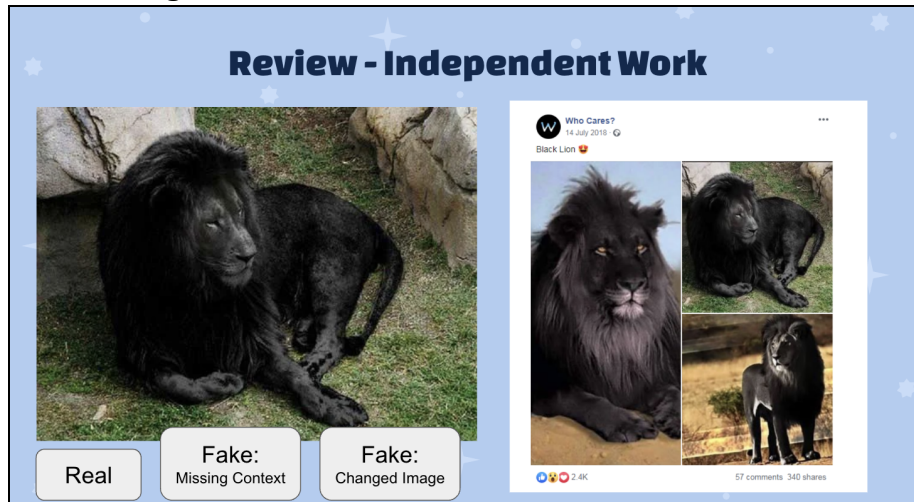


The visible layout or surface features of a website was another means by which students evaluated sources, and even influenced how much time they would spend evaluating the relevance of a source. Surface features include elements that "are easily visible on the site and under the control of the site's owner," such as a website's layout, logo, ads, or top-level domain (McGrew, 2021b, p. 85). For example, John stated he stays on a site, "if it just looks good to me or if I usually take a look at about three to five sentences to see if it looks really good to get information from" (John, February 26, 2021). He also indicated he looks out for viruses using visual cues: if a website has "a lot of ads that don't look like a real company or they pull a lot of emojis and stuff in their comments and some information that's usually trying to convince you" (John, February 26, 2021). When reviewing observation videos, I paid attention to Diego and me discussing how to improve mini-lessons for future students; he shared that it would be a good idea to include a website with "pretty good editing to make it look real," because people are more likely to believe something that they can see, like an image or video (January 15, 2021). His understanding of how technology operates was informed by his knowledge of social structures and how people make assumptions about what to believe online.

Riley relied on the visual aspects of the information they encountered online during their reverse image search task. During a media literacy lesson taught to all sixth-grade students, we taught students how to conduct a reverse image search and use keywords to determine the credibility of some teacher-provided memes. This was a new lesson added to the curriculum to provide students with an additional tool to address misinformation. Students were asked to practice determining if a given meme was a real image with misleading context, a real image

with accurate content, or a manipulated image. I observed Riley as they worked independently to determine if the images in Figure 8 were credible.

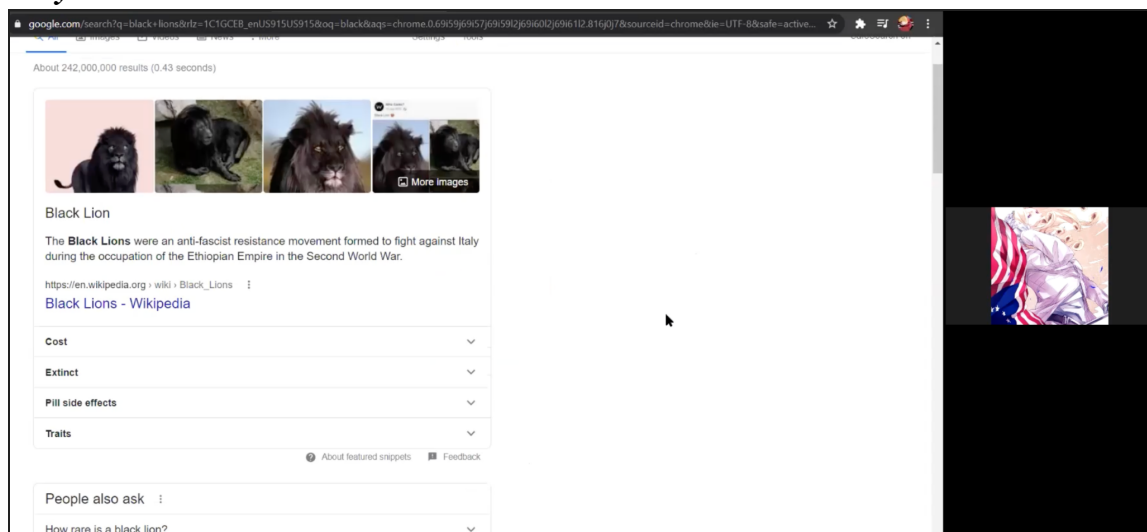
**Figure 8**  
*Reverse Image Search Task*



Riley decided to begin with a keyword search. They not only moved quickly in their search, but relied on surface-level visual cues to evaluate information. While existing literature (Breakstone et al., 2018a; Kohnen et al., 2020; McGrew, 2021b) has documented students using surface features to evaluate websites, in this instance, I observed Riley using surface features to evaluate search engine results from Google. Figure 9 is a screenshot from when Riley searched for "black lions" using Google's search engine. The results showed the digitally altered photographs of black lions at the top of the search and a highlighted description of an anti-fascist group that goes by the name Black Lions; the second and third entries in the search results were from Wikipedia about lions with black manes. Because Riley relied on quick visual cues, information layout, and their perception of Google as the ultimate authority, they did not carefully read the search results or even attempt to open any of the links. Riley used the Google search results *as their source of information*, and as a result, they missed the fact that one website

described an organization and had nothing to do with the information they were seeking to disprove (Researcher's Notebook, February 10, 2021). Both the search engine algorithm and Riley's decision making created a situation where knowledge was constructed between human and technological agents embedded in a sociocultural network. Furthermore, Riley so strongly believed that Google's search results were confirming information that black lions exist that they ignored my verbal comment that they were looking at an altered image and should read the search results more carefully. It appears as though their focus on top search results and reliance on the surface feature led them to make inaccurate assessments about the images' credibility (Researcher's Notebook, February 10, 2021).

**Figure 9**  
***Riley Searches For Black Lions 02/10/2021***



In reviewing transcripts of our teacher discussions, Megan wondered out loud, "I wonder how they know what to click?," before noting she saw them use the first thing that they clicked and seemed to pick what "looks the best" (Megan, February 9, 2021). She wondered if students who read laterally and look at multiple sources might be freed from the "pressure of one source being trustworthy" because they would have options in determining what was credible (Megan,

February 9, 2021). While students were beginning to verbalize the need to read laterally, they ultimately did not transfer this knowledge into their practice and apply it. Instead, when they made a determination about whether to use information, all students relied on top search results, surface features, or the visible layout. While students could verbalize the need to read laterally to confirm the credibility of information, they did not practice it.

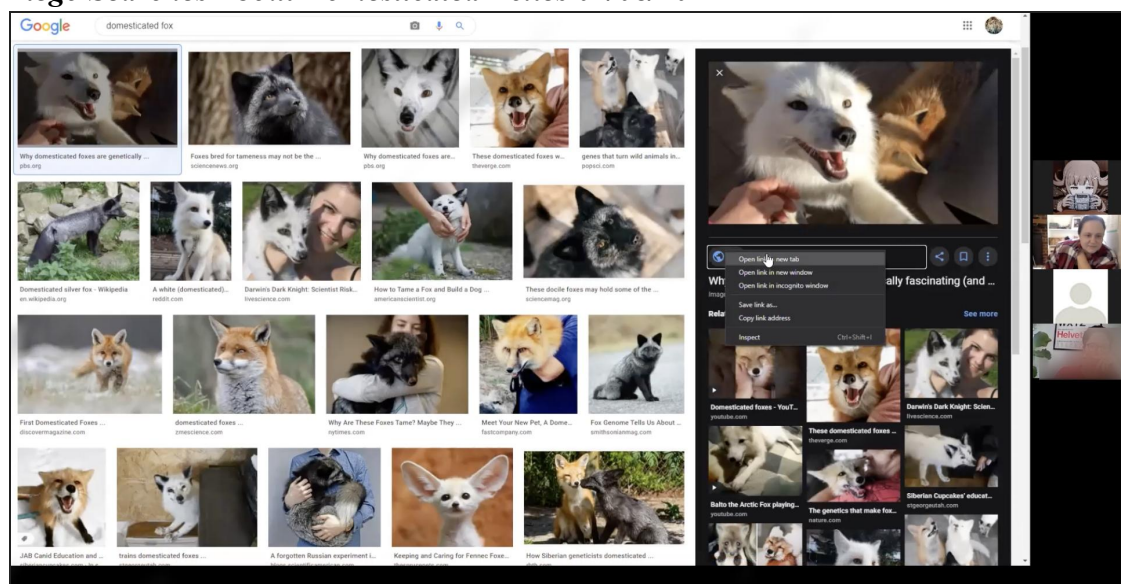
Diego reflected on a website saying, "It's a .com, so I think it's safe," but then quickly questioned this thinking, saying, "Yeah, I think maybe not" (Diego, October 2, 2021). Making decisions based on a web address was another example of surface features' role in decision-making. He wanted to have a way to evaluate information and websites, but he was also not really sure how to do that. Following lessons on lateral searching, Diego was observed continuing to evaluate sources based on visual cues and how quickly he could find the information. For example, when we were discussing how similar his new dog looked to a wolf, we began talking about the process of domestication. Figure 10 shows a screenshot taken as Diego quickly opened Google Images Search and appeared to begin reading laterally to confirm the credibility of what I shared with him. He clicked on an image and opened a new tab to look up information about domesticating wolves and foxes. However, he did not read more than the title and the first sentence of the tab he opened, appearing to value only quick confirmation (Researcher's notebook, January 8, 2021). Rather than confirming the credibility of information through corroboration, he fell back into old habits: quick decisions and top search results.

Even in a class-wide lesson focused on click restraint where we earnestly encouraged students to slowly and carefully determine the credibility of an online claim, Megan recalled that "they still just looked at the first Google result and they were like, I found it!" because they



wanted to be first to share that they had found the answer (Megan, February 9, 2021). My examination of the data allowed me to confirm that students primarily valued time-saving heuristic, relying on top search results and visual scans of search results. They did not appear to go beyond these skills when judging the credibility of information or choosing it for their inquiries. While Megan and I wanted students to search like fact-checkers and read laterally in order to verify the information they encountered, the data showed that the students did the opposite and placed their value on quick answers and visually interesting information.

**Figure 10**  
***Diego Searches About Domesticated Foxes 01/08/2021***



***Generation Z Students' Belief in Online Information and Misinformation Increased as a Result of Confirmation Bias, Social Endorsement Heuristics, and Recognition Heuristics***

When I analyzed the data, I determined that all five of my student participants were more likely to believe the online information they encountered when they had prior knowledge or a personal connection to it. As I used reflective writing to generate and test assertions, I referenced the literature and found the concept of heuristics to help me explain students' behaviors and



beliefs. Specifically, I observed students using three strategies: confirmation bias, social endorsement heuristics, and recognition heuristics. As a brief reminder of these ideas from Chapter 2, confirmation bias refers to the shortcuts humans take to view new knowledge as confirming their preexisting beliefs. Social endorsement heuristics refer to how people tend to prefer information they receive from their social contacts. Recognition heuristics highlight how people prefer information that they have been exposed to previously. My analysis also showed that students overlapped heuristics in various instances of online inquiry in order to reduce their effort when making decisions.

As I documented these observations in my researcher's notebook, I grew concerned that students might become victims of misinformation based on these shortcuts. They were using ineffective ways to confirm the credibility of information and relying heavily on their prior knowledge as a means of verifying the truth of new information. In conversations with me, students identified the sources of this prior information as social structures and personal experiences.

Drawing on their personal interests, many students had some prior exposure and knowledge stemming from a range of resources as they conducted their online inquiries. They relied on things they had heard or read in the past or experienced in their own life (Researcher's Notebook, February 9, 2021). Through reflective writing, I assert that this represents a pattern of recognition heuristics because students relied on their perception of patterns to confirm the quality and usefulness of the information they encountered online. One example of a student using recognition heuristics was when Riley made connections between the plugins they were researching and times they had seen it applied by others in-game. In my researcher's notebook, I

reflected that Riley's search seemed to result in an understanding that relied heavily on how it related to their prior knowledge rather than taking time to deeply understand the information being presented by their research or constructing new knowledge (Researcher's Notebook, November 13, 2020). This was also reflected in their initial research document, which can be seen in Figure 11, where Riley explored possible Genius Hour topics and wrote "it was my experience" as a means of supporting the trustworthiness of online information they found (Riley, Step 3 Researching Document).

**Figure 11**  
***Riley's Step 3 Researching Document***

Step 3: Researching		
My research question		
How will Roblox's new update affect the developers income on the website?		
Information that is helpful	Link to Website	Notes about website (do I trust the information? How do I know?)
The fact that the transaction will take up to 3-7 days to be verified makes it so that the devs have to wait for up to 7 days for any revenue they make to come in. which may make it hard because they need their money so that they can pay for food, rent and other things. (10/30)	<a href="https://youtu.be/vaEvM7SQ4gA">https://youtu.be/vaEvM7SQ4gA</a>	I trust this source because the dude who made the video, Konekokitten, Is a very popular and respected person in the roblox community. He has also been on roblox since 2007. So he has more experience with Roblox than me.
Will the client have to wait to get the item they purchased, or just the dev to wait for their revenue? No, We already had to wait 3 days in the past to get our revenue, but now it could take 3-7 days. So the client will get their item and the dev has to wait up to a week for their revenue. (10/30)	<a href="https://youtu.be/vaEvM7SQ4gA">https://youtu.be/vaEvM7SQ4gA</a>	I trust this source because the dude who made the video, Konekokitten, Is a very popular and respected person in the roblox community. He has also been on roblox since 2007. So he has more experience with Roblox than me.
People are very upset over the update. The builders, artists, clothing designers and other devform members are EXTREMELY upset over this update. Some people understand 3 days, some understand 3-5 days but almost all of them say 3-7 days is too much. (10/30)	<a href="https://youtu.be/vaEvM7SQ4gA">https://youtu.be/vaEvM7SQ4gA</a>	I trust this source because the dude who made the video, Konekokitten, Is a very popular and respected person in the roblox community. He has also been on roblox since 2007. So he has more experience with Roblox than me.
Update came out--- It just came out-- The things I have experienced so far is that it takes up to 5 min for my transactions to go through. So I may get a shirt for example and it takes a few min for it to go to my inventory. Though for the creator, it takes longer for them to get their revenue off it. (1/13)		It was my experience.

Prior knowledge and real-world experience also shaped John's description of what information he believed credible. He stated that he knew the Red Cross was "very reliable"

because they "help millions and millions of people," and "they're at baseball games and everything, handing out stuff." He recognized this organization from his real-life experience, which led him to view online information as reliable "because if I know who they are and I've heard of them millions of times, then I know that they're reliable" (John, February 26, 2021). Here we see the impact of the previous assertion, *Generation Z students described relevant information and reliability in a synonymous manner, as they quickly looked for information that provided an answer to their inquiries*, intersecting with the recognition heuristic that led students to automatically trust familiar information. I saw John trusting information that was familiar and describing that information as reliable.

Sophia was a bit of an outlier for this assertion, since she had less prior experience and knowledge to draw on; she often seemed confused or overwhelmed by the online inquiry tasks we requested students try. When I would ask her to explain why she selected a source of information, she would often say, "Um, I'm not sure" (Sophia, October 30, 2020). When I asked why she was spending a lot of time on a particular portion of a web page, her response indicated that she was reading to understand, "I'm trying to read and see what it says" (Sophia, March 2, 2021). As I observed her selecting what to include in her research collection chart about her topic of becoming a singer, I noticed that she often focused on information she found relatable, avoiding the technical parts. For example, when she read about singing in a way that allowed air through the nose and asked me to explain it to her, which I did. Yet she did not include this information in her record-keeping chart and instead paraphrased from advice about confidence, writing, "be brave and face your fears" (Sophia, March 2, 2021). From our previous conversations, I knew that these motivational messages were something with which she had

familiarity; she often wrote statements like this in her notebooks. While her prior experience on her chosen topic was limited, she found portions of online information that aligned with her experiences of cultivating positive messages and encouragement. More than half of her final product consisted of motivational and inspirational messages to encourage others to follow their dream of singing, reflecting her use of recognition heuristics to determine what went into her final project.

I began to see that familiarity and recognition significantly shaped students' beliefs about information; this pointed to the social nature of learning as students sought to connect their learning to their known experiences and relationships. Students valued knowledge and information that came from trusted individuals and social connections, which is known as social endorsement heuristics. The credibility they ascribed to information from social sources was not limited to people the students knew directly, it also included online personalities. Diego relied on his relationship with his coach and his experiences with soccer as his primary reference point for determining the usefulness of online information. He described that he knew that researching how professionals train would not necessarily be a good idea because his coach had taught him about adolescent health; "I can't train like the pros... that's not good for me." He also considered the real-life limitations of some of the strategies that came up in his search, "I don't have the resources of a car to go somewhere" (Diego, October 23, 2020). His process for determining the relevance of the information required that he consider his experiences and knowledge of soccer to find resources that met his specific needs. In the opening vignette for Chapter 4, Diego looked at various soccer training drills and decided that a video would be good to include because the drills reminded him of things his coach had asked him to do. His past social interactions and

relationships were seen shaping his construction of information in online spaces. Since a trusted person in his life had recommended similar drills, he trusted them: "my coach would do these, so I think that's good" (Diego, December 4, 2020). Megan reflected on how Diego's trust in his coach shaped the research he relied upon; she called this "Googling your neighbor," describing how people use the human resources in their life to help them learn and understand new things (Megan, February 9, 2021). Diego acknowledged this when reflecting on the mini-lesson on trusting information stating, "I typically don't do this. I just ask an adult I find reliable" (Diego, November 6, 2020). These ideas represent another intersection of assertions, where a student took mental shortcuts to trust information gained from a social relationship, and thereby believed online information to be reliable without confirming credibility. Diego used recognition heuristics to value information about soccer that was like his own experiences and social endorsement heuristics to trust information that resembled something his coach had done with him. These were the primary factors in determining whether that information was useful and worth including in his final product.

Similarly to how Diego often considered if the information were something his coach would do, Izzie made decisions about online information based on whether or not it was something she had seen her mother do. Genius Hour time gave her space to explore her ideas and inquire online about making a dress, but she ultimately decided that she would learn the most from working with her mother. Together, they worked on "the design of it," bought the fabric, and navigated using the sewing machine (Izzie, October 21, 2020). In my researcher's notebook, I reflected that while I would not have originally envisioned this path, it made sense. My own mom taught me to cook and install light fixtures and many other practical everyday skills. While

I could have Googled how to do these things, having someone there to teach me, as well as the social component of learning from someone I trusted and had a relationship with, was so meaningful to me (Researcher's Notebook, October 21, 2020). Megan observed that the increased isolation of pandemic living meant students were doing so many things virtually; it made sense to her that Izzie might want to rely on human connections (Megan, December 14, 2020). When Izzie and I worked through the mini-lessons and looked to enhance the knowledge she gained from her mother with an online inquiry, she would often still use the prior experiences with her mother as an anchor to determine what information to use. She selected a tutorial website that she determined had relevant information because of the social cues with her mom: "and then this one, I'm pretty sure, because I'm pretty sure I've seen my mom use it" (Izzie, November 23, 2020). This was yet another combination of recognition heuristic and social endorsement heuristics shaping how students navigate the internet and selected information to use and believe.

Related to recognition heuristics, I observed students reducing their cognitive effort when searching online by valuing not only the familiar information, but information that confirmed their previously held beliefs. For example, Riley shared that part of why something they read "sounded accurate" was because it confirmed their prior experience and beliefs related to streaming services for gamers, "Twitch and YouTube are definitely better because I've never heard of Mixer" (Riley, February 26, 2021). This is a description of confirmation bias because Riley focused on the information in their search that confirmed their existing beliefs. In addition to the experience of being on some of the streaming platforms, they had just watched "a three-hour long video" about what it was like to stream on YouTube by a trusted YouTuber

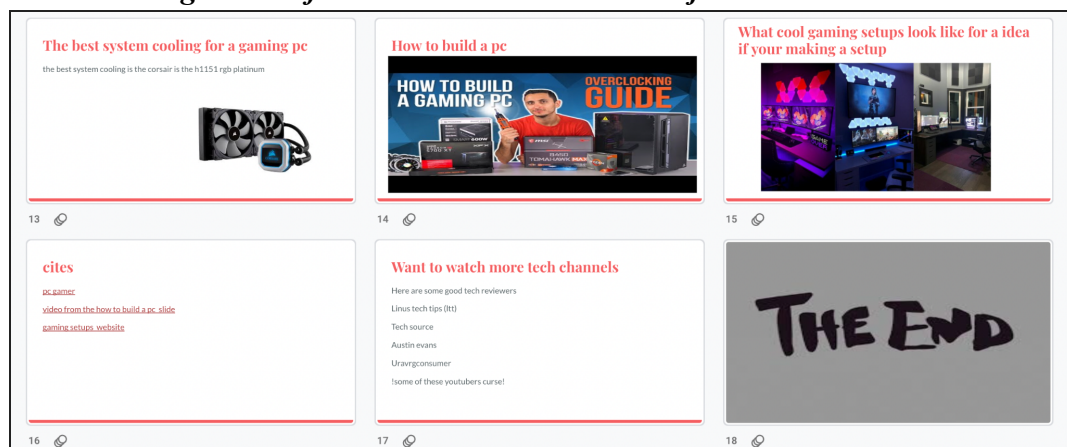
(Riley, February 26, 2021). While their research chart (Figure 11) contained ideas from websites that used lists to describe reasons people like some streaming services over others, Riley relied on the gaming streamers they knew and trusted who preferred one platform over the other (Researcher's Notebook, February 26, 2021). Their decision about which streaming provider was best was primarily based on a known knowledge source. Social cues shaped how they perceived online information; it was easier to believe the online personality Riley trusted.

Similarly, John listed many known video game and tech streamers in his final Genius Hour product (see Figure 12), describing them as resources he enjoyed and found helpful. His experience watching these videos and the trust he placed in these online gamers led him to trust the information they presented. He used them in his final product and encouraged others to use these streamers if they wanted to learn more (Researcher's Notebook, December 9, 2020). Megan observed that John had already decided which products he thought were the best for his final online inquiry project based on his own experience and his life; that it was "like he was Googling himself" (Megan, February 9, 2021). Indeed, both student observations and teacher discussions indicated students searched for information confirming their pre-existing beliefs and used confirmation bias while searching online.

As I tried to understand John's reasoning behind his online decisions, I encouraged John to show me his process for finding the best PC parts and sources; how could he better support his findings? He pushed back, sharing that it was not needed; he was confident in what he had listed. When I asked him about his citations, he shared, "I have the one from PC gamer. It doesn't list all the qualities that I put in there, because I know from friends of friends, and friends that have some of these products that say that that's what they like about it" (John, October 22, 2020). With

these words, John indicated his online inquiry was primarily a way to confirm his previously held beliefs about the best PC products; he was not willing to go beyond the ideas he gained from friends or family (Researcher's Notebook, December 9, 2020). John shared that the people in his life help him determine what websites he can rely on because good researchers "use websites that your friends or family or co-workers have told you that are good or have linked to you" (John, December 9, 2020). Such combinations of heuristics proved challenging to combat as a teacher seeking to help my students gain new skills.

**Figure 12**  
*John's Ending Slides of His Final Genius Hour Project*



The impact of multiple heuristics became most apparent to me when Riley and I worked through the reverse image search task. Megan and I designed it to help students spot misinformation, and asked students to reverse image search the photograph of a black lion to determine if it was a true image, a changed image, or a changed context. Riley asserted that the image was real without doing an Internet search. When I asked them "why?" they shared:

I think the black lion is real because I mean, I've seen black lions. Like my dad showed them to me and stuff. So I'm pretty sure it's real. Also, I feel like you showed me them. So, I'm almost 100 percent sure that it's real (Riley, February 10, 2021).



Their perceived recognition of the information paired with a social connection cue made them more likely to believe misinformation. These heuristics led Riley to save time in their online decision-making and simply trust misinformation. Even when I pushed them to read more carefully and look for the evidence, they relied on a few top search result titles without reading past the surface features of the search. This made it nearly impossible for me to convince them that what they were viewing was, in fact, a digitally altered image. I could hear it in their voice when I showed them the altered image next to the real one; they were still struggling to comprehend that their previously held belief was wrong as they said, "Oh, I don't know, I guess it's fake, oh no, I thought it was real" (Riley, February 10, 2021). Their reliance on heuristics shaped how they navigated online spaces, decided what information to trust and constructed their understanding with technological tools in a social world.

All five Generation Z students in our Genius Hour sessions demonstrated the use of recognition heuristics, social endorsement heuristics, confirmation bias, or a combination of heuristics; this made them more likely to believe information with which they had prior exposure. Students were seen using a range of cognitive elements to guide decision making while using technology as a tool that can reinforce existing power structures in a social environment. They heavily relied on information that confirmed their existing beliefs or had been previously endorsed by a trusted person in their lives.

### **Generation Z Students Needed Instructional Support in Order to Determine Credibility and Read Laterally**

*Megan shared her screen to begin the day's lesson. As students logged into the Zoom call, student names in white font over black boxes start appearing on the screen. Only two students*

*put their cameras on like teachers. The students shared a greeting through chat or audio, and Megan outlined the plan for our zoom time together. As co-teachers, we shared responsibilities for student learning and instruction. I loaded student documents from our learning management system and watched 20 tabs of student documents to observe who was following along in real-time as Megan instructed. She directed students to a viral meme and explained, "We are taking on the role of professional fact-checkers." She briefly reminded students of the previous day's lesson to introduce the day's guided practice: "Here is what we are going to do: first, you are going to open a new tab and check the facts before reading deeply; then you're going to think, can the facts be confirmed? Who is behind that information, and what is the evidence?" Megan set the timer for the students to complete this task as I looked at the chat and realized Riley had messaged me privately. They wrote: "It all says false. Like, EVERY link." As we continued to chat, Riley wondered if humor was the reason why false information like this could spread online. As the timer ended, I noticed most students filling in their digital documents in response to the prompt, "Can the facts be confirmed?" Only a few students could find information about who was behind the meme. Megan refocused the class, and I modeled doing a Google search, thinking aloud about my search terms and modeling how I use meme title, snippets, and URL to gather information about this topic. Next, I selected a few web pages to open in separate tabs, "We're not just going to read the headlines, we're going to tab, tab, tab." On my first tab, I thought aloud as I skimmed the page to see if I could confirm the information in this meme and determine who is behind it. When I located enough information to say that this was a real image with a fabricated caption, I reminded students that we must look to see whether the "other tabs say the same thing." I paused to point out where websites link and document their*

*evidence and concluded my think-aloud. Megan concluded the lesson by reminding students that they must read laterally in order to "to quickly see multiple sources" and determine "Is this real? Or is this not real?" Only once we have taken the time to read laterally do "we dig in deeper and read vertically."*

This vignette illustrates one example of Megan and me taking action and creating curricular plans designed to explicitly teach all our students to evaluate information and confirm the credibility of information through lateral reading. This lesson was created based on our observations of Genius Hour students, but delivered to everyone.

Three of our five Genius Hour students were often confident in their online inquiries. The other two students had literacy needs that impacted their speed and confidence in locating information online and finding credible information. While the confident students displayed fluency in quickly locating information, consuming it, and synthesizing answers to their inquiries, their ability to confirm the credibility of information was limited. For example, Megan and I taught a lesson to the whole class about lateral reading and asked students to confirm the credibility of a claim through lateral reading; the result was that multiple students shared their answers in under five seconds, suggesting they quickly answered the question without laterally reading (Researcher's Notebook, January 26, 2021). Later during that same lesson, Diego said, "only 1% of people can touch their pinky to their thumb," then quickly walked it back, saying that probably wasn't true, but when I asked him to do a lateral search, he just went back to his previous conversation (Diego, January 26, 2021). We saw all students relied on heuristics to make decisions as they searched for what to categorize as reliable information, but few were using the lateral reading strategies we had been teaching during our Genius Hour time.

Reflections my conversations with Megan revealed that the more time we spent watching and learning about how our students inquired online, the more we began to see that our students' inquiry processes were superficial; they needed explicit support to learn how to think critically and find reliable information (Researcher's Notebook, January 4, 2021). We sought to balance the need to "teach real-life searching the Internet" while also considering how to provide the scaffolds that support students to successfully inquire online (Amanda, September 17, 2020). While we were grateful for having one-to-one laptops for so many years, we knew that just "handing a kid a laptop is not the same as teaching them the skills they need" (Amanda, January 22, 2021). School-wide efforts to teach digital citizenship and online safety were happening, but most classroom lessons on digital and media literacy related to finding accurate information online simply referred students to use library databases or checklists explained in Chapter 1. Specifically, our discussion showed that we wanted to remove these sorts of basic, gatekeeping processes and empower students to ask, "Who is behind the information, and what is the evidence?" (Researcher's Notebook, January 26, 2021). Many of the discussions among teachers in our grade-level PLC reflected that everyone saw this as an urgent need. In particular, the social context of the misinformation around the 2020 US Presidential election and January 6 attack on the US Capitol galvanized my team to support media literacy in all classes (Researcher's Notebook, February 8, 2021). Our PLC discussion was shaped by our experiences in society, which guided us as we socially constructed our curriculum priorities to focus on how to empower our students. It was clear from these discussions that current structures in place were not sufficient and teachers knew we needed to take action to change our students' ability to find and evaluate credible information.

After spending months wearing "my research hat," I felt as though I had learned a lot about how students researched online, but when it came time to "put on my teacher hat" and plan a lesson for the whole grade level, I struggled to fit that lesson into 35 minutes of synchronous instruction (Researcher's Notebook, February 5, 2021). My school's existing resources for grade level ELA instruction relied on having students research teacher-assigned topics using library databases, and there was little instruction designed to support students' authentic online inquiries. Additionally, schoolwide guidance for evaluating information asked teachers and students to use the CRAAP test asking students to consider Currency, Relevance, Authority, Accuracy, and Purpose in a checklist format (Blakeslee, 2004, Appendix A). Megan and I were concerned that using checklists did not match the sophistication of the Internet in which students were operating (McGrew et al., 2017). Additionally, the lengthy series of questions did not match our students' desire to use time saving heuristics to help them decide what information to consume. Because fact checkers "read less but learned more," (Wineburg & McGrew, 2019, p. 32) we sought instead to focus on teaching students to read laterally and use click restraint, as fact checkers are trained to do (McGrew et al., 2017).

Our Genius Hour time gave Megan and me insights into what was required. We decided to explicitly teach students to conduct lateral reading and click restraint as a first step in helping our students learn the necessary "strategies for separating truth from falsehood, good arguments from bad" (Wineburg & McGrew, 2019, p. 33). Based on recommendations from McGrew et al. (2018) which calls on teachers to "provide students with opportunities to learn and practice these skills," Megan and I started our lessons with modeled Google searches where we verified the accuracy of claims as we searched (p. 186). This can be seen in the vignette above when Megan

asked, "can the facts be confirmed?" While McGrew et al. (2018b) suggest starting with, "who is behind the information," Megan and I found that our students' desire for quick determinations required that we start with, "what do other sources say" in order to teach lateral reading in a way that met the needs of our hasty sixth-grade students. Along with the vignette, Figure 13 shows how we initially presented this concept during our first grade-wide lesson, then provided guided practice to follow up. As teachers, our goal was to model our thinking and show students how to use click restraint to open various websites in new tabs to compare that the information we were finding could first be confirmed. Following that, we asked questions like, "who is behind this information and what is the evidence?"

**Figure 13**  
*Diego's Media Literacy Notes*

**Media Literacy**

Your main question should be:  
Can I trust what I find?

**Professional Fact Checkers say:**

- 1) Open a new tab and check the fact before reading deeply
- 2) If the facts can be confirmed, then read deeply and look for
  - a) Who is behind the information?
  - b) What is the evidence?

**Your turn to practice**

**BREAKING NEWS**  
Russia unleashed more than 500 lions on its streets to ensure that people are staying indoors during this pandemic outbreak.

**Professional Fact Checkers say:**

- 1) Open a new tab and check the fact before reading deeply
- 2) Can the facts be confirmed? ☒ Yes that it is fake
  - a) Who is behind the information?
  - b) What is the evidence?

While modeling lateral reading using the meme in Figure 13, Megan shared how she found this news post about lions in Russia was something she saw on Twitter, which she took to be a joke. It turns out, the photo was real, but actually originated from a South African movie set in 2016, not Russia.

Diego's notes on Megan's lesson did not show the complexity that Megan communicated and modeled. Instead, he just wrote as his evidence, "that it is fake." Riley shared in the chat that they believed the makers of this meme were trying to be funny but also play off people's feelings

about the leader of Russia saying, "I mean, it's easy to think it was real. Russia is such a brutal place that you could believe it easily." (Riley, January 25, 2021). The complexity of helping students analyze who is behind information and what evidence one can find for that became more clear to Megan and me as we watched students practice this process. I shared with Megan that to help students move away from the fast "true or fake binary" that they were seeking to determine, I wanted to show students a range of social media images the next day to emphasize that "none of these have enough evidence" and all must be confirmed using lateral reading (Amanda, January 26, 2021). I also communicated with Megan the tension I was feeling to include the state standards as described in the Virginia Standards of learning curricular framework (Figure 14), even though they did not align with what I was finding in my research: "I felt obligated to put those in and they're not bad, but they're also not the most helpful thing" (Amanda, January 26, 2021). Megan and I desired for our students to read laterally to confirm the credibility of information, and the curriculum framework seemed to also require that information when they asked, "Is the same information found in more than one place" (Figure 14). However, the state's curriculum framework seemed to encourage students to use checklist style questions that mainly required reading a single source vertically. I viewed focusing on questions that ask if there is contact information, recent publication date, or a copyright symbol as an outdated way to look at credibility online. Questions also focused on if the author has something to gain, or what is the purpose of the webpage. It was not that the evaluating purpose and audience elements of the standards were unimportant, but they were insufficient. The standards suggested deep reading was called for, yet this directed students' limited focus to the wrong place. Furthermore, Megan and I viewed these standards as unable to address the urgent

challenge of our students being misinformed and denied the power of accurate information. Only in eighth grade is the idea of misinformation is presented in the curriculum framework (Commonwealth of Virginia Board of Education, 2017).

**Figure 14**  
***Find, evaluate, and select appropriate resources***

**Essential Knowledge, Skills, and Processes:**

To be successful with this standard, students are expected to:

- understand and use the online, print, and media references
- evaluate the validity and authenticity credibility of texts, using questions, such as:
  - Does the writer have something to gain from his opinion?
  - Does the information contain facts for support?
  - Is the same information found in more than one source?
  - Is contact information provided?
  - Is there a copyright symbol on the page?
  - What is the purpose of the page?
  - What is the date of the most recent publication?
- avoid plagiarism and its consequences by giving credit whenever using another person's media, facts, statistics, graphics, images, music and sounds, quotations, or paraphrases of another person's words.

*Note.* From *English Standards of Learning Curriculum Framework* (p. 122), by The Virginia Department of Education, 2017, ([https://doe.virginia.gov/testing/sol/standards\\_docs/english/index.shtml](https://doe.virginia.gov/testing/sol/standards_docs/english/index.shtml)).

As we transitioned to classwide media literacy and explicitly taught lateral reading, the needs clarified as we planned: "I think the actual practicing of it is going to be really important" (Megan, January 26, 2021). As we began teaching students these concepts, we kept seeing the need for students to have more practice. During PLC, I recall a fellow teacher concerned about the amount of time needed to do these lessons well because students needed instruction and guided practice (Researcher's Notebook, February 8, 2021). We responded with additional lessons to help students engage with the complexity of examining evidence and comparing it to other sources. Figure 15 shows how we presented a real image with a misleading context to show students they did not have enough evidence without lateral reading. Additionally, Figure 16 shows how we used a real image with accurate context to indicate that even when a reader can

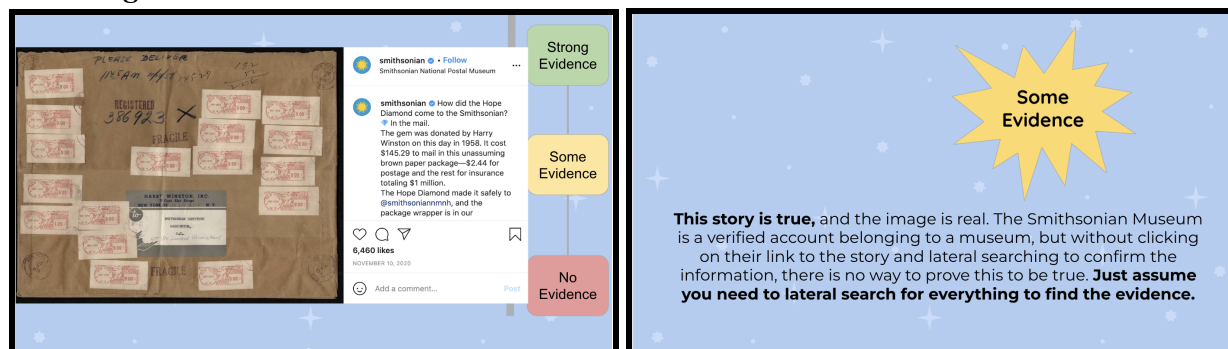


verify who is behind information (like the Smithsonian), social media links can take you to other places; even when the evidence looks strong, readers must still confirm credibility with other sources.

**Figure 15**  
*Real Image with Misleading Context*



**Figure 16**  
*Real Image with Accurate Context*



Following these lessons, I reflected "the students had a low threshold for frustration, they made initial judgments about the accuracy of each image and caption and were confident" (Researcher's Notebook, February 10, 2021). I was also experiencing tension between what appeared to me as a clear need for more instruction and practice and a quickly approaching hybrid schedule where I would be in-person with some students while simultaneously online with most students. COVID-19 had disrupted so many aspects of our instruction, we just did not have any additional class time to commit to critical media literacy. In the end, there were four

whole grade lessons that built on what was learned during the online inquiry projects, and the intention to add more during the next school year.

These grade level lessons contained in Figures 14 and 15 came about as Megan and I used CPAR to engage in cycles of reflection to meet our students' needs and transform our practice. The online inquiry curriculum and Genius Hour projects led Megan and me to be more explicit in our instruction and expand the reach of these lessons. A review of the data indicates that while students could describe lateral reading as part of their process for determining the credibility of online information, they relied on heuristics and strategies for speed that left them vulnerable to misinformation.

Ultimately, I came to understand that although we can teach students how to read laterally, we must first help them build a critical mindset that enables them to be skeptical enough to use the skill (Researcher's Notebook, February 10, 2021). When Megan asked me how we could support students subject to misinformation, both online and from individuals in their lives who they trust, I responded, "You have a mindset of always questioning" (Amanda, October 2, 2020). In reflection, this was a missing piece in our instruction. We needed to help students take a more skeptical stance toward all information they encounter. We worked to incorporate this in subsequent mini-lessons, modeling our own skepticism using the Think Aloud strategy, and prompting students to reflect as we observed them. For example, when I was working with Sophia to reteach the mini-lesson material, I reinforced the idea of being skeptical, saying, "Your goal right now is thinking, can I trust this information? How do I know?" (Amanda, March 2, 2021). Megan and I often used real-life examples of questions we wondered about or things

related to classroom content to model the skills we were asking students to try (Researcher's Notebook, January 8, 2020).

After viewing the video lesson on Internet searching, Diego shared, "So something interesting is that you should look at more than one website, but I don't normally don't do that. I just kind of take information from the top or something that I think is reliable." He learned, "I'm going to skip the things that have ads on the top ... and taking a little bit longer to look up information because you have to check more than one place to make sure that's reliable" (Diego, November 11, 2021). While Diego reflected on the theoretical benefit of verifying sources and reading laterally to confirm information, observations indicate he did not change his quick decision-making and preference for top search results. Similarly, Sophia began to use language and vocabulary related to lateral reading, saying that good readers and researchers "go to many websites to check them out and see if they are good" (Sophia, March 2, 2021). However, in practice, she often read a single site vertically for information and invested a lot of time in a website that she believed was "good" or had information relevant to her needs (Researcher's Notebook, March 2, 2021).

Following direct instruction on lateral reading, John did a think-aloud observation where he watched a video on CPR and then read a website about CPR to see "if it's more information" (John, February 26, 2021). He seemed to be reading laterally to confirm the information on the video from another source but phrased it as a search for deeper understanding. Then in the post-observation interview, he used the vocabulary of lateral reading, stating that good researchers "use lateral researching and they usually...it's the best if you have past knowledge of what you're researching." He went on to describe how he relies on his own knowledge and his

network of peers and family members to evaluate sources, saying, "if you know the websites owners, because like then you know that it's a reliable resource, then you can trust that information and then you can put it in your slideshow or document" (John, February 26, 2021). John's words hinted that our lessons made some small differences in how he conducted online inquiries, but he still strongly relied on social heuristics and confirmation bias in evaluating Internet sources. Moreover, John's comment reminded me how incredibly complex it is to teach from a critical literacy stance because even if you know the "owner," every person is biased and can make errors which is a whole other layer to be unpacked when using a critical literacy stance. Megan emphasized the importance of practice in helping students automatize these skills: "I think the lateral searching is going to be really helpful either way for them to practice doing" (Megan, February 9, 2021). Ultimately, we offered more explicit instruction and practice to help students read laterally like fact-checkers.

Our encouragement for students to take a skeptical stance began to show up in what students said about their online inquiries. Students started to think more critically about the information they encountered through lateral reading, but ultimately, they did not achieve competency before we moved to a hybrid school schedule and needed to move to other curricular priorities. Students needed more practice with lateral reading and taking a skeptical stance when inquiring for answers to their questions. Data analysis yielded the following two sub-assertions related to students' need for more support, which describe the actions Megan and I took, along with the conditions which made our actions possible.

***Teaching Generation Z Students to Navigate the Internet Required an Environment that Fostered Learning Through Building Relationships, Encouraging Student-directed Learning, and Being Responsive to Students' Needs***

Across all observations, interviews, and notes from our Genius Hour sessions, I found that to effectively teach lateral reading and credibility-seeking behaviors, there were some critical things we did, as teachers. We fostered a learning environment by intentionally building relationships, encouraging student-directed learning, and being responsive to students' needs.

**Building Relationships.** While fostering relationships and building community with students to support learning has always been a crucial aspect of our teaching, it became especially important as many students and teachers felt isolated due to the COVID-19 pandemic. In the first few weeks of that school year, I wrote, "I was surprised by the emerging social needs of students" (Researcher's Notebook, September 17, 2020). I noticed some students would come to Genius Hour simply to talk with a teacher about their day or connect with a peer. While they enjoyed the projects and the opportunity to pursue their interests, the most significant driving factor for student participation appeared to be social (Researcher's Notebook, October 7, 2020). Diego shared this sentiment when he said, "I'm not here to study, really, I'm just here to hang out. Is that okay?" (Diego, October 30, 2020). During an informal class discussion, many students shared that virtual learning had been very isolating and "having so many limits on their social opportunities, that they desired connections" (Researcher's Notebook, December 2, 2020). After an early Genius Hour session, Megan shared, "I think it's clear that it is [community], they just come to hang out" (Megan, February 5, 2021). I noted in the previous week it seemed that some students were coming to Genius Hour to meet their social and emotional needs, and "I'm glad

they had a safe space to come to and get what they needed" (Amanda, February 5, 2021).

Transcripts indicated we all craved relationships in this pandemic context. Riley shared that they "never go anywhere" also that the "days all seem the same" (February 5, 2021). That day, rather than work on our planned lessons to accompany Genius Hour, I felt that "having fun with a peer and sharing their interests with their teachers was what they needed" (Researcher's Notebook, February 5, 2021). This decision to pivot indicates how Megan and I attended to our relationships with students. As we did so, we noticed students became more open about their online behaviors. Megan and I learned a great deal about the students' authentic online inquiries because we had established a safe learning environment and were genuinely interested in their lives and experiences. As a result of this shared trust and community, our students participated in our lessons and learning time during what could have otherwise been free time for them.

**Encouraging Student-Directed Learning.** Genius Hour was introduced to students as an opportunity to pursue their passions and interests and direct their own learning. Megan shared that this agency and choice is part of why she enjoys making Genius Hour part of the curriculum, "what I love about Genius Hour is that it is interest-driven; it's really about what kids are curious about" (Megan, September 17, 2020). The student teacher, Sarah, added that while Genius Hour was new to her, she was excited that we would be providing the opportunity to let students "actually get to bring some agency to school and learning" in a space that is so often dominated by adults telling students what they need to do and learn (Sarah, September 17, 2020). Students who participated in Genius Hour not only had space to direct their own learning but were specifically encouraged to pursue their interests as part of the curriculum. When presented with the idea of Genius Hour and having support to pursue their interests, Riley shared via chat to

Megan:

omg im SOOO excited!!!! I love scripts and computer programming so much and now I finally get to actually research it with people who will help me!! I can't express how much it means to me that we can do this! (Riley, October 9, 2020)

As a team, we were excited to see what the students were curious about and support them to conduct their online inquiries. We recognized that we would have an essential role in this student-directed journey as their guide and teacher. With our desire for student direction working alongside their need for instruction, we took the stance of a teacher as a guide who gives space for exploration "to determine something they are curious about" while supporting students "to have some guidance in how to seek out valid and reliable information" (Megan September 17, 2020). Outside of Genius Hour, most online inquiries in the classroom or outside of the classroom were directed by the students. They chose the search terms, the click path, how long they viewed the information, and what parts they consumed. We knew that in the real world, there were no gatekeepers to direct students to the right information and that for them to develop the skills needed to find reliable information, we needed to offer a classroom environment that would closely resemble their lived experience outside it. This is why we chose to structure Genius Hour time and lessons around student choice and agency.

**Being Responsive to Students' Needs.** In order to have a successful student-directed learning experience, the teaching team needed to be responsive to students' needs through ongoing reflection and action. Megan and I saw our role as helping students understand their inquiries, find relevant information, and evaluate that information so they could communicate their understanding. Many of these instructional needs are described above, as I assert the needs

of Generation Z to construct knowledge through practice with critical thinking and lateral reading. But being responsive to students' needs also required the awareness to identify when students required support and providing opportunities to practice with skilled guides. While the central philosophy of Genius Hour and learning to inquire online was a student-directed process, there were times we could see students needed explicit digital literacy instruction. Throughout the observations, teachers paused instruction or directed students to attend to nuances related to learning online. Discussions of hypertext, web-page structure, click paths, Internet vocabulary, and Web 4.0 algorithms are just a few examples of the topics where we offered direct instruction. One day, when Sophia was struggling to make sense of her search results, I directed her to "see that one there is purple" and explained how "it means you've opened it already" (Amanda, March 2, 2021).

In addition to these in-the-moment explanations, we offered mini-lessons described in Chapter 3. Although we wanted to move immediately into teaching students to search like a fact checker and read laterally, we noticed that "it is a struggle because how do they know what to lateral search (i.e., author, company behind a source) if we don't teach them how to read the information on the page/structure of web pages?" (Researcher's Notebook, November 19, 2020). Megan and I often modeled the think aloud process so our students could "borrow" our cognitive skills: "what we are doing right now is called thinking aloud; we are kinda sharing right now what is going on in our minds" (Amanda, October 2, 2020). We made statements such as, "when I looked at the top of the page, I read that..." (Amanda, October 30, 2020). We did all of this as we screenshared; this became the new reality of distance learning—something I documented early in the school year: "screen sharing and talking through thinking is the new normal, where before



this would have been outside of our normal" (Researcher's Notebook, October 21, 2020).

In addition to modeling our thinking to meet students' needs, we actively questioned students to guide them in considering the credibility of sources. We often asked, "Do you think that website might have good information?" (Amanda, October 14, 2020). Other times questions were designed to get students to slow down and look at search results to make more thoughtful choices, "what words are letting you know what it's about? Or what pictures or what things are helping you?" (Amanda, December 11, 2020). Other times, we used questions to help students plan what to do next: "With all that you already know, what are your next steps? What more do you want to learn?" (Amanda, October 16, 2020) or "How can you change your search to find more of what you're looking for?" (Amanda, October 21, 2020). Sometimes Megan and I found that just getting students to slow down and talk us through what they were doing was beneficial for their online inquiry process.

Adapting to students' needs was a common topic of discussion for me and Megan. As we prepared to do Genius Hour time with the students, Megan emphasized the "need to be adaptable and flexible to meet students' needs" (Megan, September 17, 2020). Our plans did not always match what happened during class time, but we were flexible. I recounted in my researcher's notebook that "I never expected Genius Hour to happen so fluidly, kids working during class time, office hours and their own time" (Researcher's Notebook, November 19, 2020). We adapted to this because we noticed that while some students needed more help and were "just barely navigating this weird online environment," other students were "flying through the work and desiring more" (Researcher's Notebook, September 16, 2020). Being responsive to students' learning needs is a core element of good teaching, but given the unpredictability and

ever-changing nature of the Internet, we knew there was no way we could predict all of our students' needs. Therefore, our focus was to reflect on our own actions and teaching to see how we might best support students.

### ***Teaching During the COVID-19 Pandemic Created Challenges for Teachers***

I came to this assertion after seeing it across all forms of data (observations, interview responses, and researcher's notebook) because Megan and I experienced significant feelings of stress and burnout throughout the 2020-2021 school year. The first occasion took place as we were planning for the first days of school. From shifting our entire curriculum to fit in a new structure of split synchronous to asynchronous time to helping students overcome technical barriers, from the beginning, the school year was filled with many new demands and challenges that often overwhelmed our mental energy during and outside of the workday (Researcher's Notebook, September 16, 2020).

As a parent of four children, three of whom were impacted by every schedule iteration that school officials released, I shared with Megan that "I am just barely getting on a routine now," and the stress of uncertainty as a parent and teacher was just exhausting (Amanda, October 2, 2020). Following one class, Megan sighed and exclaimed, "class has been stressful, I don't know about you guys, like today felt really stressful" (Megan, October 15, 2020). With only a few weeks of getting adjusted to all virtual instruction, new updates about different phases of school reopening trickled down. My colleagues and I shared how the beginning of a normal year was stressful; it just keeps getting harder (Researcher's Notebook, October 16, 2020). There were so many new roles and expectations piled on top of our regular duties. We also worried about the

students we were not reaching because they were not showing up to virtual school. I recalled the weight of wearing "so many hats." (Researcher's Notebook, October 30, 2020).

In my research journal, I could see these needs weighing on me, and as evidenced in the transcripts, Megan also voiced these concerns saying, "I think people are tired and ready for a little break" (Megan, November 20, 2020). It was not just us teachers but students and families who were feeling burnt out. As the year continued, the feelings of exhaustion mounted, "I feel stretched so thin" (Researcher's Notebook, February 9, 2021). Our teacher role shifted dramatically due to the demands of the 2020-2021 school year; it simultaneously motivated us to help our students navigate the Internet while also being one of our career's most draining teaching experiences.

### **Generation Z Students in This Study Faced Challenges Offline, Which Often Become Challenges Online**

*Izzie shared her screen and started with Google to search about using a sewing machine. When Google's search predictor recommended the addition of 'for beginners,' she shared, "I would put 'for beginners' because I have never used one before in my life." Izzie shared her thoughts aloud, saying, "I would scroll down; if I didn't find any website, I would choose a video" She shared, "I'm going to pick this one because it has a little bit of pictures and writing" and then selected a website that was titled: How to Use a Sewing Machine (with Pictures). She shared that if she had her sewing machine out, she would follow along with the pictures on the page, looking for each button the photographs pointed out to see how to use her machine. Step three of the wikihow.com website she was viewing described how to find and use a thread guide in text, but Izzie seemed confused and asked me, "What does this do? It doesn't really explain it."*

*I read aloud the description accompanying the photograph and quickly realized that there was a lot of sewing-specific vocabulary in this description, causing her confusion.*

This vignette describes Izzie's experiences as she navigated an online inquiry for her Genius Hour project. The context of Izzie's inquiry invites consideration of how her learning needs shaped her learning experience. While all students experienced some obstacles that prevented or slowed their ability to gather information online, students like Izzie experienced more pervasive challenges. Being online, using Zoom, and navigating a learning management system during a pandemic to complete what used to be all face-to-face tasks created challenges for all of us. At one time or another, all of the students in this study experienced some sort of barrier due to learning from home. They were typically minor inconveniences like Diego's barking dog or Riley's brother being distracting in the background. However, there seemed to be an additional layer of challenges for Izzie and Sophia that I describe in this portion of the chapter. Both students experienced challenges offline that impacted their ability to engage in inquiries on the Internet.

When I observed Izzie use a Google search to learn about using a sewing machine described in the vignette above, I noticed that some of the vocabulary on the web pages was unfamiliar to her, which impeded her understanding of the information. She explained that it "helps me out more, looking for a video" because "you can pause it while they are doing it." She recommended that students who conduct research online could use the search term "for beginners" and look for videos or websites that would have "step by step, maybe a little bit of pictures, to help them out" (Izzie, November 23, 2020). In my researcher's notebook, I described my concerns that Izzie was encountering unknown English words, seeking to understand the

meaning of vocabulary, and using tools like images and videos to support her understanding (Researcher's Notebook, November 23, 2020). I observed her struggle to find needed information because she did not know the terminology of "patterns," "stitches," "fabric" and "sewing machines." As I watched her base her search on the color of a dress in a tutorial, I paused our think-aloud to help build some needed prior knowledge, sharing that "the pattern is like a piece of paper that gives you the cuts that you have to make, and the steps" (Amanda, November 23, 2020). Izzie shared that overall, she "was pretty successful" while also acknowledging the challenges she faced. She knew her inquiry results were "pretty confusing, they didn't explain [what she was hoping to find] that well" (Izzie, November 23, 2020). I reflected in my researcher's notebook that it must be a struggle for students to inquire online if they do not have much prior knowledge on a topic because they are expected to both acquire new information and quickly process it in order to conduct the rest of the online inquiry (Researcher's Notebook, November 23, 2020).

Additionally, because we spent our time together focused on understanding the information presented, Izzie received less instruction and guidance on more complex thinking related to taking a skeptical stance when inquiring online. Her offline literacy tasks were focused on increasing her reading fluency, background knowledge, and vocabulary. These did not fully encompass the skills she needed to research online. Because she and I needed to focus on helping her understand how to read the information and vocabulary, she had less instructional time devoted to lateral reading and critically evaluating sources. I also reflected on the idea that the strategy she described of using videos became a potential barrier because she often had limited Internet bandwidth and would have to pause her inquiries because she was "waiting for it to

load" (Izzie, November 23, 2020). Whether the Internet connectivity was slow due limited bandwidth or financial issues that limited her access to high-speed Internet, these offline challenges created an additional hurdle for her in online learning. For Izzie, gathering information online was also challenging because she needed information at a vocabulary and reading level that met her needs.

Sophia also seemed to struggle with reading the content in her search results and the selected pages. She spent a great deal of time making sense of the processes involved in conducting online inquiries and understanding the text she encountered. My experience with Sophia reflected her need for further instruction on conducting online inquiries and support with comprehension. I struggled to do a think-aloud observation with her as I had initially intended because she needed so much instruction. Sophia wondered out loud, "What does it mean to use your nose? Learn to cover the voice?" (December 11, 2020). She was reading for meaning and understanding, but it led her to have more questions beyond her original inquiry. In those situations, I would often support by filling in prior knowledge gaps so they could focus on their original inquiry without becoming frustrated (Researcher's Notebook, October 9, 2020). Often, Sophia's online inquiries resembled more traditional reading practices. She rarely did lateral reading, needing to rely instead on a single web page's text to make sense of the information before using that information or determining that the webpage did not have what she needed. Like Izzie, Sophia was looking for the best fit based on her needs. Sophia, however, was the only student in the study who did not seem to seek out quick answers when conducting online inquiries. She was purposefully careful, taking her time to read and make decisions with extra time built into her process (Researcher's Journal, October 30, 2020).

I found the students with the highest learning needs experienced challenges with their online inquiries that paralleled their challenges offline. While each of our students experienced challenges, the patterns I observed with Diego, John and Riley were often different from the ones Sophia and Izzie experienced. Since the two girls spent so much time trying to understand what they read, they had fewer opportunities to receive instruction on concepts related to online inquiries and practice those skills. As a result, while they did grow and learn a few new skills, their challenges and skill gaps persisted, compared to their peers.

## **Conclusion**

This study used interpretive methods in a critical participatory action research framework to explore what Generation Z students did online in the context of instruction designed to help them evaluate the credibility of information. Based on analysis of observations, interviews, and students' work samples, the participant students in this study primarily relied on time-saving practices and mental shortcuts to find information that they nearly always subsequently categorized as reliable. Since students prioritized finding information quickly, they conflated the meanings of "relevant information" and "reliable information," using these terms synonymously. When asked to explain and justify their online decision making, Generation Z students primarily used confirmation bias, social endorsement heuristics, and recognition heuristics to explain why they viewed information as trustworthy. As a result, I found that Generation Z students needed explicit instructional support to determine credibility through lateral reading. In order to support students' critical media literacy development, I worked with my co-teacher to create an authentic learning environment oriented to students' interests. We also supported student learning by building relationships with them and being responsive to their needs. Findings also illustrated the

challenging nature of the COVID-19 pandemic and its shaping influence on educational structures. Lastly, findings revealed Generation Z students in this study faced challenges offline, which translated to their online inquiry work. Chapter Five discusses the significance of these findings in light of related literature, and offers suggestions and thoughts for future research and instruction.



## **Chapter 5: Discussion and Recommendations**

This study explored sixth-grade students' reasoning as they conducted their online inquiry research projects while I simultaneously taught them the skills necessary to evaluate the information obtained from the Internet. Rooted in CPAR and driven by the desire to transform practice in a way that empowered students through cycles of self-reflection, I relied on interpretive methods as a means to understand my own transformation. My research question asked, What happens when Generation Z students conduct inquiries on the Internet when teachers are instructing them to evaluate information and reason online? This question put the students' experience at the center of my investigation. The topic is essential because participation in a democratic society requires citizens to access and evaluate high-quality information to inform decision-making. Students must therefore learn how to be critical evaluators of information as they inquire online.

Next, I will provide more insights and analysis about the findings, contextualized within the theoretical framework and related research literature that informed my study. Specifically, I explore three implications: 1) online inquiry heuristics, 2) be skeptical, save time, and 3) instructional progress reveals more to do. These three implications were derived from my assertions described in Chapter Four. At the end of this chapter, I also explain the limitations of the study before offering recommendations for future research and suggestions for other interested stakeholders.

### ***Online Inquiry Heuristics***

Although much has been written about the use of heuristics, when I embarked on this study, I could have never predicted how important heuristics were for sixth-graders. My data

provided me with critical insights into the students' use of heuristics to minimize effort and time as they sought to judge the credibility of information in a landscape of vast and instant answers. My analysis allowed me to see the complexity of digital technologies that required distributed cognition (Hutchins, 1995) to address cognitive factors, such as the students' use of heuristics, which can only be understood by looking at the social interactions between people and technology in the environment. On the whole, I learned that the students who participated in my study were no different from other adolescents and young adults who have been observed using my similar research methods. For instance, my analysis showed that they were concerned with the relevance and usability of sources (Goldman et al., 2012; List et al., 2016; Walraven et al., 2009), selected top search results (Breakstone et al., 2018a; McGrew et al., 2017), and rarely left the initial website while creating ad hoc lists of surface features (McGrew, 2021b). Furthermore, the students who participated in my study relied on overlapping social and cognitive heuristics to avoid systematically evaluating online information (Metzger et al., 2010); specifically, I observed social endorsement heuristics (Messing & Westwood, 2014), confirmation bias (Meppelink et al., 2019), and recognition heuristics as criteria for evaluating credibility online (Borukhson et al., 2021).

When looking to connect each of these phenomena from my assertion to the literature, I found fragmented pieces throughout existing research. However, what was missing was an examination of the common vein running throughout all of the student choices, time- and effort-saving heuristics. When I explored what these heuristics meant as a whole, a new idea emerged in my thinking. I offer the new term *online inquiry heuristics*, which does not currently exist in the literature. To break down my process to how I arrived at this term, I first drew from

critical media literacy, which requires educators to guide students to disrupt power structures and critically reflect on information rather than being passive consumers (Tisdell, 2008). However, in my findings, I observed students using online inquiry heuristics to avoid determining the credibility of information by focusing on relevancy (McGrew, 2021; List et al., 2016; Walraven et al., 2009). When pushed to explain their thinking or justify their choices, students explained that they relied on ad-hoc lists of superficial features (McGrew, 2021b) or cognitive bias and heuristics (Baybutt, 2018). By avoiding the question of credibility or taking shortcuts, students lack access to reliable information (Breakstone, 2018a) and fail to consider how information and truth is represented in the world (Buckingham, 2019). Drawing from my theoretical framework, I came to understand this phenomenon by reprioritizing power for those whom my research is designed to serve, my students (Irizarry & Brown, 2014). By honoring and acknowledging students' needs to conserve energy and time while inquiring online, I could see the complex and overlapping use of heuristics throughout their decision-making. Over and over, I observed the students in my study taking multiple shortcuts as they tackled the onslaught of news, information, and noise they encountered online.

Again, I offer the term online inquiry heuristics because it highlights students' propensity for time-saving and effort-reducing behaviors that can be used to deny students access to credible information. Due to my findings, I now know more than ever how important it is to prioritize empowering students to judge the accuracy of online information in order to engage in a democratic society (Kahne & Bowyer, 2017). While I recognize that some online shortcuts can provide any of us with accurate information, without the necessary awareness of students' use of heuristics to increase access to mis- and disinformation, there is an urgent threat to democracy.

Compelled by concerns about my students' ability to access credible knowledge on the Internet, critical literacy (Luke, 2012) and provided the perspective from which I could examine how students determine credibility online. Given how easily digital content creators can incorporate misleading and false information into seemingly professional-looking veneers, it is crucial that teachers guide students to understand their online inquiry heuristics in order to access the potential power of information and knowledge on the Internet. Moving forward, I implore school leaders and educators to be on the lookout for these online inquiry heuristics I analyzed. Doing so will better prepare students to successfully navigate an Internet shaped by Web 4.0 and beyond.

Given students' trust in online inquiry heuristics, it is crucial to understand the implications of the growing *personalization* of Web 4.0 (Nath & Iswary, 2015), where a range of algorithms shape what information students see first. The impact of personalization is seen as some Internet users become walled off from information that varies from their worldview in filter bubbles (Herm-Morris, 2022) and, as a result, becomes less critical of misinformation (Rhodes, 2021). At times I perceived the students in my study to be in filter bubbles. However, at the time of data collection, I did not know this term; instead, I referred to this phenomenon as "silos of information," as noted in my researcher's notebook. My reference to this term came when I observed how they relied on recommendations from their favorite online personalities, favored websites, and people in their life. Relying on social constructivism (Vygotsky, 1978), I saw my students making meaning online through social interaction and spaces constantly shaped and reshaped by social forces. Furthermore, students' use of online inquiry heuristics requires distributed cognition to examine how students employ cognitive factors to make meaning online

in a socially constructed world. The students also used top search results to guide what information they consumed, which becomes an increasing concern as personalized algorithms can change what appears at the top of a search. Looking to the future of Web 5.0, which is presumed to include an "emotional web that senses human feelings," has the potential for an even more personalized and unique Internet experience (Rani et al., 2021, p. 4). While online inquiry heuristics existed in previous iterations of the web (i.e., 3.0), it is more urgent than ever to prepare our students to find credible information due to filter bubbles, the sheer speed at which something can be submitted and spread online, and the potential unknown needs of new web technology. I will share more practical guides for classroom use in the subsequent two implications.

### ***Be Skeptical, Save Time***

Using CPAR, I envisioned my students reading laterally like fact-checkers to find credible information, but they resisted these lessons and instead relied on online inquiry heuristics. Therefore, I reoriented my instruction to meet the students' needs for minimizing time and effort; I sought to use the phrase, *Be Skeptical, Save Time* to frame an approach that will help students to save time in the long run by first being skeptical. Reflecting on what was learned from Genius Hour, Megan and I called on students to be skeptical as we embarked on our grade-level media literacy lessons. Skepticism was used to cue students to question the information they encountered. Furthermore, we contrasted skepticism with cynicism because we wanted to emphasize to students that questioning information is distinct from giving up hope about finding quality information; our goal was empowerment.

Megan and I experienced resistance from our students when we asked them to change their online habits. Therefore, instead of fighting this resistance, my first recommendation is to honor students' limited attention spans and help them to save time in the long run by directing students to skepticism, a helpful online inquiry heuristic. The students in this study were regularly engaging with Web 4.0 technology designed to increase efficiency and speed for users using the semantic web, structured to increase information access across the Internet of things (Waters, 2021). Yet, this comes with a price, as seen in my data, when my students' need for efficiency prevents them from effectively questioning and determining the credibility of information. On the current Internet, there is a "flow of fake news/truth spreading finds its way through the channels of tied relationships" (Bodaghi & Oliveira, 2022, p. 15). This is why skepticism is needed even more to help students navigate online spaces where social and technological factors shape how information is spread and credibility is determined. Teaching students to be skeptical will guide them through questioning the information they experience and require the use of lateral reading, a helpful online inquiry heuristic, to locate the credible information they need to participate in a democratic society. The following are specific steps for supporting students to be skeptical when inquiring online.

**Skeptical Questions.** My findings showed that students, although not consistently, asked questions about the credibility of online information. Furthermore, Megan and I often used questioning techniques to push students to be skeptical of the information they encountered. Teaching my students to find credible information required that we start with skepticism to guide students to see the value in questioning the credibility of online information. I am not alone in making these suggestions as McGrew et al. (2017) recommend using the following questions to

help students read laterally and consider the credibility of information they encounter online "(1) identifying who's behind the information presented, (2) evaluating the evidence presented, and (3) investigating what other sources say" (p. 5). However, Megan and I found these questions really challenging for our sixth-grade students. Therefore, to introduce skepticism in a way that was scaffolded to younger students, we started with the question, "what do other sources say?" Using that single skeptical question can serve as a springboard to lateral reading because it requires students to open multiple tabs to confirm a single claim using various sources. Then as students gain confidence and skills, they can move from that proficiency to consider who is behind a particular site's information and how to evaluate the evidence provided and use lateral reading to ascertain answers to their skeptical questions. The evidence from my assertions indicates that taking a skeptical stance is needed to cue students to question the information they encounter and prompt the lateral reading needed to confirm the credibility of online claims.

**Reading Laterally.** With skeptical questions to guide their thinking, students are better positioned to employ the helpful online inquiry heuristics needed to navigate the challenging Web 4.0 environment, lateral reading. For students to read laterally, they need to be explicitly taught the steps. Even more nuanced, my analysis showed me that the steps of lateral reading need to be broken down and named. I know this because, as evidenced in Chapter Four, the students wanted to rely primarily on a single website, meme, or online source in evaluating the merit and veracity of information. As a result, Megan and I reoriented our instruction to explicitly name our own choices to read laterally before spending time with any particular source. In addition, we had to shift our instruction to include more think-aloud practices and model this for students. As we did so, we found that students started to understand better what

we were asking of them and how it could be useful. Wineburg and McGrew (2019) called lateral reading a "powerful heuristic for taking bearings" because individuals can save time and decrease their mental load by opening a few tabs to confirm the credibility of a source or the information in that source before beginning an in-depth reading of a single article (p. 121).

As we named our choices aloud, our students watched us decide where to click. We described our process for opening a few tabs from various sources, modeling it as we went. For example, we directed students to use keyword searches to locate relevant search results. Then we modeled using click restraint to skim those results, thinking aloud as we examined web URLs, blue link titles, and excerpts to get our bearings. Next, we selected two or three links and opened each in a separate tab, ensuring at least one of the links came from a second page of search results. We explicitly explained that we were skimming the chosen text to confirm or deny the claims of the initial online source. Once we could confirm the claims in multiple places, we walked students through ways to determine who was behind the information and evaluate the evidence presented. Modeling how to think and make choices helped our students consider their use of technical tools as they socially construct an understanding of how click restraint supports them in becoming more thoughtful consumers of online information (Breakstone et al., 2018a). Similarly, modeling lateral reading with think-alouds during a research project and questions to guide critical thinking helps students take a more skeptical stance about online information (Walsh-Moorman et al., 2020). From a perspective of skepticism, students can save time in the long run by avoiding becoming misinformed and instead using lateral reading to access credible information.



**Extensive Practice.** My data analysis showed me that in order for students to engage in helpful online inquiry heuristics of skepticism and lateral reading, they need more opportunities to practice exact experiences of how these behaviors save time in the long run. The data showed Megan and I cued students to be skeptical and asked questions that required lateral reading, then we named and modeled the steps of lateral reading, but we experienced modest gains. Reflecting on the findings showed that students relied on particular online inquiry heuristics that did not cultivate their skepticism or help them understand why they needed to practice the skills we offered. While my study worked with younger students and engaged in lessons over more extended periods than existing studies (Kohnen et al., 2020; Walsh-Moorman & Pytash, 2021), we found similar results. Students showed progress in their awareness and shifts in their behavior, but they ultimately did not follow through in confirming credibility through lateral reading strategies. Reflecting on the Genius Hour time with my students, it became clear that they needed more targeted practice. The structure of the Genius Hour projects did not force students to confront issues that challenged their existing beliefs or recognize the nuance of mis and disinformation. The grade-wide lessons were Megan and my first attempt to socially construct critical media literacy lessons that focused on memes and other information that required students to be skeptical in order to determine credibility. Our current information environment will best serve students who know how to be thoughtful and skeptical consumers of information; helping them reach this state will take additional instruction, time, reinforcement, and practice (Breakstone et al., 2018a). The reach of our lessons was limited by the need to shift quickly to in-person instruction and adjust our curriculum to accommodate new needs. However,

the lessons learned shaped our curriculum for the next year to include additional practices with examples that better matched the students' lived experiences and required them to be skeptical.

**Teachable Moments.** Again, the term Be Skeptical, Save Time can come to fruition if educators use the aforementioned structures. It was effective for our students because it honored students' passionate need for a quick answer from a particular place. We then built-in opportunities for students to explore the nuance that is created by everchanging Web 4.0 technologies and complexity required to determine a source's credibility. This is not to say that skepticism and lateral reading will guarantee that my students have access to credible information. There is a great deal of nuance related to how we gather information online, and much of it will continue to change as socially constructed online spaces evolve. Therefore to empower students to have access to credible information, teachers must commit to growing alongside students and finding teachable moments, and fostering authentic experiences to engage in the complicated and messy work of making meaning online. Alongside this work, students can learn about the structural problems built into the digital landscape they navigate and the cognitive factors that shape their decision-making. Such awareness can further empower students to be literate in critical media. Megan and I did this by sharing insights about the nuances of algorithms and tactics used by content creators. These often took the form of teachable moments; for example, when modeling a lateral searching task, Megan and I shared our different search results from the same keywords with students. We discussed with students how algorithms use a range of data to curate personalized recommendations to explain that the first few results were not necessarily the most reliable ones. This reflected our desire to help our students start considering why this information is online and how they can make the complex decisions about

whether to trust it (McGrew et al., 2017). We began by naming the complexities and the messiness of our decision-making process guided by skepticism.

### ***Instructional Progress Reveals More To Do***

After spending over a semester working with students to navigate the Internet and support them in determining informational credibility, I discerned the most significant change was in myself and my understanding of how best to support my students. Taking on a critical literacy perspective demands that I examine my roles as a teacher and evaluate how my choices shape my teaching decisions, including information, tools, and cultural and social purposes (Luke, 2012). My findings revealed that my sixth-grade students were not ready to confirm the credibility of information as professional fact-checkers do, but students are presently and daily making decisions about what to believe online. As a result, this work must take place now; a more comprehensive and systematic approach is needed to be effective. I did not go into this study thinking that sixth-graders would easily learn to evaluate online text. As stated in Chapter One, even adults struggle to tease out dis- and misinformation, which has already been shown to divide our country (Wineburg & McGrew, 2019). I did not envision the curriculum Megan and I co-created would entirely solve the problem, but I hoped our efforts would be a starting point. Chapter 4 explains that our critical media literacy curriculum faced tensions and resistance. I refer to this first iteration as the critical media literacy curriculum version 1.0. Through CPAR, we learned lessons that helped shape our curriculum 2.0 for the next year, and we will continue to make adjustments as technology changes (i.e., Web 4.0 to Web 5.0) to ensure our students have access to credible information needed for participation in a democratic society.

I changed how my students were taught media literacy by removing many gatekeeping structures in our existing curriculum so students could participate in an authentic online inquiry on topics of their choice. Learning from how my Generation Z students inquired online, I worked with my PLC to move critical media literacy from an isolated and overlooked topic to a more consistent and empowering approach. I wanted to help my students gain the skills that "can help children interpret information in the post-truth era, a time when the spread of mis- and dis-information online has increased" (Kupiainen, 2022, p. 2). Even though these skills were not going to be measured on the standardized end-of-year test, I knew the value of having students take a skeptical stance without feeling powerless on the Internet. My findings revealed that while students made some progress and growth, we have further to go with them. Furthermore, I learned that teaching students to inquire online is work that will take a lifetime because while bias and questions of power are not new, technology and the Internet will constantly redefine what is required to be powerfully literate. Ultimately, for students to be empowered and capable of navigating the Internet in pursuit of informed citizenship, school-wide systems for supporting these processes ought to prioritize critical media literacy across all content areas.

**Schoolwide Structures for Critical Media Literacy.** In the absence of adequate state standards requiring students to critically evaluate online information and combat misinformation, school leaders and local school boards need to take action to make these skills a priority for their students. Misinformation culture represents a threat to democracy, requiring classroom activities that support students in identifying inaccurate information and limiting its spread (Nee, 2019). Teachers involved in this work would benefit from situating these efforts into a school-wide framework scaffolded by grade level. Such a continuum could grow with student capacity.

Effectively navigating the demands of the Internet must be taught, cultivated, and practiced.

While most schools have policies restricting Internet access, students as young as first grade can begin to build the skills necessary to critically examine information (Pilgrim & Vasinda, 2021).

Simply providing technology to teachers and students is insufficient for teaching students the critical media literacy skills they need to succeed in the 21st century. Schools must help students make a fundamental shift away from accepting the authority of the presented text and instead empower them to be skeptical and read laterally. Effective vetting of sources requires uncovering the motivations behind information; such skills support more effective participation in the digital information age of the 21st century (Walsh-Moorman & Pystash, 2021).

Ultimately, this is an equity issue for schools. Many local school divisions, like my own, are deeply involved in work surrounding equity and culturally responsive teaching to broaden educational opportunities for students from a range of backgrounds and close opportunity gaps (Hammond, 2014). Inequality stemming from varying levels of participation in digital spaces further reinforces the need to provide equitable educational opportunities for all students to learn about the processes behind the creation and distribution of online content (Kahne & Bowyer, 2017). Educational providers who do so can more effectively close gaps in digital literacy skills, responding appropriately to this social justice issue so that all students leave schools prepared to participate fully in the 21st century (Emejulu & McGregor, 2019). Only through a comprehensive approach to digital literacy instruction and practice can schools begin to close the digital gaps that have far-reaching impacts on the lives of students.

In addition to comprehensive plans for students across content areas and grade levels, schools need to intentionally support teachers to take on this challenge. Results from Hatlevik

and Hatlevik (2018) indicate that facilitating collaboration for teachers seeking to support students in evaluating online information is an effective way to enhance teachers' classroom practice. It is insufficient to teach educators to use specific digital programs and apps; teachers need a comprehensive professional development approach that can increase their comfort with critically evaluating the credibility of online information. Teachers who use digital information during instruction are more likely to foster students to be critical evaluators of online information since they have a more nuanced view of the wide range of online information (Hatlevik & Hatlevik, 2018). Teachers need high-quality resources, professional development, and time for professional collaboration to prepare students (Breakstone et al., 2018b).

Related to this is the need to safeguard teachers' mental health to prevent burnout. Some researchers believe the progression toward teacher burnout could be limited and even reversed if teachers believed they had enough resources to meet the demands placed upon them (Ozamiz-Etxebarria et al., 2021). Teachers experienced a range of stressors resulting from the COVID-19 pandemic, namely increased stress and anxiety due to the increased demands of teaching during a pandemic added to their own health and safety concerns (Pressley, 2021). Exhaustion has always contributed to burnout, and the COVID-19 pandemic has created significant exhaustion among teachers (Sokal et al., 2020a). Given the COVID-19 pandemic and resulting teacher burnout, school leaders must mitigate exhaustion and provide additional resources to decrease burnout (Sokal et al., 2020b). Specifically following the 2020-2021 school year, about one in four teachers indicated that they might leave their job compared to before the pandemic when one in six considered leaving (Steiner & Woo, 2021). Retaining high-quality teachers is an essential element of succeeding in supporting students' critical media literacy.

## **Limitations**

The limitations of this study's research design and the ways they were addressed were discussed in Chapter 3. With a retrospective view on the data collection and analysis process, I can see that I perceived students as conducting authentic online searches, yet my teacher role and work to observe students likely communicated certain expectations to them that subsequently shaped their searching behaviors. The nature of interpretive methods requires making assertions which always have limitations. I endeavored to practice a critical scrutiny, recognizing the meaning and implications for teaching were limited to my own setting (Erickson, 1985). Given the small group of students in this study, it is likely that different participants or a larger group of participants would have yielded different results. Furthermore, the unique conditions of the COVID-19 pandemic's effects on educational settings are not replicable. Therefore, more research is needed to generalize these findings.

## **Recommendations for Future Research**

These findings showed that the five middle school students who participated in this study made quick decisions and relied on surface features as they searched for relevant information. It subsequently advocates for teachers to help students think critically and search laterally to effectively navigate online spaces. This research reveals students' need for instruction that matches their desire for quick, energy-conserving strategies. Therefore, future studies could usefully explore how teachers could more effectively deliver such instruction, and how students respond.

While there has been a growing interest in how Generation Z students navigate the Internet and find credible information, there is still a lack of specific instructional practices that

teachers can use to support students in navigating this treacherous digital territory. While some studies propose ways to support students at the high school level and college level to improve their ability to evaluate the credibility of online sources (McGrew & Chinoy, 2021; Breakstone, Smith, Connors, et al., 2021), there is a dearth of research oriented to middle school students. Future research should investigate resources for middle school students to support authentic online inquiry oriented to their current skills. Additionally, I am curious to discover whether there are specific instructional practices or other helpful online inquiry heuristics beyond skepticism and lateral reading to support students.

Another area worth investigating is how to best prepare teachers for this challenging work. Research by Wineburg & McGrew (2019), showed that even the most knowledgeable PhD historians and professors failed to properly identify who was behind information presented online and laterally check the evidence behind a claim, underscoring the challenge of asking teachers and students to do this work. It is inappropriate to assume teachers have and practice these skills; further research is needed to support teachers in acquiring the skills needed for success on the Internet and sharing that understanding with students in a meaningful way. Furthermore, given the need for students to practice the skills related to identifying credible information online (Hodgin & Kahne, 2018; McGrew, 2021a; Walsh-Moorman et al., 2020) it is important to support teachers across multiple disciplines in this work. A study of high school teachers who received professional development to implement civic reasoning found teachers still modeled poor judgment and decision making in their online reasoning (McGrew, 2021a). This illustrates the importance of research into how teachers can develop a deep enough understanding of this work to effectively enact it alongside students.



## **Conclusions**

Generation Z students are seeking shortcuts to quick information while conserving mental energy. This leads them to use unhelpful online inquiry heuristics, leaving them susceptible to false and misleading information. If students are to successfully participate in a democratic society, they must be able to find accurate information and build informed knowledge within an ever changing Internet landscape. Based on findings from this study, students and teachers made progress in building some curricular steps toward evaluating the credibility of online information. While students began to understand the need to take a skeptical stance and engage in helpful online inquiry heuristics, they were unable to consistently enact such practices. Further research is needed on the specific curriculum that will support Generation Z students in utilizing helpful online inquiry heuristics, subsequently empowering them to access and evaluate credible information in pursuit of full democratic participation.

## Appendix A

### CRAAP Test

#### Evaluating Information – Applying the CRAAP Test

Meriam Library  California State University, Chico

When you search for information, you're going to find lots of it . . . but is it good information? You will have to determine that for yourself, and the **CRAAP Test** can help. The **CRAAP Test** is a list of questions to help you evaluate the information you find. Different criteria will be more or less important depending on your situation or need.

Key: ■ indicates criteria is for Web.

#### Evaluation Criteria

##### **Currency:** *The timeliness of the information.*

- When was the information published or posted?
- Has the information been revised or updated?
- Does your topic require current information, or will older sources work as well?
- Are the links functional?

##### **Relevance:** *The importance of the information for your needs.*

- Does the information relate to your topic or answer your question?
- Who is the intended audience?
- Is the information at an appropriate level (i.e. not too elementary or advanced for your needs)?
- Have you looked at a variety of sources before determining this is one you will use?
- Would you be comfortable citing this source in your research paper?

##### **Authority:** *The source of the information.*

- Who is the author/publisher/source/sponsor?
  - What are the author's credentials or organizational affiliations?
  - Is the author qualified to write on the topic?
  - Is there contact information, such as a publisher or email address?
  - Does the URL reveal anything about the author or source?
- examples: .com .edu .gov .org .net

##### **Accuracy:** *The reliability, truthfulness and correctness of the content.*

- Where does the information come from?
- Is the information supported by evidence?
- Has the information been reviewed or refereed?
- Can you verify any of the information in another source or from personal knowledge?
- Does the language or tone seem unbiased and free of emotion?
- Are there spelling, grammar or typographical errors?

##### **Purpose:** *The reason the information exists.*

- What is the purpose of the information? Is it to inform, teach, sell, entertain or persuade?
- Do the authors/sponsors make their intentions or purpose clear?
- Is the information fact, opinion or propaganda?
- Does the point of view appear objective and impartial?
- Are there political, ideological, cultural, religious, institutional or personal biases?



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Blakeslee, S. (2004). The CRAAP test. *Loex Quarterly*, 31(3), 4.

<https://library.csuchico.edu/sites/default/files/craap-test.pdf>

## Appendix B

### Teacher Permission Form



#### University of Hawai'i

#### Adult Consent to Participate in a Research Project

Charlotte Frambaugh-Kritzer, Principal Investigator

*Project Title: Teaching Generation Z to Navigate Web 4.0:*

*Middle School Students Conduct Inquiry Through Genius Hour*

Hello! My name is Amanda Vogel, and you are invited to take part in a research study. I am a graduate student at the University of Hawai'i at Mānoa (UHM), from the College of Education in the Curriculum and Instruction department and a teacher at Jack Jouett Middle School. The results of this study will contribute to my Doctoral Dissertation.

#### **What am I being asked to agree to?**

If you participate in this project, I will observe our class as we teach a genius hour project, and meet with you individually for an interviews throughout the unit at a location and time convenient for you.

#### ***Taking part in this study is your choice.***

Your participation in this project is completely voluntary. You may stop participating at any time. If you stop being in the study, there will be no penalty or loss to you. Your choice to participate or not participate will not affect your rights to services at the University of Hawaii.

#### ***Why is this study being done?***

The purpose of my research project is to better understand how to teach students digital literacy, and better understand how students read and research online. I am asking your permission to observe our class and interview you due to the existing genius hour unit for students enrolled in the language arts class that we co-teach.

#### ***What will happen if I decide to take part in this study?***

The interview will consist of 5-10 open ended questions. It will take 20-30 minutes. The interview questions will include questions like, "What were your lesson goals today?" "How has having one-to-one laptops shaped your lesson planning?"

Only you and I will be present during the interview. With your permission, I will video-record the interview (or zoom video record) so that I can later transcribe the interview and analyze the responses.

Additionally, this study is based in critical participatory action research which means I am looking to study my practices and our collective practices around teaching for the purpose of changing our practice. If you choose to participate in this process I am interested in discussing and collaborating together about the students' progress and learning throughout the unit so that we can improve our quality of instruction. With your permission I would video record our discussion and/or take notes in a researcher journal so that I can later transcribe the discussion and analyze the responses.

#### ***What are the risks and benefits of taking part in this study?***

I believe there is little or no risk to you participating in this project. You may become stressed or uncomfortable answering any of the interview questions or discussing topics with me during the



**University of Hawai'i**  
**Adult Consent to Participate in a Research Project**  
 Charlotte Frambaugh-Kritzer, Principal Investigator  
*Project Title: Teaching Generation Z to Navigate Web 4.0:*  
*Middle School Students Conduct Inquiry Through Genius Hour*

interview. If you do become stressed or uncomfortable, you can skip the question or take a break. You can also stop the interview or you can withdraw from the project altogether.

Participating in the interview might provide a potential benefit of reflecting on digital literacy practices and changing practices for existing and future students. The results of this project might help me, other teachers, and researchers to teach future students to effectively read and research online.

***Results of Research:***

There will not be any clinically relevant test results produced as a result of this study, but upon request a summary of findings can be made available.

***Privacy and Confidentiality:***

Any information that is obtained in connection with this study and that can be identified with your name will remain confidential and will be disclosed only with your permission. All study data will be secured in encrypted files on a password protected computer. My University of Hawai'i advisor and I will have access to the information. After I write a transcript of the interviews and observations, I will erase video-recordings. When I report the results of my research project, I will not use your name. I will not use any other personal identifying information that can identify you. I will use pseudonyms (fake names) and report my findings in a way that protects your privacy and confidentiality to the extent allowed by law.

Other agencies that have legal permission have the right to review research records. The University of Hawaii Human Studies Program has the right to review research records for this study.

***Future Research Studies:***

After removal of identifiers, the research records may be used for future research studies or distributed to another investigator for future research. We will not seek further approval from you for these future studies.

***Questions:***

If you have any questions about this study, please call or email me at (434) 975-9320 or [vogela@hawaii.edu](mailto:vogela@hawaii.edu). You may also contact my advisor, Charlotte Frambaugh-Kritzer, at [kritzer@hawaii.edu](mailto:kritzer@hawaii.edu).



**University of Hawai'i**

**Adult Consent to Participate in a Research Project**

Charlotte Frambaugh-Kritzer, Principal Investigator

*Project Title: Teaching Generation Z to Navigate Web 4.0:*

*Middle School Students Conduct Inquiry Through Genius Hour*

You may contact the UH Human Studies Program at (808) 956-5007 or [uhirb@hawaii.edu](mailto:uhirb@hawaii.edu) to discuss problems, concerns and questions; obtain information; or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit <http://go.hawaii.edu/jRd> for more information on your rights as a research participant.

If you agree to participate in this project, please sign and date the following signature page and return it to: Amanda Vogel.

Keep a copy of the informed consent for your records and reference.

**Signature(s) for Consent:**

I give permission to join the research project entitled, Teaching Generation Z to Navigate Web 4.0: Middle School Students Conduct Inquiry Through Genius Hour. I understand that I can change my mind about being in the study at any time. Please initial next to either "Yes" or "No" to the following:

\_\_\_\_ Yes \_\_\_\_ No I consent to being video-recorded for the observation portion of this research.  
 \_\_\_\_ Yes \_\_\_\_ No I consent to being video-recorded for the interview portion of this research.

**Name of Participant (Print):** \_\_\_\_\_

**Signature of the Person Giving Consent:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Thank you!

## Appendix C

### Research Assent Form



**University of Hawai'i**

**Parent/Guardian Consent for their Child to Participate in a Research Project**

Charlotte Frambaugh-Kritzer, Principal Investigator

*Project Title: Project Title: Teaching Generation Z to Navigate Web 4.0:  
Middle School Students Conduct Inquiry Through Genius Hour*

### Research Assent Form

Hi! My name is Amanda Vogel and I am inviting you to participate in my research study. I am your teacher at Jouett Middle School, and I am also a graduate student at the University of Hawai'i at Mānoa (UHM). In order to get my degree, I am doing this research project. I want to learn about what middle school students think about reading and researching online during class projects.

#### What is a research study?

Research studies help us learn new things. We can test new ideas. First, we ask a question. Then we try to find the answer.

This paper talks about my research project and the choice that you have to take part in it or not. I want you to ask me any questions that you have. You can ask questions any time.

#### Important things to know...

- You get to decide if you want to take part.
- You can say 'No' or you can say 'Yes'.
- No one will be upset if you say 'No'.
- If you say 'Yes', you can always say 'No' later.
- You can say 'No' at anytime.

#### Why am I doing this research?

I am doing this research to find out more about how middle schools students read and research online for class research projects.

#### What would happen if I join this research?

If you decide to be in the research, I would ask you to go the following:

- Questions: I would ask you to read questions on a paper or google form and then mark your answers.
- Watching: I would watch you do your classwork, and ask you to share aloud what you are thinking as you read online and do research for your project using the internet.
- Talking: I would ask you questions, then you would say your answers aloud.
- Recording: I will record you as you research online using video recording and screen recording. I will also video record when asking and answering questions. This will help me better remember what was said. Once the study is done all recordings will be deleted.





**University of Hawai'i**

**Parent/Guardian Consent for their Child to Participate in a Research Project**

Charlotte Frambaugh-Kritzer, Principal Investigator

*Project Title: Project Title: Teaching Generation Z to Navigate Web 4.0:  
Middle School Students Conduct Inquiry Through Genius Hour*

**Could bad things happen if I join this research?**

Some of the questions might be hard to answer. If you don't want to answer a question, that is fine. We can skip that question and ask another question, or you can stop the questions all together. I don't think anything bad will happen to you if you join this research project.

You can say 'no; to what I ask you to do for the research at any time and I will stop.

**Could the research help me?**

This research project will not help you. I do hope to learn something from this research though. Someday I hope it will help me and other teachers with how we design classroom projects using the internet.

**What else should I know about this research?**

If you don't want to be in the study, you don't have to be.

It is also OK to say yes and change your mind later. You can stop being in the research at any time. If you want to stop, please tell me. You can ask questions any time. You can talk to me, Amanda Vogel. Ask me any questions you have. Take the time you need to make your choice.

You may contact the UH Human Studies Program at (808) 956-5007 or [uhirb@hawaii.edu](mailto:uhirb@hawaii.edu) to discuss problems, concerns and questions; obtain information; or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit information on your rights as a research participant. Keep this copy of the informed consent for your records and reference.

**Is there anything else?**

If you want to be in the research after we talk, please write your name below. I will write my name too. This shows we talked about the research and that you want to take part.

Name of Participant \_\_\_\_\_  
(to be written by child/adolescent)

Printed Name of Researcher Amanda Vogel

Signature of Researcher

\_\_\_\_\_  
Date

\_\_\_\_\_  
Time

**Original form to:**  
Researcher File

**Copies to:**  
Parents/Guardians

## Appendix D

### Parent Permission Form



#### University of Hawai'i

#### Parent/Guardian Consent for their Child to Participate in a Research Project

Charlotte Frambaugh-Kritzer, Principal Investigator

*Project Title: Project Title: Teaching Generation Z to Navigate Web 4.0:*

*Middle School Students Conduct Inquiry Through Genius Hour*

Hello! My name is Amanda Vogel. I am requesting your permission for your child to participate in my research project. I am a graduate student at the University of Hawai'i at Mānoa (UHM), from the College of Education in the Curriculum and Instruction department and your child's teacher at Jack Jouett Middle School. The results of this study will contribute to my Doctoral Dissertation.

#### **What am I being asked to agree to?**

All 6th grade language arts students are allowed to participating in an optional class project as part of distance learning this marking period, if you choose to have your child participate in the study they will be asked to participate in the following:

- Take a 10 question survey about their interest in reading and researching online via google forms
- Observe them during optional zoom class research lessons
- During the zoom lesson observation students will be asked to think aloud about online reading process as they share their screen
- Allow researcher to look at class work
- Conduct one or two interviews consisting of 8-12 questions that will take approximately 20 minutes via zoom. I will be asking about your child's experience reading, thinking and researching during class.

#### ***Taking part in this study is your choice.***

You can choose to allow your child to take part, or you can choose not to take part in this study. I also will ask your child to agree to participate in this project. You, or your child, also can change your mind at any time. If you stop being in the study, there will be no penalty or loss to you.

#### ***Why is this study being done?***

The purpose of my research project is to better understand how students read and research online. I am asking your permission for your child to participate in this project because he/she is part of a school with one-to-one laptops and enrolled in an advanced language arts class that conducts online reading and research.

#### ***What will happen if I decide to take part in this study?***

If you and your child agree for your child to be in the study, the interview, observation, collection of student work and survey will be held in Fall 2020. The survey will take about 5 minutes and the interview will take about 20 minutes; the observations will occur during a recorded optional zoom class and each participant will be asked to share their screen and describe their online research and learning process. Your child and I (their classroom teacher) will be present in the room during the survey, interview and observation.

If your child participates, he or she will first be given a survey and based on interest, he or she may be selected to be observed during an optional zoom lesson and interviewed afterward. One example of the kind of question I will ask is, "How good are you at figuring out where to go on the Internet to find what you want?" "In your opinion, what do good readers do when they are reading and researching for information on the Internet?" If you would like to see a copy of all of the questions that I will ask, please contact me via the phone number or email address listed near the end of this consent form.





**University of Hawai'i**

**Parent/Guardian Consent for their Child to Participate in a Research Project**

Charlotte Frambaugh-Kritzer, Principal Investigator

*Project Title: Project Title: Teaching Generation Z to Navigate Web 4.0:*

*Middle School Students Conduct Inquiry Through Genius Hour*

With your and your child's permission, I will video record the zoom session. The observation will also include a screen recording of your child's computer screen. This is to allow the research to better understand how students read, research and learn online. I am video recording the interview so I can later type a written record of what we talked about during the interview. I will evaluate the information from the observation and interview.

***What are the risks and benefits of taking part in this study?***

I believe there is little or no risk to your child in participating in this project. All students in the class will have the opportunity to do the optional research project as part of the regular class curriculum. If your child chooses to participate or chooses not to participate they will have the same access to the class curriculum. Only those who chose to participate in the study will be observed and recorded by the researcher. There is a possibility your child may become uncomfortable or stressed by answering an interview/survey question or questions. If that happens, we will skip the question, take a break, or stop the interview/survey. Your child may also withdraw from the project altogether at any time.

If during the observation of your child using the internet reveals any concerning behavior on the internet (e.g. looking for help from abuse, sexting, etc.) the school protocols for reporting such behavior will be followed.

There will be no direct benefit to you or your child for participating in this project. The results of this project might help me, other teachers, and researchers to teach future students to effectively read and research online.

***Results of Research:***

There will not be any clinically relevant test results produced as a result of this study, but upon request a summary of findings can be made available.

***Privacy and Confidentiality:***

Any information that is obtained in connection with this study and that can be identified with your child will remain confidential and will be disclosed only with your permission. All study data will be secured in encrypted files on a password protected computer. My University of Hawai'i advisor and I will have access to the information.

After I write down the interviews, I will destroy the video-recordings and screen recordings. Identifiers will be removed from the research records. When I report the results of my research project in my typed paper, I will not use your child's name or any other personal information that would identify your child. Instead, I will use a pseudonym (fake name) for your child. If you would like a copy of my final report, please contact me at the number listed near the end of this consent form. Other agencies that have legal permission have the



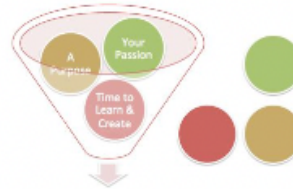
## Appendix E

### Introduction to Genius Hour

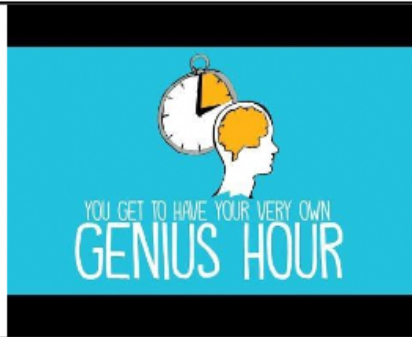
#### Welcome to Genius Hour!

This is optional opportunity for exploration!

#### What is Genius Hour?



We are here to help you on your journey each Friday



#### You own the journey

You can be creative and think critically as you direct your own learning

We are your guides as you navigate the internet

#### How to pick a topic

**What are you interested in?**

**What are your passions?**

**I like gaming and reading and my dog**

**What would you like to know more about?**

Appendix F

Step 1: Getting Started

Genius Hour Getting Started

Type your topic ideas in the box

What are you interested in?  
What are your passions?  
What would you like to know more about?

Pick three topics from your ideas listed above.	Let's learn more about those ideas. Write down some fun things you learned as you searched about your interests.	Copy and paste the website address you used to find these facts
1.		
2.		
3.		

## Appendix G

### Step 2: Narrowing Your Focus

#### Step 2: Narrowing your focus

Based on your search, what topic stood out as the most interesting?

What do you imagine your goals are? What do you want to make, create or do at the end of this project?

What question (or questions) will guide you as you start your research?



Check in with a teacher to get feedback on your questions before moving on to the next step.

### Step 3: Researching

My research question

--

[illegible]

## Appendix I

### Mini Lessons Reflection Sheet

Mini Lessons	Something interesting that stood out	How this might impact or change my internet behaviors
<a href="#">Basic Google Search and Search Terms</a>		
<a href="#">Advanced Search Terms</a>		
<a href="#">Image Searching</a>		
<a href="#">Can I trust this information?</a>		



## Appendix J

### Step 4: Final Product

#### Genius Hour Final Step

- 1) Describe your research question or what you were working to become a genius in.

- 2) Show what you know! What did you learn on your journey to becoming a genius  
*A video of your work, pictures, written summary, whatever you made, put it in the box below or link it in the box below.*

- 3) What did you learn about researching on the internet?  
*3-5 sentences. For example: How many websites did you rely on? How did you know you could trust the information? Why was some information more helpful than others?*



## **Appendix K**

### **Student Post Think-Aloud Interview Questions**

- 1) Describe the task you did today.
  - a) What were you reading and researching?
- 2) How successful were you at completing the task you did today?
  - a) What helped you with your research?
  - b) What worked best for you to find the answer to your questions?
  - c) Is there anything else that would have helped you be more successful?
- 3) In your opinion, what do good readers do when they are reading and researching for information on the Internet?
- 4) If your teacher asked you to give advice to other students about how to read and research on the Internet, what would you tell the students about the things that happen in your mind when you read and research on the Internet?
- 5) As you were searching on the Internet today, what worked best for you to find the answer?
- 6) What kinds of things are helpful to know when you are reading on the Internet and trying to figure out what to read next? Are some of these more useful than others?
- 7) Do you ever find yourself making predictions as you read on the Internet? If so, when?
- 8) Anything else you want to share about your reading or researching today?

## **Appendix L**

### **Teacher Interview Questions**

#### **Pre-Unit Questions**

- 1) What has been your experience teaching and observing students as they use the Internet to inquire?
- 2) How has having access to the Internet through one-to-one laptops shaped your lesson planning?
  - a) How often do you use technology in your classroom? What types of technology do you use, and for what purposes?
- 3) What considerations were made when designing this unit?
- 4) What are your learning goals for this unit?
- 5) How will you accomplish these goals?
- 6) What have you noticed about your students' digital literacy skills and research processes when they enter your class at the beginning of the year?
  - a) What are your students' strengths, overall? What are their weaknesses?
- 7) Anything else you want to share about how students engage in digital literacy or about the students in general?

#### **Mid-Unit Questions**

- 1) What were your lesson goals for today's lesson?
- 2) Can you describe how those goals were addressed through the lesson?
- 3) What did you notice about how students read and researched online?

- 4) Anything else you want to share about how students engage in digital literacy today or during this unit thus far?

### Post-Unit Questions

- 1) What are your overall impressions of the unit?
- 2) What do you think students learned during the course of this unit?
  - a) What specific digital literacy practices and research processes did they develop or strengthen?
- 3) What teaching strategies did you find the most helpful to students and why?
- 4) How did you go about deciding what and how to model for students during the unit?
- 5) What do you think works best for students when reading and researching online?
  - a) Do you think most students do this? Why is that?
- 6) What challenges did these students encounter in their learning and how did you modify instruction to address these needs?
- 7) What are some of the ways you supported students with their projects outside of direct instruction?
- 8) Would you make any changes to the unit for the next time, if so what?
- 9) Anything else you want to share about how students engage in digital literacy or the unit overall?

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