

ON A HEURISTIC POINT OF VIEW CONCERNING  
SOCIAL MEDIA NEWS AND  
SECONDARY TEACHERS

by

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## DEDICATION

I want to dedicate this dissertation to my family. I have often answered the question of “who the most influential person in your life is” with the answer “my family.” My family raised me, taught me to read, taught me to care about others, and held me to a standard. I carry small pieces of their wisdom with me as I have completed this dissertation. It is only appropriate that I start with my grandparents and great aunt, who raised their children to be exceptional people. Without them, I would not have the role models I have today. The most influential people in my life are my parents who have supported me every step of the way. They are my example of what defines a good person and that caring about people is always paramount. Thank you, Mom and Dad, I love you both so much. I also dedicate this paper to all of my aunts, uncles, and cousins who showed me their wisdom as I grew up. When it comes to my family, it truly has been a pleasure to walk through their garden. And finally, I dedicate this dissertation to future family members and hope that they carry on our family legacy of being strong, educated, and happy.

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## ABSTRACT

Certain cues used by a consumer of news can trigger heuristics that help determine whether information is credible (Metzger, 2007; Sundar, Knobloch-Westerwick, & Hastall, 2007). This study addresses which cues secondary teachers perceive as effective when assessing the credibility of news on social media. The purpose of this study is to determine how secondary teachers rate cues in order of importance when evaluating the credibility of news obtained in the context of social media. The participants in this study were secondary teachers in a northwest state who teach about online information credibility. A survey adapted from the *Kids and Credibility Study* (Flanagin, Metzger, & Hartsell, 2010) asked secondary teachers to rate the importance of 23 credibility cues or heuristics commonly found in social media news posts. A principal components analysis revealed three components that are a composite of heuristics reflected in the literature (Beavers et al., 2013). The resulting components were named Endorsement, Reputation & Confirmation, and Low Level Endorsement respectively. By using a sum scores comparison, the composites of heuristics were ordered by perceived level of credibility (DiStefano, Zhu, & Mindrila, 2009; Grace-Martin, 2016). Reputation & Confirmation rated highest on the scale as indicators of credibility, Endorsement ranked second, and Low Level Endorsement ranked last. The results of the study indicate that secondary teachers believe that the most effective heuristics while using low to medium cognitive effort for assessing news credibility are the reputation of the author of the information, along with confirming the information from another source to make a quality judgment on the factual nature of the source. Social endorsements (such as “likes” and “shares”) on social media play an important role in determining credibility; however, secondary teachers indicate that they perceive Reputation and Consistency to be better at indicating credibility. This study illuminates the role heuristics play in credibility decisions when evaluating news found in a social media setting.

## CHAPTER ONE – INTRODUCTION

Introduction

*“How many miles have I scrolled through on my phone?” -Anon*

Teaching is an evolving profession that must continually adapt to the changing world. From one-room schoolhouses to online academies, educators can be fairly certain that what teaching looks like now will evolve along with societal needs. This study focuses on what cues secondary teachers believe to be the best in a social media environment when determining the credibility of news. If the 1930s were about the role of government and the New Deal, the 1950s and 1960s were about Civil Rights, surely the 2010s and 2020s will be about how we process information. As much of a sea change to the 15<sup>th</sup> century Gutenberg’s printing press was, the Internet is that change for the 21<sup>st</sup> century. At no point in history has information been so readily available. For the Early Renaissance, the abundance of printed books created the need for people to be literate. Literacy during the 15<sup>th</sup> century might be considered the ability to read the Bible. Before the masses could read, scenes immortalized in church stained glass windows would depict events of scripture. While many churches still have stained glass windows, the need for the windows to tell stories has become inconsequential because current generations are literate and can read and interpret scripture on their own. This research is rooted in the idea that a new literacy needs to be developed to critically think in the information age. If our ancestors asked, *“what good is a book if we cannot read it?”* our

children will judge us by how we answer the question “*what good is unlimited access to information without knowing how to interpret it?*”

Growing up in the 1980s and 1990s, I knew that Tom Brokaw, Dan Rather, or Peter Jennings would report the evening news. These news anchors were trusted guests in our home, as we would absorb their stories of the world as we watched and learned. We never doubted the integrity of these news anchors or the news they provided. After all, journalism is the fourth estate, or the people’s institution that checks the three branches of the United States government. While we might challenge actions of that time period, we never questioned that the actions themselves happened. The authority of information provided by news media was not questioned like it is in today’s news media which may indicate a gap in the skillset of social media news consumers.

Fast forward to 2018, and the idea of “fake news” has engrossed the nation. Vosoughi, Roy, and Aral (2018) push back on the term “fake news” to change the narrative to false or true news because “fake” implies deceit, where people that share news most likely are unaware the information is incorrect. What is reported as a positive story by one source is undermining national security on the next. Worse yet, political division in the country has supported narratives on the truth instead of truth itself. To make things even more confounded, I look at my Facebook feed only to find friends have posted articles promoting their own opinions as well as sharing questionable news articles and then arguing about points they deem significant, while ignoring the other perspective altogether. Through the confluence of many mediums used to obtain news, there is a

cacophony of points of view, evidence, and agendas, with some individuals determined to demonstrate their view of the world is correct, no matter how dubious the source.

News can come from a dizzying array of locations on the Internet from Facebook to websites to smart phone applications. An individual on social media can seem to be perceived to be just as credible as the traditional gatekeepers of information (such as anchors and respected news outlets). Traditional news media are news groups such as the Associated Press, Reuters, basic cable news rooms, newspapers, and the like. These attacks on traditional media outlets have caused a fake news panic forcing the average citizen to determine what is credible news and what is not independently very likely on a social media platform. The responsibility of the traditional gatekeeper has shifted to the citizen. What once was a skill mastered by the likes of Walter Cronkite, the citizen must bear this new burden.

Callister Jr (2000) describes how our normal rules for determining credibility of news sources break down in cyberspace and new skills will be needed for this medium. The first step in critical thinking in cyberspace means learning how to determine what information is credible and what is not. In a relatively short period of time, from 2004 and the beginning of Facebook, to the invention of the iPhone in 2007, to today with a myriad of social media platforms, the world is inundated with information at an incredible rate from countless sources, especially through social media. A 2016 Pew Research Center survey stated that 62% of Americans obtain their news across a variety of social media platforms such as Facebook and Twitter (Gottfried, 2016). Therefore, if news information is overwhelmingly available and traditional gatekeepers' perspectives

are being undermined, how people are processing this information? Research indicates there are a variety of cues that an individual may use in order to determine the credibility of a source (Flanagin, Metzger, & Hartsell, 2010; Fogg et al., 2003). For example, I might see a post on Facebook that has 10,000 “likes” which could be an indication of the information’s credibility because other people have provided an endorsement. It is unclear how people interpret a social endorsement such as a “like”, so it is unclear if it is a quality indicator of credibility or not. Callister Jr (2000) describes that traditional indications of credibility become increasingly difficult because the dynamics of online tools. I argue that with seemingly limitless amounts of information, a new skillset has to be discovered.

As I was doing the groundwork for this study, it seemed I had found the answer to how people decide what is credible or not on the Internet and/or social media. Kuhlthau (2005) promotes the use of a six-stage systematic process. Feeling pretty good about myself, I checked my phone and scrolled through my Facebook feed on my iPhone for a quick news update. I realized that I was making credibility judgments without using any systematic process at all. I was using a heuristic, which is a quick, low cognitive judgment based on a credibility cue I looked at (Chen, Duckworth, & Chaiken, 1999). I was making critical assessments on the credibility of news in an instant. Even the phrases “visiting a website” or “surfing the internet” implies a low to medium cognitive effort in the experience (Fogg et al., 2003, p. 12). This led me to ask myself, “Who taught me how to do this correctly?” What I realized is that I was processing the credibility of vast amounts of information without any real training in this medium.

Teachers generally teach a systematic way to evaluate websites, where students learn to follow a set of criteria to assess if a particular website is credible or not, hopefully alleviating bias. As Ostenson (2014) notes, the criteria for assessing credibility in a systematic model are ingrained in the print world as well as being taught by teachers, such as checking the Uniform Resource Locator or URL, author, website, and date of publication for credibility. This systematic process takes considerable cognitive effort but is rigorous in determining credibility.

This is the moment where this study began. That initial research led me to a body of work on heuristics and how students assess credibility of sources. As I am a teacher by trade, my initial thought was why are educators not teaching about heuristics in schools, especially when research says this is the skillset students may be using to interpret information due to the nature of social media news may only trigger a medium to low cognitive effort (Metzger, 2007). A comprehensive search of the literature on what teachers believe are the best indicators of credibility of information yielded unsatisfactory results. My dissertation was written to fill this gap in the literature.

### Definition of Terms

- **Cognitive Heuristic** (or simply a heuristic): A strategy to process information using low level cognitive efforts (Metzger & Flanagin, 2013). For example, if a long message is posted, it might trigger the length is strength heuristic (Sundar, 2008).

- **Credibility:** This term should be understood not as whether something is credible, but as how the individual deems the news to be credible (Choi & Stvilia, 2015).
- **Credibility Cue:** This is an element of a social media post that triggers a specific heuristic. For example, seeing that someone has shared a piece of information would indicate a level of credibility such as a like or number of comments on the post. The heuristic triggered may be the endorsement heuristic (Flanagin et al., 2010).
- **Consistency Heuristic:** The consistency heuristic is the method of determining the credibility of information by cross-validating it elsewhere (Metzger, Flanagin, & Medders, 2010). For example, someone might check a number of news sources to see if the story they read about were true.
- **Endorsement Heuristic:** The endorsement heuristic utilizes social cues as the means of a credibility assessment (Metzger et al., 2010). For example, a social cue may be a “like,” “comment,” “share,” or possibly asking someone if information is credible.
- **Like:** This term is used as both a noun and a verb. As a noun, a like is a description of an endorsement of a social media post. As a verb, the term like is used as an expression of endorsement of the post. For example, “I saw my mother had posted a painting of hers, so I liked it.”



- **Platforms:** This term describes the different outlets that social media news can be seen on. The popular platforms used at the time of this study are Facebook, Twitter, Instagram, and Snapchat.
- **Post:** This term is used as both a noun and a verb. As a noun, a post is the entry that is presented within the different social media platforms and may also be seen with the descriptors “social media” preceding the term. As a verb, the term describes the action of finding something and sharing it within the platform. This term is similar to the term “tweet.”
- **Reputation Heuristic:** The reputation heuristic is method of confirming information by checking to see if the source of the information, author or institution, has a reputable status (Metzger et al., 2010). An example of a source with a trusted reputation might be an individual like Walter Cronkite or an institution like the Wall Street Journal.
- **Satisficing:** This is a term (a combination of “satisfy” and suffice”) used to describe the action of stopping a search because the individual is satisfied or reaches a point of satisfaction (Simon, 1956). This term is similar to the sufficiency principle and principle of least effort (Bohner, Moskowitz, & Chaiken, 1995; Chen & Chaiken, 1999).
- **Scroll (or Scrolling):** This term depicts the act of the sifting through information by scrolling through a social media feed.
- **Share:** This term is used both as a noun and a verb. As a noun, a share describes the type of a post that was distributed by someone within the

social media circle the individual populates. As a verb, the word describes the action of reposting a piece of information on a personal social media outlet. This term is similar to the term “retweet.”

- **Social Media Feed:** This term should be interpreted as the thread of information produced by a social media outlet like Facebook or Twitter. The feed should be able to be scrolled through quickly.
- **Systematic Process:** An information processing method that engages a high level of motivation and capacity in a rigorous process to understand information (Metzger et al., 2010). These processes will usually require an individual to assess the credibility of a number of different elements within a social media source and is used in a number of academic exercises in education settings for writing essays and papers. Two examples of this rigorous process are the CRAAP test described by Blakeslee (2004) and the Information Search Process by Kuhlthau (2005).

### Theoretical Framework

The decrease in the reliance of credible authorities on information is not only limited to news. With the ability to purchase goods and services on the Internet, the reliance on professions such as travel agents and retail sales workers have been reduced (Metzger & Flanagin, 2013). The decrease in reliance on these professionals places the burden of determining credibility on the consumer, who must make judgments about goods and services independently. This represents a dramatic change in the way

individuals select goods and services, but also in how they interact with information in the era of social media. Currently, the legitimacy of established sources of information has come into question. Where *The New York Times*, or a science textbook may have once been seen as a trusted and definitive source, current political rhetoric has put these sources' legitimacy into question. This study will focus on secondary teachers' perception of credibility cues related to news sources obtained through social media.

The research on credibility cues extends beyond simply the news, but for this study the focus will be on social media news. The theoretical framework for this study is constructed from dual-process theory (Chaiken, Zanna, Olson, and Herman, 1987) called the Heuristic-Systematic Model as well as the Elaboration Likelihood Model (Petty & Cacioppo, 1986), the MAIN Model (Sundar, 2008), and finally the Dual Processing Model of Credibility Assessment (Metzger, 2007). In the following section, I will outline how each model works in concert to demonstrate how individuals determine the credibility of information obtained through social media news feeds.

Dual-process theories concerning persuasion combine the idea that people exhibit characteristics of both scientists when systematically evaluate information as well as “cognitive misers” when processing information in an unsystematic way, such as scrolling through a Facebook feed (Bless & Schwarz, 1999, p. 423). A cognitive miser can be thought of in terms of satisficing, which is using as little cognitive effort as possible. Bless and Schwarz (1999) describe the advantages that dual-process models have because the information an individual comes across can be wide ranging. In the context of social media feeds, a person scrolls through news, family posts, entertainment

updates, advertisements, etc. People use systematic to heuristic approaches depending on motivation level that the information elicits as well as the person's own capacity to understand a topic. An example of a systematic process would be the Currency Relevance Authority Accuracy Purpose (CRAAP) test which describes five evaluation criteria that a person must use in order to determine credibility (Blakeslee, 2004). The CRAAP test shows how an individual must assess currency, relevance, authority, accuracy, and purpose as a means to determine credibility. Kuhlthau (2005) describes the six- stages in the search process which shows initiation, selection, exploration, formulation, collection, presentation, and finally assessment. Gigerenzer and Todd (1999) describe how an example of a quality heuristic might be if a medical doctor has investments in a certain company, they may be highly motivated to read information about that company if it were to be posted on that doctor's social media feed. The medical doctor may also see an article posted on their social media feed that oversimplifies a medical procedure this doctor is an expert in. This doctor has a large capacity to understand the procedure and may start assessing the article in a systematic way. There are a number of theories that deal with people using systematic and heuristic approaches.

### Theories Used

The foundational theory used in this study is the Heuristic-Systematic Model (HSM). In this model, Chaiken (1980) describes that high involvement in information processing will lead people to use a systematic model, whereas low involvement will push individuals to use a heuristic processing strategy. The two kinds of involvement are the level of capacity someone has to understand the information and the amount of

motivation the person has on a certain topic. For example, an international trader may have a high capacity to understand what a strong or weak dollar will do to a specific market, and thus read articles in a systematic way, where someone not involved in the international market may not process the information due to lack of capacity to understand the subject. Motivation works in a similar way. For example, a new mother and father may be highly motivated to learn about their baby and will use a systematic process to absorb information.

Beyond being established as a leading model for looking at social media and heuristics, this model makes practical sense. It is practical because, as different bits of information present themselves in a social media feed, one will see credibility cues, which will elicit different levels and types of motivation depending on the credibility cue. Along with motivation, the credibility cue will trigger a heuristic that an individual will use to determine whether something is credible or not.

Models. There are a number of other models that help describe the process of how persuasion works concerning social media. The theoretical framework, for this study is the model by Metzger (2007) called the Dual Process Model of Credibility Assessment along with strong influences from the Elaboration Likelihood Model (ELM) by Petty and Cacioppo (1986), and Modality, Agency, Interactivity, and Navigability (MAIN) Model by Sundar (2008). The ELM describes the likelihood of someone processing information after observing it (Petty & Cacioppo, 1986). The MAIN Model describes elements of a website that people are likely to interact with as well as providing important heuristics for this research (Sundar, 2008). Much like the HSM, ELM, and MAIN Model, Metzger

(2007) proposes that the Dual Processing Model of Credibility Assessment can predict when and how someone will evaluate information. The Dual Processing Model describes both the person's level of motivation when evaluating information as well as their ability to process the information. This combination of motivation and ability will predict whether a heuristic process or a systematic approach will be used. This theory describes three phases that a person will go through in the information credibility assessment process: Exposure Phase, Evaluation Phase, Judgment Phase (Metzger, 2007).

This study uses a combination of these four theories to construct a framework for assessing the credibility of information. How the theoretical framework supports the credibility cues is the key point of this study. The credibility cue is the starting point for the Dual-Process Model to work and will direct which heuristic is processed. It is the goal of this study to determine what credibility cues secondary teachers believe are the most important, which will indicate the most suitable heuristic(s) for students to assess the credibility of a source.

### Background and Context

In order to begin to understand how to discover information, one must break out of the traditional ways of thinking about reading and move forward with a new way that people process information. A social media user in 2018 may look like a person sitting on a chair scrolling through their phone, not unlike the traditional scene of a person reading a book in a comfortable nook in their home or at a coffee shop. While it may seem on the surface that these two scenarios are similar, they are vastly different. For instance, while

it may seem that the social media user is reading in isolation, this person is actually interacting with many people online in direct and indirect ways (Metzger et al., 2010). This evolving social media landscape is changing the way individuals both consume and process information. Because of this, a new skillset has to be understood and then developed.

### Changing Media Situation

While media and the Internet is clearly changing the way we discover news, perhaps the most striking aspect of the change is how social the process has become (Metzger et al., 2010). The classic view of someone reading the newspaper in isolation, being exposed to a finite amount of information that can fit in a paper, is rapidly being replaced with a digital screen and virtually unlimited information. A recent Pew study shows that 62% of Americans obtain their news from social media (Gottfried, 2016). This study shows a massive trend in the way Americans receive their news. There is more to the information processing experience as well. While one may certainly go to their online newspaper smart phone application of choice online which may be developed by their favorite news outlet, the 62% of people are using social media feeds like Facebook to obtain their news (Gottfried, 2016). This news is presented in the form of a friend that has shared the news through an actual share, a “like”, a “retweet”, or something of that nature. At this point is where the change in how we process the information takes place.

Information processing has stopped being an experience conducted in isolation; it has transferred to a social method where the articles are now shared, commented, and liked among people within the social network. This shift has created a step between the

gatekeepers of news and the consumer. Consumers of information now are presented information their friends are reading which can positively or negatively influence their position on news consumption. Algorithms, which are lines of code written to promote familiarity when using social media, on Facebook and other social media sites create echo chambers where people only read what they have previously consumed in one form or another (Bessi et al., 2016).

### Critical Thinking Skills Needed for Social Media News Credibility Inquiry

The news now must be processed by the individual and evaluated for credibility. As Messing and Westwood (2014) articulate, processing information becomes incredibly complex when looking at a list of ten items to determine what is credible and what is not. They indicate that the complexity of processing information has several components: how we weigh one piece of information with another, along with integrating our social experiences, perceived importance of the information, and potential impact on our lives (Messing & Westwood, 2014). Because of this seemingly overwhelmingly complex calculation, our brain settles on what we perceive to be “good enough,” thus the brain uses a heuristic (Messing & Westwood, 2014).

### Statement of Problem

There is a great deal of research concerning how adults and children process credibility on social media concerning news (Flanagin et al., 2010; Fogg et al., 2001; Winter, Metzger, & Flanagin, 2016); however, there is little research on what teachers



believe to be the most important heuristics and credibility cues for students to use while searching for news on their social media threads. Therefore, this study addresses a gap in the literature about which cues secondary teachers perceive as optimal when assessing the credibility of news on social media. It is important because these initial cues can trigger heuristics that help a person determine if information is credible or not (Metzger, 2007; Sundar, Knobloch-Westerwick, & Hastall, 2007). For example, a person may use a social endorsement like a friend who has shared the information as their main indicator of credibility, which can trigger a motivation that biases their ability to process the information. However, if a person sees that the information was written by an author that was not credible, they could determine the information is incorrect and ignore it. If educators can teach students to look at the correct cue, it can have a powerful impact on their ability to judge the credibility of information they see in a social media feed.

#### Purpose of the Study and Research Questions

The purpose of this study is to better understand theory of dual processing by asking secondary teachers to indicate which credibility cues they believe are the most important when evaluating the credibility of news obtained in the context of social media. The variables for this study are the credibility cues derived from the survey instrument by Flanagin et al. (2010). The participants in this study are secondary teachers in a northwest state who teach about online credibility. The study has secondary teachers narrow the wide array of credibility cues or heuristics to a manageable number. A principal components analysis determined that these credibility cues were a composite of heuristics

in the literature (Beavers et al., 2013). By using a sum scores comparison, the composite of heuristics can be ordered by perceived level of credibility (DiStefano, Zhu, & Mindrila, 2009; Grace-Martin, 2016).

The search to understand which credibility cues educators value the most is important because skills that students are using to define whether a source is credible may not be being fully addressed at the k-12 level. Before the advent of the Internet, there were gatekeepers such as Walter Cronkite and Tom Brokaw that could curate and report information accurately whereas today, these gatekeepers' integrity has increasingly become in question in the social domain. Because the gatekeepers' integrity has become more politicized than ever, assessing credibility has moved to the public at large. Because teachers are tasked with instructing their students on the credibility of information, teachers should be involved in determining how students learn that information. While this study does not go into the depth needed to answer the broader question of what is "fake news", it does have teachers assess the perceived quality of a variety of cues to use when determining the credibility of news posted on social media threads.

The research questions this study will focus on will primarily answer:

- Research Question 1: Do the composite components within the credibility cue list match credibility heuristics in the literature?
- Research Question 2: Of the composite components produced in this study, what is the rank of the components relative to each other, as reflected on the scale of "Extremely Effective" to "Somewhat Effective"?

### Delimitations and Limitations

Limitations are elements that the researcher cannot control which may be weaknesses. Delimitations are choices the researcher makes that should be explained in order to understand the study and limit its scope (Creswell, 2004). The limitations of this study include the instrument, the sample, and time constraints. The first limitation is the instrument. The present study asks teachers what credibility cues on social media feeds are perceived to be the most credible. While the instrument was designed to evaluate credibility cues generally seen online, it may not address all of the different kinds of cues on the variety of different social media platforms. For example, while a “like” by Facebook is essentially the same act as a “heart” on Instagram, they may be interpreted differently, especially since Facebook now has a number of different ways to “like” a shared piece of information (ranging from “thumbs up” to “angry face”). This study also claims that all survey items indicate a level of credibility, however those indications can vary from in their perceived effectiveness when determining credibility (Messing & Westwood, 2014).

The study used a purposeful sample. This is a limitation because the survey was completed by 115 secondary teachers in a Rocky Mountain state but claims on representing the population cannot be made because population data is unavailable. Another limitation of the sample is that participants needed to have basic familiarity with reading news online to understand the implications of every credibility cue. Finally, time constraints were a limitation because participants may not have spent adequate time on each response.

Delimitations include elements in the instrument, the literature, population, and methods used in this study. The first delimitation concerns the reduction of the total number of variables used in the instrument adapted from Flanagin et al. (2010) in order to accommodate the present study. Many of the credibility cues were redundant or did not apply to the study and were eliminated. For example, I removed “You ask an expert (your doctor, teacher, etc.) who you know in person” because the setting of reading news on social media may not allow for outside expert inquiry. Notes on instrument modification are provided upon request.

Another delimitation concerning the instrument is the assumption that participants could rate each credibility cue as important, which would render results from the survey meaningless. In order to account for this potential confusion, the linear numeric scale was modified from the original instrument to provide a range of “extremely effective” to “somewhat effective”. Additionally, a delimitation is the literature review compared to other literature reviews on similar topics, which define in great detail what makes a website credible. The present study aims to discover what secondary teachers believe are the most important credibility cues concerning news obtained through social media. The purposeful sample is another delimitation. While the present study would benefit greatly from having all middle school and high school teachers in the region participate, a purposeful sample with the required  $N$  provides information on secondary teachers that may have a vested interest in the topic.

The final delimitation concerns the methodology of the study. There are a number of different options that could be applied to this study including a qualitative approach,

mixed methods approach, as well as other quantitative approaches. Principal components analysis was chosen in order to mirror the analytic method used the original study (Metzger, 2007).

## CHAPTER TWO – LITERATURE REVIEW

Introduction

Social media has changed the way individuals process news. Messing and Westwood (2014) describe how news sources were previously chosen by individuals, and the journalists from those sources, like *The New York Times*, produced trusted information. Social media has effectively removed the source of information and presented the information itself, forcing the individual to be the gatekeeper of credible knowledge. For example, a Facebook feed provides a variety of different kinds of information from social/ personal updates to advertisements to humorous posts to news. This information comes from an infinite number of sources and contexts which can be overwhelming to consume. Knobloch-Westerwick, Westerwick, and Johnson (2015) call for a look at new types of credibility cues that connect with a changing communication technology context because traditional cues may not be applicable in the world of likes, shares, and creative information sharing platforms. While individuals sift through information, they must make credibility judgments, as contrasted with the past, the gatekeeper made the credibility judgement rather than the individual (Messing & Westwood, 2014). In addition to being the new gatekeepers of credible information, individuals need to have enough motivation to critically evaluate information. It may be unrealistic to think that people have the motivation or ability to critically evaluate every piece of information that they come across (Metzger, 2007). When thinking about how people are the new gatekeepers and they may not be motivated to put the time and effort

into a systematic critical evaluation process, what tools do people use to process this new task they must complete? I posit that heuristics play the key role in that process, and that a better understanding of how individuals process news will lead to a citizen that can better decide fact from fiction. Therefore, I surveyed secondary teachers to determine what they believe the most important credibility cues, and by extrapolation, heuristics are when engaging with news that comes across a social media feed.

To illustrate how routine the use of heuristics are in everyday life, Gigerenzer and Todd (1999) describe the following situation at a hospital. Imagine a patient visits the emergency room, having a heart attack, and the doctor is confronted with the decision to determine whether he is high-risk or low-risk. While the doctor would optimally spend hours and hours combing over the patient's lifestyle, family history, symptoms, and other factors with an entire team of doctors, time does not allow for this luxury. Thankfully, a simple decision tree was developed to guide doctors which steps to take next. The decision tree eliminates a variety of clues that lead to understanding the patient's health and narrows the number to three simple questions. While a decision tree does not gauge or contemplate all of the information provided in the scenario, it narrows the information down to three essential questions in order to determine the level of risk: 1) blood pressure, 2) age, and 3) presence of sinus tachycardia. This anecdote illustrates how quick decisions, while not exhausting all possible information, narrows down choices into a manageable package that guides doctors' decisions that can be the difference between saving a patient's life or his/her death. What this story describes is that heuristics, while

seemingly a shortcut, can produce quick and credible decisions (Gigerenzer & Todd, 1999).

Information processing using heuristics is not only effective in the medical world; they also apply to youth's information processing in social media (Sundar, 2008). This literature review will initially describe the major theories that illustrate how people process information on the Internet. The literature review will then describe the role of confirmation bias, bounded rationality, and motivation in information processing in a social media context. The literature review will then illustrate how heuristics play a role in credibility as well as the different kinds of heuristics used by individuals. Finally, the literature review will conclude by outlining various credibility cues and how different individuals may use different cues dependent on their motivation level as well as the types of information they may be processing.

### Bounded Rationality

Messing and Westwood (2014) describe a fictional scenario where a person has a list of ten news headlines in which this person must choose which headline has the most important story relative to the others. At this point in the scenario, a person is comparing each story with the other nine stories. The task of finding the optimal story becomes increasingly complex for the human mind because as an individual looks through each headline, he or she must weigh each article against the others relative to its information. This task becomes increasingly complex when adding additional information such as asking which story out of the ten stories gives the best information on stock prices as well



as civic developments. If each news headline and story involve both stock prices and civic developments, this task is very complex. The ability of an individual to meticulously run through every headline while weighting every scenario and expecting to find the optimal headline may push the limit of human cognitive ability beyond its capacity. In a real-world scenario of the casual news consumer, an individual will not process all of this information but will make a best guess depending on the amount of involvement the individual desires to spend. In essence, the mind is not unbounded with limitless processing power, but tied in the real world. This notion is called bounded rationality (Messing & Westwood, 2014).

Bounded rationality is a concept that is key to understanding how thinking occurs. Stemming from bounded rationality are concepts such as “ecological rationality” and “satisficing” (Gigerenzer & Todd, 1999; Simon, 1955, 1956). Simon (1955), who first described bounded rationality, envisions the concept as having two elements: limitations of thought, and the environment in which those thoughts are used. He describes that while bounded rationality can be thought of in terms of these two separate elements, the environment can also be the biological body itself and therein has limits. Essentially, individuals have constraints on how much information they can process and cannot always act rationally due to these limits (Simon, 1955).

The first element describes how our mind has limitations on its processing power (Gigerenzer & Todd, 1999). One might think of this as a person playing a game, such as chess, in which many decisions are needed to win. The human brain cannot process all conceivable moves in order to choose the optimal choice because we simply do not have

that kind of processing power, or capacity. We must make a choice based on factors that we can process in order to win the game.

The second element to bounded rationality best described by Gigerenzer and Todd (1999) concerns the environment in which the mind is situated. The term *ecological rationality* describes how individuals might use a realistic decision-making process to substitute for the unrealistic ability to select the best choice in relation to all of the alternatives of a situation. This decision-making process is often referred to as a heuristic. These heuristics are optimized for the environment the individual is using. For example, a doctor in an emergency room will use a different set of heuristics than a person surfing social media for news might use. Also, an experienced fly-fisherman casting in a familiar stream will use a different set of heuristics as a novice might. According to Gigerenzer and Todd (1999), the environment plays a key role in the sophistication of the decision-making process.

Satisficing is another key point that brings the two elements in bounded rationality together. Satisficing (a combination of “satisfy” and “suffice”) can be thought of as “computing the optimal stopping point” where the individual makes a judgment on where and when to stop analyzing a source (Gigerenzer & Todd, 1999, p. 15). An individual will choose a framework that determines when to stop searching and be satisfied with understanding the information, which might be thought of as an ecological rationality (Gigerenzer & Todd, 1999, p. 18). One might understand this term as how individuals use the environment to determine the set of heuristics needed for any given environment.

In the search for optimal heuristics taking into account ecological rationality when determining the credibility of news obtained through social media, there are many factors to consider. The environment must be understood in order to select the correct heuristic. Additionally, when teaching individuals to use heuristics, the “generality versus specificity” trade-off must be understood because each example of news will be unique and therefore, creating a set of optimal heuristics should be effective with most situations but cannot be expected to work with all situations. If heuristics become too specific to a certain environment, they become useless (Gigerenzer & Todd, 1999, p. 18). For example, if we were to create a specific set of heuristics for looking at news from Facebook, then create other individual sets of heuristics for Instagram, Snapchat, and Twitter, the heuristics would be almost useless for many reasons. One obvious reason is that any one of these social media outlets may become obsolete, replaced by another, as evidenced by the demise of Myspace and Friendster. As Gigerenzer and Todd (1999) state, cues that are determined important should stay important because the general environment of social media news should not change drastically enough for a new set of heuristics to be used. Gardening provides a strong analogy. While individual plants may need specific ph. levels in the soil, among other specifics, general rules of thumb apply to almost all plants, such as sunlight, soil, and water. In my experience choosing winning teams in the NCAA Basketball “March Madness” tournament, if I over research a team, my bracket is usually less accurate than when I stick to general rules of thumb, such as their season record.

It is important to understand then why a person may use a systematic process instead of heuristics when making decisions. While bounded rationality describes why heuristics can be used to make accurate judgments, what exactly determines which process will be used? There are many theories that attempt to understand this notion. For the purpose of this study, theories that specifically deal with decision-making concerning credibility of information found on the Internet are explored. These include heuristic accuracy, dual-process theory, the heuristic-systematic model, the elaboration-likelihood model, the MAIN model, and prominence-interpretation theory.

### Heuristic Accuracy

Heuristics, on the surface, may incite a great deal of criticism for being a “lazy” way to process information. While this may seem like an easy argument and is valid in many circumstances, heuristics can also be a “rule of thumb” developed over time with experience in the field (Sundar, 2008). In order to determine how accurate heuristics are relative to a systematic approach, one must understand the components involved in obtaining accurate information. Gigerenzer and Goldstein (1999) describe two commandments of accuracy: complete search and compensation. The complete search commandment can be thought of as finding all available information about a topic and then making a judgment about when to stop searching because the search will not result in additional information. The compensation commandment can be thought of as combining all pieces of information in order to understand a given concept or idea fully

(Gigerenzer & Goldstein, 1999). The more fully both of these commandments are implemented, theoretically, the more accurate the understanding of the information.

When determining the accuracy of any given heuristic, there are a number of variables. As Gigerenzer and Todd (1999) have proposed, any single heuristic may not be as powerful as much as a collection of heuristics they call “the adaptive toolbox.” This toolbox combines a certain set of heuristics in order to make judgments on city populations, for example, using only minimal information. They propose that heuristics based in rational judgment are fast, frugal, and accurate and can be used in other real-world environments without creating advanced algorithms. These heuristics must fulfill the need for the person to make the right choice, otherwise the heuristic would change. In addition to the fact that occupation such as emergency room doctors must use heuristics due to the need for rapid decision-making, heuristics can be a valid way to assess credibility when assessing information. It is also important to note that, as Bulger, Mayer, and Metzger (2014) describe, academic proficiency is the highest indicator of digital literacy. When students have the right toolbox, they still have to make a judgment. For example, as much as giving an individual the correct sized wrench for the job is not enough because the individual must also know how to operate the wrench, having the right heuristic is not enough, because one must be able to use the heuristic correctly.

### Heuristics Used by Historians

Heuristics have been used by historical figures and historians. While this may not have been as recognizable in the past, a new generation of researchers are putting much more credence in the use of heuristics and their importance. The understanding of what a

heuristic is has changed over time. As explained by Gigerenzer and Todd (1999) one of the more famous examples of use of a heuristic is with a young patent clerk named Albert Einstein. Einstein believed a heuristic was a view that was incomplete because he felt that his model on the quantum properties of light was going to evolve. Therefore, Einstein believed that a heuristic is a starting point, but not an end point (Gigerenzer & Todd, 1999).

Wineburg (1991) discusses the use of “sourcing heuristics,” which is a practice of looking at the source of the information before looking at the information itself. He reports that 98% of historians use this heuristic where only 31% of history students do. The students focused on what the text said but did not judge the credibility of the material by the merits of the source. This demonstrates how historians value the credibility of the author, more than the text itself. As both Einstein and Weinburg illustrate, heuristics are used in a wide range of disciplines from physics to history.

### Dual-Process Theory

Dual-Process theory describes how information is processed in two distinct modes depending on a number of factors, with the most important being motivation and capacity. Dual process theories generally deal with the notion of persuasion (Bless & Schwarz, 1999). In order to understand the manner in which dual-process theory works in a social media environment, one must understand that social psychologists do not think of dual-process models as having only two choices, but rather, verifying there is not just one choice (Gilbert, 1999). Chaiken and Maheswaran (1994) describe how one mode of

thinking may influence the other; specifically, a heuristic can bias a systematic process when there is a lack of clear evidence. While dual-process models may, on the surface, imply only two modes of thinking, one should think of the process of determining credibility as singularly one or the other, but a possible combination of both. The impact of the heuristic on an individual will increase if cognitive capacity or motivation is low (Bless & Schwarz, 1999).

The present study attempts to illustrate dual-process theory in the environment of social media, specifically the evaluation of the credibility of news on social media. The two modes described by Bless and Schwarz (1999) to process information is either using a high cognitive mode or a low cognitive mode. One might think about the high cognitive mode as an individual acting as a “lay scientist” using significant effort to process information whereas a low cognitive mode might be described as individuals using a set of self-made “rules of thumb” to process information (Bless & Schwarz, 1999, p. 423). As a person scrolls through a social media thread, they may switch from one mode to another and back again in a fluid and iterative fashion. To further illustrate these modes in a clearer way, one might think of the high cognitive mode as a situation where an individual is using significant cognitive effort in order to process information in a systematic way, whereas a situation requiring less significant cognitive effort due to a number of factors such as time or capacity, in a more instinctive manner.

The dual process models described in this literature review are the Heuristic-Systematic Model and the Elaboration Likelihood Model. Both models serve as a window into understanding the notions of persuasion and information processing. The

present study is grounded in both models. In the following sections, I will describe how both models explain obtaining and processing information. Because both models fall under the dual processing umbrella, many key elements in each model are common including assumptions about the motivation of individuals to hold correct attitudes (Chaiken, Giner-Sorolla, & Chen, 1996a; Petty & Cacioppo, 1986). Both models are essential in understanding the methods by which individuals process information.

### Heuristic-Systematic Model

Chaiken et al. (1987) describe the Heuristic-Systematic Model (HSM), which is grounded in dual-process theory. This model demonstrates how persuasion impacts the processing of information on social media. The HSM shows how two different modes are used, along with the role motivation and capacity play in this process. The two modes are called heuristic and systematic, respectively, and are used depending on the individual's level of motivation and his or her cognitive capacity when processing information. It is important to note that an individual may interchange between the two or the modes may even co-occur (Bohner et al., 1995).

While a systematic approach requires a detailed understanding of content, heuristics rely on a balance of minimized effort to sufficiently understand a topic (Bohner et al., 1995). The sufficiency principle, which is similar to the principle of least effort, is when an individual has invested enough time and effort into a new piece of information to feel he or she accepts it as truth (Bohner et al., 1995; Chen & Chaiken, 1999). This



principle can also be understood as using the least amount of effort in order to maximize a desired result.

Chaiken (1980) describes that an individual with a high level of motivation or capacity will use a systematic approach to process information, while an individual with low motivation or capacity will use heuristic(s) to process information. Capacity is defined as the ability for a person to process a piece of information. For example, compare how a doctor and an auditor might process legislation on corporate tax reform. Because the doctor does not have the background in taxes that the auditor does, an expert describing the legislation on television may be credible enough, whereas the auditor would probably take a more systematic and critical approach to understanding the topic due to a greater amount of capacity to process the information. Chaiken et al. (1987) describe how an individual with a low level of information processing could change his or her opinion on a piece of information because individuals may only assess superficial cues in order to determine credibility. This means that the doctor will be more likely to develop an opinion compared to the auditor, who has a more nuanced understanding of the information.

A low level of information may be perceived as necessary due to a combination of bounded rationality and motivation. This means that calculations that are complex and need quick solutions but lack the perceived value of a large time investment would use a heuristic. Motivation plays a key role in how information is processed, and the degree and type of that motivation can determine which information is being processed and what that process looks like.

## Motivation

Motivation plays an essential role in the manner in which an individual processes information which can possibly persuade the individual to recognize one piece of information over another as truth. The HSM assumes that individuals want to possess accurate beliefs and attitudes (Chaiken et al., 1996a). The level of motivation a person has when identifying information can dictate whether the person is using high or low cognition, which will lead to either a systematic or heuristic mode of processing (Chaiken, 1980; Chaiken et al., 1987). According to Bless and Schwarz (1999), a high level of motivation will instigate a high cognitive level whereas a low level of motivation will produce a low level of cognition. Chaiken et al. (1987) continue to explain that simple heuristics will be more persuasive when an individual's motivation is low compared to a complex heuristic requiring more complex cognitive thought. Winter et al. (2016) describe how these affective states will change depending on situational motivations and the goals of the individual. The HSM is a multiple-motive framework that has three main motives: accuracy, defense, and impression. Each play significant roles in processing information (Bohner et al., 1995; Metzger & Flanagin, 2013). For a clear description of the different motivations, Chaiken, Giner-Sorolla, and Chen (1996b) describe the three kinds of general motivations: accuracy, defense, and impression.

Accuracy. The accuracy motivation is activated when the individual has an accuracy goal he or she wants to achieve. If the motivation and/or capacity are low, individuals may use heuristics to achieve their goal. If motivation and/or capacity are high, the individual may move to a systematic approach to achieve his or her goal. For

example, a person may use a systematic method of finding information because he or she may have been informed of an illness in a family member and may exhaust his or her researching capability to find as much information about the illness as possible (Chaiken et al., 1996b; Chen et al., 1999).

Defense. The defense motivation describes the desire for information to fit within the individual's previous understanding of the issue, known as self-definition. Judgmental heuristics are most likely used in order to protect that previous understanding because this understanding can be tied to the individual's strong belief or value system. Selective usage of the same heuristics employed in accuracy motivation could be applied, where the individual is only processing information that aligns with his or her previous views. This biased method of information processing will overemphasize supportive information while deemphasizing conflicting information. The motivation level and use of systematic or heuristic processing can vary until satisfaction can be reached and any gaps in confidence created with this information can be closed (Chaiken et al., 1996b; Chen et al., 1999). An example of the defense motivation could be triggered when looking for information on divisive issues such as politics.

Impression. The final general motivation described in the HSM is called the impression motivation. This motivation is activated when an individual wants to satisfy a social goal like making good impressions in order to fit the dynamics of a social group. This impression motivated group will select heuristics that may act in the opposite way a defensive heuristic might because they desire agreement with the group. When the

impression motivation is high, individuals engaged in this process will likely use a heuristic to process biased information that reinforces the values and beliefs of the desired social group (Chaiken et al., 1996b; Chen et al., 1999).

When understanding all three motives, it is important to note the role that self-esteem has in the processing of information. Chen et al. (1999) notes that when impression motivation and defensive motivations are in conflict, defensive motivation prevails, possibly to due to the uncertainty that the approval into the group may not be returned. This is important to note because it could mean that convincing others of common values may become minimized in a toxic political environment.

### Credibility Cues

The Heuristic-Systematic Model describes how credibility cues serve as a gateway to credibility heuristics or systematic processing concerning the perception of information as truth (Chaiken et al., 1987). A credibility cue should be thought of as a piece of evidence that an individual would process that provides evidence toward believability of a source. Credibility cues may not always be proximal to the source but can be distal in nature (Chaiken et al., 1987). A proximal cue may be related to the plausibility of the source itself whereas a distal cue may link more strongly with the credibility of the author. In a heuristic situation, a message recipient may accept a distal argument from a respected individual on the merits of that individual, for example a school principal, compared to a systematic approach where the message recipient will exhaust many variables in order to come to a conclusion. An example in a social media environment is when a person shares a news story in his or her feed and another person

accepts the validity of that information because the person who shared it has been credible in the past, thus triggering a liking-agreement heuristic.

There is a wide range of cues that trigger certain heuristics from length of an article equating strength of an argument (also known as the “length is strength” heuristic) to numerous individuals agreeing with an idea triggering a consensus heuristic. Since different cues can activate higher or lower levels of cognition, the cue will be more persuasive if it matches the process being used. For example, if a person is systematically processing a topic, like information on an illness, a “length equals strength” heuristic is less likely to be an effective way to determine credibility compared to other, more mentally rigorous, cues. Assimilation of certain heuristics can come from an individual’s past experiences which informed the individual in a positive way thus giving credence to using the same kind of heuristic again (Chaiken et al., 1987). This model also describes that heuristic processes are so effortless that individuals may not even be aware they are using them, such as a teacher teaching a lesson to students. Students will likely accept knowledge as truth because the teacher is perceived as an authority.

#### Applicability of the HSM

The Heuristic-Systematic model describes a method for individuals to process information to meet the sufficiency principle. From different kinds of motivation, to high levels of motivation and capacity, to low levels, the HSM describes the different situations where perceivers of knowledge will use a systematic approach, heuristic approach, or both to interpret information (Bohner et al., 1995).

Credibility cues can be thought of as the initial contact point that initiates these processes. Understanding which credibility cues should be identified is essential in teaching individuals how to process news on social media. As a multiple-motive approach, this framework is a strong model for understanding how selective exposure can impact the “persuasion and attitude formation to the phase of information selection” (Winter et al., 2016, p. 688). This model is foundational in the area of understanding how consumers of social media news process information.

#### The Elaboration Likelihood Model

Another major model in the Dual-Process realm is the Elaboration Likelihood Model (ELM). Petty and Cacioppo (1986) describe this model as a method to understand persuasive communication that can be applicable to attitude change situations. The basic premise of the ELM is that persuasion can take two processing routes that may be perceived as similar to the HSM; however, Chaiken, Duckworth, and Darke (1999) argue their difference. While the HSM describes both a heuristic and systematic process, the ELM describes a peripheral route and a central route, which would be a typological difference due to the peripheral route making theoretical assumptions beyond what the HSM does (Chen & Chaiken, 1999). To some extent, both models describe the capacity or ability of an individual to process information as a key factor in the decision-making process. In contrast, one of the major differences between the HSM and ELM is that the HSM’s predictions uses the sufficiency principle (tradeoff of effort and adequate

judgment), where the ELM focuses on attitude change as an end result (Bohner et al., 1995; Chaiken et al., 1996a; Petty & Cacioppo, 1986).

The central route is the first type of persuasion in the ELM. The central route can be described as when someone carefully considers information in order to support an idea. The ELM describes this process as thoughtful and assessing the true merits of an idea. For this to occur, there has to be a high elaboration likelihood. The peripheral route is the second method of persuasion that the ELM describes. This peripheral route can be thought of as similar to a heuristic or a process that is unconscious or superficial.

The ELM includes a list of postulates that parallel the HSM but are also important in understanding how the decision process works. The postulates include the idea that people desire to have the correct understanding of their world, people are limited in their ability to process information, motivation can enhance or detract when processing information, and issues that are processed through the central route have a greater impact on decision than issue processed through the peripheral route (Petty & Cacioppo, 1986).

### Applicability of the ELM

The Elaboration Likelihood Model is an applicable model for educators because it describes a straightforward process of persuasion but is not the same as the HSM. Both models describe how motivation plays a role in decision making; however, the ELM lacks the heuristic model elements that are critical to much of the recent research in social media platforms. The ELM is a model that describes persuasion, where the HSM expands on persuasion and shows how people process information as credible. The ELM specifies that the stronger the source of information, the more likely the information will be

processed. While the ELM provides broad ideas on how to approach information processing, educators may want to examine more specific theories tailored to the nuances of the learning process.

### MAIN Model

A promising theory on how information obtained through social media is evaluated as credible is described by Sundar (2008) and called the MAIN model. MAIN stands for Modality, Agency, Interactivity, and Navigability, which describe affordances that, to varying extents, can indicate heuristics involved in determining credibility. The MAIN model contains a number of steps that lead to a credibility judgment. First, affordances lead to heuristics via credibility cues identified by the individual. The quality of these cues will determine how the individual evaluates the information. For instance, if the cue is trustworthy, it may have a different impact than a cue that indicates clarity. The MAIN model focuses on “technological aspects of digital media that can influence credibility judgments” (Sundar, 2008, p. 79). In other words, technology itself (in the case of the present study, social media) may have an effect on credibility heuristics.

Sundar (2008) describes how each affordance is unique in that it can help categorize heuristics. First, *Modality Cues* are specific to a certain medium, such as newspapers or social media platforms. Other types of cues could be audio cues or text-based cues. The second affordance is called an *Agency Cue* and deals with the individual’s understanding of the source of the information. For example, if the information came from a trusted friend or a respected newspaper, it may be deemed more



credible. Third, the *Interactivity Cue* describes where one can interact with information as both the origin or source of the information. An example may be a website that provides the ability to input one's specific criteria in order to find a result, such as a health website. Finally, the *Navigability Cue* describes how easily the appropriate information is accessed. An example might be a website that has an optimal layout for information that the consumer of information understands and is comfortable with, such as a Pinterest wall. These four groupings of heuristics, as Sundar (2008) describes, could specifically lead to credibility assessments in social media platforms.

#### Applicability of the MAIN Model

The MAIN model provides an interesting avenue when organizing heuristics into broader themes. While a group of heuristics may fall in the category of reputation or accuracy, the MAIN model proposes that heuristics could also be categorized by the format in which they are delivered. For example, reputation heuristics that are tied to modality cues may be more effective at indicating credible cues than reputation heuristics that are located in agency cues. Since the MAIN Model was published in 2008, the emphasis on social media evaluations may need to be updated for definitional clarity. While the model mentions Facebook, it does not articulate how the variety of social media inputs can impact credibility decisions.

#### Prominence-Interpretation Theory

The Prominence-Interpretation Theory (PIT) is focused on website credibility assessment using a model where the prominence of a website combines with how a

perceiver interprets that prominence which in turn, makes an impact on credibility (Fogg, 2003). In other words, if information is located on a website, individuals make a judgment about that information. The two key factors in this theory are Prominence and Interpretation with specific factors that describe each mode.

There are five factors that affect Prominence. These revolve around the individual's actions and motivations at the time the information is obtained. The five factors are: involvement of the user, topic of the website, task of the user, experience of the user, and individual differences. According to the PIT, involvement is the most dominant factor concerning Prominence because the motivation of a user will determine how many factors an individual notices. Generally speaking, these all involve how an individual may interpret a website. Under the theory, one cannot interpret the website without addressing these factors (Fogg, 2003).

The second factor in the PIT is Interpretation. After one or more of the Prominence factors are noticed, an individual will process that information in three different manners: the assumptions of the individual, the skill/knowledge of the individual, and the context of the individual. This suggests that different individuals make different judgments on websites depending on the interpretation factors.

#### Applicability of the PIT

While this study brings up many intriguing factors that aid in the process of understanding credibility online, the PIT does not provide the roadmap that the Heuristic-Systematic Model does. The PIT theory provides an oversimplified equation (Prominence x Interpretation = Credibility Impact), yet when each element is described, the model is

inadequate for the purposes of the present study. For instance, the PIT describes that five Prominence factors and three Interpretation factors work together to impact the credibility assessment, but it does not describe how they all interact with each other.

While this theory has merit to interpret websites, the factors that affect prominence and interpretation are difficult to process as presented in order to develop a solid grounding compared to the HSM. The HSM clearly shows that a credibility cue triggers either a credibility heuristic or systematic method for determining credibility depending on the individual's motivation and capacity. This may be why most of the current research on information processing is grounded in the HSM while the PIT is used less frequently. In particular, the research that led to the development of the instrument that the present study's instrument is based upon is grounded in the HSM (Flanagin et al., 2010).

### Credibility

Understanding credibility in a social media context is essential for the present study. Fogg et al. (2001) associates "credibility" with the term "believability". While secondary teachers may focus on students making credibility judgments in isolation, social media credibility decisions are made in a setting where many individuals' opinions influence credibility decisions (Metzger et al., 2010). For example, a student may write a research report in isolation, identifying sources and analyzing those sources using a systematic process that the teacher outlines in order to determine credibility. In contrast, credibility of news obtained through social media is determined in a fundamentally

different manner. Rather than the individual making decisions on credibility in isolation, a number of different credibility cues such as a Facebook friend that has shared a post or a large number of “likes” on a post can influence the credibility of information. Where students may make decisions in isolation for research reports, social influences can have a large impact on determining credibility in social media platforms (Metzger et al., 2010).

In order to understand what credibility cues are demonstrating to the perceiver of information, it is essential to understand the meaning of credibility itself. The present study examines what secondary teachers perceive as the most important cues to determine the credibility of information. The previous sections of this literature review examined credibility cues, credible heuristics, and how perceived credibility is processed. The next step is to understand the definition of credibility. Fogg et al. (2003) describe that when individuals look at the design of a website, they use that as a measure to determine its credibility. An important question to ask is whether the design of a website is a reliable indicator of credibility. It is conceivable that if a person or entity with nefarious intentions knew that people looked at website design as a measure of credibility, professional-appearing website design could be employed to make biased or inaccurate information appear as credible. As stated in previous sections, credibility cues are not the only influences on judgments. One must also consider the role of motivation as well as capacity to understand information.

### Current Trends in Online Credibility

Gottfried (2016) states that 62% of Americans use social media to obtain their news. Therefore, heuristics could be a suitable method for processing that information. There are a variety of credibility cues consumers of news could employ. Often times, the cue triggers a heuristic with the same name; for example, the cue is that the document is long enough, which might trigger the *long is strong* heuristic. Other times, heuristics can be much broader in scope, such as information that is unwelcome may trigger an *intrusiveness* heuristic (Sundar, 2008).

The importance of understanding heuristics may have more immediate consequences in today's world than at any other time. The majority of current research in this area focuses on how individuals assess credibility of sources by cues and heuristics. This research is usually centered in the disciplines of information literacy and communication, with the research having implications in the disciplines of education and political science. Studies dealing with assessment of credibility provide a variety of descriptions demonstrating how individuals process information. Considering that the social media landscape is evolving at a rapid pace, and there is little indication that this trend will change, addressing the most recent research in this realm is paramount in grounding the present study. Information gatekeeping has forever shifted away from trusted institutions onto to the social media user.

Studies by Metzger and Flanagin (2013) and Metzger et al. (2010) demonstrate that individuals use cognitive heuristics to form credibility judgments about online information. These studies describe how different heuristics can influence different

credibility judgments and how some heuristics can be subsets of other heuristics. For example, the *reputation heuristic* may be part of a larger *authority heuristic* that affirms the source is valid because the source is reputable, thus has authority. The *endorsement heuristic* is important in information obtained through social media because it deals with how people view a source as credible because other individuals who are deemed credible believe the information and therefore is closely linked to the *liking/agreement heuristic*. In the MAIN model, Sundar (2008) refers to a similar heuristic called the *bandwagon heuristic* which is a heuristic that describes how a person might see others as agreeing with it, therefore this person will agree with it. Another heuristic Metzger and Flanagin (2013) describe is the *consistency heuristic*. This heuristic indicates how individuals substantiate information based on whether they can find similar information elsewhere; however, many individuals may not complete an exhaustive search, only searching enough to satisfy their curiosity. The *self-confirmation* heuristic can be understood as a heuristic that confirms one's own previous beliefs. The studies also elaborate on the *expectancy violation heuristic* which is triggered when information does not meet the expectation of the consumer in some way which can manifest itself in lack of information or the website requiring too much effort to process. The final heuristic described by Metzger and Flanagin (2013) is the *persuasive intent* heuristic. This heuristic is triggered when the consumer feels the information is biased in some way, particularly in advertising, but could conceivably be applied to other areas such as news. While this list of heuristics is not exhaustive, it describes many different feelings and emotions that can be triggered by various credibility cues.

Winter et al. (2016)'s study is based on the Heuristic-Systematic Model. The study addressed how people with different motivations evaluated heuristics and found that participants in certain motivational structures were prone to using certain heuristics. For example, individuals with a defensive motivation had a stronger confirmation bias where individuals with impression motivations were tied to social recommendations. This research shows how individuals are prone to a bias depending on their motivations activated by certain cues. It stands to reason that teaching individuals about how susceptible they are to biased information when in a particular motivation and providing tools to avoid reading biased news would improve the ability for teachers to understand the difference between biased and unbiased news (Winter et al., 2016).

Messing and Westwood (2014) suggest that the usefulness of information obtained through social media is triggered by heuristics that come from social endorsements. They argue that cues that convey the most useful information will be more likely to be used by consumers. What this means for consumers of news obtained through social media is that social endorsements have greater impact on an individual compared to source cues. The results indicated that partisan individuals will select a variety of news sources if given the opportunity. As Messing and Westwood (2014) describe, a variety of viewpoints on a social media feed increases the exposure to different kinds of news; however, if the exposure of news is limited to one political side due to social media algorithms designed to promote what the consumer desires, an echo chamber is created (Bessi et al., 2016). Overall, this research implies that if educators are to teach students

which cues they should notice, those cues must provide a great deal of useful information.

To continue to demonstrate how sources provide credibility, Flanagin and Metzger (2007) conducted a study on which types of information sources were perceived to have the most credibility. Along with e-commerce sites, news organizations were perceived to be the most trustworthy, compared to special interest and personal websites. The study reports that design elements can increase the credibility perception of a website compared to other sites with equal design elements. This research is important because an individual who obtains news from a news organization on a social media feed may view it as credible due to the nature of the information from that organization. What students may not know is a credible site compared to a non-credible site. It is conceivable that an individual that does not know that *The Onion* is a satire website may perceive it to be factual news.

Hocevar, Flanagin, and Metzger (2014) discuss the notion of social media self-efficacy. Results of their study demonstrate two important concepts: a person with higher social media self-efficacy trusts information shared on the internet more than people with lower self-efficacy and people with higher social media self-efficacy may be disposed to trusting information and opinions shared “specifically when evaluating or verifying the information they find online” (Hocevar et al., 2014, p. 261). This is another indication that a bandwagon heuristic may be quite powerful to students when perhaps they should be looking at other cues. Furthermore, Johnson, Sbaffi, and Rowley (2016) describe how college freshmen and juniors look at elements such as ease of use, content, and



recommendations, implying a wide range of items considered to determine credibility. Educators should be aware that students already evaluate information online, so the work of teaching new heuristics may also include the unlearning of heuristics that lead to misidentifying inaccurate information as accurate.

Lin, Spence, and Lachlan (2016) build on the MAIN model by focusing on the agency affordance via three types of heuristics: authority, identity, and bandwagon. This study involved the risk/health domain. Results indicated that tweets from the U.S. Centers for Disease Control were perceived as more credible compared to health information from peers and strangers. This study demonstrates that the source of the information triggers an important credibility heuristic and perhaps individuals will trust information directly from the source.

To understand why certain sources may offer a more trustworthy heuristic, Carlin and Love (2013) argue that trust is hampered by lack of reciprocity (meaning lack of common ground), rather than partisanship. Partisanship is what prevents reciprocity from happening. One can reasonably infer that in a social media news context, if one does not engage with an opposing news source, one will never learn to trust it due to partisan biases (Carlin & Love, 2013). In other words, when an individual looks at a source to determine its credibility, bias will play a part in that decision and must be overcome, particularly if the individual has a defensive motivation. This confirms the HSM because the defensive motivation can explain why partisan individuals do not trust one another (Chaiken & Maheswaran, 1994).

Finally, a recent study by Vosoughi et al. (2018) indicates that social media news falsehoods are spread through social media at a much greater rate than true social media news articles due to the false stories being more interesting. The authors contrast “fake news” with the notion of “false or true” news which is an important distinction. “Fake news” intends to deceive whereas people that share “false news” may actually believe that news to be true. Because “false news” is more likely to spread through social media at ever increasing rates, misinformation can be spread thus indicating the need to teach practices to ensure social media users are better informed to make credibility decisions (Vosoughi et al., 2018).

### Summary of Heuristic Theories

We know that the majority of Americans use social media to obtain the news. This demonstrates that individuals are now the arbiters of information which requires a skillset that may not yet be developed. This skillset must include a toolkit that allows for people to utilize heuristics that aid in determining the credibility of news (Gigerenzer & Todd, 1999). Simply knowing the heuristics is not enough; one must understand the motivations that might trigger those heuristics. Accuracy, defense, and impression can indicate whether a systematic or heuristic process is used (Metzger, 2007). When looking at the research in its totality, researchers are interested in what people *are* doing, but there is little research on what people *should* be doing when assessing credibility. This study will demonstrate what secondary teachers perceive as the most important credibility cues for news obtained through social media. While some skills are currently being used to

assess credibility, the use of a proper set of credibility assessment tools is needed in the age of social media.

### Heuristics with K-12 Students

In the K-12 classroom, picture a student assigned to complete a research report on a topic, completing the report, receiving a poor grade, and wondering why. In this example, the student takes a moment to reflect on the process used to complete the report and realizes that he or she used poor heuristics throughout the process of researching and writing the report. The Heuristic-Systematic Model can provide an explanation as to what might be occurring (Chaiken et al., 1987). One of two situations may have happened causing the student to fail: either the student was not motivated to complete the report well, or the student did not have the capacity to understand the assignment. Perhaps the student did not have the motivation to systematically evaluate all of the sources obtained through a Google search and simply picked the top results. Perhaps the student read the report prompt and did not understand it, indicating the student did not have the capacity to understand the question. Both of these situations could trigger low-cognitive heuristics which guided the student's decision-making process.

In many respects, students use heuristics all of the time for making decisions. Since using heuristics means that one uses low cognitive decision-making process or rules of thumb, heuristics can take many forms in a student's day. Fung, Chiu, Ko, Ho, and Lo (2016) assessed three major mobile library websites based on ten heuristics and found areas of improvement based on an analysis of the heuristics used by students when

searching for information. Only when significantly motivated or having a high capacity to understand the material through one form or another will a student turn to the systematic process to understand information. In other words, students initially default to a heuristic to process information.

Understanding the role of heuristics in a K-12 classroom is essential. One of the keys to the HSM is understanding the role that motivation plays in the level of cognitive effort a student will use on any given topic. Ideally, students would have a high motivation to learn all of the subjects they encounter every day. The Theory of Bounded Rationality could be interpreted to indicate that students use low level cognitive decision making in some classroom situations. It should be noted that just because students do not use systematic approaches to all learning, using heuristics can be an effective way to make decisions because they are grounded in standard rules of thumb. For example, Burns et al. (2015) argues that heuristics can play a role in a mathematics classroom by teaching students math processes that he calls procedural fluency heuristics. By isolating the point where a student may struggle in solving a math problem, the teacher can identify that step and create an intervention aimed at correcting the students' deficiency.

#### Heuristics and K-12 Teachers

The process of verifying web-based information is a skillset teachers need to engage in with their students to ensure their information is accurate. Flanagin and Metzger (2000) describe how individuals may rarely verify information, in which case teachers may be called upon to teach these skills to students, which could be in the form

of teaching credibility heuristics. While the use of heuristics is a low cognitive endeavor, that does not mean the use of heuristics is a poor decision-making process. Through education, training, and experience, heuristics can be used as “rules of thumb” that are effective in various contexts (Yadav, Stephenson, & Hai, 2017). While a student may not have had time to develop applicable heuristics, an experienced teacher certainly has. A teacher makes a number of complicated decisions while teaching. It is unrealistic to think that every situation a teacher faces in a day will spur a systematic, thorough process weighing all of the variables and outcomes a decision may carry in any given situation. Davis and Krajcik (2005) describe heuristics as principles that may not have the empirical testing to prove their usefulness. They describe a set of design heuristics that may help science teachers improve their instructional practices (Davis & Krajcik, 2005). While a systematic approach may be an optimal option, it is by no means pragmatic. For example, an elementary teacher may make a number of decisions to help his or her children complete a project. Students will approach the teacher with questions concerning the quality of the work, questions about the process, or students telling the teacher about other students. These decisions need to be made calmly and quickly. By having the correct heuristic toolbox, teachers make effective decisions that help the day run smoothly. These heuristics are developed through the experiences of the teacher over his or her career.

### Dual Processing Model of Credibility Assessment

Resulting from changes in the way people process information due to the nature of the Internet, Metzger (2007) updated the dual process models to include credibility assessments about websites. This theory may not be useful for social media users all of the time, but it can describe how people evaluate information depending on their “motivations and ability” (Metzger, 2007, p. 2087). While motivations have been previously discussed in the HSM, ability can be associated with capacity, which is the individual’s ability to assess information. This theory also includes the premise that individual’s goals are not always to find complete information but can be more “casual” in nature. For example, a person may go online to get a Facebook update, begin scrolling through posts, and find new information. Because of this “casual” nature, people may not use extensive cognitive effort to assess credibility.

Much like the HSM and ELM, Metzger (2007) proposes that the Dual Processing Model of Credibility Assessment can estimate how someone will evaluate information. The person’s motivation describes when someone will evaluate information and the ability to process the information describes whether a heuristic process or a systematic approach will be used. This theory describes three phases that a person will go through in the information credibility assessment process: Exposure Phase, Evaluation Phase, and Judgment Phase.

The Exposure Phase consists of three elements that begin the credibility assessment process. First, a person must be exposed to the website. Second, the person must be motivated to evaluate the website. Third, the person must have the ability to

evaluate the website. Each of these three elements must take place for evaluation to happen. There are a variety of paths that a “no” answer will take which are described in the Evaluation Phase (Metzger, 2007).

The Evaluation Phase also has three main elements that all describe how evaluation might take place. First, if a person has no motivation to evaluate a website, then there might not be any evaluation of the website. The second piece to the Evaluation Phase is the Heuristic/Peripheral Evaluation. This phase is triggered when either there is no motivation to evaluate or there is no ability to evaluate the evidence. The final piece in this phase is when there is a path where a person is exposed to a website, has the motivation to evaluate, and has the ability to evaluate the credibility of the website. When these elements occur, a Systematic/Central evaluation piece is triggered (Metzger, 2007).

The final phase in this model is called the Judgment Phase. This phase demonstrates that credibility judgments are only made when a Heuristic/Peripheral or Systematic/Central Evaluation takes place (Metzger, 2007). This evaluation model shows each of the potential pathways to make a credibility judgment, which is helpful when understanding the importance of the exposure a person has to a website.

#### Applicability of the Dual Processing Model

Metzger’s (2007) model includes elements such as the manner in which the systematic/central and heuristics/peripheral routes from the ELM are achieved as well as why heuristics are used to describe a how a credibility judgment is made (Choi & Stvilia, 2015). While there may need to be an addition on how the quality of the heuristic determines what the judgment is as in the MAIN model from Sundar (2008), this is the

most straightforward model that is adapted and used as the theoretical framework for the present study.

### Conceptual Framework

As shown in FIG 1, the working conceptual framework for this study combines elements from the Heuristic-Systematic Model (Chaiken et al., 1987), Elaboration Likelihood Model (Petty & Cacioppo, 1986), MAIN model (Sundar, 2008), and Dual Processing Model (Metzger, 2007). The conceptual framework was developed from a variety of sources stemming from the *Kids and Credibility Study* by Flanagin et al. (2010). This foundational study was my entry into the broader research on online credibility.

One of the common elements of these studies is that they describe *what* people do, not what they *should* do. It is for this reason that I do not simply use the Dual Processing Model of Credibility Assessment, but also add in the “quality” element of the MAIN model. When surveying teachers to find out which credibility cues students should identify on their social media feeds, results could show a number of cues reporting as similar. In this case, grouping the cues by heuristic and even possibly “quality” which is included in the MAIN model may be essential.

The first step in the conceptual framework is the credibility cue. Depending on how the individual processes the cue will determine either no capacity to process the cue, or a low to high capacity to process the cue. Since novice teachers may be lacking in their understanding of politics, it is paramount for new teachers to build their own capacity in



order to help guide students in making credibility judgements (Journell, 2013). The next step is kind of motivation the individual has when processing the cue. The person could either have no motivation, which leads to no processing of the information, a defensive or impression motivation, or an accuracy motivation, which are highlighted in the HSM (Chaiken et al., 1987).

The next step is the level of motivation caused by the cue. A low to medium level of motivation will most likely produce a heuristic process of judging credibly, whereas a high level of motivation, most likely from an accuracy motivation, will cause a systematic processing of information. The following step is the quality phase, as described in the MAIN model, where the individual makes a judgment on the heuristic or systematic process (Sundar, 2008). For example, if the heuristic produces information that confirms the information, the person will trust the cue. This step will most likely determine whether the information is credible. What this process demonstrates is that each credibility cue is tied to a certain type of judgment. When working backwards, the purpose of the present study is to discover which credibility cue (or family of cues) that triggers a heuristic produces the most accurate judgment.

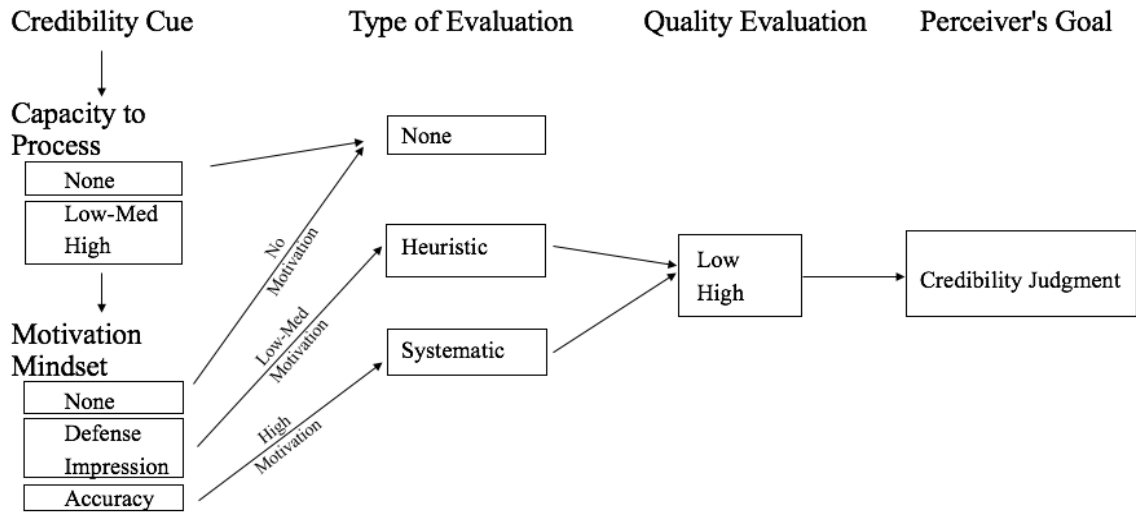


FIG 1. Credibility Judgment Process

### Kids and Credibility Study

The present study is based on *Kids and Credibility: An Empirical Examination of youth, Digital Media Use, and Information Credibility* (Flanagin et al., 2010). This study was funded by the John D. and Catherine T. MacArthur Foundation which assessed how children from 11-18 began using the Internet, their activities online, their Internet skill level, and their impressions of the environment on the Web. While *Kids and Credibility* asked students what they perceived as credible cues on the internet, the present study assesses what secondary teachers perceive to be the most effective cues when assessing the credibility of news found on social media. The instrument used in this study was adapted from the *Kids and Credibility* study as it deals with heuristic and social cues to determine credibility of a website.

The *Kids and Credibility* study by Flanagin et al. (2010) assesses students' perceptions of credibility cues on a likert scale from 1-5. The scale describes "not at all important" (1) to "very important" (5) in the 22-item survey. "The information on the Web site is up-to-date" (3.85) rates as the highest as compared to "The Web site address has a certain ending (like ".gov" or ".edu" or ".com")" (2.96). "The information on the Web site is up-to-date" is confirmed by Sundar (2008) in terms of youth being attracted to surface features. Because the means of the credibility cues are so similar, the wide range of what cues students may perceive as being credible hold equal footing. For example, "Others recommend the Web site or information source" (3.39) is relatively the same as "You get more than just one person's opinion" (3.38), and demonstrates that students need greater clarity on what is a credible cue and what is not (Flanagin et al., 2010, p. 52).

The *Kids and Credibility* study by Flanagin et al. (2010) came to a number of interesting conclusions. First, young people (age 18 and below) tended to use heuristic processes to evaluate credibility than analytic processes. Next, the study found that heuristic credibility strategies used by kids were made in a short amount of time and lacked evaluation in a meaningful way. This lends credence to need to develop these heuristic credibility strategies. Finally, the study concluded that while students understand the need for making quality credibility judgments, they do not always follow through on a rigorous method (Flanagin et al., 2010).

## Conclusion

Processing information is not simple, but rather, has many dynamic elements. The literature suggests that a credibility cue starts individuals on a path that reaches into their motivations as well as capacity to make judgments about the information they see which happens in a low cognitive mindset (Metzger, 2007) which is a situation such as scrolling through social media news feeds. While people are likely to use social endorsements to determine credibility (Messing & Westwood, 2014), research should determine if secondary teachers perceive if these social endorsements are effective in determining credibility. The present study uses principal components analysis to determine which credibility cues secondary teachers perceive as most important in a social media environment. Secondary teachers clearly must address accuracy in social media, current events, and credibility with their students because individuals may not always verify web-based information (Flanagin & Metzger, 2000). In the next chapter, I describe the method of the present study, including the survey design, population and sample, data collection and instrumentation, procedures, and method of data analysis.

## CHAPTER THREE – METHODOLOGY

### Introduction

The goal of the present study is to understand which credibility cues secondary teachers in a Rocky Mountain state perceive as the best for students to use when evaluating news obtained through social media. This chapter provides an explanation of the method including the research question, problem and purpose, data collection, sample survey instrument, and procedures for principal components analysis. This study is based on Flanagin et al. (2010) that surveyed students aged 11-18 on a variety of online evaluation habits. When reading about the different cues that students use when evaluating online information, the survey did not ask what cues secondary educators believe students should assess. After a search of the literature on social media credibility cues, a gap in the literature became clear.

### Research Problem and Purpose

Current trends in how individuals process news obtained through social media are changing to the degree that secondary educators need to modify their instruction. Credibility of journalistic institutions such as the *New York Times*, routinely come into question, which means people must individually determine what is credible. To complicate matters, people now have an unprecedented amount of access to information on the Internet, particularly through social media. As recently as the early 2000s, the majority of Americans read newspapers or watched televised news programs as their

primary sources, but since the advent of the Internet and social media, 62% of Americans now obtain news through social media platforms (Gottfried, 2016). In a social media environment, people make credibility judgments using quick-low cognitive decisions (Metzger, 2007) and these judgments are impacting how people interpret information on political events and other news (Pierce, Redlawsk, & Cohen, 2016).

The purpose of this quantitative study is to better understand how secondary teachers in the Rocky Mountain Region value credibility cues and heuristics when teaching students how to process news on social media. It is hoped that the present study will lay the foundation for future research on how secondary teachers should teach students how to evaluate the credibility of news found on social media.

### Research Questions

- Research Question 1: Do the composite components within the credibility cue list match credibility heuristics in the literature?
- Research Question 2: Of the composite components produced in this study, what is the rank of the components relative to each other, as reflected on the scale of “Extremely Effective” to “Somewhat Effective”?

### Survey Design

This is a cross-sectional exploratory factor analysis for the purpose of data reduction. It is cross-sectional because the study analyzes secondary teachers in one point in time, 2018 (Creswell, 1994). An exploratory factor analysis method will be conducted

in order to measure underlying factors within the credibility cues (Gay, Mills, & Airasian, 2006). Factor analysis was chosen because this methodology will show what the sources of common variance are in the cues, which may lead to interpretable constructs (Field, 2013; Leech, Barrett, & Morgan, 2014; Wang, Watts, Anderson, & Little, 2013). Not only is the exploratory factor analysis appropriate for understanding underlying factors, an exploratory factor analysis was employed in the original study conducted by Flanagin et al. (2010). A modified version of this instrument was used. By employing a factor analysis, the credibility cues can be reduced into clusters which may demonstrate optimal heuristics that secondary teachers believe are the most useful when evaluating news on social media platforms.

During the 2017-2018 academic year, the survey was completed by 115 secondary teachers in a Rocky Mountain state using the online Qualtrics survey administration tool. Any responses that could be used to identify participants were masked. The data are stored on a password protected computer. Data were analyzed using SPSS software version 24. Concerning the protection of human subjects, Montana State University's Institutional Review Board approved this study and the subject waiver form can be found in Appendix B.

### Population and Sample

The participants are secondary teachers, selected because they are likely to teach about the news using online sources in middle and high school settings. The purposeful sample is 115, self-selected from the approximate 3,977 middle and high school

secondary teachers in a Rocky Mountain state (D. Murray, personal communication, December 12, 2017), for a total response rate of 3%. The researcher used a purposeful sample due to convenience and availability of the participants (Creswell, 1994). This survey was voluntary and the majority of respondents came from schools with a large population due to the amount of teachers in larger schools. The data collection began at the annual educator conference in the state. Additional participants were recruited through larger school districts in close proximity to the researcher. The researcher then approached individual school districts and principals in order to promote the survey. Individual contacts improved the response rate. The data collection process required the researcher to visit specific schools in order to meet the required sample for the study. In this case, schools were selected based on the receptiveness of their administrator to allow the researcher access to the secondary teachers.

This process was repeated until  $N=115$  was achieved. A 5:1 ratio of participants to variables is was used for a total of 115 participants. However, it should be noted that not only do ratio and sample size determine a strong principal components analysis, but also communalities, variables in each factor, loadings, as well as the number of factors (de Winter, Dodou, & Wieringa, 2009). Since there are 23 variables indicating credibility cues in the modified instrument, the approximate number of subjects is  $N=115$ , for a 5:1 ratio (Costello & Osborne, 2005; Suhr, 2006). Steven (2002) recommends a minimum of 5:1 ratio of questions to participants with a total  $N$  being greater than 100. As Costello & Osborne (2005) point out, low ratios are acceptable if other thresholds are met such as crossloadings or high communalities which would require more data. Since this study



met the conditions of a PCA, no further data were required. Prior to implementing the study, an expert panel reviewed the instrument for face validity (Creswell & Clark, 2007). Clarification examples were added to the survey questions as a result. The intended confidence level of the modified instrument was high due to two main factors: the original instrument was used in previous research, and the sample met the respondent threshold required for an instrument with 23 questions.

### Data Collection and Instrumentation

The modified survey instrument contains twenty-three questions that illustrate different credibility cues. The instrument is based on a study that surveyed the credibility cues students from ages 11-18 used when looking at information online. The present study used a slightly modified version of the *Kids and Credibility* study (Flanagin et al., 2010). The instrument used a linear, numeric scale where participants rated each of the twenty-three credibility cues. The researcher measured both importance and relative measures of the different cues (Alreck & Settle, 2004). A principal components analysis was selected in order to reduce the wide-ranging number of credibility cues into a manageable number and find underlying factors within the cues.

The scale was modified due to possible multicollinearity issues. Multicollinearity occurs when variables are highly correlated. The scale of the original instrument used 1= “Not important” to 5= “Very important”. However, the researcher assumed that a secondary teacher may believe that all of the credibility cues could register a 3 to 5 score (Flanagin et al., 2010). Because it was assumed that multicollinearity could be an issue

with the original instrument's likert scale, the scale was modified to a linear numeric scale in order to rank the different credibility cues against each other. The instrument for this study uses a five-point linear numeric scale from 1= "Extremely Effective" to 5= "Somewhat Effective." It is important to note that the instrument read "Extremely Effective" as a 5 and "Somewhat Effective" as a 1, but this was reversed due to the Qualtrics survey software coding the scale from 1 to 5 instead of 5 to 1. This was used because a typical likert scale may not have enough variance to detect due to the nature of the questions. The difference between the original likert scale and the linear numeric scale of the modified instrument is based on the assumption that all of the credibility cues will register some kind of ranking on importance, thus nullifying the bottom two scale options on the likert scale. By changing the wording to "Somewhat Effective" as the lowest possible answer, participants will hopefully utilize more of the scale which may produce clearer factors. For example, it is plausible to assume that both "the information on the website is up to date" could score a high rating similar to "the information on the website is similar to information on other websites" whereas using a linear numeric scale will give both absolute measure and relative measure of importance (Alreck & Settle, 2004). The language was changed from "Important" to "Effective", which is a semantical change that the researcher believed better represented the question. For example, saying "how important is this cue in determining credibility" seemed more ambiguous than "how effective is this cue in determining credibility?" There are no negatively worded items. Finally, according to Alreck and Settle (2004), intermediate level labeling is not recommended because consensus of the meanings of those labels could be

misunderstood, common spacing between 1 and 5 is understood, and there is “no possible mistake” about new dimensions that may be interpreted by the participants (p. 132).

<b>Research Question</b>	<b>Quantitative Measure</b>
RQ1: Do the composite components within the credibility cue list match credibility heuristics in the literature?	Principal Components Analysis using a Varimax rotation, which was used in the initial <i>Kids and Credibility</i> study, revealed three components which represent credibility heuristics. Standard PCA assumptions were met.
RQ2: Of the composite components produced in this study, what is the rank of the components relative to each other, as reflected on the scale of “Extremely Effective” to “Somewhat Effective”?	Sum scores above the cut-off value determined by the component loadings was used in order to determine which component was perceived to be the most credible.

FIG 2. Research questions and quantitative measures

### Procedures

The survey instrument was constructed using the online Qualtrics software. A QR code or link attached to an email was provided to potential participants. In order to maximize participation, the survey was readable not only on laptop and desktop computers, but also easily readable on smart phones and tablets. The instrument was evaluated by graduate students in the field of education for face validity and was further refined. The data from graduate students were analyzed using SPSS version 24 and interpreted on its usefulness by the researcher and his advisor prior to administration. After the instrument refined, the researcher administered the survey to participants at conferences and at school locations until  $N=115$  was reached. When 115 participants completed the survey, SPSS software was used to analyze the data.

### Variables

Twenty-three independent measured variables were used in this survey. There are underlying or latent factors that will come from the variables so an principal components analysis is the most appropriate test (Leech et al., 2014). The variables are slightly modified credibility cues from the *Kids and Credibility* study (Flanagin et al., 2010). The respondents' demographics are size of school, type of school (Middle/Jr. High or High School), teacher content area, age, and gender. "Elementary school" was added as a selection in order to ensure that if an elementary teacher took the survey, the data could be extracted accordingly. For the same reason, "Administrator/other" was also added to better filter out completed surveys not relevant to the analysis.

### Field Testing for Face Validity

The instrument was field tested for face validity through a process of sending the instrument to a number of graduate student colleagues. Graduate students completed the survey and added feedback after each question. Feedback included slight changes to the phrasing of a few questions for clarity as well as adding helpful explanation tabs into the survey. Many of the credibility cues in the original instrument were designed for websites and needed context added in order to specifically understand the cues. Trivial factors were eliminated in this step-in order to strengthen the overall results (Brown, 2014).

### Data Analysis

The data analysis process may lead the researcher to use a number of different analytic strategies. The study by Flanagin et al. (2010) was used inform the data analysis

process for the present study. Depending on the principal component analysis results, a number of different data analysis steps may proceed.

### Validity and Reliability

Analyzing for normality of data distributions, variable multicollinearity, and descriptive statistics are the first steps in data analysis process. This instrument is based on a Kids and Credibility study done by Flanagan et al. (2010) which used an exploratory factor analysis. Before beginning the factor analysis, normality, skewness, and kurtosis tests were administered for construct validity. Factor analysis assumes that the underlying factors represent dimensions in the real world (Field, 2013). The Kaiser-Meyer-Olkin (KMO) measure, which measures if enough items are predicted by a factor, was checked with an SPSS report and should present in the output as greater than .70 and no less than .50 (Leech et al., 2014). If scores are below .50, it is recommended that cues be dropped, and the test administered again (Field, 2013). The Bartlett test was checked for significance at less than .05 to check if variables correlate enough for a factor analysis to produce reasonable results (Leech et al., 2014).

Reliability indicates that if another researcher wants to conduct a similar study in the future, that researcher should have similar results as this study (Field, 2013).

Reliability for this study was determined by testing for Cronbach's  $\alpha$  to be at least .7 (Field, 2013). Since there are no reverse-scored credibility cues, one overall  $\alpha$  is needed. For this survey, Cronbach's  $\alpha = .916$

### Principal Components Analysis

Components represent underlying heuristic credibility structures that could be used by individuals when using social media websites. As Brown (2014) notes, the number of components chosen is the most crucial step for this research because over factoring or under factoring could have consequences for future research. A Varimax rotation was used because it is a common rotation and easy to interpret (Brown, 2014; Costello & Osborne, 2005). In order to determine the number of components to retain, eigenvalues above 1.0 were used as the benchmark. For the present study, the assumption is that the variables will predict components, thus justifying the PCA.

Components Emerge. The analysis revealed three components. A number of steps were undertaken in order to ensure that the components are logically linked. For example, survey items that said, “information is from an expert on the topic” and “you have heard good things about the information sources or Web site creator” may mean that secondary teachers value a component that deals with a source. After the components emerged, then the process of calculating the sum scores above the cut-off value in the component and then computing the mean of those sum scores revealed each component by perceived importance. This calculation results in a factor-based score, which can be easily understood and interpreted (DiStefano et al., 2009).

Descriptive Statistics. Descriptive statistics were computed in order to ensure that the sample consisted of secondary teachers. A number of administrators, elementary teachers, or other educators completed the survey, and analyzing these data ensured the

ability to eliminate surveys. The linear numeric scale provided a measure to rank importance so computing the means provided the necessary analysis to rank the components by relative importance which was required to answer the second research question.

### Summary

This study examined how secondary teachers perceived how different cues found in a social media post indicate the credibility of social media information. The research project incorporated purposeful sampling, consisting of secondary teachers in a Rocky Mountain western state. A principal component analysis was conducted to reduce the 23 credibility cues derived from the *Kids and Credibility* study (Flanagin et al., 2010) into components. The PCA produced components that matched with the heuristics found in the literature (Metzger, 2010). A sum scores above the cutoff line technique was used to calculate where those heuristics were placed on the linear numeric scale used in the survey (DiStefano et al., 2009; Grace-Martin, 2016) that secondary teachers perceived in order of importance for assessing the credibility of news obtained from social media platforms.

## CHAPTER FOUR – RESULTS

### Introduction

The purpose of this study is to examine which heuristics secondary teachers believe are the best indicators of credibility for a social media news post. A principal component analysis (PCA) was chosen to examine what, if any, underlying components could lead to a credibility heuristic structure (Field, 2013). The principal components analysis results produced three distinct components within the structure. The overall structure is stable with  $N=115$ . The PCA produced components that describe specific groupings of credibility cues. After the components were determined, sum scores above the cut-off value of 1.0 were calculated in order to determine which component was perceived to be the strongest indicator of credibility. This chapter demonstrates that variables grouped into a construct, reflecting reputation and consistency heuristics, were deemed the strongest indicator. The results section will first describe the demographic information of the participants, then outline validity and reliability, and then how the 23 variables group into the three components.

### Research Questions

Results of the PCA, which produced three components, are used as the basis for answering the two research questions proposed in this study. The instrument was adapted from the *Kids and Credibility Study* which studied a number of situations that students might encounter in order to determine the credibility of websites (Flanagin et al., 2010).



The instrument used in the present study specifically focuses on news obtained through social media platforms. The research questions are as follows:

- Research Question 1: Do the composite components within the credibility cue list match credibility heuristics in the literature?
- Research Question 2: Of the composite components produced in this study, what is the rank of the components relative to each other, as reflected on the scale of “Extremely Effective” to “Somewhat Effective”?

### Data Analysis

I used a principal component analysis (PCA) paired with a sum scores- above cut-off value technique to report the resulting components as they rank on the linear numeric scale used in the survey. A number of assumptions need to be met to determine a strong PCA. This chapter includes participant demographics, ratio and sample size, communalities, variables in each factor, loadings, as well as the overall number of factors (de Winter et al., 2009).

### Participant Demographics

Participants in this study consisted of secondary teachers in a rural state in the Mountain West region of the U.S. Due to the method of survey distribution (through emails that may have been forwarded), the response rate cannot be determined. A number of non-secondary teachers completed the survey. These responses were removed prior to analysis. Secondary teachers that did not complete the survey were also removed prior to

analysis. After removing 48 survey responses due to not meeting the criteria for inclusion, 115 respondents remained and were used in the study.

Demographic information included gender, social media usage, grade level, school size, age range, and subject taught. The category of “subject taught” was omitted from analysis due to respondents expressing confusion if they taught multiple subjects. The total number of participant responses analyzed was  $N=115$ . Survey responses analyzed included those who teach at a secondary level, which includes both middle and junior high school or high school level. Table 1 describes participant demographics. Typically, secondary teachers provide students with research-based assignments that require outside sources including sources found online. A normal part of research-based assignments is teaching how to vet the sources.

Of the 115 respondents, 65% were female ( $N=75$ ) and 35% were male ( $N=40$ ). 53% of the respondents ( $N=61$ ) reported their age as 30-49, with 26% of respondents age 18-29 and 20% ( $N=3$ ) age 50-69. One respondent was 70-79 years old ( $N=1$ ), at less than 1%. 79% of respondents ( $N=91$ ) reported using social media on a daily basis. 7% of respondents ( $N=8$ ) reported never using social media or only using once a week.

Population density played a role in the demographics of the sample. In the data collection process, I found that school principals were more likely to send surveys to their teachers if I met them in person and described the study. Because of this, I visited larger school districts in order to maximize collection data efforts. Therefore, larger school districts and high schools are represented in the study at 53%. This is a delimitation of the study and future studies should aim for a more balanced sample that reflects the

demographics of the region. 88 of the participants reported working at a high school and 27 reported working at a middle or junior high school. Two individuals did not respond to this question, but their responses were included in the PCA

**Table 1. Participant Demographics**

	N	Percent
Gender		
Female	75	65.2
Male	40	34.8
Social Media Use		
Daily	91	79.1
4-6 times a week	11	9.6
2-3 times a week	5	4.3
Once a Week	4	3.5
Never	4	3.5
Grade Level		
Middle School/Jr. High	27	23.5
High School	88	76.5
School District Size		
1000 >	62	53.9
120-999	32	27.8
100-370	11	9.6
0-140	8	7
Age Range		
18-29	30	26.1
30-49	61	53
50-69	23	20
70-79	1	0.9

### Assumptions of Data

Principal components analysis (PCA) is a data reduction technique. Because of this, a number of assumptions need to be met in order to determine component structure. If the assumptions meet the criteria, it can be assumed that the PCA structure is stable for the sample surveyed. The tests used to determine whether assumptions in the data were met in order to perform a PCA were total *N* threshold, Correlations between variables,

determinant, Barlett's test, KMO test, and Cronbach's Alpha. Each test and the assumption addressed is outlined in the section below.

A sample size threshold was used to address the assumption that the analysis was credible. A minimum of 5:1 ratio of questions to participants with a total  $N$  being greater than 100 is recommended (Steven, 2002). Since there are 23 questions in the survey,  $N$  must equal 115, which was reached. In order to meet the criteria for normality, a correlation matrix was produced to determine if multicollinearity or singularity existed. While a number of intercorrelations were below the .30 threshold, there were enough intercorrelations that reached above the .30 threshold to ensure that factoring was the correct procedure (Field, 2013). As demonstrated below, since there were no other apparent concerns in the data assumption reports, a PCA was determined to be an appropriate procedure.

The four key assumption tests are as follows: determinant, Bartlett's test of sphericity, Kaiser Meyer-Olkin, and finally Cronbach's Alpha as outlined by Field (2013). First, the determinant was examined to see whether an infinite number of linear combinations existed, which is expressed by a number being smaller than .00001 (Field, 2013). The determinant for correlation matrix in this study is 1.90 E-005, or .000019 indicating that multicollinearity was not an issue. The next test was Bartlett's test of sphericity, which is used to determine if the correlation matrix is an identity matrix indicating issues with the data set. Bartlett's null hypothesis was rejected because the test is significant at  $p < .001$ , showing that there was a relationship with the data. The Kaiser Meyer-Olkin (KMO) test was also performed because it indicates that distribution of the

sample values meets accepted criteria which is above .5. The KMO for this survey is .883, which indicates a high degree of common variance and is considered “meritorious” (Field, 2013, p. 1707). Cronbach’s Alpha is a test to determine reliability of the data and should measure above .70. For the 16 variables retained, Cronbach’s Alpha for this study was .916 (Field, 2013).

### Principal Components Analysis

SPSS software was used to conduct a principal component analysis (PCA). While a number of different extraction methods can be used in while conducting multivariate analysis, PCA produced a set of components that best reflected the theoretical constructs, and mathematically would not result in a significant difference. Beavers et al. (2013) describes the theoretical stance of the PCA as “the component is a composite of the observed variables” which theoretically fits the variables of this study (p. 5). Field (2013) notes, if communalities are greater than .7 with 30 or more variables, the differences in results of a PCA and other extraction methods are doubtful. Field (2013) also states that if a number of communalities are below .4 with 20 or fewer variables, differences in a PCA and other extraction methods are minimal. As reported in Table 2, 16 variables were used with 9 of the 16 variables greater than .7 and one variable dropping below the .4 threshold. Therefore, it is assumed that PCA and any other extraction method would not constitute a mathematical difference in the results.

Table 2. Communalities

	PCA
The Social Media Post's website is easy to use	0.601
People you know, such as friends and family, believe the Social Media Post's source.	0.669
There are high ratings or "likes" on the Social Media Post.	0.642
There are positive comments or good reviews.	0.763
Others recommend the Social Media Post's source.	0.763
A lot of other people use the Social Media Post's source.	0.608
The information you find is similar to what you already think.	0.528
Experts believe the Social Media Post. Ex. The post has an expert endorse it.	0.766
The Social Media Post is from an expert on the topic.	0.789
The information on the Social Media Post is similar to information found elsewhere.	0.715
There is information about the source or author's education or training.	0.824
You have heard of the source or information creator before.	0.736
The Social Media Post's address has a certain ending (like ".gov" or ".edu" or ".com").	0.369
Using the advice or input from other people as a credibility assessment.	0.776
Making a credibility decision because the social media post just feels right to you.	0.719
Ask for help from other people online (on social networking sites, forums, online communities, etc.)	0.558

The standard Kaiser Criterion was used, which describes Eigenvalues be set above 1.0 (Brown, 2014; Field, 2013). Eigenvalues measure the amount of variance in a component, and values above 1.0 demonstrate that more than one variable explains a component. The components also theoretically match indicating that eigenvalues accurately measure the component. For this PCA, total variance explained for Component 1 was 44.88% of the total variance with an eigenvalue of 7.181. Component 2 is reported as 15.73% of the total variance with an eigenvalue of 2.517. Component 3 is reported as 7.05% of the total variance with an eigenvalue of 1.129. The total variance explained was 67.66%. Components other than the top three had eigenvalues of .763 or lower, and were not considered for this study (Field, 2013).

A component extraction and rotation were then performed. For a principal components analysis the recommended extraction method to use in SPSS is principal component extraction (Field, 2013). Brown (2014) describes the reasons for using the

PCA, including that it is computationally simpler than an exploratory factor analysis (EFA) and therefore easier to interpret accurately as well as producing similar results as an EFA. As outlined in Chapter 3, mathematically, both extraction methods produce similar results. An orthogonal Varimax rotation was used because it is most commonly used in social science research, the simplest to interpret, and produces the cleanest data (Brown, 2014).

### Component Interpretation

A principal component analysis (PCA) was conducted to see whether the instrument produced components that matched credibility heuristics identified in previous research. This analysis is necessary to determine which factors are perceived to be grouped together in a heuristic along with determining degree of credibility for each construct. There were a number of factors eliminated through the PCA process to be included in the final set of components, no components could load on two or more components above  $|.4|$  and cross-loaded components needed to have a difference of approximately  $|.3|$ . Seven of twenty-three survey questions were eliminated because they did not meet one or both of these criteria. From a theoretical standpoint, these seven components also do not fit into the final component structures as they would not be associated with the Reputation & Consistency heuristic or the Endorsement heuristic (Metzger et al., 2010). Other heuristics that the instruments could possibly measure did not load in the PCA loadings table. The final factor loadings are presented in Table 3.

Table 3. Component Loadings

	Component 1	Component 2	Component 3
<b>Component 1</b>			
The Social Media Post's website is easy to use	<b>0.836</b>	0.192	0.163
People you know, such as friends and family, believe the Social Media Post's source.	<b>0.803</b>	0.091	0.131
There are high ratings or "likes" on the Social Media Post.	<b>0.746</b>	0.413	0.188
There are positive comments or good reviews.	<b>0.746</b>	-0.049	0.289
Others recommend the Social Media Post's source.	<b>0.712</b>	0.243	0.187
A lot of other people use the Social Media Post's source.	<b>0.652</b>	0.359	0.231
The information you find is similar to what you already think.	<b>0.621</b>	0.188	0.327
<b>Component 2</b>			
Experts believe the Social Media Post.	0.130	<b>0.890</b>	0.123
The Social Media Post is from an expert on the topic.	0.101	<b>0.882</b>	0.037
The information on the Social Media Post is similar to information found elsewhere.	-0.041	<b>0.825</b>	0.290
There is information about the source or author's education or training.	0.272	<b>0.800</b>	0.025
You have heard of the source or information creator before.	0.363	<b>0.774</b>	0.073
The Social Media Post's address has a certain ending (like ".gov" or ".edu" or ".com").	0.238	<b>0.543</b>	0.129
<b>Component 3</b>			
Using the advice or input from other people as a credibility assessment.	0.215	0.107	<b>0.848</b>
Making a credibility decision because the social media post just feels right to you.	0.386	0.066	<b>0.752</b>
Ask for help from other people online (on social networking sites, forums, online communities, etc.)	0.296	0.293	<b>0.620</b>

\*The full instrument can be found in Appendix B

Three constructs met statistical and theoretical requirements. Construct 1 was named Endorsement, Construct 2 was named Reputation & Consistency, and Construct 3 was named Low Level Endorsement. All three constructs met the  $|\lambda| \geq 0.512$  threshold for a solid construct at an  $N=100$  or greater (Field, 2013). Cross-loadings that either did not meet this threshold or had a difference of approximately  $|\lambda| \geq 0.3$  were omitted. Retained in the component structure that meet this approximation are in Construct 1 with "A lot of other people use the Social Media Post's Source" with a difference of  $|\lambda| = 0.293$  and "the



information you find is similar to what you already think” with a difference of  $|.294|$  respectively.

Construct 1. The Endorsement construct consisted of seven survey items. These survey items met the statistical and theoretical criteria of grouping as a construct. This construct accounted for 44.88% of the variance in the data. The range of the loading values were .621 to .836 and nearly all of the components reflect the theoretical heuristics found in the literature. In other words, the combined survey items generally show the same kind of information. For example, the Endorsement construct includes five survey items that have a social endorsement of some kind meaning that individuals are seeking a peer group of some kind to validate information. Of the seven survey items, five mention an endorsement from another person ranging from a “like” on the post to many other people using that post to having positive comments or good reviews. Two of the survey items mention the ease of the format the information being presented on to use is as well as information being similar to what they think. This may indicate that a familiarity with the information, due to social influences, was the underlying credibility determinant in this construct. The average score on the scale of 1 being “Extremely Effective” to 5 being “Somewhat Effective” was 3.62, indicating low effective indication of credibility for this component.

Construct 2. The Reputation & Consistency construct consisted of six survey items. These variables met the statistical and theoretical criteria of a construct. This construct accounted for 15.73% of the variance in the data. The range of the loading

values were .543 to .890 and all of the components reflect the theoretical heuristics found in the literature. Of the six components, four mention that credibility was determined because the source was an expert. One component said that information can be found elsewhere. The final variable, which loaded at .543, showed there was a specific ending on the URL, such as .gov, .edu., or .com. The average score on the scale of 1 being “Extremely Effective” to 5 being “Somewhat Effective” was 2.50, indicating a moderately high effective indication of credibility for this heuristic.

Construct 3. The Low Level Endorsement construct consisted of three survey items. These variables met the statistical and theoretical criteria of being in a factor. This factor accounted for 7.05% of the variance in the data. The range of the loading values were .620 to .848. These three variables may describe a process in arriving at a credibility judgement which would fit within the endorsement heuristic but may indicate a separate process at arriving at a credibility judgment. Two of the three variables within in the construct describe involving someone else in the credibility process, while also making a decision because “the social media post just feels right to you.” The mean of the construct is 3.81, indicating a low credibility assessment for this construct.

#### Component Interpretation by Importance

Principal Components Analysis (PCA) is a multivariate test used for data reduction and assists in data analysis. To answer the second research question, it was also necessary to understand how respondents assessed the degree of credibility of each component. Respondents rated each variable on a scale from 1 to 5, 1 being extremely

credible and 5 being somewhat credible. A PCA reduces these variables into components but does not describe which component respondents believe is the most effective in determining credibility. In order to determine the perceived credibility of each component, marker variables were calculated within each component (DiStefano et al., 2009). Marker variables are variables within a component structure that register above the threshold (DiStefano et al., 2009), which is .512 in the present study. For each component the mean was calculated by adding the variable means together and dividing by three to produce the component-based score. Comparing each of the scores and finding the lowest score demonstrates which component is perceived to be the strongest indicator of credibility on the linear numeric scale.

**Table 4. Descriptive Statistics for Components**

	Mean	Std. Dev.
<b>Component 1</b>		
The social Media Post's website is easy to use	3.46	1.179
People you know, such as friends and family, believe the Social Media Post's source.	3.55	1.118
There are high ratings or "likes" on the Social Media Post.	4.17	0.982
There are positive comments or good reviews.	3.57	1.155
Others recommend the Social Media Post's source.	3.42	1.084
A lot of other people use the Social Media Post's source.	3.6	1.033
The information you find is similar to what you already think.	3.59	1.008
<b>Component 2</b>		
Experts believe the Social Media Post.	2.77	1.243
The Social Media Post is from an expert on the topic.	2.28	1.211
The information on the Social Media Post is similar to information found elsewhere.	2.37	1.063
There is information about the source or author's education or training.	2.28	1.064
You have heard of the source or information creator before.	2.75	1.099
The Social Media Post's address has a certain ending (like ".gov" or ".edu" or ".com").	2.57	1.140

Table 4 Continued

<b>Component 3</b>		
Using the advice or input from other people as a credibility assessment.	3.71	1.074
Making a credibility decision because the social media post just feels right to you.	4.17	0.982
Ask for help from other people online (on social networking sites, forums, online communities, etc.)	3.56	1.110

\*Unused variables not reported

I used the following process to determine the perceived degree of credibility for each component on the linear numeric scale. Means and standard deviations are shown in Table 2. The degree of credibility determined by adding the scores or means above the threshold of each component, and then divided by the total number of variables in each component in order to compute each component's credibility score (DiStefano et al., 2009; Grace-Martin, 2016). The questions asked secondary teachers to rate how effective each survey item is in determining the credibility of a social media news source. A list of survey items is located in Appendix A. The factor-based scores were then interpreted with the instrument's linear numeric scale which rated "extremely effective" as 1 and "somewhat effective" as 5. For example, a score of 2 would rank high on this scale as being credible compared to a 4 which would be interpreted as somewhat credible. As seen in FIG 3, the factor-based scores of each component, which indicates what respondents perceive as the best component to use in determining credibility, reported that the second component or Reputation & Consistency heuristic, is the most credible with a 2.5 average. The first component, which describes the Endorsement component in a social media setting had a 3.6 average. The Low Level Endorsement component

resembles a different aspect of the endorsement heuristic and has a mean score of 3.8, indicating respondents believe that this is the least effective way to determine credibility.

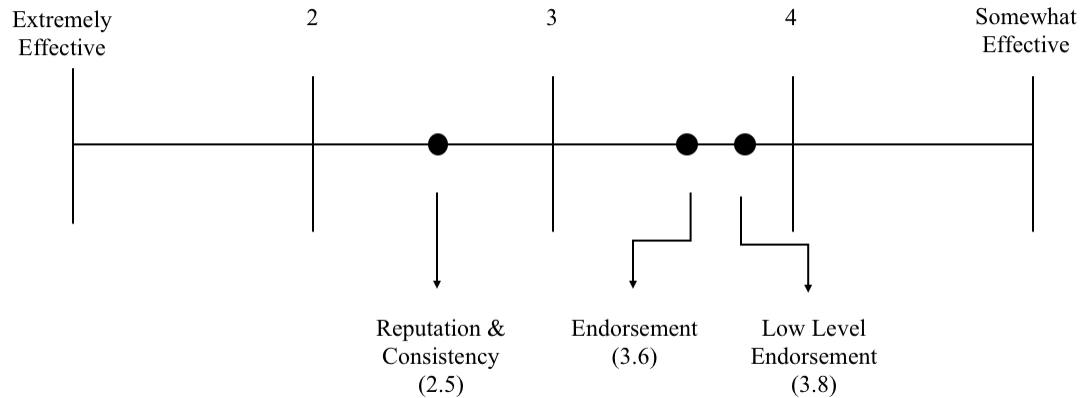


FIG. 3 Linear Numeric Scale Representation of Credibility Heuristics (lower scores indicate higher level on scale)

### Summary

The results of the principal components analysis (PCA) revealed three components along with a ranking of each component using a factor-based score. The sample (n=115) was analyzed in order to determine the underlying components in the credibility cue list as well as rating which of the components that participants believe is the best method to determine credibility. Each component meets the statistical and theoretical requirements needed to produce a sound PCA. The first component, which consisted of 7 variables and was 44.88% of the variance, matches the endorsement heuristic defined by Metzger et al. (2010). The second component, which consisted of 6 variables and accounted for 15.73% of the variance, matches the reputation heuristic with one variable matching the consistency heuristic also described by Metzger et al. (2010).

The third component, which consisted of 3 variables and accounted for 7.05% of variance, are similar to the endorsement component, but teachers reported this component as low quality indication of credibility (Metzger et al., 2010). The factor-based score demonstrates that secondary teachers indicate that the second component, or using a combination of reputation and consistency heuristics, may be the best method to interpret news obtained through social media. The discussion section will provide interpretation of these constructs in terms of methodology, theory, policy, and pragmatic educational settings. I propose that secondary educators work to combine capacity to understand issues, motivation, and the credibility cues uncovered in this study to teach a credibility heuristic which could be used to help students make better credibility decisions when looking at news obtained through social media.

## CHAPTER FIVE – DISCUSSION

### Introduction

This study was designed to better understand which credibility cues and heuristics secondary teachers are perceived to be the most useful at assessing the trustworthiness of news found on social media platforms. Much like people in Gutenberg's time needed to learn to read a book, individuals today must activate critical thinking techniques in order to determine the credibility of news. While previous generations may have watched the evening news and read a newspaper with confidence that the information was credible, children today are bombarded with news on social media in a hyper-partisan political world. These realities require subsequent generations to become arbiters of news because they are bombarded with a plethora of information that may or may not be credible (Sundar, 2008). This study proposes a number of heuristics that secondary teachers perceive as the most useful in determining credibility when looking at social media news.

### Framing the Situation

While exploring the literature, I found that there is a great deal of information on analyzing sources but not a great deal of information on analyzing sources while scrolling through social media news feeds using heuristics. Online information literacy approaches are taught in social studies and English classes across the country; however, little may be taught about how cognitive heuristics are used in this type of analysis (Metzger et al., 2010; Sundar, 2008). A fair amount of research has been conducted on what information

people use for marketing purposes, and the cues that this research has uncovered have helped advertisers and politically motivated entities to promote certain viewpoints. The lack of a standard skillset in understanding how these marketing elements can sway a reader has given rise to the “fake news” situations we read about today. Instead of improving the skillset of individuals as arbiters of information, movements working to fix the “fake news” problem focus on what social media companies and governments can do to thwart inaccurate information posted on various social media platforms. Another type of solution to the “fake news” conundrum involves creating expert panels that will analyze social media news and rate that news in some way, most likely giving some kind of credibility cue alongside a social media news post. Shifting the responsibility from the reader to outside entities may not be the best solution because it is the reader that ultimately makes the final determination of credibility. Because of the gap in the literature discussing how credibility heuristics applied to social media news evaluation could be taught in schools, this study examined two research questions:

- Research Question 1: Do the composite components within the credibility cue list match credibility heuristics in the literature?
- Research Question 2: Of the composite components produced in this study, what is the rank of the components relative to each other, as reflected on the scale of “Extremely Effective” to “Somewhat Effective”?

In order to examine these two questions, an instrument created by Flanagin et al. (2010) used in the *Kids and Credibility Study* was modified and deployed in this study to



determine which credibility cues secondary teachers believe produced the most accurate indication of the credibility of a social media news post.

### Summary of the Results

To answer the two research questions, a principal components analysis was used to uncover the components within the 23 credibility cues in order to see if those components matched known credibility heuristics. Then, using the sum scores above the cut-off line to determine the most credible heuristic, the heuristic which was deemed most credible would be shown (DiStefano et al., 2009).

The principal component analysis (PCA) found three distinct components from the data, accounting for 67.67% of the variance with eigenvalues above 1.0. The three components' names mirror the heuristics discussed by Metzger et al. (2010) but also include other heuristics, consistent with Gigerenzer and Todd (1999) and their discussion on how heuristics may not simply be one criterion, but a number of criteria taken together. Components' names were matched with the corresponding heuristic when possible, resulting in Component 1 being named the *Endorsement heuristic*, Component 2 being named the *Reputation & Consistency heuristic*, and Component 3 being named *Low Level Endorsement*. The PCA reflected the heuristics already established in the literature. Using the sum scores – above the cut-off value method, I calculated that component 2, the Reputation & Consistency heuristic, was perceived to be the most effective heuristic to use when analyzing news in a social media context.

### Endorsement Component

The first component described by the PCA accounted for seven survey items. Five of the seven items dealt with a social endorsement of some kind. Endorsement, in this context, means that these credibility cues focused on using people online to confirm the credibility of information (Metzger et al., 2010). This component indicates that people perceive the different kinds of social endorsement as being similarly credible ways to interpret information. These endorsement items loaded together, indicating that the PCA was the correct data reduction method.

The first research question asked if credibility cues would form credibility heuristics that matched those found in the literature. If so, this might indicate that a credibility heuristic is perceived to consistently measure the credibility of a source in the same way. Messing and Westwood (2014) describe that social endorsements are more powerful cues than the source itself to persuade that something is true. For example, if an individual shares a post through social media, it may be more likely to be believed than if it is posted by a news source such as *The New York Times*. Vosoughi et al. (2018) would add that the information shared by the individual is more likely to be salacious and interesting, thus making it more likely to be believed and shared.

The other two items that loaded on the first component were “the social media post’s website is easy to use” and “the information you find is similar to what you already think”. The first of these two survey items was “the Social Media Post’s website is easy to use”, which could indicate that people feel comfortable using a website and will return to it but may not deem that as an indication of high credibility, rather it indicates ease of

use. The second item that did not fit into the larger context of the Endorsement construct was “the information is similar to what you already think.” Participants may have interpreted this to be other people believing themselves which would be similar to a social arbitration type situation. For example, a participant may believe that while they trust themselves, they may not trust another person. If that participant thought this question was about someone else, they would rate it in this component.

Compared with what Metzger et al. (2010) describe as “endorsement”, the results of the present study may provide a more nuanced definition that is specific to news obtained through social media. Specifically, Metzger et al. (2010) define endorsement broadly as perceiving something as credible because others do as well. The survey items focus this definition due to the variety of ways a social media user can endorse news obtained through social media. For example, a family member can share an article, like and article, or comment on an article. The present study demonstrates that these types of endorsements, which this component includes within its working definition, are different from asking someone in person about the article. For example, if I had a physical newspaper, I might ask the person sitting next to me about an article. My research indicates that while sharing, liking, and commenting on news in a social media context is a type of endorsement, it is a different kind of endorsement than asking someone about it in person, as described in the third component.

### Reputation & Consistency

The Reputation & Consistency component has 6 total survey items loaded, of which 4 items seem very similar. These four items indicate that a person knowing

something about the author of the article all have similar variance, indicating that it has similarly perceived ability to predict the credibility of a source. The two other items have important implications for what a credible heuristic is because it can help thwart areas where manipulation may happen in the context of news obtained through social media.

The four items that are similar in this component define a credible source as a person who wrote the article as an expert on the topic. Each example refers to the author as being someone of authority and also someone you have heard about before. For example, if Walter Cronkite describes news on Vietnam, people would be more likely to believe him than a purported “expert” that is unknown. One other indication that the person is credible is the lowest loading item which is “the social media post’s address has a certain ending (like “.gov” or “.edu” or “.com”).” This indication of credibility can be critical in determining phishing scams, particularly if the information comes across as a social media feed saying something like “as reported on CNN, your account is in danger” or something along those lines. While it does not fall under the category of news, the post does camouflage itself as news.

The final survey item discussed in this component has tremendous implications on credibility, especially with the wide array of information that is on the Internet. The survey item “The information on the Social Media Post is similar to information found elsewhere” is a powerful tool in assuring that the information an individual is reading is consistent with other sources of information. For example, if a friend posts a news article that is salacious in nature and perhaps triggers a defensive or impression motivation, verifying that information somewhere else is important precaution. While major stories

may be susceptible to being untrue, there are also reports of bots, autonomous algorithms designed to rewrite individual sentences within seemingly credible sources to subtly change the facts or tone of the news article.

This component combines three elements to make a powerful interpretive heuristic for the social media consumer. If a person were to implement this credibility heuristic while in a low to medium cognitive context, it is conceivable that person would be optimally suited to read and process accurate news on social media.

#### Low Level Endorsement

The Low Level Endorsement component consisted of three survey items that accounted for 7.05% of variance. Two of the three variables are very similar in that they describe a unique description of the endorsement heuristic described by Metzger et al. (2010) combined with a person's own intuition. This construct could describe how a person would ask someone else's opinion in order to influence their decision on credibility. This differs from the endorsement heuristic discussed in the Component 1 Endorsement heuristic because social arbitration occurs through actually seeking out someone's advice on a topic, not simply seeing how others have already perceived the article through common social media endorsements. While the two are similar in nature, the participants may have seen this action of asking someone else as unrealistic or impractical due to the context of scrolling through a social media thread and finding a news source.

In what could be considered an outlier compared to the two survey items describing asking someone else their opinion, the "Making a credibility decision because

the social media post just feels right to you” survey item loads if one considers this component as a low-quality heuristic. While not directly confirmed by the PCA itself, a calculation of the means of each of the components revealed a low perception of this component leading to a quality credibility decision. Therefore, it can be assumed that the variance that relates these three components to each other is the notion that all three are low level credibility items. The process of using means to rate the quality of the components will be discussed in the next section.

#### Rating Components by Perception of Quality

While the principal components analysis was critical in exploring whether survey items grouped into components, this method only accounts for variability, but does not rate each component on the survey’s linear numeric scale. Again, the survey required participants to rate each credibility cue on its perceived effectiveness in indicating the credibility of a news source found on social media. The scale rated credibility cues at “Extremely Credible” as a 1 to “Somewhat Credible” as a 5. Items that rank at 3.5 or higher would be seen in the bottom half of the scale and thus are perceived as poor indicators of credibility. In order to determine the perceived credibility of each component, the mean of each of the survey items loaded into that component was calculated. The highest perceived component was the Component 2, Reputation & Consistency, with an average of 2.5. Component 1, Endorsement, rated at 3.6 while component 3, Low Level Endorsement, rated at 3.8.

The results of the perceptions of quality have implications for secondary teachers because they should address credibility heuristics when discussion quality sources in

class. The order of these three components is important because it shows teachers that their peers believe that the reputation of the information and the ability to confirm the information elsewhere are key components to credibility assessments when using social media sources. It is important to note that the assignment would have to specify that students received their information from social media to use in an assignment that did not require students to use a systematic approach in order to complete that assignment. For example, teachers should always use systematic approaches when teaching students to write a research-based essay. This research addresses the need for students to use critical thinking skills even when a systematic approach is not required. For instance, a social studies teacher could use this information on lessons about propaganda and how it is used in the digital age. The teacher could address research that says salacious information is more likely to be spread, however secondary teachers believe using the reputation and confirmation cues are a better indicator of a quality source.

In interpreting the results, context is critical. When individuals use social media, it is unlikely they will use a systematic approach to assess the credibility of information. Secondary teachers surveyed perceive the Reputation & Consistency heuristic as the best low to medium cognitive heuristic to use when scrolling through a social media feed. Again, this critical thinking strategy for evaluating the credibility of news obtained through social media should only be implemented in low to medium cognitive situations. High cognitive situations, such as research reports or looking for medical information should use a more systematic investigation of information.

### Methodological Implications

Several important methodological decisions were made to draw conclusions. These decisions impacted this study and should be considered if the study is replicated. The key decisions were to use a principal components extraction, Varimax rotation, sum scores – above the cut-off line, and assuming components mirror credibility heuristics found in the literature.

Using a principal components analysis may have implications on what a heuristic is and how it relates to credibility cues. While mathematically similar, a component analysis and common factor analysis are theoretically different. A component analysis describes a combination of variables whereas a factor analysis describes an underlying structure within the data (Alreck & Settle, 2004). For the present study, it is critical to note that a credibility heuristic may not include every element of the broad definitions of consistency or reputation heuristics but may actually only reflect key elements within each heuristic. This implies that a credibility heuristic is a combination of a number of credibility cues. For example, the results of this study demonstrate that participants believe that knowing the author of the source as well as confirming the source are part of the same component. Metzger et al. (2010) described these two as different heuristics; however, in the context of social media, they may need to be taught to social media news consumers as parts of the same heuristic. Because of this structure, we can infer that credibility heuristics may not always be intuitive; rather, they may need to be taught in a specific manner. Where a student may easily equate a long source as credible (the length equals strength heuristic), he or she may not easily combine both heuristics of



recognizing the author as well as confirming the information with another source.

Because of the principal component analysis, we can infer that elements can be combined to create components which are heuristics.

The orthogonal Varimax rotation was used due to its popularity and ease of interpretability (Field, 2013). Orthogonal and oblique rotations were both considered for this study, but the Varimax produced the most interpretable results due to this rotation mathematically loading a lower number of survey items per component.

Finally, the use of sum scores- above the cut off line was a technique used to discover which component participants perceived as the most effective. To calculate the order of components by effectiveness, I could not only rely on the PCA due to the nature of the analysis. While a PCA accounts for variance within the data, variance does not take into account the specific nature of the linear numeric scale. For example, a score of “5” and a score of “2” have mathematical meaning within a PCA but does not have tangible meaning. A score of “2” on the survey measures variance, but also measures the person’s perception of how effective the item is in determining credibility. Therefore, a second mathematical step was conducted to give meaning to the components. This study produced three components, but without ranking the components’ effectiveness in determining credibility, the usefulness of the results is quite limited. For example, describing three credibility components would leave the second research question unanswered which aims to discover which components secondary teachers perceive as the most effective in determining credibility.

In order to answer the second research question, a sum scores-above the cut off line technique was used (DiStefano et al., 2009). There are two methods in which this calculation can be executed, and this study chose to use the simpler of the two. The simple way is to add the mean scores of each survey item, then divide those scores by the number of survey items in the component. This approach is straightforward and easy to interpret. The second way to calculate these scores is to multiply the mean of each survey item by the loading, thus accounting for the amount of variance each survey item is relative to the overall component, then taking those scores and finding the mean. I ran the calculations both ways and the results were the same. Future research on credibility heuristics using a PCA may need to consider integrating loadings into their calculations.

### Theoretical Implications

There are a number of implications for the various theories referenced in this study. This study focuses on social media that can be accessed through multiple devices including computers as well as smartphones and tablets. This context of low to medium cognitive credibility decisions in social media has not previously been considered in relation to the theoretical constructs in the literature. Cognitive heuristics is both an exciting and emerging area of study due to our increasingly fast-paced world, indicating that we will increasingly rely on credibility heuristics. In determining what is credible, teaching about heuristics is tremendously important. This study has implications with the MAIN Model (Sundar, 2008), and the Dual Processing Model of Credibility Assessment (Metzger, 2007).

The MAIN Model predicts the usefulness of this study by describing that “heuristics are judgment rules that users employ, which means they carry in their heads a theoretical connection between the presence of a cue and the relevant credibility judgment” (Sundar, 2008, p. 92). The MAIN Model focuses on the technical aspects of how digital media influences judgments in credibility (Sundar, 2008). The MAIN Model is relevant to this study because social media platforms are only briefly mentioned within the model, which is a specific form of digital media. This study also does not address how credibility judgments are made concerning the medium, but rather attempts to highlight which heuristics secondary teachers describe as the best indicators of credibility. When Sundar (2008) describes the *Agency Cue*, social media platforms are not given the amount of attention that perhaps is needed today. Language and nuance within the model may need to be updated to account for the complexity of social media interactions, specifically how different cues described in this study impact social media users. The present study uses social media platforms as its contexts, and also indicates what teachers perceive as the most effective credibility cues. Additionally, how the different cues are ranked by order of perceived effectiveness may inform further development of the MAIN Model. The results of this study describe a definitional clarity to specific cues when using social media that the MAIN Model does not.

The Dual Processing Model of Credibility Assessment is the basis for the present study (Metzger et al., 2010). This model focuses a number of theories around web-based credibility decision making. Metzger et al. (2010) suggests that instead of a checklist approach to determining credibility, a contextual approach that integrates heuristic

processes may be more appropriate due to the fact that people will likely not use a checklist or systematic approach. This study's context was news obtained through social media on laptops, tablets, and smartphones, and then determines what secondary teachers perceive as optimal credibility cues. Specifically, I ask secondary teachers what the best starting point is when making credibility decisions about news. The participants described that a student should know the author of the post (reputation heuristic), along with ensuring that the information can be confirmed (consistency heuristic). Metzger et al. (2010) describes these heuristics, along with the endorsement heuristic are members of the *social confirmation* credibility heuristics group. The present study separates this *social confirmation heuristic* into two, combining reputation and consistency together and demonstrates that secondary teachers perceive that this credibility heuristic will promote quality credibility judgments, as contrasted with the endorsement heuristic, which is not perceived to promote quality credibility judgments.

### Policy Implications

Examining credibility decision making in the context of low motivational situations such as heuristics should inform educational policy. Specifically, policy makers should explicitly understand the power of context in the digital age. Students need the skillset to not only read and interpret information, they need these skills to apply to a variety of contexts. The two key contexts in which students need to develop critical thinking skills are the online context, as well as the context that changes with the level of

motivation. As students are the arbiters of assessing credibility, these skills need to be explicitly taught.

Students need to be explicitly taught low level critical thinking skills in the form of heuristics. Two standards in the National Council for the Social Studies' College, Career, and Civic Life (C3) framework parallel the findings of this study. However, these standards do not mention context. For example, standard D3.1.9-12 states "Gather relevant information from multiple sources representing a wide range of views while using the origin, authority, structure, context, and corroborative value of the sources to guide the selection", where context is a historical term, rather than a specific reference to the medium of the information (National Council for the Social Studies, 2014, p. 54). This standard does represent the confirmation heuristic which is a part of the construct deemed as most effective in determining credibility found in this study. Additionally, Standard D3.2.9-12 states "Evaluate the credibility of a source by examine how experts value the source" (National Council for the Social Studies, 2014, p. 54). While this standard does mirror the language in the construct found in the present study because it outlines the importance of the source of the information, it does not give educators any indication that they may need to use a systematic process as well as a heuristic process in determining the credibility of news found in social media settings. In this standard, the credibility heuristic is inferred but not explicit. Again, if 62% of Americans obtain their news through social media, standards frameworks designed to guide instruction should incorporate a thorough understanding of both systematic and heuristic processes,

especially since the percentage of Americans obtaining news through social media platforms is likely to rise in the coming years (Gottfried, 2016).

While social studies teachers are at the forefront of teaching students about different contexts through which news can be obtained, including social media, school librarians also have a critical role to play. Since librarians are often tasked with providing professional development to teachers about determining the credibility of news, school leaders must ensure that librarians have access to the kinds of professional development they need in order to provide instructional leadership in this area. Not only do students need these critical thinking skills, the community the school resides in may need to learn social media news literacy skills as well. School leaders and librarians can work together to provide community members with workshops on credibility, teaching about heuristics, and also building trust in the institutions of schools.

Professional development plays a key role in promoting the use of the credibility heuristics described in this study. Sessions for teachers should not only include the credibility cues that are the most effective but should also integrate information about the importance of capacity and motivation. These three elements combined form the structure of the credibility heuristic. In-service teachers and librarians should receive professional development, and pre-service teachers should be taught about heuristics as well.

In the classroom, after introducing students to this heuristic decision-making process, teachers should encourage their students to use their normal social media programs they enjoy and practice these skills. Again, context is key, so encouraging students to use these skills in the contexts in which they are familiar will not only

reinforce the skills promoted in this study but will also provide opportunities for students to give their teachers feedback to continually refine the teaching of credibility heuristics.

### Practical Implications

This study has a number of practical implications. This study was designed with a pragmatic result in mind, to determine a tangible technique teacher can use when evaluating the news on social media. In the present study, I address how context can change the nature of credibility evaluation from a systematic approach to a heuristic one, where people are making credibility judgments very quickly in a social media environment. I hope that teachers will combine an understanding of capacity, motivation, and quality credibility cues into a credibility heuristic in order to ensure that students have the critical thinking skills needed in a social media environment. My study focuses on the credibility cue portion of these three elements, resulting in secondary teachers perceiving that evaluating both the author of the information and ability to confirm the information are the most important elements in looking at a social media news post. Taken together, capacity, motivation, and credibility cues grouped as a credibility heuristic should be considered alongside other systematic media and information literacy processes for determining what is credible. While this credibility heuristic is likely intuitively used in some degree by many social media news consumers, its elements may not have been articulated in this manner.

In the context of social media, it is unreasonable to think that students will consistently use systematic approaches to evaluate news. That is not to say that a

systematic approach will not ever be used. When motivation is high, or capacity is high, a systematic approach may be used by the social media news consumer. For example, if research is reported about a specific breakthrough in a disease that the person may be concerned about, the systematic process may be triggered and implemented. Social media users may go back and forth from a heuristic process to a systematic process as they interact with social media.

Gigerenzer and Todd (1999) describe the potential that heuristics have to elicit quick and credible decisions. If tested and implemented, a social media news credibility heuristic could be a valuable critical thinking tool for students to use and could be applicable within a variety of social media platforms. Much like a doctor in an emergency room has to combine a variety of best practices into one decision, a credibility heuristic would include three elements: capacity to understand the information, understanding of situational motivation, and determining the correct credibility cue.

Capacity can be thought of in two different manners which are critical to understand how heuristics work. The first way is the capacity for people to evaluate information, which was discussed in the context of bounded rationality. The second way to discuss capacity deals with building the heuristic, which is the ability to understand a topic enough to draw an informed conclusion. For example, if an individual were read an opinion on how the latest tax policy were to impact the steel industry, he or she would need to have some fundamental understanding of this topic to agree or disagree with the opinion, or the likelihood of manipulation is high. Bless and Schwarz (1999) discuss how systematic evaluation is less likely if motivation or capacity is low. This implies that



using the appropriate credibility cue may not lead to accurate credibility decisions; rather, it is a part of the larger heuristic.

The practical application of capacity is that the role of teachers is as critical as it ever has been. Students need the capacity to understand complex information or they may be easily manipulated to believe something inaccurate. Vosoughi et al. (2018) demonstrate that information that is false is more likely to spread than if it is true. Teachers should teach students that if they do not understand an issue, having an opinion on that issue may be unwise because it may lead to poor credibility decisions. This should not only include a discussion about having informed opinions on a subject, but also demonstrate the consequences of forming uneducated opinions. Social media news posts may oversimplify complex problems, creating situations where logical fallacies become an easy way to manipulate readers. For example, a headline may promote the false dichotomy fallacy or non-sequitur fallacy, causing an individual to believe something untrue. The false dichotomy fallacy oversimplifies an argument in a headline. A non-sequitur fallacy assumes that something happens causing something else to happen, when in reality, the phenomena are not connected. Logical fallacies can be used to manipulate the credibility of information due to students not having the capacity to understand that the two facts do not have a connection. Logical fallacies can also play on a person's motivations, which is why not only understanding capacity but also know how one's own personal bias can lead to incorrect credibility judgments. Chaiken et al. (1987) described how a heuristic may be developed due to a positive result in a person's past experience,

like a message from a political entity. If this political entity then promotes a logical fallacy in a news-like post, a person is likely to be persuaded to believe the information.

Understanding how motivation impacts a person's desire to evaluate information is another central tenet to how individuals interact with news on social media. There are a variety of motivations discussed in the literature that impact information processing, each of which can trigger wither a systematic or heuristic process (Chaiken, 1980). Accuracy motivation, or a high level of motivation used for writing school reports or personal medical situations, defense, and impression motivations would be involved with a heuristic. Defense motivation implies reading a piece of information that that might be attitude-challenging, while an impression motivation would alter a person's understanding due to positive circumstances (Chaiken et al., 1999; Winter et al., 2016). Teaching students about how their motivation impacts how they process information is critical when information may be violating logical fallacies, much in the same way that a lack of capacity can make students susceptible.

The credibility cue is the third part of the credibility heuristic, which is the focus of this study. Depending on the social media platform the student may use, specific names of credibility cues can vary a great deal, even though they essentially have the same function. For example, Facebook uses a number of emojis that show a reaction to a post, usually a "like", where Instagram uses a heart. It is conceivable that with future social media platforms, something similar will be used. Because of this, heuristic definitions serve as a broad and flexible tool for the changing environment of social media. The results of this study demonstrate that secondary teachers grouped survey

items by perceived indication of credibility effectiveness. The principal component analysis grouped the survey items by heuristics reflected in the literature. Secondary teachers recommend that students need to know who the author of the material is as well as confirming the information somewhere else. Knowing the author of the news article will give a number of indications as to the information's credibility, and the confirmability piece could be a powerful tool in alleviating not only bias, but "bots" that may manipulate specific sentences within the article, subtly changing the meaning of specific points in the article.

One of the critical pieces to the credibility heuristic is the notion of consistency. Only one survey item was designed for that heuristic. Since this study was exploratory in nature, it was unexpected that an item like this would register so highly. This item seems to fit with an online credibility heuristic due to the vast amount of misinformation posted on social media. While people may post a topic, consistency guides the student to confirm information. If a "bot" rewrites a single sentence in an otherwise credible source, and the individual reads that source and shares it, the misinformation will not only be absorbed, but it will spread to others. Vosoughi et al. (2018) describe how people will start a rumor cascade that is not credible, but rather due to the nature of the material having a novelty that expands understanding. For example, I am much more likely to share a piece of information that is unique rather than sharing something that is not. The parameters of what novelty depends on the user. This is why the consistency piece of the credibility heuristic is so essential is for the research conducted by (Vosoughi et al.,

2018) which indicates that social media users are more likely to absorb and share novel information rather than less novel information.

Secondary teachers did not rate social endorsements as effective as indicators of credibility as knowing the author of the information or confirming that information elsewhere. Thus, students should be cautioned about using social endorsement cues as indications of credibility. For example, a post from *The Onion*, a satirical news site, could have thousands of “likes” and comments; however, these social endorsements may not be indications of credibility as much as endorsements of entertainment. Students must learn to navigate the variety of information on their social media feeds because these feeds do not only show news exclusively, they also show posts about entertainment, health, as well as communications between people. Students need to understand when to engage these credibility cues, which is why capacity is such an important element of the credibility heuristic.

In conclusion, I propose that secondary teachers integrate the credibility heuristic into their classroom lessons. This credibility heuristic incorporates a number of elements, that with time and practice, can be a powerful tool in preventing the absorption and spread of inaccurate news found on social media. This credibility heuristic incorporates three elements: capacity, motivation, and credibility cues. I propose that if a person has the capacity to understand a topic, understands their own motivational biases, and is using the author of the information and seeking out confirmation of that information, they will be much better prepared to deal with news that the person may encounter.

### Limitations

This study has a number of limitations. The nature of social media and news is that it changes, and new credibility assessments may need to be implemented. While always knowing who the author is and making sure that a social media news consumer always confirms their information somewhere else, future formats may change this dynamic. The limitations of this study include different manners through which people obtain news that are not in the format of an article, such as a format commonly known as a “meme,” and that echo chambers may prevent individuals from cross checking information, or that people may not have the online information literacy skills to perform such tasks. Other limitations include the survey instrument and the purposeful sample.

The purposeful sample of this survey is a limitation. While secondary teachers teach their students how to find sources, that does not mean they are experts in assessing credibility. Many teachers may not have the expertise to know what to look for or have not considered that the context of social media evaluations might be different than the sources for the reports that they assign. More research using a variety of methods should be conducted to determine whether the results found in this study can be replicated.

This study also focused on social media news but did not focus on different ways teachers may receive news. Memes, which are popular with students, are a very short sentence that have accompanying pictures and are a popular way to convey information, some of which could be satire. These memes may oversimplify news and information to promote a bias. Compound memes with the social media algorithms that create social media echo chambers, which is similar information posted on a social media feed, and it

may be difficult for an individual to confirm the news that they see alongside mainstream sources. This study does not address echo chambers or the impact of social media self-efficacy and how these notions may influence a person's ability to discern truth from fact (Hocevar et al., 2014). While understanding that capacity, motivation, and credibility cues can be a pathway to leading people to make better credibility decisions, the issue is exceptionally complex, and additional research should be conducted in these areas.

### Recommendations for Future Research

This study focuses on a specific portion of the credibility heuristic outlined in the literature. It also adds to the small but important notion of the larger questions about social media news credibility. Research in these areas largely deals with what social media users do, but little has been conducted regarding what they should do in the context of low level cognitive social media environments that are used daily by millions of people. Much of the credibility information centers around systematic approaches to credibility, which do not address the context of quickly scrolling through a social media feed. While this research focuses on credibility cues, research should be conducted to not only confirm the results of this study but to develop a curriculum and implement it in secondary schools. Curriculum should improve students' capabilities in determining the credibility of news obtained through social media.

Additional studies are warranted for social media companies in the area of news accuracy. While this study focuses on secondary educators, this is only a small portion of the population that would benefit from this training. I recommend that social media sites

like Facebook and Twitter develop short lessons their users could complete before accessing information. These lessons would be relatively short in nature but could be every day over the span of weeks or months. These short lessons would develop credibility habits that would promote a healthy skepticism of news obtained through social media.

I recommend that future researchers consider the context in which people evaluate information by specifically teaching and testing students to work within social media contexts. While one may see a student on his or her phone as situation where the student is in isolation, that student has entered a world where he or she is socially connecting to others in ways we may not fully understand. This context, and the kinds of decisions students make in these contexts, is critical to understand as educators and researchers move deeper into the ever-changing world of online information. There may also be implications with different demographics as generational research could impact how the context of social media impacts users of different ages.

I also recommend that the results of this study be developed into a brief curriculum. This curriculum could be implemented in schools and students could be assessed to determine if in fact students can tell the difference between what is real and what is not on social media. Since context is so important, these assessments must not have a news feed that exclusively has news but should assess students in the social media contexts they are currently using. These contexts would not only include news, but also have entertainment postings, health postings, and postings from friends and family.

Students would need to integrate the credibility heuristic along with the other heuristics they may use as they interact within the social media context.

Researchers must also assess their students' use of the credibility heuristic as social media platforms change. While one generation of students may use Facebook, the next uses Snapchat, and the next will use something different. The changing nature of social media platforms may force the credibility heuristic to change because there may be no avenue to check the author, for example. The flexibility of the credibility heuristic will be key to its usefulness.

Another way that this curriculum may be integrated could be from the social media platforms themselves. After a curriculum is developed, it could be divided into a series of very short lessons that social media users of that platform would have to complete in order to access the content. The lessons would not take very long but may be required to complete once a day over the span of weeks or months. These lessons could help train people to identify misrepresentation of facts or inaccurate news. While this idea is not the silver bullet to solving the issues surrounding false news on social media, it could be a small but necessary piece to the larger issue.

### Conclusion

Sundar (2008) addresses how the surface features (of a social media platform or post) are what hold students' attention. In order to be well informed citizens, youth need to learn the tools to break through the surface features and get to the truth. Since they are the arbiters of knowledge, we must give them the tools to thrive in these changing



contexts. Simply giving students the means to systematically analyze a process may help them find information for their taxes but may not help them with day to day information evaluation.

It is for this reason that this study addresses the question: what skills do we need to prosper in a future that is unknown? While our students may ask for black and white answers, educators need to teach them how to evaluate and analyze information on their own. The world is becoming ever more complex, so this dissertation should not be seen as an end, but as the beginning of a larger conversation. From developing critical thinking skills with the spreading of Gutenberg's printing press to the unlimited amounts of information on the Internet, it is our duty as researchers and educators to continually understand and embrace the manner in which the evaluation of information can evolve.

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APPENDICES

APPENDIX A

INSTRUMENT

Q51 Survey Overview: This survey consists of 23 cues that a student might use to determine the credibility of a Social Media News Post. You are being asked to rate the quality of each cue for use in determining the credibility of any given news source posted on social media. Facebook and Instagram are a few examples of the many social media sites or apps where news can be posted. Before you start, please read and accept the consent form.

D1 Gender

- 1 Male
- 2 Female
- 3 Transgender
- 4 Other

D2 How often do you use social media?

- 1 Daily
- 2 4-6 times a week
- 3 2-3 times a week
- 4 Once a week
- 5 Never

D3 Which grade level do you teach at?

If you teach at a K-8 school and teach grades 6-8, please select Middle School/Jr. High

- 1 Elementary
- 2 Middle School/Jr. High
- 3 High School
- 4 Student Teacher
- 5 Administrator/Other

Q38 What is the size of the school district?

- 1 AA
- 2 A
- 3 B
- 4 C

Q43 What is your age?

- 1 18-29
- 2 30-49
- 3 50-69
- 4 70-79

Q35 What subject do you teach the majority of your time? (please select one)

- 1 Social Studies
- 2 English
- 3 Math
- 4 Sciences
- 5 Art/Music
- 6 Physical Education
- 7 Technology/CTE
- 8 Other

Q37 The next section of this survey asks you to rate the effectiveness of different credibility cues one might see on a social media news post found on Facebook, Instagram, etc. For each question, please rate the statements based on how effective the statement is at showing credibility. For example, if "making decisions because the post just feels right to you" is an extremely effective measure of credibility, select "Extremely Effective". Upon completion of the survey, you will be redirected to a link entering you into a drawing for a \$50 Amazon gift certificate. Thank you in advance!

Extremely Effective					Somewhat Effective
1	2	3	4	5	

Q1 Using the advice or input from other people as a credibility assessment.

Ex. You ask someone about the social media post.

Q2 Making a credibility decision because the social media post just feels right to you.

Q3 Ask for help from other people online (on social networking sites, forums, online communities, etc.).

Ex. You might show a friend the post or text someone about it.

Q4 The information on the Social Media Post is up-to-date.

Ex. Information was posted recently.

Q5 The Social Media Post seems safe and secure.

Q6 The Social Media Post is very complete.

Ex. All of the information needed is in the post.

Q7 Experts believe the Social Media Post.

Ex. The post has an expert endorse it.

Q8 The Social Media Post is from an expert on the topic.

Q9 The information seems reasonable to you.

Q10 The Social Media Post does not try to convince you to do something or buy something.

Q11 The Social Media Post's website is easy to use.

Ex. If you have used the website in the past.

Q12 People you know, such as friends and family, believe the Social Media Post's source.

Q13 There are high ratings or "likes" on the Social Media Post.

Q14 There are positive comments or good reviews.

Q15 Others recommend the Social Media Post's source.

Q16 You have heard good things about the Social Media Post's creator.

Q17 The information is well written, and you see no grammatical mistakes.

Q18 The information on the Social Media Post is similar to information found elsewhere.

Ex. You see the same information in other places.

Q19 There is information about the source or author's education or training.

Q20 You have heard of the source or information creator before.

Q21 A lot of other people use the Social Media Post's source.

Q22 The information you find is similar to what you already think.

Q23 The Social Media Post's address has a certain ending (like ".gov" or ".edu" or ".com").

APPENDIX B

IRB APPROVAL

**SUBJECT CONSENT FORM FOR PARTICIPATION IN HUMAN RESEARCH  
AT MONTANA STATE UNIVERSITY**

Project Title: Processing the News in Social Media: Heuristic or Systematic Process  
Researcher: Spencer Johnson (advisor: Ann Ewbank PhD) You are being asked to participate in a research study to rate the importance of a variety of credibility cues students should use when looking at news on social media platforms. Rationale of research: This research will help us obtain a better understanding of which credibility cues and heuristics should be taught to students in the classroom. You were identified as a participant because you are a middle school or high school teacher who may want to teach their students about how to determine if news is credible in a social media environment. Procedures: 1. If you agree to participate, you will be asked to answer an on-line survey. Participation is voluntary, and you can choose to not answer any question you do not want to answer and you can stop at anytime. 2. The survey will take no longer than 10-15 minutes. You will be asked to rate 23 different credibility cues on their effectiveness in determining credibility of a social media news post. After the survey is over, the researcher will collect and interpret data. 3. Surveys can be taken at any time, and from anywhere.

Risks: If you do not feel comfortable answering questions, you may stop the survey at any time. There are no other foreseen risks.

Benefits: The study will help the researcher better understand what methods students should use when looking at a social media news post. This information can be used to help support teachers' needs in the classroom.

Confidentiality: The confidentiality of the subjects is of the utmost importance to the validity of the study. In no way will the school or the names of the students be mentioned in any part of the study. Pseudo names will be used for all participants and the location. The information of this study may be published, but your school and the students' identity will not be revealed. Source of Funding: NA Cost to the subject: None If you have any question or request clarification of any question during the interview process, please feel free to ask. Confidentiality of Records: Data that will be collected will be kept confidential by the researcher. The computer where the data and interpretations will be stored are owned by the researcher and password protected. Your email for the Amazon Gift Certificate cannot be linked to the survey. All materials used for the study will be destroyed one year after the IRB approval date. Questions: If there are any questions about the study, please feel free to ask the researcher at any time. Spencer Johnson can be contacted at [spencer.johnson2@montana.edu](mailto:spencer.johnson2@montana.edu) or (406) 696-1430. Upon your approval, the proposal for this study will be fully evaluated by Montana State University's Institutional Review Board. If you have additional questions about the rights of human subjects, you can contact the Chair of the Institutional Review Board, Mark Quinn, (406) 994-4707 [[mquinn@montana.edu](mailto:mquinn@montana.edu)]

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of this study. Upon answering the survey questions, I agree to participate in this research. I understand that I may later refuse to participate, and that I may withdraw from the study at any time and for any reason. I can have a copy of this consent form for my own records and will email the researcher if needed.